APPENDICES

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Appendix A **Notice of Preparation and Comments Received**

Appendix B **Land Evaluation and Site Assessment (LESA) Model**

Appendix C **Air Quality and Greenhouse Gas Supporting Data**

Appendix D **Reconnaissance-Level Biological Survey, Quad Knopf, Inc., April 2012**

Appendix E **Cultural Records Search Results, Central California Information Center, April 4, 2012**

Sacred Lands File Search Results, Native American Heritage Commission, April 3, 2012

Appendix F **Memorandum Re: Turlock Airpark Risk Assessment, Mead & Hunt, August 6, 2007 Memo**

Appendix G **Environmental Noise Assessment, j.c. brennan & associates, Inc., July 29, 2013**

Appendix H **Water Supply Assessment, Quad Knopf, Inc., January 2014**

Appendix I **Morgan Ranch Master Plan Traffic Impact Analysis Report, Omni-Means, Ltd., October 2014**

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APPENDIX A

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NOTICE OF PREPARATION
DRAFT ENVIRONMENTAL IMPACT REPORT (EIR)
MORGAN RANCH MASTER PLAN
GENERAL PLAN AMENDMENT 2010-01
REZONE 2010-01

DATE: February 10, 2012

TO: State Agencies
Responsible Agencies
Local and Public Agencies
Trustee Agencies
Interested Parties

FROM: City of Turlock
Development Service Department
Planning Division
156 S. Broadway, Suite 120
Turlock, CA 95380-5454

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report for the Morgan Ranch Master Plan

LOCATION: City of Turlock, California

PROJECT APPLICANT/LEAD AGENCY: City of Turlock

The City of Turlock will be the Lead Agency and will prepare an Environmental Impact Report (EIR) for the project identified above pursuant to the California Environmental Quality Act (CEQA). The City of Turlock requests your input on how the Morgan Ranch Master Plan may affect the environment. More specifically, input is being solicited relative to the scope and content of the environmental analysis that is relevant to your individual or agency's statutory/regulatory responsibilities in order to ascertain potential impacts of the proposed project.

A description of the proposed project, location map, and preliminary identification of the potential environmental effects are contained in the attached materials.

If your agency is a responsible agency as defined by Section 15381 of the State CEQA Guidelines, your agency will need to use the environmental documents prepared by the City of Turlock when considering your permit or approval for action.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than thirty (30) days after receipt of this notice pursuant to CEQA Guidelines Section 15082(b). Please send your written response, along with the name of your agency contact person, to Debbie Whitmore, Deputy Director, City of Turlock Development Service Department, Planning Division, 156 S. Broadway, Suite 120, Turlock, CA 95380-5454. Responses can also be faxed to Ms. Whitmore at (209) 668-5107 or emailed to dwhitmore@turlock.ca.us.

A public Scoping Meeting will be conducted on February 23, 2012 at 6:00PM, at the Turlock City Hall Council Chambers, 156 S. Broadway, Turlock, CA. If you have questions regarding this NOP or the Scoping Meeting, please contact Ms. Whitmore at (209) 668-5542 x 2218.

Debbie Whitmore, Deputy Director, Planning Division — Date
City of Turlock

PROJECT TITLE

Morgan Ranch Master Plan

LEAD AGENCY NAME AND ADDRESS

City of Turlock
Development Services Department, Planning Division
156 S. Broadway, Suite 200
Turlock, CA 95380-5454

CONTACT PERSON AND PHONE NUMBER

Debbie Whitmore, Deputy Director, Planning Division
City of Turlock
(209) 668-5542 x 2218

PROJECT LOCATION AND BOUNDARIES

The proposed project is located in the City of Turlock in Stanislaus County on approximately 170 acres located at the southwest corner of Glenwood Avenue and Golf Link Road and bounded to the south by State Route 99. (*See Figure 1-1, Project Vicinity*). The project site is in the vicinity of the Lander Avenue/State Route 99 interchange and bounded by Lander Ave. on the West, Glenwood Ave. on the north, Golf Rd. on the east, and Highway 99 on the south.

The project site is identified by the Stanislaus County Assessor's office with the following Assessor's Parcel Numbers (APNs) (See *Figure 1-2, Existing Parcels.)*:

044-023-005	044-025-003	044-028-010
044-023-006	044-025-006	044-028-013
044-023-018	044-025-007	044-028-014
044-023-031	044-025-008	044-065-001
044-023-032	044-025-010	044-065-002
044-023-035	044-025-016	044-065-003
044-023-037	044-025-017	044-065-004
044-023-038	044-028-007	044-065-005

DESCRIPTION OF PROJECT

The proposed project consists of the adoption and implementation of the Morgan Ranch Master Plan. The Morgan Ranch Master Plan would modify the General Plan designations and zoning for approximately 170 acres. Table 1-1 provides a summary of the development.

Table 1-1: Development Summary

Component	Approximate Acreage	Characteristics
Medium Density Residential	97.1	Future 680 to 1,456 dwelling units at 7 to 15 units per gross acre
Medium Density Residential	23.1	Future well site and drainage area
High Density Residential	15.0	Future 225 to 600 dwelling units at 15 to 40 units per gross acre
Community Commercial	8.9	Existing gas station and car wash; vacant for future commercial
Office	1.5	Future offices
Public/Semipublic	11.1	Future Elementary School (estimated 300 students)
Public/Semipublic	4.4	Existing Caltrans drainage basin
Park	8.7	2 future neighborhood parks

Source: City of Turlock, Administrative Draft Morgan Ranch Master Plan

The Master Plan provides development standards and design guidelines to ensure consistency in the quality and character of the Plan Area neighborhoods as the Plan is implemented. It is the intent of the Master Plan to facilitate development by providing a framework to ensure that, over time, the built environment of the Plan Area will be cohesive and consistent with the overall vision of the City. This Master Plan will be used as a tool in the review and approval process of precise development proposals such as tentative subdivision maps, site plans, and improvement plans as they are proposed for the Plan Area. Responsibility for interpretation of these development standards and design guidelines lies with the City of Turlock and is administered by the Turlock Planning Division.

EXISTING LAND USE

Most of the project site is currently used for agricultural purposes. There are approximately five rural residences, a gas station, and a car washing facility.

SURROUNDING LAND USES

The land uses in the vicinity includes rural residential uses to the east, single family residential to the north, and agricultural uses to the west and south. Table 1-2 provides a summary of the surrounding land uses.

Table 1-2: Surrounding Land Uses

Direction	Land Use
North	Low density residential
East	Rural residential
South	Agricultural
West	Agricultural

GENERAL PLAN DESIGNATIONS

The project site is currently designated Heavy Commercial (HC), High Density Residential (HDR), Low and Medium Density Residential (LDR/MDR), Low Density Residential (LDR), and Park (P) (*see Figure 1-3*). The proposed General Plan land use designations are Community Commercial (CC), Office (O), High Density Residential (HDR), Medium Density Residential (MDR), Public/Semi-Public (PUB), and Park (P) (*See Figure 1-4*).

ZONING

The project site is currently zoned Heavy Commercial (H-C), High Density Residential (R-H), Low and Medium Density Residential (R-L 4.5), and Low Density Residential (R-L) (*See Figure 1-5*). The proposed zoning designations are Community Commercial (CC), Commercial Office (CO), High Density Residential (R-H), Medium Density Residential (R-M), and Public/Semipublic (P-S) (*See Figure 1-6*).

RESPONSIBLE AND TRUSTEE AGENCIES

A number of other agencies in addition to the City of Turlock will serve as Responsible and Trustee Agencies, pursuant to CEQA Guidelines Section 15281 and Section 15386, respectively. These agencies may include, but are not limited to the following:

- California Department of Transportation (Caltrans)
- California Department of Fish and Game (CDFG)
- Central Valley Regional Water Quality Control Board (RWQCB)
- San Joaquin Valley Air Pollution Control District (SJVAPCD)

POTENTIAL ENVIRONMENTAL IMPACTS TO BE CONSIDERED

- Aesthetics;
- Agricultural Resources;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Geology/Soils;
- Greenhouse Gases;
- Hazards/Hazardous Materials;
- Hydrology/Water Quality;
- Land Use/Planning;
- Noise;
- Population/ Housing;
- Public Services;
- Recreation;
- Transportation/ Traffic;
- Utilities.

Figure 1-1: Regional Location

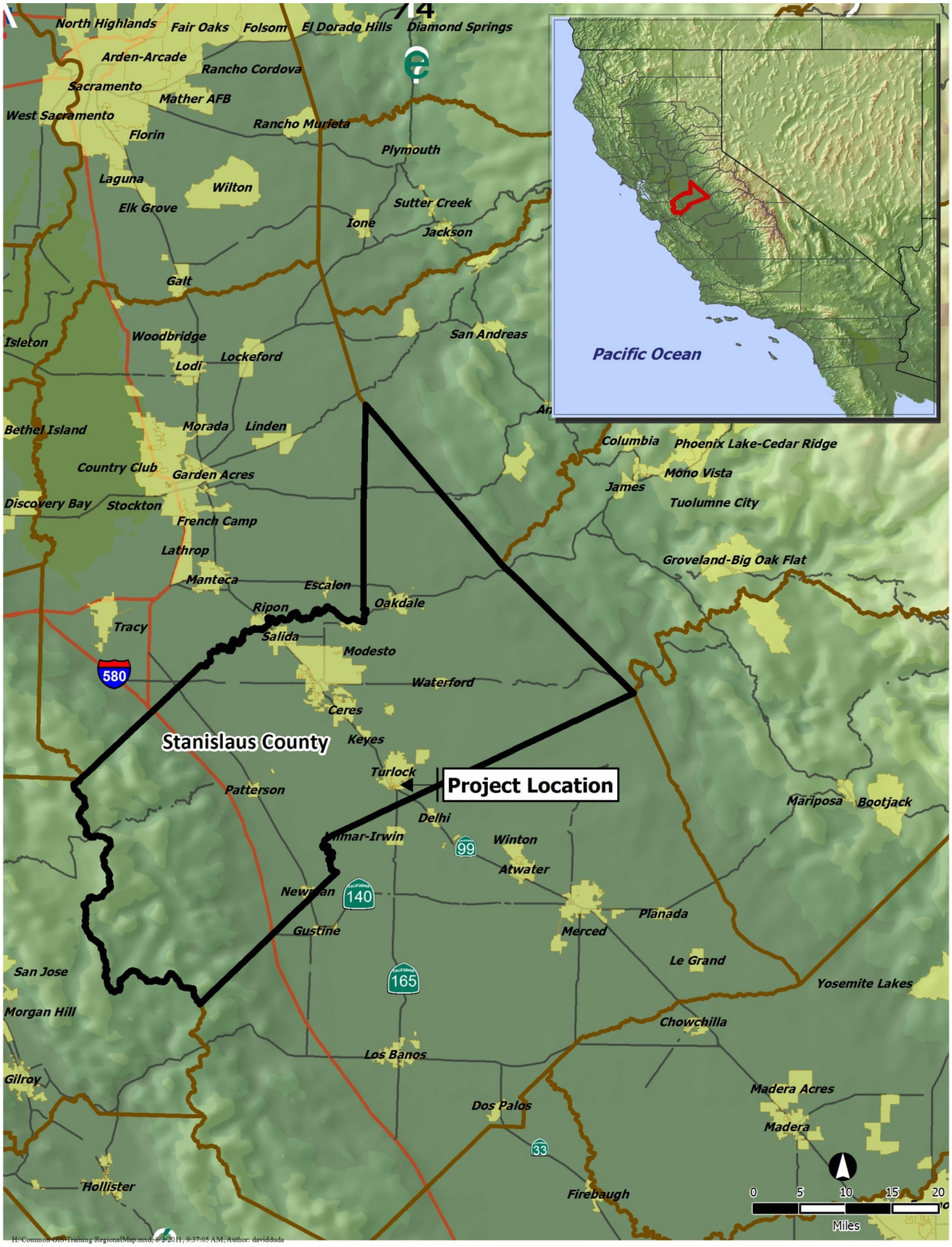


Figure 1-2: Existing Parcels

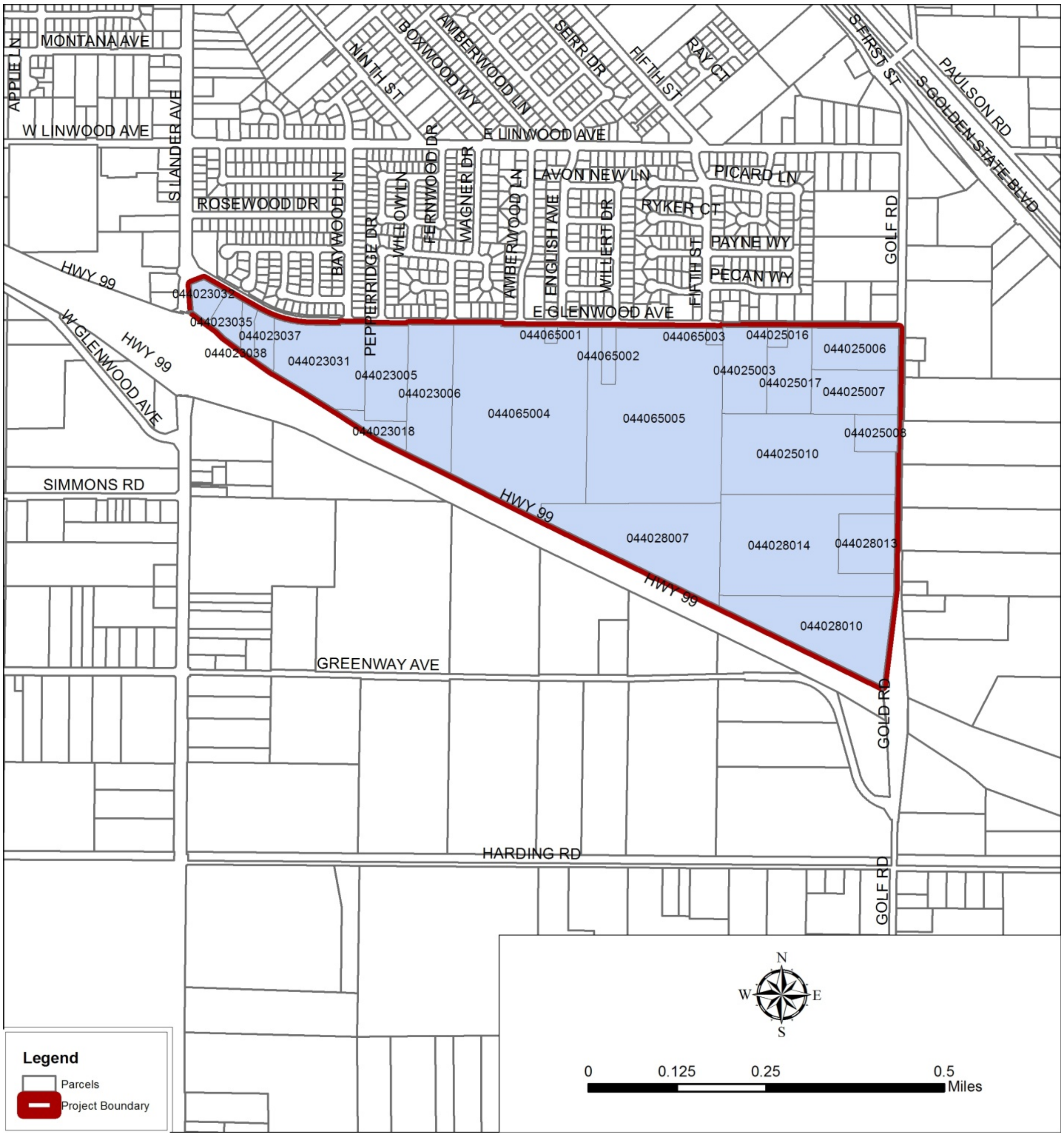


Figure 1-3: Existing General Plan Land Use Designations

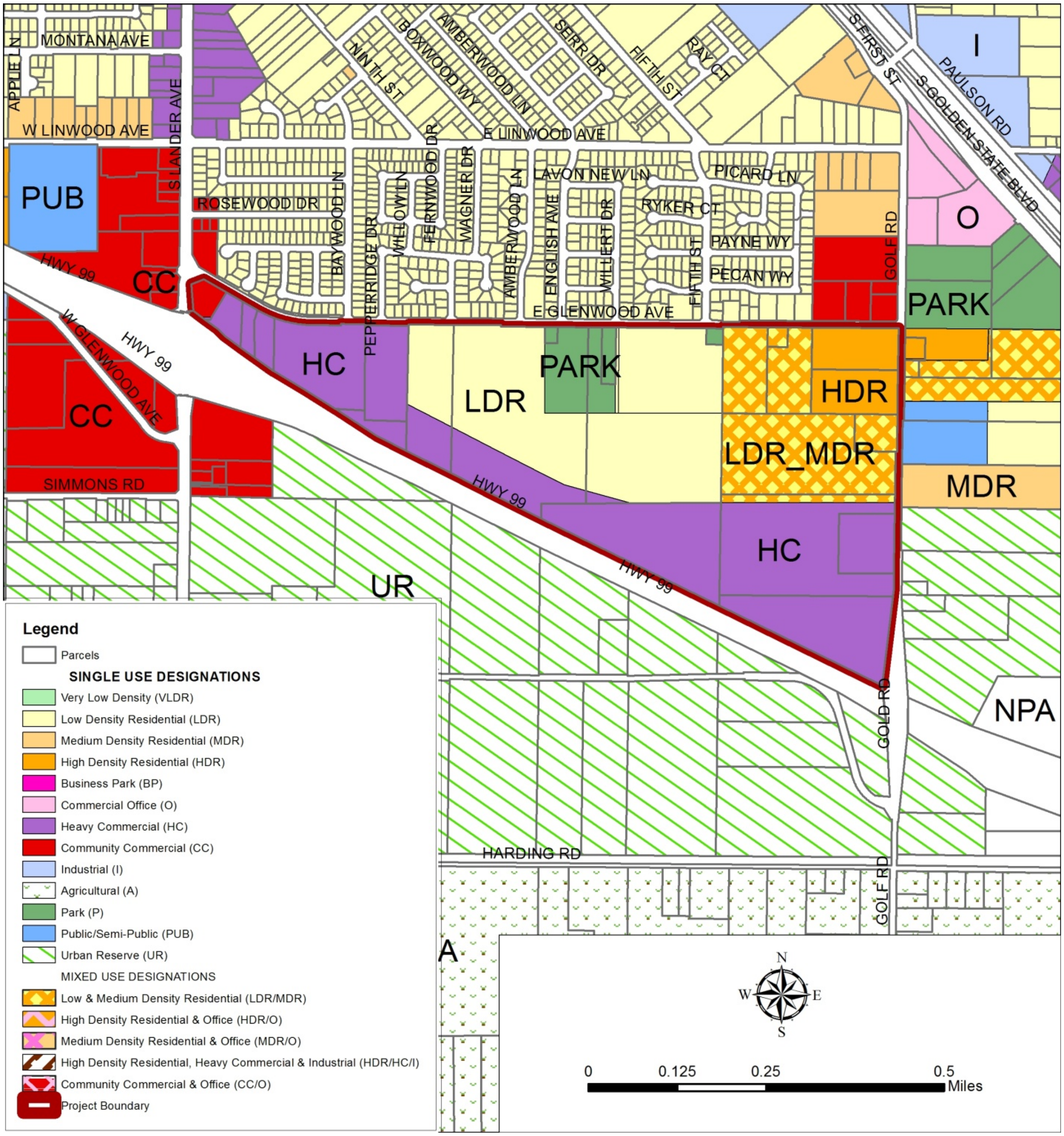


Figure 1-4: Proposed General Plan Land Use Designations

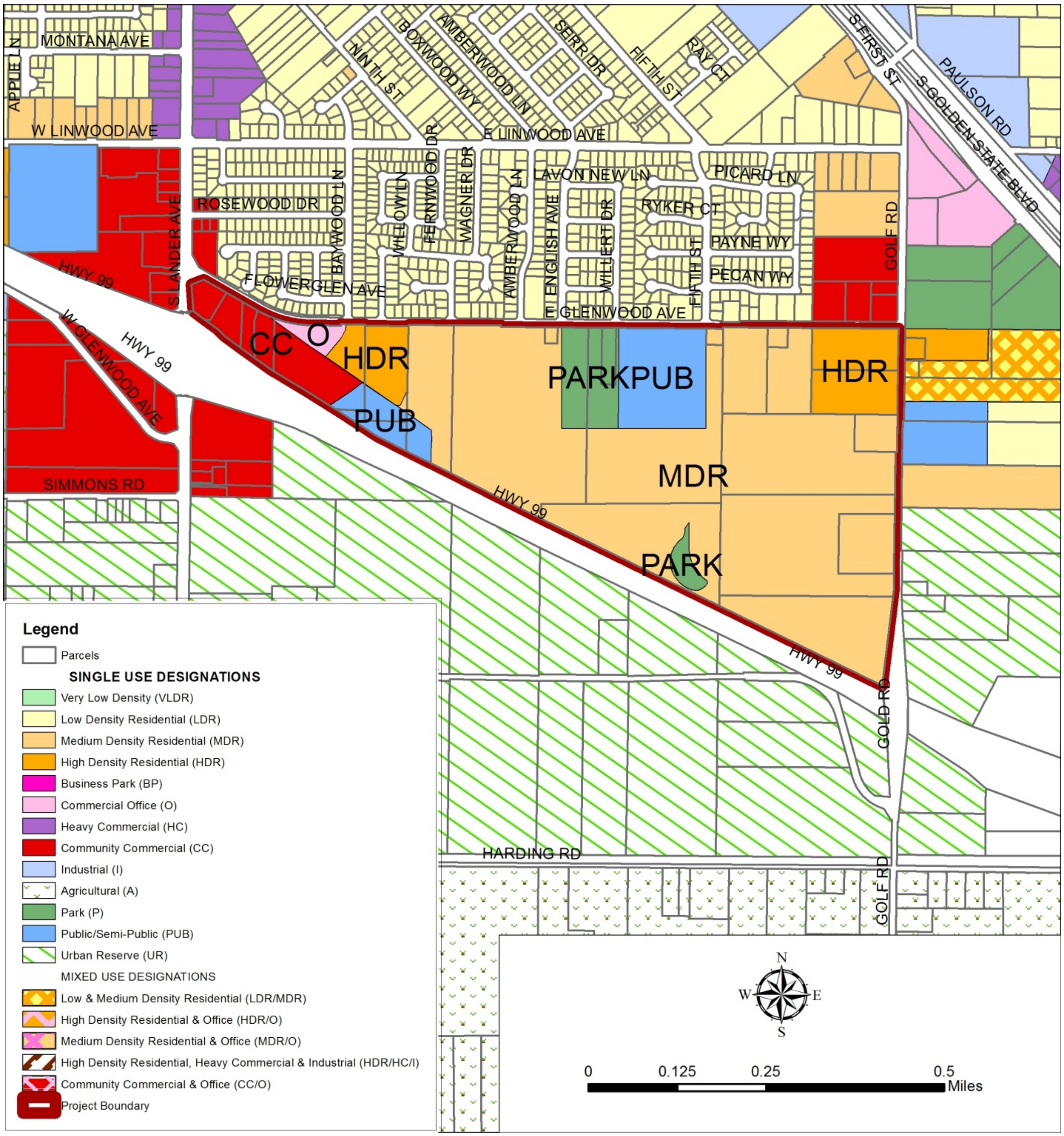


Figure 1-5: Existing Zoning

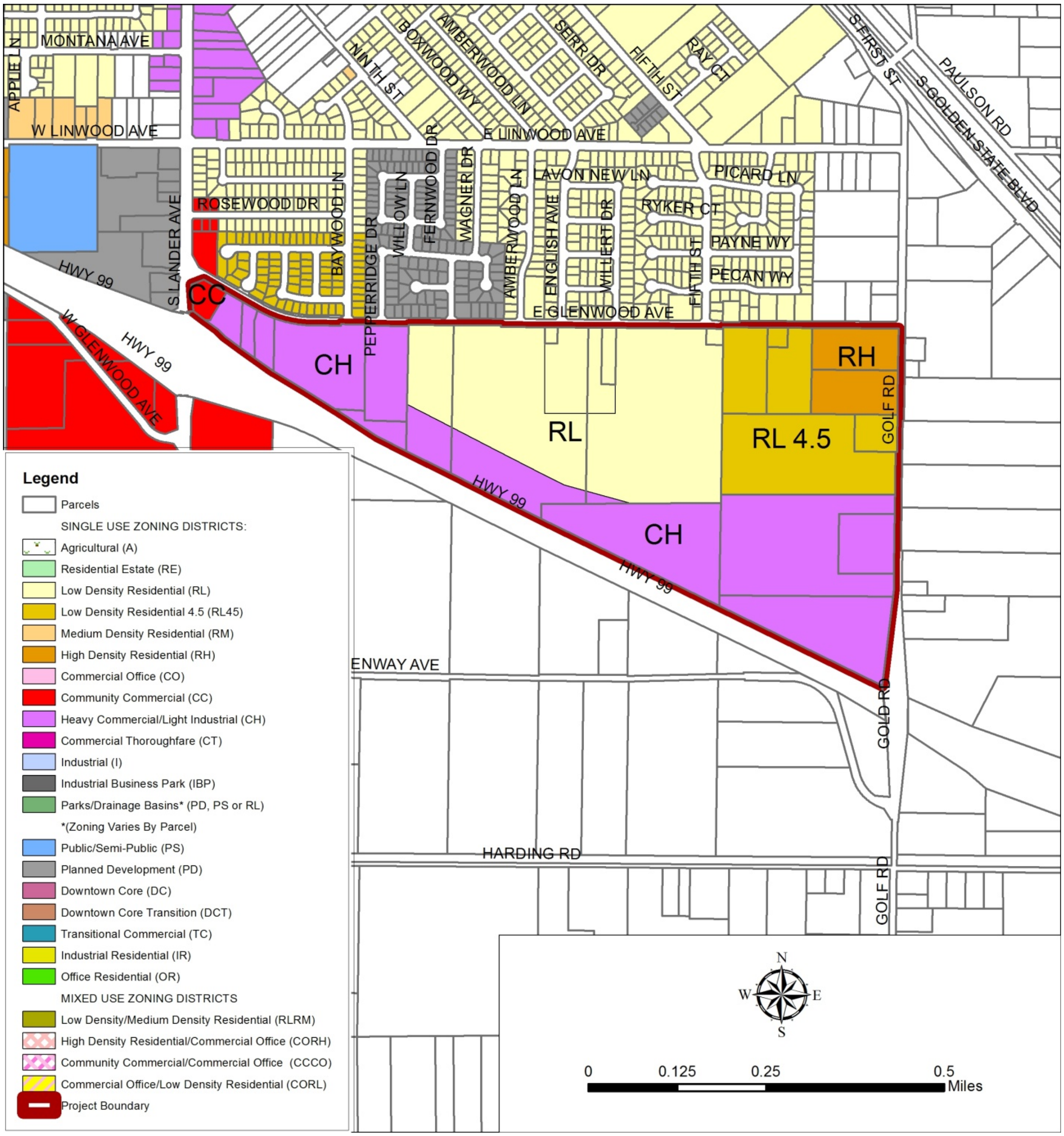
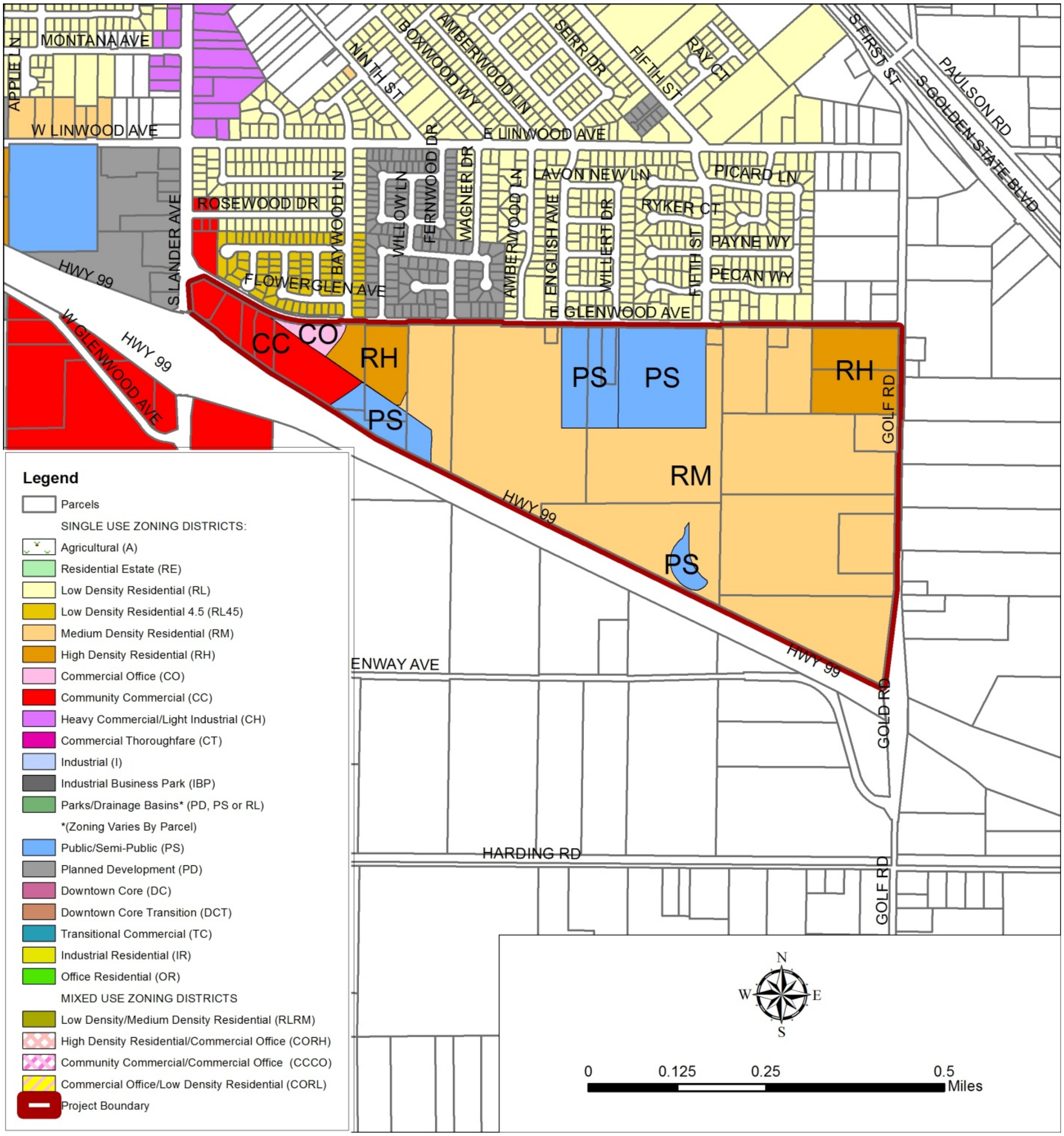


Figure 1-6: Proposed Zoning



DEPARTMENT OF TRANSPORTATION
DIVISION OF AERONAUTICS – M.S.#40
1120 N STREET
P. O. BOX 942874
SACRAMENTO, CA 94274-0001
PHONE (916) 654-4959
FAX (916) 653-9531
TTY 711

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MAR 12 2012
CITY OF TURLOCK
PLANNING DIVISION

March 7, 2012

Ms. Debbie Whitmore
City of Turlock
156 South Broadway, Suite 120
Turlock, CA 95380

Dear Ms. Whitmore:

Re: Notice of Preparation for the Morgan Ranch Master Plan; SCH # 2012022039

The California Department of Transportation (Caltrans), Division of Aeronautics (Division), reviewed the above-referenced document with respect to airport-related noise and safety impacts and regional aviation land use planning issues pursuant to the California Environmental Quality Act (CEQA). The Division has technical expertise in the areas of airport operations safety, noise, and airport land use compatibility. We are a funding agency for airport projects and we have permit authority for public-use and special-use airports and heliports. The following comments are offered for your consideration.

The proposal is for the adoption and implementation of the Morgan Ranch Master Plan which would modify the general plan designations and zoning for approximately 170 acres in the City of Turlock. The master plan land use designations and zoning modifications will allow for more residential and less commercial/industrial construction opportunities.

The project site is located approximately 1000 feet northeast of the Turlock Airpark. None of the figures showing existing and planned land use and zoning designations attached to the notice of preparation show the location of the airpark relative to the project site. This oversight should be corrected in the draft Environmental Impact Report.

Due to its proximity to the airport, the project site may be subject to aircraft overflights and subsequent aircraft-related noise and safety impacts. The proposal should also be coordinated with airpark staff to ensure that it will be compatible with future as well as existing airpark operations.

Business and Professions Code Section 11010 and Civil Code Sections 1102.6, 1103.4, and 1353 address buyer notification requirements for lands around airports and are available on-line at http://www.leginfo.ca.gov/calaw.html. Any person who intends to offer subdivided lands, common interest developments and residential properties for sale or lease within an airport influence area is required to disclose that fact to the person buying the property.

These comments reflect the areas of concern to the Division with respect to airport-related noise, safety, and regional land use planning issues. We advise you to contact our District 10 office concerning surface transportation issues.

Thank you for the opportunity to review and comment on this proposal. If you have any questions, please call me at (916) 654-6223, or by email at philip_crimmins@dot.ca.gov.

Sincerely,

Philip Crimmins

PHILIP CRIMMINS
Aviation Environmental Specialist

c: State Clearinghouse

STATE OF CALIFORNIA
FACSIMILE COVER
10-2A-0049

TO: Debbie Whitmore	**FROM:** Joshua Swearingen, Transportation Planner Caltrans – D10 Metropolitan Planning **DEPARTMENT OF TRANSPORTATION 1976 EAST CHARTER WAY STOCKTON, CA 95205**	
UNIT/COMPANY: City of Turlock Planning Division	**DATE:** 03-08-12	**TOTAL PAGES (Including Cover Page):** 2
	FAX # (209) 942-7164	**ATSS FAX** N/A
DISTRICT/CITY: Turlock	**PHONE #** (209) 942-6022	**ATSS** N/A
PHONE # (209) 668-5540 / **FAX #** (209) 668-5107	**ORIGINAL DISPOSITION:**	

RE: 10-STA-99-Various
Morgan Ranch Master Plan
SCH No. 2012022039

Thank you,

Josh

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 10
P.O. BOX 2048, STOCKTON, CA 95201
(1976 E. DR. MARTIN LUTHER KING JR. BLVD. 95205)
PHONE (209) 948-7943
FAX (209) 948-3670
TTY 711

Flex your power!
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March 8, 2012

10-MER-99-Various
Morgan Ranch Master Plan
SCH No. 2012022039

Debbie Whitmore
City of Turlock
156 S. Broadway, Suite 120
Turlock, CA 95380

Dear Ms. Whitmore:

The California Department of Transportation (Department) appreciates the opportunity to have reviewed the NOP for the Morgan Ranch Master Plan DEIR. The Department has the following comment:

- The Department has no objection to re-zoning the property at this location however we would like to review any future entitlement applications and site plans describing additional on site activities. Comments may be provided by the Department regarding the impacts of those activities after the Department's review. Please forward the Lead Agency's California Environmental Quality Act (CEQA) determination and supporting documentation to the Department for mitigation monitoring.

If you have any questions or would like to discuss our comments in more detail, please contact Joshua Swearingen at (209) 948-7142 (e-mail: joshua_swearingen@dot.ca.gov) or me at (209) 948-7112.

Sincerely,

Joshua Swearingen
For

Tom Dumas, Chief
Office of Metropolitan Planning

CHIEF EXECUTIVE OFFICE
Richard W. Robinson
Chief Executive Officer

Patricia Hill Thomas
Chief Operations Officer/
Assistant Executive Officer

Monica Nino
Assistant Executive Officer

Stan Risen
Assistant Executive Officer

1010 10th Street, Suite 6800, Modesto, CA 95354
P.O. Box 3404, Modesto, CA 95353-3404
Phone: 209.525.6333 Fax 209.544.6226

STANISLAUS COUNTY ENVIRONMENTAL REVIEW COMMITTEE

March 9, 2012

Debbie Whitmore, Deputy Director
City of Turlock
Development Services Dept.
Planning Division
156 S. Broadway, Suite 120
Turlock, CA 95380

SUBJECT: **ENVIRONMENTAL REFERRAL – Notice of Preparation of a Draft Environmental Impact Report for the Morgan Ranch Master Plan**

Ms. Whitmore:

The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has determined that it may have a significant effect on the environment in regards to traffic impacts. The Stanislaus County Department of Public Works is looking forward to working with the City of Turlock any related transportation issues for the area and would like to review the Traffic Impact Analysis for this Master Plan once it is developed.

The ERC appreciates the opportunity to comment on this project. Thank you also for providing us a time extension to fully discuss the subject project.

Sincerely,

Raul Mendez, Senior Management Consultant
Environmental Review Committee

cc: ERC Members

RM:kg

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MAR - 2 2012

CITY OF TURLOCK
PLANNING DIVISION

March 1, 2012

City of Turlock
Planning Division
Attn: Debbie Whitmore
156 South Broadway, Suite 120
Turlock, CA 95380

RE: Notice of Preparation of a Draft Environmental Impact Report for the Morgan Ranch Master Plan

Dear Ms. Whitmore:

The Turlock Irrigation District (District) acknowledges the opportunity to review and comment on the referenced project. District standards require development occurring within the District's boundary that impacts irrigation and electric facilities, to meet the District's requirements.

The District has previously commented on the Morgan Ranch project in a letter dated June 19, 2007, and the same comments and conditions apply. I have enclosed a copy of that letter for your convenience.

If you have any questions concerning irrigation system requirements, please contact me at (209) 883-8367. Questions regarding electric utility requirements should be directed to Paul Rodriguez at (209) 883-8438.

Sincerely,

Todd Troglin
Supervising Engineering Technician, Civil
CF: 2004034

TURLOCK IRRIGATION DISTRICT
333 EAST CANAL DRIVE
POST OFFICE BOX 949
TURLOCK, CALIFORNIA 95381
(209) 883-8300

Don Pedro Dam and Powerhouse

June 19, 2007

City of Turlock
Planning Division
Attn: Debbie Whitmore
156 South Broadway, Suite 120
Turlock, CA 95380

RE: Morgan Ranch - JKB Homes Norcal, Inc.
VTSM 2003-10

Dear Ms. Whitmore:

The Engineering Department of the Turlock Irrigation District (District) acknowledges the opportunity to review and comment on the referenced project. District standards require development occurring within the District's boundary, that impacts irrigation and electric facilities, to meet the District's requirements.

The District has previously commented on this project in a letter dated March 24, 2004. This response updates the comments in that letter.

There are two improvement districts that currently convey irrigation water to parcels in the subject area and beyond and will have to be brought up to current District Standards as individual phases are developed.

The first, Improvement District 34A, the Casey, runs south to north from under Highway 99 in a northwesterly direction to eventually cross under Glenwood Avenue and continues in a westerly direction to serve other downstream parcels. As there are numerous downstream parcels still irrigating beyond Glenwood Avenue these facilities will have to be upgraded to current District Standards along with the dedication of appropriate irrigation easements.

The second, Improvement District 247B, the Goldberry-Conyers, runs south to north from under Highway 99 for approximately 1800 feet, turns east for approximately 350 feet, then runs northeasterly for approximately 400 feet, and then again turns north to cross under Glenwood Avenue. As stated before, if downstream parcels continue to irrigate then these facilities will have to be upgraded to current District Standards along with the dedication of appropriate irrigation easements.

The District also operates a drainage pump and well (District Pump 112) located approximately 600 feet west of Golf Road on the south side of Glenwood Avenue. This pump discharges into a structure box located to the east on the Goldberry-Conyers pipeline and its purpose is to control groundwater elevations in the area. Should the Goldberry-Conyers pipeline be abandoned due to the development of all member parcels then the pump discharge will have to be re-routed to the Casey pipeline along with the dedication of an appropriate irrigation easement.

The plans indicate a storm drainage basin located in the southern portion of the project. If the District's canal system is to be used for storm water drainage, the existing Master Storm Drainage Agreement between the City of Turlock and the Turlock Irrigation District must be reviewed to determine if the additional discharge can be accommodated. This additional discharge would be subject to District approval. In addition, the detention basin must be capable of containing the water from a 10-year, 48-hour storm.

It will be necessary for the developer to submit plans detailing the existing irrigation facilities, relative to the proposed site improvements, in order for the District to determine specific impacts and requirements.

Properties that will no longer irrigate or have direct access to water must request abandonment from the improvement district(s). Developed property adjoining irrigated ground must be graded so that finished grading elevations are at least 6 inches higher than irrigated ground. A protective berm must be installed to prevent irrigation water from reaching non-irrigated properties. Stub-end streets adjoining irrigated ground must have a berm installed at least 12" above the finished grade of the irrigated parcel(s).

The District shall review and approve all maps and plans of the project. Any improvements to this property shall be subject to the District's approval and meet all District standards and specifications. If it is determined that irrigation facilities will be impacted, the applicant will need to provide irrigation improvement plans and enter into an Irrigation Improvements Agreement for the required irrigation facility modifications. An Improvement Plan review fee based on District Board approved time and material rates must be submitted along with the Improvement Plans.

If the pipelines are to be relocated in a new alignment, then irrigation improvement plans and an Irrigation Improvements Agreement for the impacted irrigation facility modifications must be executed before the District approves a final map.

In order for the District to accept the necessary easements, this statement should appear on the acceptance documents:

Certificate of Acceptance
This is to certify that the interest in real property conveyed by this map to the Turlock Irrigation District, a governmental agency, and to the named improvement districts of the District (if any) are hereby accepted by the undersigned officer on behalf of the Board of Directors of the Turlock Irrigation District pursuant to authority conferred by Turlock Irrigation Rule RL 0340.001.

Dated this ________________day of ________________________, 2004

____

Wilton B. Fryer
Civil Engineering Department Manager

The final map signature block is as follows:
As to Irrigation Tax

________________________ ____________
Mike Kavarian Date
Deputy Collector, Turlock Irrigation District

A 13-foot Public Utility Easement must be dedicated along all street frontages. If the easement is to include an irrigation pipeline, then a 15-foot easement will be required.

The front building setback is to be a minimum of 15-feet from the property line and a minimum of 15-feet from the back-of-sidewalk to enable the safe placement of utilities.

The owner/developer must apply for a facility change for any pole or electrical facility relocation. Facility changes are performed at developer's expense.

If you have any questions concerning irrigation system requirements or electric utility requirements, please contact me at (209) 883-8384 or Paul Rodriguez at (209) 883-8438 respectively.

Sincerely,

Arie W. Vander Pol

Arie W. Vander Pol
Engineering Technician, Civil
CF: 2004034c

STATE OF CALIFORNIA **Edmund G. Brown Jr., Governor**

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

February 21, 2012

RECEIVED

FEB 23 2012

CITY OF TURLOCK
PLANNING DIVISION

Debra Whitmore
City of Turlock
156 South Broadway, Suite 120
Turlock, CA 95380

RE: SCH# 2012022039 Morgan Ranch Master Plan; Stanislaus County.

Dear Ms. Whitmore:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Preparation (NOP) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

- ✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- ✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
- ✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **USGS 7.5 minute quadrangle name, township, range and section required.**
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached.**
- ✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Katy Sanchez

Katy Sanchez
Program Analyst
(916) 653-4040

cc: State Clearinghouse

Native American Contact List
Stanislaus County
February 21, 2012

Tule River Indian Tribe
Ryan Garfield, Chairperson
P.O. Box 589
Porterville , CA 93258
chairman@tulerivertribe-nsn.
(559) 781-4271
(559) 781-4610 FAX

Yokuts

Southern Sierra Miwuk Nation
Anthony Brochini, Chairperson
P.O. Box 1200
Mariposa , CA 95338
tony_brochini@nps.gov
209-379-1120
209-628-0085 cell

Miwok
Pauite
Northern Valley Yokut

Southern Sierra Miwuk Nation
Jay Johnson, Spiritual Leader
5235 Allred Road
Mariposa , CA 95338
209-966-6038

Miwok
Pauite
Northern Valley Yokut

Southern Sierra Miwuk Nation
Les James, Spiritual Leader
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Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

North Valley Yokuts Tribe
Katherine Erolinda Perez
PO Box 717
Linden , CA 95236
(209) 887-3415
canutes@verizon.net

Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH# 2012022039 Morgan Ranch Master Plan; Stanislaus County.

Tracy Medical Group/Tracy Outpatient Surgery Center

530 W Eaton Ave., Ste K, Tracy, Ca. 95376
Phone: (209)835-4232
Fax: (209)835-3246

To:	Debbie Whitmore	Fax:	668-5102
From:	Nanci Pena	Date:	3-8-12
Re:	Morgan Ranch	Pages:	3
Cc:			

Urgent   For review   Please comment   Please reply   Please recycle

Pls see attached

CITY OF TURLOCK INC. 1908

CEQA Scoping Meeting Comment Form

Please give us your comments!

* **Required Fields.** Please print clearly.

Name (First and Last)*	Nanci Pena				
Organization	—				
Title	Home owner				
Address*	1701 Golf Rd.				
City*	Turlock	**State***	CA.	**Zip Code***	95380
E-mail	nancipena2002@yahoo.com			**Phone***	639-8848

Completing this form will automatically add you to the mailing list for project updates and notices of document availability. If you prefer to not be on the mailing list, please check this box ☐

Comments on the Scope of the Environmental Impact Report:

See attached letter

Responses must be received by March 12, 2012

I am very sadden to hear that more country land will be taken by more housing. My parents moved to 1701 Gold Rd. over 40 years ago. It was my home as a child and is currently where I live with my family. When my parents moved there nothing but land and wonderful neighbors and people surrounding us. Over the years other housing has moved in. I am sad to say that the housing brings in rentals and with rentals people that do not take pride in where or how they live. I have concerns about my well water and the quality of it with more housing moving in. I also worry about getting my farm equipment out of my drive onto a four lane highway. My main concern is my daughter crossing a four lane highway to be taken to school in the morning by our neighbor. I feel for my neighbors who will open their front door to a four lane highway.

Thank you for the opportunity to be heard.

CITY OF TURLOCK INC. 1908

CEQA Scoping Meeting Comment Form

Please give us your comments!

* **Required Fields**. Please print clearly.

Name (First and Last)*	William & Jenae Worsham
Organization	
Title	
Address*	PO Box 2903 (1025 E. Greenway Ave)

City*	Turlock	**State***	CA	**Zip Code***	95381
E-mail	wgworsham@clearwire.net			**Phone***	209-667-8284

Completing this form will automatically add you to the mailing list for project updates and notices of document availability. If you prefer to not be on the mailing list, please check this box ☒

Comments on the Scope of the Environmental Impact Report:

Morgan Ranch Master Plan

We request a Noise study is performed that includes the properties along East Greenway Avenue which is across the freeway (South side) from the Morgan Ranch Master Plan. It is our belief this plan needs to include a Noise study before, during and after construction of the sound wall that is planned to surround the Morgan Ranch Master Plan Project.

If Noise levels change we request a mitigation plan be put in place, up to and including a Sound Wall on the South side of the freeway.

William Worsham

Jenae Worsham

Responses must be received by March 12, 2012

CITY OF
TURLOCK
INC. 1908

CEQA Scoping Meeting Comment Form

Please give us your comments!

*** Required Fields**. Please print clearly.

Name (First and Last)*	Lois Marsh				
Organization					
Title					
Address*	1031 E Glenwood Ave				
City*	Turlock	**State***	CA	**Zip Code***	95380
E-mail				**Phone***	

Completing this form will automatically add you to the mailing list for project updates and notices of document availability. If you prefer to not be on the mailing list, please check this box ☐

Comments on the Scope of the Environmental Impact Report:

I am concerned about the amount of traffic that a school (across from me) will generate. What air quality will result from so many new homes in a fairly small area?

Responses must be received by March 12, 2012

CITY OF TURLOCK INC. 1908

CEQA Scoping Meeting Comment Form

Please give us your comments!

*** Required Fields**. Please print clearly.

Name (First and Last)*	CARL GRUBB SHIRLEY GRUBB				
Organization	HOMEOWNERS				
Title					
Address*	2030 GOLF RD. TURLOCK				
City*	TURLOCK	**State***	CA.	**Zip Code***	
E-mail	—			**Phone***	634-7993

Completing this form will automatically add you to the mailing list for project updates and notices of document availability. If you prefer to not be on the mailing list, please check this box ☐

Comments on the Scope of the Environmental Impact Report:

PLEASE SEE ATTACHED 6 PAGES.

Responses must be received by March 12, 2012

Reasons for Golf Road not to become a 4 lane road:

The idea of making Golf Road a 4-lane road from slightly north of the Musso property at the planned stoplights is not sensible. Having a 2-lane road (north of Musso's) abruptly change into a 4 l-lane road (at the foot of an over-pass no less) for a little over a mile does not make sense to drivers heading north or south on Golf Road. Are Merced and Stanislaus counties prepared to widen the rest of Golf Road to August Avenue?

The proposed 4 lanes will be at our front doors! What of the added noise, bad air quality, and accidents from the increased traffic?

If we did not now have a turn-around area in front of our house, we could not back out of our driveway onto Golf Road. The turn-around allows us to back out and then turn to head out onto Golf Road, instead of backing out into on-coming traffic. (There are no homes on this stretch of Golf Road who do not have areas to turn and head out onto Golf Road. No one backs out.) With a 4-lane road we would lose this area, and trying to back out into the added traffic would be more than dangerous for us.

We would also lose any parking area for visitors that we now have. Where would anyone park on a 4-lane road?

We have a large 5th wheel trailer that is parked on our property next to our house. The access is through the turn-around in front of our house, through double gates to the parking area. How would we enter, leave, or park under the conditions if we lose the area in front of our house? What will happen with the added traffic and no maneuvering space? An accident waiting to happen!

With no front yard to speak of, and fronting on a 4-lane road, our property value will plummet. Our home was only built 3 years ago, but who would want to buy a home with such close proximity to a busy 4-lane road? Add that to proposed high-density housing just across the street, and the chance of ever selling our home at a decent price are nil.

If Glenwood Avenue is no longer an entrance/exit on Golf Road, this is going to present a real problem for us to have access to our pharmacy and grocery on Lander Avenue. Now, it is only a quick mile down Glenwood Avenue to reach them. If we lose our turn-around drive, we will need to back out onto 4-lane Golf Road and try to make an immediate left turn into traffic, go south to the proposed signal, and turn onto the proposed 4-lane road, and then to Lander Avenue! Not only is this distance much further, but getting onto Golf Road will be an almost impossible challenge (especially when you are in your 70's). I cannot think of the fog and the rain added to this mess. You are setting us up for accidents!

Signal light so near the foot of the over-pass, with a road change from 2 to 4 lanes at this point, seems very dangerous. Drivers coming northbound on Golf Road on the over-pass will have a change just ahead (not good for speeders!).

Why does a sub-division of this size need to have a 4-lane road (from Lander Avenue to Golf Road)? No other sub-division in Turlock, to the north or east has more than a 2-lane road (or roads) through it. (Taylor Road and Christopherson Parkway are main arteries, not sub-division roads.) A wide 2-lane road with turning lanes as-or-if needed should be sufficient. A 2-lane Golf Road at the proposed signal could have turning lanes to take care of traffic. A 2-lane sub-division road could have turning lanes into streets, and continue into a 2-lane Golf Road. It would discourage speeding and would be controlled by speed limit signs. 4 lane traffic encourages faster driving and unsafe passing vehicles entering the main road would have a much better safety chance is the traffic was slower.

The plans as they stand certainly are not acceptable, and more and better planning needs to be done. The displacing of property and the hard-ship that will be placed on so many families really needs to be addressed.

Many of the people, whose property will be affected, even though they are not adjacent to the planned project, were not aware or notified. This was an over-sight on your part. Everyone north of Glenwood Avenue on Golf Road will be affected in some way and should have been notified of the plans for Golf Road.

Why can't Golf Road just be made into a good 2-lane road? We don't need more traffic and speed that will be the end result with 4 lanes.

The developers of Morgan Ranch are not going to be living there. They seem to have forgotten that those of us who are living here are being put-upon and cheated of our rights and property.

Everything cannot be changed to satisfy developer's greed!

Regarding the proposed High Density housing planned for the property at Glenwood Avenue and Golf Road:

We are only going on the assumption that the same plans we were given 4 or 5 years ago regarding the property are the same. They are what we are basing our concerns on. No other information has been given us, and no-one at the Scoping meeting could give us any information.

Our feelings are that any 2 story houses should be built in the center of the project, not around the perimeter of Golf Road and Glenwood Avenue.

Even with a wall along Golf Road and Glenwood Avenue, we will be faced with the rear views of these houses. These houses will be low-income, and for the most part, rentals. (Be realistic, who would buy one of these?) At lease with 1 story houses backing to the walls, we would not be forced to see broken blinds and curtains hanging out of 2nd story windows! Put the 2 story houses in the center of the sub-division. (Don't make it another Berkeley/Bothum or Fulkerth near the Fairgrounds.)

Regarding the only one street for exiting and entering the sub-division:

With the narrow, winding streets, and on-street parking, it seems it will be very difficult for emergency vehicles to maneuver. Plus, with short, (1 car-length) driveways and street parking (see Linwood Avenue between Golf Road and Lander Avenue and the sub-divisions between Linwood Avenue and Glenwood Avenue) it will make for difficult access. The pre-mentioned areas have vehicles parked all over – 24 hours a day! This will be more of the same.

Would yards and property be maintained by owners of the rentals? Realistically, these types of areas don't have a great track-record of home and yard up-keep, and when they go downhill they attract unsavory residents. We don't need more of that! Our home has been broken into twice and property in our yard and out-buildings taken many times.

Police services are few and far between in our area now. How are they going to handle more population and territory? Is there money to hire more officers?

There also was no mention made at the Socping meeting regarding Fire Service. Is another fire station going to be built near here, especially with so many houses another school being built? If not, the nearest station will be at Minaret and Marshall, quite a distance away.

We hope the developers and planners will read and listen to the neighbors concerns.

We have everything to lose and nothing to gain.

Sincerely,

Carl R Grubb
Shirley A. Grubb

Carl R. Grubb
Shirley A. Grubb
2030 Golf Rd.
Turlock, CA 95380
Ph. 634-7993

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APPENDIX B

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Land Evaluation Worksheet

Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
Dinuba sandy loam (DrA)	9	0.05	2w	80	4.2	82	4.3
Hilmar loamy sand (HfA)	161	0.95	3w	60	56.8	57	54.0
Totals	170	1.00		**LCC Total Score**	61.1	**Storie Index Total Score**	58.3

Site Assessment Worksheet 1

Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV - VIII
	9	161	
Total Acres	9	161	
Project Size Scores	0	100	0

Highest Project Size Score	100

Table 2. Numeric Conversion of Land Capability Classification Units

Land Capability Classification	LCC Point Rating
I	100
IIe	90
IIs,w	80
IIIe	70
IIIs,w	60
IVe	50
IVs,w	40
V	30
VI	20
VII	10
VIII	0

Table 3. Project Size Scoring

LCC Class I or II soils		LCC Class III soils		LCC Class IV or lower	
Acres	*Score*	*Acres*	*Score*	*Acres*	*Score*
80 or above	100	160 or above	100	320 or above	100
60-79	90	120-159	90	240-319	80
40-59	80	80-119	80	160-239	60
20-39	50	60-79	70	100-159	40
10-19	30	40-59	60	40-99	20
fewer than 10	0	20-39	30	fewer than 40	0
		10-19	10		
		fewer than 10	0		

Source of Table 2 and Table 3: California Land Evaluation and Site Assessment Model Instruction Manual, 1997

Site Assessment Worksheet 2 - Water Resources Availability

A	B	C	D	E
Project Portion	Water Source	Proportion of Project Area	Water Availability Score	Weighted Availability Score (C x D)
1	Irrigated water	1	90	90
2				
		(Must Sum to 1.0)	**Total Water Resource Score**	90

Table 5. Water Resource Availability Scoring

Option	Non-Drought Years			Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS			RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	
1	YES	NO	NO	YES	NO	NO	100
2	YES	NO	NO	YES	NO	YES	95
3	YES	NO	YES	YES	NO	YES	90
4	YES	NO	NO	YES	YES	NO	85
5	YES	NO	NO	YES	YES	YES	80
6	YES	YES	NO	YES	YES	NO	75
7	YES	YES	YES	YES	YES	YES	65
8	YES	NO	NO	NO	-- --	-- --	50
9	YES	NO	YES	NO	-- --	-- --	45
10	YES	YES	NO	NO	-- --	-- --	35
11	YES	YES	YES	NO	-- --	-- --	30
12	Irrigated production not feasible, but rainfall adequate for dryland production in both drought and non-drought years						25
13	Irrigated production not feasible, but rainfall adequate for dryland production in non-drought years (but not in drought years)						20
14	Neither irrigated nor dryland production feasible						0

Source of Table 5: California Land Evaluation and Site Assessment Model Instruction Manual, 1997

Site Assessment Worksheet 3

Surrounding Agricultural Land and Surrounding Protected Resource Land

A	B	C	D	E	F	G
Zone of Influence						
Total Acres	Acres in Agriculture	Acres of Protected Resource Land	Percent in Agriculture (B/A)	Percent Protected Resource Land (A/C)	Surrounding Agricultural Land Score (From Table)	Surrounding Protected Resource Land Score (From Table)
635.37	124	30	19.5%	5%	0	0

Table 6. Surrounding Agricultural Land Rating

Percent of Project's Zone of Influence in Agricultural Use	Surrounding Agricultural Land Score
90 - 100%	100 Points
80 - 89	90
75 - 79	80
70 - 74	70
65 - 69	60
60 - 64	50
55 - 59	40
50 - 54	30
45 - 49	20
40 - 44	10
40 <	0

Table 7. Surrounding Protected Resource Land Rating

Percent of Project's Zone of Influence Defined as Protected	Surrounding Protected Resource Land Score
90 - 100%	100 Points
80 - 89	90
75 - 79	80
70 - 74	70
65 - 69	60
60 - 64	50
55 - 59	40
50 - 54	30
45 - 49	20
40 - 44	10
40 <	0

Source of Table 6 and Table 7: California Land Evaluation and Site Assessment Model Instruction Manual, 1997

Final LESA Score Sheet

Calculation of the Final LESA Score:

(1) Multiply each factor score by the factor weight to determine the weighted score and enter in Weighted Factor Scores Column.
(2) Sum the weighted factor scores for the LE factors to determine the total LE score for the project.
(3) Sum the weighted factor scores for the SA factors to determine the total SA score for the project.
(4) Sum the total LE and SA scores to determine the Final LESA Score for the Project.

	Factor Scores	**Factor Weight**	**Weighted Factor Scores**
LE Factors			
Land Capability Classification	61.1	0.25	15.3
Storie Index	58.3	0.25	14.6
LE Subtotal		0.50	29.8
SA Factors			
Project Size	100.0	0.15	15.0
Water Resource Availability	90.0	0.15	13.5
Surrounding Agricultural Land	0.0	0.15	0.0
Protected Resource Land	0.0	0.05	0.0
SA Subtotal		0.50	28.5
		Final LESA Score	58.3

Impact Determination **Significant**

Table 9. California LESA Model Scoring Thresholds

Total LESA Score	Scoring Decision
0 to 39 Points	Not Considered Significant
40 to 59 Points	Considered Significant only if LE and SA subscores are each greater than or equal to 20 points
60 to 79 Points	Considered Significant unless either LE or SA subscore is less than 20 points
80 to 100 Points	Considered Significant

Source of Table 9: California Land Evaluation and Site Assessment Model Instruction Manual, 1997

APPENDIX C

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tblProjectCharacteristics

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2015	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	1625	45.6	0

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2017	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	1300	47.5	0

tblProjectCharacteristics

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2019	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	894	40.9	0

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2020	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	944	30.05	0

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
Elementary School	300	Student
Apartments Mid Rise	169	Dwelling Unit
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**	Pacific Gas & Electric Company
Climate Zone	3	**Precipitation Freq (Days)**	46		

1.3 User Entered Comments

Project Characteristics - Phase_2014

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Includes a 4.4 acre detention basin with an 8-foot depth (worst case scenario).

Energy Use -

Sequestration - Rough estimate based on 2 trees per residential unit and 150 school. All future development is subject to the City of Turlock's Municipal Code, Chapter 7-7.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation - Proposed elementary school.

Area Mitigation -

Water Mitigation -

Waste Mitigation -

Architectural Coating - No construction arch. coating.

Vechicle Emission Factors - VRPA Research, 2006-Accepted by the SJVAPCD for fleet mix revisions.

Vechicle Emission Factors - "

Vechicle Emission Factors - "

Woodstoves - Awwume 100 natral gas fireplaces.

Energy Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	3.02	21.49	15.06	0.03	1.72	1.21	2.92	0.86	1.21	2.06	0.00	2,451.15	2,451.15	0.24	0.00	2,456.23
2015	1.84	11.78	9.39	0.02	0.12	0.80	0.92	0.01	0.80	0.80	0.00	1,428.14	1,428.14	0.15	0.00	1,431.24
Total	**4.86**	**33.27**	**24.45**	**0.05**	**1.84**	**2.01**	**3.84**	**0.87**	**2.01**	**2.86**	**0.00**	**3,879.29**	**3,879.29**	**0.39**	**0.00**	**3,887.47**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	9.57	20.36	15.65	0.03	0.76	1.01	1.77	0.34	1.01	1.35	0.00	2,451.15	2,451.15	0.24	0.00	2,456.23
2015	5.95	12.10	9.72	0.02	0.12	0.67	0.80	0.01	0.67	0.68	0.00	1,428.14	1,428.14	0.15	0.00	1,431.24
Total	**15.52**	**32.46**	**25.37**	**0.05**	**0.88**	**1.68**	**2.57**	**0.35**	**1.68**	**2.03**	**0.00**	**3,879.29**	**3,879.29**	**0.39**	**0.00**	**3,887.47**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.01	0.04	3.83	0.00		0.00	0.07		0.00	0.07	0.00	655.94	655.94	0.02	0.01	660.03
Energy	0.08	0.69	0.31	0.00		0.00	0.06		0.00	0.06	0.00	1,736.94	1,736.94	0.06	0.03	1,747.68
Mobile	4.66	5.42	41.66	0.06	6.74	0.24	6.98	0.26	0.24	0.50	0.00	5,188.38	5,188.38	0.26	0.00	5,193.91
Waste						0.00	0.00		0.00	0.00	92.22	0.00	92.22	5.45	0.00	206.68
Water						0.00	0.00		0.00	0.00	0.00	75.61	75.61	1.02	0.03	105.25
Total	**8.75**	**6.15**	**45.80**	**0.06**	**6.74**	**0.24**	**7.11**	**0.26**	**0.24**	**0.63**	**92.22**	**7,656.87**	**7,749.09**	**6.81**	**0.07**	**7,913.55**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.98	0.04	3.37	0.00		0.00	0.06		0.00	0.06	0.00	655.04	655.04	0.02	0.01	659.09
Energy	0.07	0.58	0.26	0.00		0.00	0.05		0.00	0.05	0.00	1,568.71	1,568.71	0.05	0.03	1,578.42
Mobile	4.07	4.57	35.50	0.05	5.47	0.20	5.67	0.21	0.20	0.41	0.00	4,235.27	4,235.27	0.22	0.00	4,239.87
Waste						0.00	0.00		0.00	0.00	46.11	0.00	46.11	2.73	0.00	103.34
Water						0.00	0.00		0.00	0.00	0.00	74.22	74.22	1.02	0.03	103.85
Total	**8.12**	**5.19**	**39.13**	**0.05**	**5.47**	**0.20**	**5.78**	**0.21**	**0.20**	**0.52**	**46.11**	**6,533.24**	**6,579.35**	**4.04**	**0.07**	**6,684.57**

2.3 Vegetation

Vegetation

	ROG	NOx	CO	SO2	CO2e
Category	tons				MT
New Trees					0.00
Total					**0.00**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.81	0.00	0.81	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.42	3.37	1.94	0.00		0.16	0.16		0.16	0.16	0.00	326.40	326.40	0.03	0.00	327.12
Total	**0.42**	**3.37**	**1.94**	**0.00**	**0.81**	**0.16**	**0.97**	**0.45**	**0.16**	**0.61**	**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**327.12**

3.2 Site Preparation - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.13	3.13	0.00	0.00	3.14
Total	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.14**	**3.14**	**0.00**	**0.00**	**3.15**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.32	0.00	0.32	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	1.48	2.75	1.79	0.00		0.11	0.11		0.11	0.11	0.00	326.40	326.40	0.03	0.00	327.12
Total	**1.48**	**2.75**	**1.79**	**0.00**	**0.32**	**0.11**	**0.43**	**0.17**	**0.11**	**0.28**	**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**327.12**

3.2 Site Preparation - 2014

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.13	3.13	0.00	0.00	3.14
Total	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.14**	**3.14**	**0.00**	**0.00**	**3.15**

3.3 Grading - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.75	0.00	0.75	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.84	6.58	4.06	0.01		0.33	0.33		0.33	0.33	0.00	696.18	696.18	0.07	0.00	697.61
Total	**0.84**	**6.58**	**4.06**	**0.01**	**0.75**	**0.33**	**1.08**	**0.40**	**0.33**	**0.73**	**0.00**	**696.18**	**696.18**	**0.07**	**0.00**	**697.61**

3.3 Grading - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.01	0.07	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	7.45	7.45	0.00	0.00	7.46
Total	**0.01**	**0.01**	**0.07**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**7.45**	**7.45**	**0.00**	**0.00**	**7.46**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.29	0.00	0.29	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	2.75	5.88	4.21	0.01		0.27	0.27		0.27	0.27	0.00	696.18	696.18	0.07	0.00	697.61
Total	**2.75**	**5.88**	**4.21**	**0.01**	**0.29**	**0.27**	**0.56**	**0.16**	**0.27**	**0.43**	**0.00**	**696.18**	**696.18**	**0.07**	**0.00**	**697.61**

3.3 Grading - 2014

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.01	0.07	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	7.45	7.45	0.00	0.00	7.46
Total	**0.01**	**0.01**	**0.07**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**7.45**	**7.45**	**0.00**	**0.00**	**7.46**

3.4 Building Construction - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.61	10.90	7.89	0.01		0.69	0.69		0.69	0.69	0.00	1,245.96	1,245.96	0.13	0.00	1,248.70
Total	**1.61**	**10.90**	**7.89**	**0.01**		**0.69**	**0.69**		**0.69**	**0.69**	**0.00**	**1,245.96**	**1,245.96**	**0.13**	**0.00**	**1,248.70**

3.4 Building Construction - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.05	0.57	0.34	0.00	0.03	0.02	0.04	0.00	0.02	0.02	0.00	87.89	87.89	0.00	0.00	87.94
Worker	0.09	0.07	0.74	0.00	0.11	0.00	0.11	0.00	0.00	0.01	0.00	84.12	84.12	0.01	0.00	84.24
Total	**0.14**	**0.64**	**1.08**	**0.00**	**0.14**	**0.02**	**0.15**	**0.00**	**0.02**	**0.03**	**0.00**	**172.01**	**172.01**	**0.01**	**0.00**	**172.18**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.19	11.08	8.48	0.01		0.61	0.61		0.61	0.61	0.00	1,245.96	1,245.96	0.13	0.00	1,248.70
Total	**5.19**	**11.08**	**8.48**	**0.01**		**0.61**	**0.61**		**0.61**	**0.61**	**0.00**	**1,245.96**	**1,245.96**	**0.13**	**0.00**	**1,248.70**

3.4 Building Construction - 2014

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.05	0.57	0.34	0.00	0.03	0.02	0.04	0.00	0.02	0.02	0.00	87.89	87.89	0.00	0.00	87.94
Worker	0.09	0.07	0.74	0.00	0.11	0.00	0.11	0.00	0.00	0.01	0.00	84.12	84.12	0.01	0.00	84.24
Total	**0.14**	**0.64**	**1.08**	**0.00**	**0.14**	**0.02**	**0.15**	**0.00**	**0.02**	**0.03**	**0.00**	**172.01**	**172.01**	**0.01**	**0.00**	**172.18**

3.4 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.13	7.58	5.97	0.01		0.47	0.47		0.47	0.47	0.00	952.79	952.79	0.09	0.00	954.73
Total	**1.13**	**7.58**	**5.97**	**0.01**		**0.47**	**0.47**		**0.47**	**0.47**	**0.00**	**952.79**	**952.79**	**0.09**	**0.00**	**954.73**

3.4 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.40	0.24	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.00	67.20	67.20	0.00	0.00	67.23
Worker	0.06	0.05	0.51	0.00	0.08	0.00	0.09	0.00	0.00	0.01	0.00	62.61	62.61	0.00	0.00	62.69
Total	**0.10**	**0.45**	**0.75**	**0.00**	**0.10**	**0.01**	**0.12**	**0.00**	**0.01**	**0.02**	**0.00**	**129.81**	**129.81**	**0.00**	**0.00**	**129.92**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.97	8.47	6.48	0.01		0.47	0.47		0.47	0.47	0.00	952.79	952.79	0.09	0.00	954.73
Total	**3.97**	**8.47**	**6.48**	**0.01**		**0.47**	**0.47**		**0.47**	**0.47**	**0.00**	**952.79**	**952.79**	**0.09**	**0.00**	**954.73**

3.4 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.40	0.24	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.00	67.20	67.20	0.00	0.00	67.23
Worker	0.06	0.05	0.51	0.00	0.08	0.00	0.09	0.00	0.00	0.01	0.00	62.61	62.61	0.00	0.00	62.69
Total	**0.10**	**0.45**	**0.75**	**0.00**	**0.10**	**0.01**	**0.12**	**0.00**	**0.01**	**0.02**	**0.00**	**129.81**	**129.81**	**0.00**	**0.00**	**129.92**

3.5 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.56	3.43	2.34	0.00		0.29	0.29		0.29	0.29	0.00	302.50	302.50	0.05	0.00	303.45
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.56**	**3.43**	**2.34**	**0.00**		**0.29**	**0.29**		**0.29**	**0.29**	**0.00**	**302.50**	**302.50**	**0.05**	**0.00**	**303.45**

3.5 Paving - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	6.68	6.68	0.00	0.00	6.69
Total	**0.01**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**6.68**	**6.68**	**0.00**	**0.00**	**6.69**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.70	2.88	2.17	0.00		0.18	0.18		0.18	0.18	0.00	302.50	302.50	0.05	0.00	303.45
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1.70**	**2.88**	**2.17**	**0.00**		**0.18**	**0.18**		**0.18**	**0.18**	**0.00**	**302.50**	**302.50**	**0.05**	**0.00**	**303.45**

3.5 Paving - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	6.68	6.68	0.00	0.00	6.69
Total	**0.01**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**6.68**	**6.68**	**0.00**	**0.00**	**6.69**

3.6 Architectural Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.05	0.31	0.23	0.00		0.03	0.03		0.03	0.03	0.00	30.60	30.60	0.00	0.00	30.69
Total	**0.05**	**0.31**	**0.23**	**0.00**		**0.03**	**0.03**		**0.03**	**0.03**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.69**

3.6 Architectural Coating - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	5.76	5.76	0.00	0.00	5.76
Total	**0.01**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**5.76**	**5.76**	**0.00**	**0.00**	**5.76**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.17	0.29	0.22	0.00		0.02	0.02		0.02	0.02	0.00	30.60	30.60	0.00	0.00	30.69
Total	**0.17**	**0.29**	**0.22**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.69**

3.6 Architectural Coating - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	5.76	5.76	0.00	0.00	5.76
Total	**0.01**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**5.76**	**5.76**	**0.00**	**0.00**	**5.76**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

Increase Density

Increase Diversity

Improve Walkability Design

Improve Pedestrian Network

Implement Trip Reduction Program

Implement School Bus Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.07	4.57	35.50	0.05	5.47	0.20	5.67	0.21	0.20	0.41	0.00	4,235.27	4,235.27	0.22	0.00	4,239.87
Unmitigated	4.66	5.42	41.66	0.06	6.74	0.24	6.98	0.26	0.24	0.50	0.00	5,188.38	5,188.38	0.26	0.00	5,193.91
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,113.71	1,210.04	1025.83	3,267,779	2,674,839
Elementary School	387.00	0.00	0.00	609,508	405,009
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	7,566,775
Total	4,668.38	4,546.52	3,928.70	13,121,415	10,646,623

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Apartments Mid Rise	10.80	7.30	7.50	48.40	13.90	37.70
Elementary School	9.50	7.30	7.30	65.00	30.00	5.00
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.00	0.00		0.00	0.00	0.00	904.17	904.17	0.04	0.02	909.83
Electricity Unmitigated						0.00	0.00		0.00	0.00	0.00	937.85	937.85	0.04	0.02	943.73
NaturalGas Mitigated	0.07	0.58	0.26	0.00		0.00	0.05		0.00	0.05	0.00	664.54	664.54	0.01	0.01	668.59
NaturalGas Unmitigated	0.08	0.69	0.31	0.00		0.00	0.06		0.00	0.06	0.00	799.08	799.08	0.02	0.01	803.95
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006	0.01	0.12	0.05	0.00		0.00	0.01		0.00	0.01	0.00	133.91	133.91	0.00	0.00	134.72
Elementary School	660383	0.00	0.03	0.03	0.00		0.00	0.00		0.00	0.00	0.00	35.24	35.24	0.00	0.00	35.46
Single Family Housing	1.18046e+007	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	629.94	629.94	0.01	0.01	633.77
Total		**0.07**	**0.69**	**0.31**	**0.00**		**0.00**	**0.05**		**0.00**	**0.05**	**0.00**	**799.09**	**799.09**	**0.01**	**0.01**	**803.95**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.07494e+006	0.01	0.10	0.04	0.00		0.00	0.01		0.00	0.01	0.00	110.73	110.73	0.00	0.00	111.40
Elementary School	537938	0.00	0.03	0.02	0.00		0.00	0.00		0.00	0.00	0.00	28.71	28.71	0.00	0.00	28.88
Single Family Housing	9.84016e+006	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	525.11	525.11	0.01	0.01	528.30
Total		**0.06**	**0.58**	**0.25**	**0.00**		**0.00**	**0.05**		**0.00**	**0.05**	**0.00**	**664.55**	**664.55**	**0.01**	**0.01**	**668.58**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
Elementary School	199143					57.93	0.00	0.00	58.30
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**937.85**	**0.04**	**0.01**	**943.74**

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	635826					184.97	0.01	0.00	186.13
Elementary School	186001					54.11	0.00	0.00	54.45
Single Family Housing	2.28623e+006					665.09	0.03	0.01	669.26
Total						**904.17**	**0.04**	**0.01**	**909.84**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.98	0.04	3.37	0.00		0.00	0.06		0.00	0.06	0.00	655.04	655.04	0.02	0.01	659.09
Unmitigated	4.01	0.04	3.83	0.00		0.00	0.07		0.00	0.07	0.00	655.94	655.94	0.02	0.01	660.03
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.73					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	3.08					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.07	0.00	0.00	0.00		0.00	0.05		0.00	0.04	0.00	649.81	649.81	0.01	0.01	653.77
Landscaping	0.12	0.04	3.82	0.00		0.00	0.02		0.00	0.02	0.00	6.13	6.13	0.01	0.00	6.27
Total	**4.00**	**0.04**	**3.82**	**0.00**		**0.00**	**0.07**		**0.00**	**0.06**	**0.00**	**655.94**	**655.94**	**0.02**	**0.01**	**660.04**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.73					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	3.08					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.07	0.00	0.00	0.00		0.00	0.05		0.00	0.04	0.00	649.81	649.81	0.01	0.01	653.77
Landscaping	0.09	0.04	3.36	0.00		0.00	0.02		0.00	0.02	0.00	5.22	5.22	0.00	0.00	5.33
Total	**3.97**	**0.04**	**3.36**	**0.00**		**0.00**	**0.07**		**0.00**	**0.06**	**0.00**	**655.03**	**655.03**	**0.01**	**0.01**	**659.10**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Water Efficient Irrigation System

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					74.22	1.02	0.03	103.85
Unmitigated					75.61	1.02	0.03	105.25
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
Elementary School	0.727272 / 1.87013					3.06	0.02	0.00	3.71
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**75.61**	**1.02**	**0.03**	**105.25**

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.51829					24.09	0.34	0.01	33.89
Elementary School	0.727272 / 1.75605					2.94	0.02	0.00	3.60
Single Family Housing	21.566 / 12.7666					47.19	0.66	0.02	66.37
Total						**74.22**	**1.02**	**0.03**	**103.86**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					46.11	2.73	0.00	103.34
Unmitigated					92.22	5.45	0.00	206.68
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
Elementary School	54.75					11.11	0.66	0.00	24.91
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**92.22**	**5.45**	**0.00**	**206.69**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	38.87					7.89	0.47	0.00	17.68
Elementary School	27.375					5.56	0.33	0.00	12.45
Single Family Housing	160.92					32.67	1.93	0.00	73.21
Total						**46.12**	**2.73**	**0.00**	**103.34**

9.0 Vegetation

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons				MT			
Unmitigated					0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

9.1 Net New Trees

<u>Species Class</u>

	Number of Trees	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
		tons				MT			
	1150					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	48.46	1000sqft
Office Park	16.34	1000sqft
Parking Lot	228	Space
Parking Lot	72.6	Space
City Park	4.35	Acre
Apartments Mid Rise	169	Dwelling Unit
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Utility Company** Pacific Gas & Electric Company

Climate Zone 3 **Precipitation Freq (Days)** 46

1.3 User Entered Comments

Project Characteristics - Phase_2016

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Based on project's description.

Energy Use -

Sequestration - Rough estimate based on 2 trees per unit, 1000 park, and 300 trees per commercial and office. All future development is subject to the City of Turlock's Municipal Code, Chapter 7-7.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

Architectural Coating - No construction emissions.

Vehicle Trips -

Vechicle Emission Factors - VRPA Research, 2006-Accepted by the SJVAPCD for fleet mix revisions.

Vechicle Emission Factors - "

Vechicle Emission Factors - "

Woodstoves - Assume 100 percent natural gas fireplaces.

Energy Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	3.50	24.73	17.96	0.04	3.35	1.24	4.59	1.75	1.24	2.99	0.00	3,213.25	3,213.25	0.28	0.00	3,219.15
2017	1.82	11.41	10.12	0.02	0.13	0.72	0.85	0.01	0.72	0.72	0.00	1,628.72	1,628.72	0.14	0.00	1,631.75
Total	**5.32**	**36.14**	**28.08**	**0.06**	**3.48**	**1.96**	**5.44**	**1.76**	**1.96**	**3.71**	**0.00**	**4,841.97**	**4,841.97**	**0.42**	**0.00**	**4,850.90**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	12.39	26.45	19.47	0.04	1.41	1.25	2.66	0.69	1.25	1.94	0.00	3,213.25	3,213.25	0.28	0.00	3,219.15
2017	6.64	13.70	10.75	0.02	0.13	0.76	0.89	0.01	0.76	0.76	0.00	1,628.72	1,628.72	0.14	0.00	1,631.75
Total	**19.03**	**40.15**	**30.22**	**0.06**	**1.54**	**2.01**	**3.55**	**0.70**	**2.01**	**2.70**	**0.00**	**4,841.97**	**4,841.97**	**0.42**	**0.00**	**4,850.90**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.74	0.04	3.79	0.00		0.00	0.07		0.00	0.07	0.00	655.94	655.94	0.02	0.01	660.03
Energy	0.08	0.71	0.32	0.00		0.00	0.06		0.00	0.06	0.00	1,904.32	1,904.32	0.06	0.03	1,916.10
Mobile	4.23	4.76	36.45	0.06	7.11	0.25	7.35	0.28	0.25	0.52	0.00	5,081.73	5,081.73	0.24	0.00	5,086.76
Waste						0.00	0.00		0.00	0.00	93.42	0.00	93.42	5.52	0.00	209.36
Water						0.00	0.00		0.00	0.00	0.00	103.28	103.28	1.35	0.04	142.54
Total	**9.05**	**5.51**	**40.56**	**0.06**	**7.11**	**0.25**	**7.48**	**0.28**	**0.25**	**0.65**	**93.42**	**7,745.27**	**7,838.69**	**7.19**	**0.08**	**8,014.79**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.71	0.04	3.34	0.00		0.00	0.06		0.00	0.06	0.00	655.04	655.04	0.02	0.01	659.09
Energy	0.07	0.59	0.27	0.00		0.00	0.05		0.00	0.05	0.00	1,722.29	1,722.29	0.06	0.03	1,732.96
Mobile	3.60	3.89	30.05	0.05	5.51	0.19	5.70	0.21	0.19	0.41	0.00	3,969.14	3,969.14	0.19	0.00	3,973.17
Waste						0.00	0.00		0.00	0.00	46.71	0.00	46.71	2.76	0.00	104.68
Water						0.00	0.00		0.00	0.00	0.00	101.24	101.24	1.35	0.04	140.49
Total	**8.38**	**4.52**	**33.66**	**0.05**	**5.51**	**0.19**	**5.81**	**0.21**	**0.19**	**0.52**	**46.71**	**6,447.71**	**6,494.42**	**4.38**	**0.08**	**6,610.39**

2.3 Vegetation

Vegetation

	ROG	NOx	CO	SO2	CO2e
Category	tons				MT
New Trees					0.00
Total					**0.00**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.17	0.00	1.17	0.65	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.54	4.20	2.52	0.00		0.19	0.19		0.19	0.19	0.00	469.60	469.60	0.04	0.00	470.52
Total	**0.54**	**4.20**	**2.52**	**0.00**	**1.17**	**0.19**	**1.36**	**0.65**	**0.19**	**0.84**	**0.00**	**469.60**	**469.60**	**0.04**	**0.00**	**470.52**

3.2 Site Preparation - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13	2.13	0.00	0.00	2.13
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.14**	**2.14**	**0.00**	**0.00**	**2.14**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.46	0.00	0.46	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	2.13	3.96	2.57	0.00		0.16	0.16		0.16	0.16	0.00	469.60	469.60	0.04	0.00	470.52
Total	**2.13**	**3.96**	**2.57**	**0.00**	**0.46**	**0.16**	**0.62**	**0.25**	**0.16**	**0.41**	**0.00**	**469.60**	**469.60**	**0.04**	**0.00**	**470.52**

3.2 Site Preparation - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13	2.13	0.00	0.00	2.13
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.14**	**2.14**	**0.00**	**0.00**	**2.14**

3.3 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.01	0.00	2.01	1.10	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	1.19	9.20	5.65	0.01		0.41	0.41		0.41	0.41	0.00	1,085.44	1,085.44	0.10	0.00	1,087.48
Total	**1.19**	**9.20**	**5.65**	**0.01**	**2.01**	**0.41**	**2.42**	**1.10**	**0.41**	**1.51**	**0.00**	**1,085.44**	**1,085.44**	**0.10**	**0.00**	**1,087.48**

3.3 Grading - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	3.92	3.92	0.00	0.00	3.92
Total	**0.00**	**0.00**	**0.03**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**3.92**	**3.92**	**0.00**	**0.00**	**3.92**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.78	0.00	0.78	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	4.21	8.97	6.14	0.01		0.37	0.37		0.37	0.37	0.00	1,085.44	1,085.44	0.10	0.00	1,087.48
Total	**4.21**	**8.97**	**6.14**	**0.01**	**0.78**	**0.37**	**1.15**	**0.43**	**0.37**	**0.80**	**0.00**	**1,085.44**	**1,085.44**	**0.10**	**0.00**	**1,087.48**

3.3 Grading - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	3.92	3.92	0.00	0.00	3.92
Total	**0.00**	**0.00**	**0.03**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**3.92**	**3.92**	**0.00**	**0.00**	**3.92**

3.4 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.62	10.57	8.70	0.02		0.61	0.61		0.61	0.61	0.00	1,441.49	1,441.49	0.13	0.00	1,444.26
Total	**1.62**	**10.57**	**8.70**	**0.02**		**0.61**	**0.61**		**0.61**	**0.61**	**0.00**	**1,441.49**	**1,441.49**	**0.13**	**0.00**	**1,444.26**

3.4 Building Construction - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.06	0.71	0.42	0.00	0.04	0.02	0.06	0.00	0.02	0.02	0.00	127.23	127.23	0.00	0.00	127.28
Worker	0.08	0.06	0.63	0.00	0.12	0.00	0.12	0.01	0.00	0.01	0.00	83.43	83.43	0.00	0.00	83.54
Total	**0.14**	**0.77**	**1.05**	**0.00**	**0.16**	**0.02**	**0.18**	**0.01**	**0.02**	**0.03**	**0.00**	**210.66**	**210.66**	**0.00**	**0.00**	**210.82**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.90	12.76	9.66	0.02		0.70	0.70		0.70	0.70	0.00	1,441.49	1,441.49	0.13	0.00	1,444.26
Total	**5.90**	**12.76**	**9.66**	**0.02**		**0.70**	**0.70**		**0.70**	**0.70**	**0.00**	**1,441.49**	**1,441.49**	**0.13**	**0.00**	**1,444.26**

3.4 Building Construction - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.06	0.71	0.42	0.00	0.04	0.02	0.06	0.00	0.02	0.02	0.00	127.23	127.23	0.00	0.00	127.28
Worker	0.08	0.06	0.63	0.00	0.12	0.00	0.12	0.01	0.00	0.01	0.00	83.43	83.43	0.00	0.00	83.54
Total	**0.14**	**0.77**	**1.05**	**0.00**	**0.16**	**0.02**	**0.18**	**0.01**	**0.02**	**0.03**	**0.00**	**210.66**	**210.66**	**0.00**	**0.00**	**210.82**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.14	7.36	6.60	0.01		0.41	0.41		0.41	0.41	0.00	1,102.32	1,102.32	0.09	0.00	1,104.25
Total	**1.14**	**7.36**	**6.60**	**0.01**		**0.41**	**0.41**		**0.41**	**0.41**	**0.00**	**1,102.32**	**1,102.32**	**0.09**	**0.00**	**1,104.25**

3.4 Building Construction - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.50	0.30	0.00	0.03	0.01	0.04	0.00	0.01	0.02	0.00	97.26	97.26	0.00	0.00	97.30
Worker	0.05	0.04	0.44	0.00	0.09	0.00	0.09	0.00	0.00	0.01	0.00	62.21	62.21	0.00	0.00	62.28
Total	**0.09**	**0.54**	**0.74**	**0.00**	**0.12**	**0.01**	**0.13**	**0.00**	**0.01**	**0.03**	**0.00**	**159.47**	**159.47**	**0.00**	**0.00**	**159.58**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.51	9.76	7.39	0.01		0.53	0.53		0.53	0.53	0.00	1,102.32	1,102.32	0.09	0.00	1,104.25
Total	**4.51**	**9.76**	**7.39**	**0.01**		**0.53**	**0.53**		**0.53**	**0.53**	**0.00**	**1,102.32**	**1,102.32**	**0.09**	**0.00**	**1,104.25**

3.4 Building Construction - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.50	0.30	0.00	0.03	0.01	0.04	0.00	0.01	0.02	0.00	97.26	97.26	0.00	0.00	97.30
Worker	0.05	0.04	0.44	0.00	0.09	0.00	0.09	0.00	0.00	0.01	0.00	62.21	62.21	0.00	0.00	62.28
Total	**0.09**	**0.54**	**0.74**	**0.00**	**0.12**	**0.01**	**0.13**	**0.00**	**0.01**	**0.03**	**0.00**	**159.47**	**159.47**	**0.00**	**0.00**	**159.58**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.53	3.25	2.50	0.00		0.27	0.27		0.27	0.27	0.00	327.16	327.16	0.04	0.00	328.06
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.53**	**3.25**	**2.50**	**0.00**		**0.27**	**0.27**		**0.27**	**0.27**	**0.00**	**327.16**	**327.16**	**0.04**	**0.00**	**328.06**

3.5 Paving - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.38	3.38	0.00	0.00	3.39
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.38**	**3.38**	**0.00**	**0.00**	**3.39**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.84	3.11	2.35	0.00		0.19	0.19		0.19	0.19	0.00	327.16	327.16	0.04	0.00	328.06
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1.84**	**3.11**	**2.35**	**0.00**		**0.19**	**0.19**		**0.19**	**0.19**	**0.00**	**327.16**	**327.16**	**0.04**	**0.00**	**328.06**

3.5 Paving - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.38	3.38	0.00	0.00	3.39
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.38**	**3.38**	**0.00**	**0.00**	**3.39**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.04	0.26	0.22	0.00		0.02	0.02		0.02	0.02	0.00	30.60	30.60	0.00	0.00	30.67
Total	**0.04**	**0.26**	**0.22**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.67**

3.6 Architectural Coating - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	5.79	5.79	0.00	0.00	5.79
Total	**0.01**	**0.00**	**0.04**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**5.79**	**5.79**	**0.00**	**0.00**	**5.79**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.17	0.29	0.22	0.00		0.02	0.02		0.02	0.02	0.00	30.60	30.60	0.00	0.00	30.67
Total	**0.17**	**0.29**	**0.22**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.67**

3.6 Architectural Coating - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.01	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	5.79	5.79	0.00	0.00	5.79
Total	**0.01**	**0.00**	**0.04**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**5.79**	**5.79**	**0.00**	**0.00**	**5.79**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

Increase Density

Increase Diversity

Improve Walkability Design

Improve Pedestrian Network

Implement Trip Reduction Program

Implement School Bus Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.60	3.89	30.05	0.05	5.51	0.19	5.70	0.21	0.19	0.41	0.00	3,969.14	3,969.14	0.19	0.00	3,973.17
Unmitigated	4.23	4.76	36.45	0.06	7.11	0.25	7.35	0.28	0.25	0.52	0.00	5,081.73	5,081.73	0.24	0.00	5,086.76
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,113.71	1,210.04	1025.83	3,267,779	2,532,960
City Park	6.92	6.92	6.92	14,766	11,445
General Office Building	533.54	114.85	47.49	966,165	748,905
Office Park	186.60	26.80	12.42	348,093	269,818
Parking Lot	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	7,165,417
Total	5,008.44	4,695.08	3,995.53	13,840,930	10,728,545

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Apartments Mid Rise	10.80	7.30	7.50	48.40	13.90	37.70
City Park	9.50	7.30	7.30	33.00	48.00	19.00
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00
Office Park	9.50	7.30	7.30	33.00	48.00	19.00
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.00	0.00		0.00	0.00	0.00	1,041.09	1,041.09	0.05	0.02	1,047.62
Electricity Unmitigated						0.00	0.00		0.00	0.00	0.00	1,084.13	1,084.13	0.05	0.02	1,090.92
NaturalGas Mitigated	0.07	0.59	0.27	0.00		0.00	0.05		0.00	0.05	0.00	681.20	681.20	0.01	0.01	685.34
NaturalGas Unmitigated	0.08	0.71	0.32	0.00		0.00	0.06		0.00	0.06	0.00	820.18	820.18	0.02	0.02	825.18
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006	0.01	0.12	0.05	0.00		0.00	0.01		0.00	0.01	0.00	133.91	133.91	0.00	0.00	134.72
City Park	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885	0.00	0.03	0.03	0.00		0.00	0.00		0.00	0.00	0.00	35.48	35.48	0.00	0.00	35.70
Office Park	390897	0.00	0.02	0.02	0.00		0.00	0.00		0.00	0.00	0.00	20.86	20.86	0.00	0.00	20.99
Parking Lot	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	629.94	629.94	0.01	0.01	633.77
Total		**0.07**	**0.71**	**0.33**	**0.00**		**0.00**	**0.05**		**0.00**	**0.05**	**0.00**	**820.19**	**820.19**	**0.01**	**0.01**	**825.18**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.07494e+006	0.01	0.10	0.04	0.00		0.00	0.01		0.00	0.01	0.00	110.73	110.73	0.00	0.00	111.40
City Park	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	534622	0.00	0.03	0.02	0.00		0.00	0.00		0.00	0.00	0.00	28.53	28.53	0.00	0.00	28.70
Office Park	315396	0.00	0.02	0.01	0.00		0.00	0.00		0.00	0.00	0.00	16.83	16.83	0.00	0.00	16.93
Parking Lot	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	9.84016e+006	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	525.11	525.11	0.01	0.01	528.30
Total		**0.06**	**0.60**	**0.26**	**0.00**		**0.00**	**0.05**		**0.00**	**0.05**	**0.00**	**681.20**	**681.20**	**0.01**	**0.01**	**685.33**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Office Park	211538					61.54	0.00	0.00	61.92
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**1,084.13**	**0.05**	**0.01**	**1,090.92**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	635826					184.97	0.01	0.00	186.13
City Park	0					0.00	0.00	0.00	0.00
General Office Building	459410					133.65	0.01	0.00	134.49
Office Park	197261					57.39	0.00	0.00	57.75
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.28623e+006					665.09	0.03	0.01	669.26
Total						**1,041.10**	**0.05**	**0.01**	**1,047.63**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.71	0.04	3.34	0.00		0.00	0.06		0.00	0.06	0.00	655.04	655.04	0.02	0.01	659.09
Unmitigated	4.74	0.04	3.79	0.00		0.00	0.07		0.00	0.07	0.00	655.94	655.94	0.02	0.01	660.03
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.85					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	3.71					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.07	0.00	0.00	0.00		0.00	0.05		0.00	0.04	0.00	649.81	649.81	0.01	0.01	653.77
Landscaping	0.12	0.04	3.79	0.00		0.00	0.02		0.00	0.02	0.00	6.13	6.13	0.01	0.00	6.26
Total	**4.75**	**0.04**	**3.79**	**0.00**		**0.00**	**0.07**		**0.00**	**0.06**	**0.00**	**655.94**	**655.94**	**0.02**	**0.01**	**660.03**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.85					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	3.71					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.07	0.00	0.00	0.00		0.00	0.05		0.00	0.04	0.00	649.81	649.81	0.01	0.01	653.77
Landscaping	0.09	0.04	3.34	0.00		0.00	0.02		0.00	0.02	0.00	5.22	5.22	0.00	0.00	5.32
Total	**4.72**	**0.04**	**3.34**	**0.00**		**0.00**	**0.07**		**0.00**	**0.06**	**0.00**	**655.03**	**655.03**	**0.01**	**0.01**	**659.09**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Water Efficient Irrigation System

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					101.24	1.35	0.04	140.49
Unmitigated					103.28	1.35	0.04	142.54
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Office Park	2.90417 / 1.77997					6.42	0.09	0.00	9.00
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**103.28**	**1.35**	**0.04**	**142.54**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.51829					24.09	0.34	0.01	33.89
City Park	0 / 4.86678					4.96	0.00	0.00	4.99
General Office Building	8.61298 / 4.95691					18.70	0.26	0.01	26.36
Office Park	2.90417 / 1.6714					6.31	0.09	0.00	8.89
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 12.7666					47.19	0.66	0.02	66.37
Total						**101.25**	**1.35**	**0.04**	**140.50**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					46.71	2.76	0.00	104.68
Unmitigated					93.42	5.52	0.00	209.36
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Office Park	15.2					3.09	0.18	0.00	6.91
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**93.43**	**5.51**	**0.00**	**209.36**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	38.87					7.89	0.47	0.00	17.68
City Park	0.185					0.04	0.00	0.00	0.08
General Office Building	22.535					4.57	0.27	0.00	10.25
Office Park	7.6					1.54	0.09	0.00	3.46
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	160.92					32.67	1.93	0.00	73.21
Total						**46.71**	**2.76**	**0.00**	**104.68**

9.0 Vegetation

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons				MT			
Unmitigated					0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

9.1 Net New Trees

<u>Species Class</u>

	Number of Trees	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
		tons				MT			
	2962					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	48.46	1000sqft
Parking Lot	228	Space
City Park	4.35	Acre
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**	Pacific Gas & Electric Company
Climate Zone	3	**Precipitation Freq (Days)**	46		

1.3 User Entered Comments

Project Characteristics - Phase_2019

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Based on project's description.

Energy Use -

Sequestration - Rough estimate based on 2 trees per unit, 1000 park, and 150 trees per commercial. All future development is subject to the City of Turlock's Municipal Code, Chapter 7-7.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Waste Mitigation -

Architectural Coating - No construction emissions.

Vechicle Emission Factors - VRPA Research, 2006-Accepted by the SJVAPCD for fleet mix revisions.

Vechicle Emission Factors - "

Vechicle Emission Factors - "

Woodstoves - Assume 100 percent natural gas fireplaces.

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	1.80	12.37	10.88	0.02	1.47	0.61	2.07	0.75	0.61	1.35	0.00	1,974.07	1,974.07	0.14	0.00	1,977.08
2019	0.97	6.19	6.54	0.01	0.07	0.37	0.44	0.00	0.37	0.37	0.00	1,055.87	1,055.87	0.08	0.00	1,057.49
Total	**2.77**	**18.56**	**17.42**	**0.03**	**1.54**	**0.98**	**2.51**	**0.75**	**0.98**	**1.72**	**0.00**	**3,029.94**	**3,029.94**	**0.22**	**0.00**	**3,034.57**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	7.70	16.39	12.19	0.02	0.63	0.80	1.43	0.29	0.80	1.10	0.00	1,974.07	1,974.07	0.14	0.00	1,977.08
2019	4.38	8.95	6.97	0.01	0.07	0.50	0.57	0.00	0.50	0.50	0.00	1,055.87	1,055.87	0.08	0.00	1,057.49
Total	**12.08**	**25.34**	**19.16**	**0.03**	**0.70**	**1.30**	**2.00**	**0.29**	**1.30**	**1.60**	**0.00**	**3,029.94**	**3,029.94**	**0.22**	**0.00**	**3,034.57**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.65	0.03	2.50	0.00		0.00	0.04		0.00	0.04	0.00	434.24	434.24	0.01	0.01	436.94
Energy	0.07	0.58	0.26	0.00		0.00	0.05		0.00	0.05	0.00	1,496.10	1,496.10	0.05	0.03	1,505.36
Mobile	2.76	2.99	22.80	0.05	5.25	0.17	5.43	0.08	0.17	0.25	0.00	3,491.91	3,491.91	0.15	0.00	3,495.08
Waste						0.00	0.00		0.00	0.00	74.55	0.00	74.55	4.41	0.00	167.08
Water						0.00	0.00		0.00	0.00	0.00	72.34	72.34	0.92	0.02	99.22
Total	**6.48**	**3.60**	**25.56**	**0.05**	**5.25**	**0.17**	**5.52**	**0.08**	**0.17**	**0.34**	**74.55**	**5,494.59**	**5,569.14**	**5.54**	**0.06**	**5,703.68**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.63	0.03	2.20	0.00		0.00	0.04		0.00	0.04	0.00	433.63	433.63	0.01	0.01	436.31
Energy	0.06	0.48	0.21	0.00		0.00	0.04		0.00	0.04	0.00	1,352.38	1,352.38	0.05	0.02	1,360.75
Mobile	2.52	2.68	20.48	0.04	4.57	0.15	4.72	0.07	0.15	0.22	0.00	3,050.09	3,050.09	0.13	0.00	3,052.88
Waste						0.00	0.00		0.00	0.00	37.28	0.00	37.28	2.20	0.00	83.54
Water						0.00	0.00		0.00	0.00	0.00	70.85	70.85	0.92	0.02	97.71
Total	**6.21**	**3.19**	**22.89**	**0.04**	**4.57**	**0.15**	**4.80**	**0.07**	**0.15**	**0.30**	**37.28**	**4,906.95**	**4,944.23**	**3.31**	**0.05**	**5,031.19**

2.3 Vegetation

Vegetation

	ROG	NOx	CO	SO2	CO2e
Category	tons				MT
New Trees					0.00
Total					**0.00**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.81	0.00	0.81	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.33	2.52	1.61	0.00		0.11	0.11		0.11	0.11	0.00	326.40	326.40	0.03	0.00	326.97
Total	**0.33**	**2.52**	**1.61**	**0.00**	**0.81**	**0.11**	**0.92**	**0.45**	**0.11**	**0.56**	**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**326.97**

3.2 Site Preparation - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39	1.39	0.00	0.00	1.39
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.40**	**1.40**	**0.00**	**0.00**	**1.40**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.32	0.00	0.32	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	1.48	2.75	1.79	0.00		0.11	0.11		0.11	0.11	0.00	326.40	326.40	0.03	0.00	326.97
Total	**1.48**	**2.75**	**1.79**	**0.00**	**0.32**	**0.11**	**0.43**	**0.17**	**0.11**	**0.28**	**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**326.97**

3.2 Site Preparation - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39	1.39	0.00	0.00	1.39
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.40**	**1.40**	**0.00**	**0.00**	**1.40**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.56	0.00	0.56	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.54	3.84	3.00	0.01		0.18	0.18		0.18	0.18	0.00	580.53	580.53	0.04	0.00	581.45
Total	**0.54**	**3.84**	**3.00**	**0.01**	**0.56**	**0.18**	**0.74**	**0.30**	**0.18**	**0.48**	**0.00**	**580.53**	**580.53**	**0.04**	**0.00**	**581.45**

3.3 Grading - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	2.67	0.00	0.00	2.67
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.67**	**2.67**	**0.00**	**0.00**	**2.67**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.22	0.00	0.22	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	2.25	4.89	3.50	0.01		0.22	0.22		0.22	0.22	0.00	580.53	580.53	0.04	0.00	581.45
Total	**2.25**	**4.89**	**3.50**	**0.01**	**0.22**	**0.22**	**0.44**	**0.12**	**0.22**	**0.34**	**0.00**	**580.53**	**580.53**	**0.04**	**0.00**	**581.45**

3.3 Grading - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	2.67	0.00	0.00	2.67
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.67**	**2.67**	**0.00**	**0.00**	**2.67**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.85	5.55	5.73	0.01		0.31	0.31		0.31	0.31	0.00	934.47	934.47	0.07	0.00	935.92
Total	**0.85**	**5.55**	**5.73**	**0.01**		**0.31**	**0.31**		**0.31**	**0.31**	**0.00**	**934.47**	**934.47**	**0.07**	**0.00**	**935.92**

3.4 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.42	0.25	0.00	0.03	0.01	0.04	0.00	0.01	0.01	0.00	87.80	87.80	0.00	0.00	87.84
Worker	0.03	0.02	0.27	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	40.80	40.80	0.00	0.00	40.84
Total	**0.07**	**0.44**	**0.52**	**0.00**	**0.09**	**0.01**	**0.10**	**0.00**	**0.01**	**0.01**	**0.00**	**128.60**	**128.60**	**0.00**	**0.00**	**128.68**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.89	8.31	6.36	0.01		0.46	0.46		0.46	0.46	0.00	934.47	934.47	0.07	0.00	935.92
Total	**3.89**	**8.31**	**6.36**	**0.01**		**0.46**	**0.46**		**0.46**	**0.46**	**0.00**	**934.47**	**934.47**	**0.07**	**0.00**	**935.92**

3.4 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.04	0.42	0.25	0.00	0.03	0.01	0.04	0.00	0.01	0.01	0.00	87.80	87.80	0.00	0.00	87.84
Worker	0.03	0.02	0.27	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	40.80	40.80	0.00	0.00	40.84
Total	**0.07**	**0.44**	**0.52**	**0.00**	**0.09**	**0.01**	**0.10**	**0.00**	**0.01**	**0.01**	**0.00**	**128.60**	**128.60**	**0.00**	**0.00**	**128.68**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.59	3.85	4.36	0.01		0.20	0.20		0.20	0.20	0.00	714.59	714.59	0.05	0.00	715.61
Total	**0.59**	**3.85**	**4.36**	**0.01**		**0.20**	**0.20**		**0.20**	**0.20**	**0.00**	**714.59**	**714.59**	**0.05**	**0.00**	**715.61**

3.4 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.03	0.30	0.18	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.00	67.13	67.13	0.00	0.00	67.16
Worker	0.02	0.02	0.19	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	30.55	30.55	0.00	0.00	30.58
Total	**0.05**	**0.32**	**0.37**	**0.00**	**0.07**	**0.01**	**0.08**	**0.00**	**0.01**	**0.01**	**0.00**	**97.68**	**97.68**	**0.00**	**0.00**	**97.74**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.98	6.35	4.86	0.01		0.35	0.35		0.35	0.35	0.00	714.59	714.59	0.05	0.00	715.61
Total	**2.98**	**6.35**	**4.86**	**0.01**		**0.35**	**0.35**		**0.35**	**0.35**	**0.00**	**714.59**	**714.59**	**0.05**	**0.00**	**715.61**

3.4 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.03	0.30	0.18	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.00	67.13	67.13	0.00	0.00	67.16
Worker	0.02	0.02	0.19	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	30.55	30.55	0.00	0.00	30.58
Total	**0.05**	**0.32**	**0.37**	**0.00**	**0.07**	**0.01**	**0.08**	**0.00**	**0.01**	**0.01**	**0.00**	**97.68**	**97.68**	**0.00**	**0.00**	**97.74**

3.5 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.29	1.80	1.57	0.00		0.14	0.14		0.14	0.14	0.00	208.08	208.08	0.02	0.00	208.58
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.29**	**1.80**	**1.57**	**0.00**		**0.14**	**0.14**		**0.14**	**0.14**	**0.00**	**208.08**	**208.08**	**0.02**	**0.00**	**208.58**

3.5 Paving - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.09	2.09	0.00	0.00	2.09
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.09**	**2.09**	**0.00**	**0.00**	**2.09**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.17	1.98	1.49	0.00		0.12	0.12		0.12	0.12	0.00	208.08	208.08	0.02	0.00	208.58
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1.17**	**1.98**	**1.49**	**0.00**		**0.12**	**0.12**		**0.12**	**0.12**	**0.00**	**208.08**	**208.08**	**0.02**	**0.00**	**208.58**

3.5 Paving - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.09	2.09	0.00	0.00	2.09
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.09**	**2.09**	**0.00**	**0.00**	**2.09**

3.6 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.03	0.22	0.22	0.00		0.02	0.02		0.02	0.02	0.00	30.60	30.60	0.00	0.00	30.66
Total	**0.03**	**0.22**	**0.22**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.66**

3.6 Architectural Coating - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.82	2.82	0.00	0.00	2.82
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.82**	**2.82**	**0.00**	**0.00**	**2.82**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.17	0.29	0.22	0.00		0.02	0.02		0.02	0.02	0.00	30.60	30.60	0.00	0.00	30.66
Total	**0.17**	**0.29**	**0.22**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.66**

3.6 Architectural Coating - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.82	2.82	0.00	0.00	2.82
Total	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.82**	**2.82**	**0.00**	**0.00**	**2.82**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

Increase Density

Increase Diversity

Improve Walkability Design

Improve Pedestrian Network

Implement Trip Reduction Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.52	2.68	20.48	0.04	4.57	0.15	4.72	0.07	0.15	0.22	0.00	3,050.09	3,050.09	0.13	0.00	3,052.88
Unmitigated	2.76	2.99	22.80	0.05	5.25	0.17	5.43	0.08	0.17	0.25	0.00	3,491.91	3,491.91	0.15	0.00	3,495.08
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	6.92	6.92	6.92	14,766	12,659
General Office Building	533.54	114.85	47.49	966,165	828,311
Parking Lot	0.00	0.00	0.00		
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	8,055,090
Total	3,708.13	3,458.25	2,957.28	10,225,058	8,896,060

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
City Park	9.50	7.30	7.30	33.00	48.00	19.00
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.00	0.00		0.00	0.00	0.00	798.74	798.74	0.04	0.01	803.74
Electricity Unmitigated						0.00	0.00		0.00	0.00	0.00	830.69	830.69	0.04	0.01	835.89
NaturalGas Mitigated	0.06	0.48	0.21	0.00		0.00	0.04		0.00	0.04	0.00	553.64	553.64	0.01	0.01	557.01
NaturalGas Unmitigated	0.07	0.58	0.26	0.00		0.00	0.05		0.00	0.05	0.00	665.42	665.42	0.01	0.01	669.47
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
City Park	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885	0.00	0.03	0.03	0.00		0.00	0.00		0.00	0.00	0.00	35.48	35.48	0.00	0.00	35.70
Parking Lot	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	629.94	629.94	0.01	0.01	633.77
Total		**0.06**	**0.57**	**0.26**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**665.42**	**665.42**	**0.01**	**0.01**	**669.47**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
City Park	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	534622	0.00	0.03	0.02	0.00		0.00	0.00		0.00	0.00	0.00	28.53	28.53	0.00	0.00	28.70
Parking Lot	0	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	9.84016e+006	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	525.11	525.11	0.01	0.01	528.30
Total		**0.05**	**0.48**	**0.21**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**553.64**	**553.64**	**0.01**	**0.01**	**557.00**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**830.68**	**0.04**	**0.01**	**835.89**

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
City Park	0					0.00	0.00	0.00	0.00
General Office Building	459410					133.65	0.01	0.00	134.49
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.28623e+006					665.09	0.03	0.01	669.26
Total						**798.74**	**0.04**	**0.01**	**803.75**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.63	0.03	2.20	0.00		0.00	0.04		0.00	0.04	0.00	433.63	433.63	0.01	0.01	436.31
Unmitigated	3.65	0.03	2.50	0.00		0.00	0.04		0.00	0.04	0.00	434.24	434.24	0.01	0.01	436.94
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.66					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	2.87					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.04	0.00	0.00	0.00		0.00	0.03		0.00	0.03	0.00	430.17	430.17	0.01	0.01	432.79
Landscaping	0.08	0.03	2.50	0.00		0.00	0.01		0.00	0.01	0.00	4.06	4.06	0.00	0.00	4.14
Total	**3.65**	**0.03**	**2.50**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**434.23**	**434.23**	**0.01**	**0.01**	**436.93**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.66					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	2.87					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.04	0.00	0.00	0.00		0.00	0.03		0.00	0.03	0.00	430.17	430.17	0.01	0.01	432.79
Landscaping	0.06	0.03	2.20	0.00		0.00	0.01		0.00	0.01	0.00	3.46	3.46	0.00	0.00	3.52
Total	**3.63**	**0.03**	**2.20**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**433.63**	**433.63**	**0.01**	**0.01**	**436.31**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Water Efficient Irrigation System

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					70.85	0.92	0.02	97.71
Unmitigated					72.34	0.92	0.02	99.22
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**72.34**	**0.92**	**0.03**	**99.22**

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
City Park	0 / 4.86678					4.96	0.00	0.00	4.99
General Office Building	8.61298 / 4.95691					18.70	0.26	0.01	26.36
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 12.7666					47.19	0.66	0.02	66.37
Total						**70.85**	**0.92**	**0.03**	**97.72**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					37.28	2.20	0.00	83.54
Unmitigated					74.55	4.41	0.00	167.08
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**74.56**	**4.40**	**0.00**	**167.08**

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
City Park	0.185					0.04	0.00	0.00	0.08
General Office Building	22.535					4.57	0.27	0.00	10.25
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	160.92					32.67	1.93	0.00	73.21
Total						**37.28**	**2.20**	**0.00**	**83.54**

9.0 Vegetation

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons				MT			
Unmitigated					0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

9.1 Net New Trees

Species Class

	Number of Trees	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
		tons				MT			
	1812					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
Single Family Housing	330	Dwelling Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**	Pacific Gas & Electric Company
Climate Zone	3	**Precipitation Freq (Days)**	46		

1.3 User Entered Comments

Project Characteristics - Phase_2020

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Trips and VMT - One haul trip for removal of equipment.

Grading - "

Energy Use -

Sequestration - Rough estimate based on 2 trees per residential unit. All tuture development is subject to the City of Turlock's Municipal Code, Chapter 7-7.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

Architectural Coating - No construction emissions.

Vechicle Emission Factors - VRPA Research, 2006-Accepted by the SJVAPCD for fleet mix revisions.

Vechicle Emission Factors - "

Vechicle Emission Factors - "

Woodstoves - Assume 100 [ercemt matira; gas fireplaces.

Mobile Commute Mitigation -

Energy Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.49	3.20	3.29	0.01	0.35	0.15	0.51	0.15	0.15	0.30	0.00	621.80	621.80	0.04	0.00	622.62
Total	**0.49**	**3.20**	**3.29**	**0.01**	**0.35**	**0.15**	**0.51**	**0.15**	**0.15**	**0.30**	**0.00**	**621.80**	**621.80**	**0.04**	**0.00**	**622.62**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	2.34	4.93	3.76	0.01	0.18	0.24	0.42	0.06	0.24	0.30	0.00	621.80	621.80	0.04	0.00	622.62
Total	**2.34**	**4.93**	**3.76**	**0.01**	**0.18**	**0.24**	**0.42**	**0.06**	**0.24**	**0.30**	**0.00**	**621.80**	**621.80**	**0.04**	**0.00**	**622.62**

2.2 Overall Operational

<u>Unmitigated Operational</u>

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.00	0.03	2.49	0.00		0.00	0.04		0.00	0.04	0.00	432.92	432.92	0.01	0.01	435.62
Energy	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	1,313.97	1,313.97	0.04	0.02	1,322.09
Mobile	2.32	2.45	19.02	0.04	4.73	0.16	4.89	0.08	0.15	0.23	0.00	3,023.85	3,023.85	0.13	0.00	3,026.68
Waste						0.00	0.00		0.00	0.00	68.98	0.00	68.98	4.08	0.00	154.60
Water						0.00	0.00		0.00	0.00	0.00	47.89	47.89	0.66	0.02	67.01
Total	**5.38**	**3.02**	**21.74**	**0.04**	**4.73**	**0.16**	**4.97**	**0.08**	**0.15**	**0.31**	**68.98**	**4,818.63**	**4,887.61**	**4.92**	**0.05**	**5,006.00**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.98	0.03	2.19	0.00		0.00	0.04		0.00	0.04	0.00	432.32	432.32	0.01	0.01	435.00
Energy	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	1,186.60	1,186.60	0.04	0.02	1,193.94
Mobile	2.31	2.43	18.90	0.04	4.69	0.15	4.85	0.07	0.15	0.22	0.00	2,999.57	2,999.57	0.13	0.00	3,002.38
Waste						0.00	0.00		0.00	0.00	34.49	0.00	34.49	2.04	0.00	77.30
Water						0.00	0.00		0.00	0.00	0.00	47.05	47.05	0.66	0.02	66.17
Total	**5.34**	**2.91**	**21.28**	**0.04**	**4.69**	**0.15**	**4.93**	**0.07**	**0.15**	**0.30**	**34.49**	**4,665.54**	**4,700.03**	**2.88**	**0.05**	**4,774.79**

2.3 Vegetation

Vegetation

	ROG	NOx	CO	SO2	CO2e
Category	tons				MT
New Trees					0.00
Total					**0.00**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

3.2 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.18	0.00	0.18	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.07	0.48	0.33	0.00		0.02	0.02		0.02	0.02	0.00	72.53	72.53	0.01	0.00	72.65
Total	**0.07**	**0.48**	**0.33**	**0.00**	**0.18**	**0.02**	**0.20**	**0.10**	**0.02**	**0.12**	**0.00**	**72.53**	**72.53**	**0.01**	**0.00**	**72.65**

3.2 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61	0.00	0.00	0.62
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.61**	**0.61**	**0.00**	**0.00**	**0.62**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.07	0.00	0.07	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.33	0.61	0.40	0.00		0.03	0.03		0.03	0.03	0.00	72.53	72.53	0.01	0.00	72.65
Total	**0.33**	**0.61**	**0.40**	**0.00**	**0.07**	**0.03**	**0.10**	**0.04**	**0.03**	**0.07**	**0.00**	**72.53**	**72.53**	**0.01**	**0.00**	**72.65**

3.2 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.61	0.00	0.00	0.62
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.61**	**0.61**	**0.00**	**0.00**	**0.62**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.11	0.00	0.11	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.12	0.79	0.64	0.00		0.03	0.03		0.03	0.03	0.00	147.69	147.69	0.01	0.00	147.89
Total	**0.12**	**0.79**	**0.64**	**0.00**	**0.11**	**0.03**	**0.14**	**0.05**	**0.03**	**0.08**	**0.00**	**147.69**	**147.69**	**0.01**	**0.00**	**147.89**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	1.02	0.00	0.00	1.03
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.02**	**1.02**	**0.00**	**0.00**	**1.03**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.04	0.00	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.57	1.23	0.85	0.00		0.05	0.05		0.05	0.05	0.00	147.69	147.69	0.01	0.00	147.89
Total	**0.57**	**1.23**	**0.85**	**0.00**	**0.04**	**0.05**	**0.09**	**0.02**	**0.05**	**0.07**	**0.00**	**147.69**	**147.69**	**0.01**	**0.00**	**147.89**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	1.02	0.00	0.00	1.03
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.02**	**1.02**	**0.00**	**0.00**	**1.03**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.21	1.35	1.68	0.00		0.07	0.07		0.07	0.07	0.00	276.68	276.68	0.02	0.00	277.03
Total	**0.21**	**1.35**	**1.68**	**0.00**		**0.07**	**0.07**		**0.07**	**0.07**	**0.00**	**276.68**	**276.68**	**0.02**	**0.00**	**277.03**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.02	0.20	0.12	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	47.05	47.05	0.00	0.00	47.07
Worker	0.02	0.02	0.18	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	30.68	30.68	0.00	0.00	30.71
Total	**0.04**	**0.22**	**0.30**	**0.00**	**0.06**	**0.00**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**77.73**	**77.73**	**0.00**	**0.00**	**77.78**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.15	2.46	1.88	0.00		0.14	0.14		0.14	0.14	0.00	276.68	276.68	0.02	0.00	277.03
Total	**1.15**	**2.46**	**1.88**	**0.00**		**0.14**	**0.14**		**0.14**	**0.14**	**0.00**	**276.68**	**276.68**	**0.02**	**0.00**	**277.03**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.02	0.20	0.12	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	47.05	47.05	0.00	0.00	47.07
Worker	0.02	0.02	0.18	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	30.68	30.68	0.00	0.00	30.71
Total	**0.04**	**0.22**	**0.30**	**0.00**	**0.06**	**0.00**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**77.73**	**77.73**	**0.00**	**0.00**	**77.78**

3.5 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.05	0.32	0.30	0.00		0.02	0.02		0.02	0.02	0.00	39.69	39.69	0.00	0.00	39.78
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.05**	**0.32**	**0.30**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**39.69**	**39.69**	**0.00**	**0.00**	**39.78**

3.5 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.77	0.00	0.00	0.77
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.78**	**0.78**	**0.00**	**0.00**	**0.78**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.22	0.38	0.28	0.00		0.02	0.02		0.02	0.02	0.00	39.69	39.69	0.00	0.00	39.78
Paving	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.22**	**0.38**	**0.28**	**0.00**		**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**39.69**	**39.69**	**0.00**	**0.00**	**39.78**

3.5 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.77	0.00	0.00	0.77
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.78**	**0.78**	**0.00**	**0.00**	**0.78**

3.6 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.00	0.03	0.03	0.00		0.00	0.00		0.00	0.00	0.00	3.83	3.83	0.00	0.00	3.83
Total	**0.00**	**0.03**	**0.03**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**3.83**	**3.83**	**0.00**	**0.00**	**3.83**

3.6 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	1.23	0.00	0.00	1.23
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.23**	**1.23**	**0.00**	**0.00**	**1.23**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.00					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road	0.02	0.04	0.03	0.00		0.00	0.00		0.00	0.00	0.00	3.83	3.83	0.00	0.00	3.83
Total	**0.02**	**0.04**	**0.03**	**0.00**		**0.00**	**0.00**		**0.00**	**0.00**	**0.00**	**3.83**	**3.83**	**0.00**	**0.00**	**3.83**

3.6 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	1.23	0.00	0.00	1.23
Total	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.23**	**1.23**	**0.00**	**0.00**	**1.23**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

Increase Density

Improve Walkability Design

Improve Pedestrian Network

Implement Trip Reduction Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.31	2.43	18.90	0.04	4.69	0.15	4.85	0.07	0.15	0.22	0.00	2,999.57	2,999.57	0.13	0.00	3,002.38
Unmitigated	2.32	2.45	19.02	0.04	4.73	0.16	4.89	0.08	0.15	0.23	0.00	3,023.85	3,023.85	0.13	0.00	3,026.68
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	3,158.10	3,326.40	2894.10	9,216,200	9,140,224
Total	3,158.10	3,326.40	2,894.10	9,216,200	9,140,224

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.00	0.00		0.00	0.00	0.00	663.08	663.08	0.03	0.01	667.24
Electricity Unmitigated						0.00	0.00		0.00	0.00	0.00	685.94	685.94	0.03	0.01	690.23
NaturalGas Mitigated	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	523.52	523.52	0.01	0.01	526.71
NaturalGas Unmitigated	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	628.03	628.03	0.01	0.01	631.86
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Single Family Housing	1.17689e+007	0.06	0.54	0.23	0.00		0.00	0.04		0.00	0.04	0.00	628.03	628.03	0.01	0.01	631.86
Total		**0.06**	**0.54**	**0.23**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**628.03**	**628.03**	**0.01**	**0.01**	**631.86**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Single Family Housing	9.81044e+006	0.05	0.45	0.19	0.00		0.00	0.04		0.00	0.04	0.00	523.52	523.52	0.01	0.01	526.71
Total		**0.05**	**0.45**	**0.19**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**523.52**	**523.52**	**0.01**	**0.01**	**526.71**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Single Family Housing	2.35789e+006					685.94	0.03	0.01	690.23
Total						**685.94**	**0.03**	**0.01**	**690.23**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Single Family Housing	2.27932e+006					663.08	0.03	0.01	667.24
Total						**663.08**	**0.03**	**0.01**	**667.24**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Electric Lawnmower

Use Electric Leafblower

Use Electric Chainsaw

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.98	0.03	2.19	0.00		0.00	0.04		0.00	0.04	0.00	432.32	432.32	0.01	0.01	435.00
Unmitigated	3.00	0.03	2.49	0.00		0.00	0.04		0.00	0.04	0.00	432.92	432.92	0.01	0.01	435.62
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.56					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	2.32					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.04	0.00	0.00	0.00		0.00	0.03		0.00	0.03	0.00	428.88	428.88	0.01	0.01	431.49
Landscaping	0.08	0.03	2.49	0.00		0.00	0.01		0.00	0.01	0.00	4.05	4.05	0.00	0.00	4.13
Total	**3.00**	**0.03**	**2.49**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**432.93**	**432.93**	**0.01**	**0.01**	**435.62**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.56					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	2.32					0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.04	0.00	0.00	0.00		0.00	0.03		0.00	0.03	0.00	428.88	428.88	0.01	0.01	431.49
Landscaping	0.06	0.03	2.19	0.00		0.00	0.01		0.00	0.01	0.00	3.45	3.45	0.00	0.00	3.51
Total	**2.98**	**0.03**	**2.19**	**0.00**		**0.00**	**0.04**		**0.00**	**0.04**	**0.00**	**432.33**	**432.33**	**0.01**	**0.01**	**435.00**

7.0 Water Detail

7.1 Mitigation Measures Water

Use Water Efficient Irrigation System

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					47.05	0.66	0.02	66.17
Unmitigated					47.89	0.66	0.02	67.01
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Single Family Housing	21.5008 / 13.5549					47.89	0.66	0.02	67.01
Total						**47.89**	**0.66**	**0.02**	**67.01**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Single Family Housing	21.5008 / 12.728					47.05	0.66	0.02	66.17
Total						**47.05**	**0.66**	**0.02**	**66.17**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					34.49	2.04	0.00	77.30
Unmitigated					68.98	4.08	0.00	154.60
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Single Family Housing	339.84					68.98	4.08	0.00	154.60
Total						**68.98**	**4.08**	**0.00**	**154.60**

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Single Family Housing	169.92					34.49	2.04	0.00	77.30
Total						**34.49**	**2.04**	**0.00**	**77.30**

9.0 Vegetation

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons				MT			
Unmitigated					0.00	0.00	0.00	0.00
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

9.1 Net New Trees

<u>Species Class</u>

	Number of Trees	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
		tons				MT			
	660					0.00	0.00	0.00	0.00
Total						**0.00**	**0.00**	**0.00**	**0.00**

tblProjectCharacteristics

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2005	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	1625	45.6	0

tblProjectCharacteristics

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2017	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	1300	47.5	0

tblProjectCharacteristics

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2019	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	894	40.9	0

ProjectNan	LocationSc	EMFAC_ID	WindSpeed	Precipitatio	ClimateZor	Urbanizatic	Operationa	UtilityComp
Morgan Ra	C	STAN	2.2	46	3	Urban	2005	Pacific Gas

CO2Intens	CH4Intensi	N2OIntens	TotalPopul	TotalLotAc	UsingHistoricalEnergyUseData
641.35	0.029	0.011	944	30.05	0

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
Elementary School	300	Student
Apartments Mid Rise	169	Dwelling Unit
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**	Pacific Gas & Electric Company
Climate Zone	3	**Precipitation Freq (Days)**	46		

1.3 User Entered Comments

Project Characteristics - Phase_2014GHG

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Includes a 4.4 acre detention basin with an 8-foot depth (worst case scenario).

Energy Use -

Sequestration -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014											0.00	2,451.15	2,451.15	0.24	0.00	2,456.23
2015											0.00	1,428.14	1,428.14	0.15	0.00	1,431.24
Total											**0.00**	**3,879.29**	**3,879.29**	**0.39**	**0.00**	**3,887.47**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014											0.00	2,451.15	2,451.15	0.24	0.00	2,456.23
2015											0.00	1,428.14	1,428.14	0.15	0.00	1,431.24
Total											**0.00**	**3,879.29**	**3,879.29**	**0.39**	**0.00**	**3,887.47**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											139.47	655.94	795.42	0.67	0.01	813.27
Energy											0.00	1,736.94	1,736.94	0.06	0.03	1,747.68
Mobile											0.00	7,766.95	7,766.95	0.71	0.00	7,781.85
Waste											92.22	0.00	92.22	5.45	0.00	206.68
Water											0.00	75.61	75.61	1.02	0.03	105.25
Total											**231.69**	**10,235.44**	**10,467.14**	**7.91**	**0.07**	**10,654.73**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											139.47	655.94	795.42	0.67	0.01	813.27
Energy											0.00	1,736.94	1,736.94	0.06	0.03	1,747.68
Mobile											0.00	7,766.95	7,766.95	0.71	0.00	7,781.85
Waste											92.22	0.00	92.22	5.45	0.00	206.68
Water											0.00	75.61	75.61	1.02	0.03	105.25
Total											**231.69**	**10,235.44**	**10,467.14**	**7.91**	**0.07**	**10,654.73**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	326.40	326.40	0.03	0.00	327.12
Total											**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**327.12**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.13	3.13	0.00	0.00	3.14
Total											**0.00**	**3.14**	**3.14**	**0.00**	**0.00**	**3.15**

3.2 Site Preparation - 2014

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	326.40	326.40	0.03	0.00	327.12
Total											**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**327.12**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.13	3.13	0.00	0.00	3.14
Total											**0.00**	**3.14**	**3.14**	**0.00**	**0.00**	**3.15**

3.3 Grading - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	696.18	696.18	0.07	0.00	697.61
Total											**0.00**	**696.18**	**696.18**	**0.07**	**0.00**	**697.61**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	7.45	7.45	0.00	0.00	7.46
Total											**0.00**	**7.45**	**7.45**	**0.00**	**0.00**	**7.46**

3.3 Grading - 2014

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	696.18	696.18	0.07	0.00	697.61
Total											**0.00**	**696.18**	**696.18**	**0.07**	**0.00**	**697.61**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	7.45	7.45	0.00	0.00	7.46
Total											**0.00**	**7.45**	**7.45**	**0.00**	**0.00**	**7.46**

3.4 Building Construction - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,245.96	1,245.96	0.13	0.00	1,248.70
Total											**0.00**	**1,245.96**	**1,245.96**	**0.13**	**0.00**	**1,248.70**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	87.89	87.89	0.00	0.00	87.94
Worker											0.00	84.12	84.12	0.01	0.00	84.24
Total											**0.00**	**172.01**	**172.01**	**0.01**	**0.00**	**172.18**

3.4 Building Construction - 2014

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,245.96	1,245.96	0.13	0.00	1,248.70
Total											**0.00**	**1,245.96**	**1,245.96**	**0.13**	**0.00**	**1,248.70**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	87.89	87.89	0.00	0.00	87.94
Worker											0.00	84.12	84.12	0.01	0.00	84.24
Total											**0.00**	**172.01**	**172.01**	**0.01**	**0.00**	**172.18**

3.4 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	952.79	952.79	0.09	0.00	954.73
Total											**0.00**	**952.79**	**952.79**	**0.09**	**0.00**	**954.73**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	67.20	67.20	0.00	0.00	67.23
Worker											0.00	62.61	62.61	0.00	0.00	62.69
Total											**0.00**	**129.81**	**129.81**	**0.00**	**0.00**	**129.92**

3.4 Building Construction - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	952.79	952.79	0.09	0.00	954.73
Total											**0.00**	**952.79**	**952.79**	**0.09**	**0.00**	**954.73**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	67.20	67.20	0.00	0.00	67.23
Worker											0.00	62.61	62.61	0.00	0.00	62.69
Total											**0.00**	**129.81**	**129.81**	**0.00**	**0.00**	**129.92**

3.5 Paving - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	302.50	302.50	0.05	0.00	303.45
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**302.50**	**302.50**	**0.05**	**0.00**	**303.45**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	6.68	6.68	0.00	0.00	6.69
Total											**0.00**	**6.68**	**6.68**	**0.00**	**0.00**	**6.69**

3.5 Paving - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	302.50	302.50	0.05	0.00	303.45
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**302.50**	**302.50**	**0.05**	**0.00**	**303.45**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	6.68	6.68	0.00	0.00	6.69
Total											**0.00**	**6.68**	**6.68**	**0.00**	**0.00**	**6.69**

3.6 Architectural Coating - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.69
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.69**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	5.76	5.76	0.00	0.00	5.76
Total											**0.00**	**5.76**	**5.76**	**0.00**	**0.00**	**5.76**

3.6 Architectural Coating - 2015

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.69
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.69**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	5.76	5.76	0.00	0.00	5.76
Total											**0.00**	**5.76**	**5.76**	**0.00**	**0.00**	**5.76**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.00	7,766.95	7,766.95	0.71	0.00	7,781.85
Unmitigated											0.00	7,766.95	7,766.95	0.71	0.00	7,781.85
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,113.71	1,210.04	1025.83	3,267,779	3,267,779
Elementary School	387.00	0.00	0.00	609,508	609,508
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	9,244,127
Total	4,668.38	4,546.52	3,928.70	13,121,415	13,121,415

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Apartments Mid Rise	10.80	7.30	7.50	48.40	13.90	37.70
Elementary School	9.50	7.30	7.30	65.00	30.00	5.00

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated											0.00	937.85	937.85	0.04	0.02	943.73
Electricity Unmitigated											0.00	937.85	937.85	0.04	0.02	943.73
NaturalGas Mitigated											0.00	799.08	799.08	0.02	0.01	803.95
NaturalGas Unmitigated											0.00	799.08	799.08	0.02	0.01	803.95
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006											0.00	133.91	133.91	0.00	0.00	134.72
Elementary School	660383											0.00	35.24	35.24	0.00	0.00	35.46
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**799.09**	**799.09**	**0.01**	**0.01**	**803.95**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006											0.00	133.91	133.91	0.00	0.00	134.72
Elementary School	660383											0.00	35.24	35.24	0.00	0.00	35.46
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**799.09**	**799.09**	**0.01**	**0.01**	**803.95**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
Elementary School	199143					57.93	0.00	0.00	58.30
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**937.85**	**0.04**	**0.01**	**943.74**

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
Elementary School	199143					57.93	0.00	0.00	58.30
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**937.85**	**0.04**	**0.01**	**943.74**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											139.47	655.94	795.42	0.67	0.01	813.27
Unmitigated											139.47	655.94	795.42	0.67	0.01	813.27
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											139.47	649.81	789.29	0.66	0.01	806.93
Landscaping											0.00	6.13	6.13	0.01	0.00	6.34
Total											**139.47**	**655.94**	**795.42**	**0.67**	**0.01**	**813.27**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											139.47	649.81	789.29	0.66	0.01	806.93
Landscaping											0.00	6.13	6.13	0.01	0.00	6.34
Total											**139.47**	**655.94**	**795.42**	**0.67**	**0.01**	**813.27**

7.0 Water Detail

7.1 Mitigation Measures Water

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					75.61	1.02	0.03	105.25
Unmitigated					75.61	1.02	0.03	105.25
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
Elementary School	0.727272 / 1.87013					3.06	0.02	0.00	3.71
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**75.61**	**1.02**	**0.03**	**105.25**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
Elementary School	0.727272 / 1.87013					3.06	0.02	0.00	3.71
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**75.61**	**1.02**	**0.03**	**105.25**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					92.22	5.45	0.00	206.68
Unmitigated					92.22	5.45	0.00	206.68
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
Elementary School	54.75					11.11	0.66	0.00	24.91
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**92.22**	**5.45**	**0.00**	**206.69**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
Elementary School	54.75					11.11	0.66	0.00	24.91
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**92.22**	**5.45**	**0.00**	**206.69**

9.0 Vegetation

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	48.46	1000sqft
Office Park	16.34	1000sqft
Parking Lot	228	Space
Parking Lot	72.6	Space
City Park	4.35	Acre
Apartments Mid Rise	169	Dwelling Unit
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization Urban

Wind Speed (m/s) 2.2

Utility Company Pacific Gas & Electric Company

Climate Zone 3

Precipitation Freq (Days) 46

1.3 User Entered Comments

Project Characteristics - Phase_2016GHG

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Based on project's description.

Energy Use -

Sequestration -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016											0.00	3,213.25	3,213.25	0.28	0.00	3,219.15
2017											0.00	1,628.72	1,628.72	0.14	0.00	1,631.75
Total											**0.00**	**4,841.97**	**4,841.97**	**0.42**	**0.00**	**4,850.90**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016											0.00	3,213.25	3,213.25	0.28	0.00	3,219.15
2017											0.00	1,628.72	1,628.72	0.14	0.00	1,631.75
Total											**0.00**	**4,841.97**	**4,841.97**	**0.42**	**0.00**	**4,850.90**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											139.47	655.94	795.42	0.67	0.01	813.27
Energy											0.00	1,904.32	1,904.32	0.06	0.03	1,916.10
Mobile											0.00	8,194.68	8,194.68	0.75	0.00	8,210.41
Waste											93.42	0.00	93.42	5.52	0.00	209.36
Water											0.00	103.28	103.28	1.35	0.04	142.54
Total											**232.89**	**10,858.22**	**11,091.12**	**8.35**	**0.08**	**11,291.68**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											139.47	655.94	795.42	0.67	0.01	813.27
Energy											0.00	1,904.32	1,904.32	0.06	0.03	1,916.10
Mobile											0.00	8,194.68	8,194.68	0.75	0.00	8,210.41
Waste											93.42	0.00	93.42	5.52	0.00	209.36
Water											0.00	103.28	103.28	1.35	0.04	142.54
Total											**232.89**	**10,858.22**	**11,091.12**	**8.35**	**0.08**	**11,291.68**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	469.60	469.60	0.04	0.00	470.52
Total											**0.00**	**469.60**	**469.60**	**0.04**	**0.00**	**470.52**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.13	2.13	0.00	0.00	2.13
Total											**0.00**	**2.14**	**2.14**	**0.00**	**0.00**	**2.14**

3.2 Site Preparation - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	469.60	469.60	0.04	0.00	470.52
Total											**0.00**	**469.60**	**469.60**	**0.04**	**0.00**	**470.52**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.13	2.13	0.00	0.00	2.13
Total											**0.00**	**2.14**	**2.14**	**0.00**	**0.00**	**2.14**

3.3 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	1,085.44	1,085.44	0.10	0.00	1,087.48
Total											**0.00**	**1,085.44**	**1,085.44**	**0.10**	**0.00**	**1,087.48**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.92	3.92	0.00	0.00	3.92
Total											**0.00**	**3.92**	**3.92**	**0.00**	**0.00**	**3.92**

3.3 Grading - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	1,085.44	1,085.44	0.10	0.00	1,087.48
Total											**0.00**	**1,085.44**	**1,085.44**	**0.10**	**0.00**	**1,087.48**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.92	3.92	0.00	0.00	3.92
Total											**0.00**	**3.92**	**3.92**	**0.00**	**0.00**	**3.92**

3.4 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,441.49	1,441.49	0.13	0.00	1,444.26
Total											**0.00**	**1,441.49**	**1,441.49**	**0.13**	**0.00**	**1,444.26**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	127.23	127.23	0.00	0.00	127.28
Worker											0.00	83.43	83.43	0.00	0.00	83.54
Total											**0.00**	**210.66**	**210.66**	**0.00**	**0.00**	**210.82**

3.4 Building Construction - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,441.49	1,441.49	0.13	0.00	1,444.26
Total											**0.00**	**1,441.49**	**1,441.49**	**0.13**	**0.00**	**1,444.26**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	127.23	127.23	0.00	0.00	127.28
Worker											0.00	83.43	83.43	0.00	0.00	83.54
Total											**0.00**	**210.66**	**210.66**	**0.00**	**0.00**	**210.82**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,102.32	1,102.32	0.09	0.00	1,104.25
Total											**0.00**	**1,102.32**	**1,102.32**	**0.09**	**0.00**	**1,104.25**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	97.26	97.26	0.00	0.00	97.30
Worker											0.00	62.21	62.21	0.00	0.00	62.28
Total											**0.00**	**159.47**	**159.47**	**0.00**	**0.00**	**159.58**

3.4 Building Construction - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	1,102.32	1,102.32	0.09	0.00	1,104.25
Total											**0.00**	**1,102.32**	**1,102.32**	**0.09**	**0.00**	**1,104.25**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	97.26	97.26	0.00	0.00	97.30
Worker											0.00	62.21	62.21	0.00	0.00	62.28
Total											**0.00**	**159.47**	**159.47**	**0.00**	**0.00**	**159.58**

3.5 Paving - 2017

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road											0.00	327.16	327.16	0.04	0.00	328.06
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**327.16**	**327.16**	**0.04**	**0.00**	**328.06**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.38	3.38	0.00	0.00	3.39
Total											**0.00**	**3.38**	**3.38**	**0.00**	**0.00**	**3.39**

3.5 Paving - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	327.16	327.16	0.04	0.00	328.06
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**327.16**	**327.16**	**0.04**	**0.00**	**328.06**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	3.38	3.38	0.00	0.00	3.39
Total											**0.00**	**3.38**	**3.38**	**0.00**	**0.00**	**3.39**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.67
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.67**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	5.79	5.79	0.00	0.00	5.79
Total											**0.00**	**5.79**	**5.79**	**0.00**	**0.00**	**5.79**

3.6 Architectural Coating - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.67
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.67**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	5.79	5.79	0.00	0.00	5.79
Total											**0.00**	**5.79**	**5.79**	**0.00**	**0.00**	**5.79**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.00	8,194.68	8,194.68	0.75	0.00	8,210.41
Unmitigated											0.00	8,194.68	8,194.68	0.75	0.00	8,210.41
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,113.71	1,210.04	1025.83	3,267,779	3,267,779
City Park	6.92	6.92	6.92	14,766	14,766
General Office Building	533.54	114.85	47.49	966,165	966,165
Office Park	186.60	26.80	12.42	348,093	348,093
Parking Lot	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	9,244,127
Total	5,008.44	4,695.08	3,995.53	13,840,930	13,840,930

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Apartments Mid Rise	10.80	7.30	7.50	48.40	13.90	37.70
City Park	9.50	7.30	7.30	33.00	48.00	19.00
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00
Office Park	9.50	7.30	7.30	33.00	48.00	19.00
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated											0.00	1,084.13	1,084.13	0.05	0.02	1,090.92
Electricity Unmitigated											0.00	1,084.13	1,084.13	0.05	0.02	1,090.92
NaturalGas Mitigated											0.00	820.18	820.18	0.02	0.02	825.18
NaturalGas Unmitigated											0.00	820.18	820.18	0.02	0.02	825.18
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006											0.00	133.91	133.91	0.00	0.00	134.72
City Park	0											0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885											0.00	35.48	35.48	0.00	0.00	35.70
Office Park	390897											0.00	20.86	20.86	0.00	0.00	20.99
Parking Lot	0											0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**820.19**	**820.19**	**0.01**	**0.01**	**825.18**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Apartments Mid Rise	2.50932e+006											0.00	133.91	133.91	0.00	0.00	134.72
City Park	0											0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885											0.00	35.48	35.48	0.00	0.00	35.70
Office Park	390897											0.00	20.86	20.86	0.00	0.00	20.99
Parking Lot	0											0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**820.19**	**820.19**	**0.01**	**0.01**	**825.18**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Office Park	211538					61.54	0.00	0.00	61.92
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**1,084.13**	**0.05**	**0.01**	**1,090.92**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Apartments Mid Rise	659675					191.91	0.01	0.00	193.11
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Office Park	211538					61.54	0.00	0.00	61.92
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**1,084.13**	**0.05**	**0.01**	**1,090.92**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											139.47	655.94	795.42	0.67	0.01	813.27
Unmitigated											139.47	655.94	795.42	0.67	0.01	813.27
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											139.47	649.81	789.29	0.66	0.01	806.93
Landscaping											0.00	6.13	6.13	0.01	0.00	6.34
Total											**139.47**	**655.94**	**795.42**	**0.67**	**0.01**	**813.27**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											139.47	649.81	789.29	0.66	0.01	806.93
Landscaping											0.00	6.13	6.13	0.01	0.00	6.34
Total											**139.47**	**655.94**	**795.42**	**0.67**	**0.01**	**813.27**

7.0 Water Detail

7.1 Mitigation Measures Water

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					103.28	1.35	0.04	142.54
Unmitigated					103.28	1.35	0.04	142.54
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

<u>Unmitigated</u>

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Office Park	2.90417 / 1.77997					6.42	0.09	0.00	9.00
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**103.28**	**1.35**	**0.04**	**142.54**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Apartments Mid Rise	11.011 / 6.94174					24.52	0.34	0.01	34.32
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Office Park	2.90417 / 1.77997					6.42	0.09	0.00	9.00
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**103.28**	**1.35**	**0.04**	**142.54**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					93.42	5.52	0.00	209.36
Unmitigated					93.42	5.52	0.00	209.36
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Office Park	15.2					3.09	0.18	0.00	6.91
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**93.43**	**5.51**	**0.00**	**209.36**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Apartments Mid Rise	77.74					15.78	0.93	0.00	35.37
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Office Park	15.2					3.09	0.18	0.00	6.91
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**93.43**	**5.51**	**0.00**	**209.36**

9.0 Vegetation

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
General Office Building	48.46	1000sqft
Parking Lot	228	Space
City Park	4.35	Acre
Single Family Housing	331	Dwelling Unit

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Utility Company** Pacific Gas & Electric Company

Climate Zone 3 **Precipitation Freq (Days)** 46

1.3 User Entered Comments

Project Characteristics - Phase_2018BAU

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Off-road Equipment - "

Trips and VMT - Trips based on worst case scenario originating from opposite end of City's limit to the north.

Grading - Based on project's description.

Energy Use -

Sequestration -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018											0.00	1,974.07	1,974.07	0.14	0.00	1,977.08
2019											0.00	1,055.87	1,055.87	0.08	0.00	1,057.49
Total											**0.00**	**3,029.94**	**3,029.94**	**0.22**	**0.00**	**3,034.57**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018											0.00	1,974.07	1,974.07	0.14	0.00	1,977.08
2019											0.00	1,055.87	1,055.87	0.08	0.00	1,057.49
Total											**0.00**	**3,029.94**	**3,029.94**	**0.22**	**0.00**	**3,034.57**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											121.48	434.24	555.72	0.58	0.01	570.40
Energy											0.00	1,496.10	1,496.10	0.05	0.03	1,505.36
Mobile											0.00	6,054.24	6,054.24	0.55	0.00	6,065.87
Waste											74.55	0.00	74.55	4.41	0.00	167.08
Water											0.00	72.34	72.34	0.92	0.02	99.22
Total											**196.03**	**8,056.92**	**8,252.95**	**6.51**	**0.06**	**8,407.93**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											121.48	434.24	555.72	0.58	0.01	570.40
Energy											0.00	1,496.10	1,496.10	0.05	0.03	1,505.36
Mobile											0.00	6,054.24	6,054.24	0.55	0.00	6,065.87
Waste											74.55	0.00	74.55	4.41	0.00	167.08
Water											0.00	72.34	72.34	0.92	0.02	99.22
Total											**196.03**	**8,056.92**	**8,252.95**	**6.51**	**0.06**	**8,407.93**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	326.40	326.40	0.03	0.00	326.97
Total											**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**326.97**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.39	1.39	0.00	0.00	1.39
Total											**0.00**	**1.40**	**1.40**	**0.00**	**0.00**	**1.40**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	326.40	326.40	0.03	0.00	326.97
Total											**0.00**	**326.40**	**326.40**	**0.03**	**0.00**	**326.97**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.01	0.01	0.00	0.00	0.01
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.39	1.39	0.00	0.00	1.39
Total											**0.00**	**1.40**	**1.40**	**0.00**	**0.00**	**1.40**

3.3 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	580.53	580.53	0.04	0.00	581.45
Total											**0.00**	**580.53**	**580.53**	**0.04**	**0.00**	**581.45**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.67	2.67	0.00	0.00	2.67
Total											**0.00**	**2.67**	**2.67**	**0.00**	**0.00**	**2.67**

3.3 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	580.53	580.53	0.04	0.00	581.45
Total											**0.00**	**580.53**	**580.53**	**0.04**	**0.00**	**581.45**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.67	2.67	0.00	0.00	2.67
Total											**0.00**	**2.67**	**2.67**	**0.00**	**0.00**	**2.67**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	934.47	934.47	0.07	0.00	935.92
Total											**0.00**	**934.47**	**934.47**	**0.07**	**0.00**	**935.92**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	87.80	87.80	0.00	0.00	87.84
Worker											0.00	40.80	40.80	0.00	0.00	40.84
Total											**0.00**	**128.60**	**128.60**	**0.00**	**0.00**	**128.68**

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	934.47	934.47	0.07	0.00	935.92
Total											**0.00**	**934.47**	**934.47**	**0.07**	**0.00**	**935.92**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	87.80	87.80	0.00	0.00	87.84
Worker											0.00	40.80	40.80	0.00	0.00	40.84
Total											**0.00**	**128.60**	**128.60**	**0.00**	**0.00**	**128.68**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	714.59	714.59	0.05	0.00	715.61
Total											**0.00**	**714.59**	**714.59**	**0.05**	**0.00**	**715.61**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	67.13	67.13	0.00	0.00	67.16
Worker											0.00	30.55	30.55	0.00	0.00	30.58
Total											**0.00**	**97.68**	**97.68**	**0.00**	**0.00**	**97.74**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	714.59	714.59	0.05	0.00	715.61
Total											**0.00**	**714.59**	**714.59**	**0.05**	**0.00**	**715.61**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	67.13	67.13	0.00	0.00	67.16
Worker											0.00	30.55	30.55	0.00	0.00	30.58
Total											**0.00**	**97.68**	**97.68**	**0.00**	**0.00**	**97.74**

3.5 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	208.08	208.08	0.02	0.00	208.58
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**208.08**	**208.08**	**0.02**	**0.00**	**208.58**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.09	2.09	0.00	0.00	2.09
Total											**0.00**	**2.09**	**2.09**	**0.00**	**0.00**	**2.09**

3.5 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	208.08	208.08	0.02	0.00	208.58
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**208.08**	**208.08**	**0.02**	**0.00**	**208.58**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.09	2.09	0.00	0.00	2.09
Total											**0.00**	**2.09**	**2.09**	**0.00**	**0.00**	**2.09**

3.6 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.66
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.66**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.82	2.82	0.00	0.00	2.82
Total											**0.00**	**2.82**	**2.82**	**0.00**	**0.00**	**2.82**

3.6 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	30.60	30.60	0.00	0.00	30.66
Total											**0.00**	**30.60**	**30.60**	**0.00**	**0.00**	**30.66**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	2.82	2.82	0.00	0.00	2.82
Total											**0.00**	**2.82**	**2.82**	**0.00**	**0.00**	**2.82**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.00	6,054.24	6,054.24	0.55	0.00	6,065.87
Unmitigated											0.00	6,054.24	6,054.24	0.55	0.00	6,065.87
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	6.92	6.92	6.92	14,766	14,766
General Office Building	533.54	114.85	47.49	966,165	966,165
Parking Lot	0.00	0.00	0.00		
Single Family Housing	3,167.67	3,336.48	2902.87	9,244,127	9,244,127
Total	3,708.13	3,458.25	2,957.28	10,225,058	10,225,058

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
City Park	9.50	7.30	7.30	33.00	48.00	19.00

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated											0.00	830.69	830.69	0.04	0.01	835.89
Electricity Unmitigated											0.00	830.69	830.69	0.04	0.01	835.89
NaturalGas Mitigated											0.00	665.42	665.42	0.01	0.01	669.47
NaturalGas Unmitigated											0.00	665.42	665.42	0.01	0.01	669.47
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
City Park	0											0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885											0.00	35.48	35.48	0.00	0.00	35.70
Parking Lot	0											0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**665.42**	**665.42**	**0.01**	**0.01**	**669.47**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
City Park	0											0.00	0.00	0.00	0.00	0.00	0.00
General Office Building	664885											0.00	35.48	35.48	0.00	0.00	35.70
Parking Lot	0											0.00	0.00	0.00	0.00	0.00	0.00
Single Family Housing	1.18046e+007											0.00	629.94	629.94	0.01	0.01	633.77
Total												**0.00**	**665.42**	**665.42**	**0.01**	**0.01**	**669.47**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**830.68**	**0.04**	**0.01**	**835.89**

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
City Park	0					0.00	0.00	0.00	0.00
General Office Building	490425					142.67	0.01	0.00	143.56
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	2.36503e+006					688.01	0.03	0.01	692.33
Total						**830.68**	**0.04**	**0.01**	**835.89**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											121.48	434.24	555.72	0.58	0.01	570.40
Unmitigated											121.48	434.24	555.72	0.58	0.01	570.40
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											121.48	430.17	551.66	0.58	0.01	566.20
Landscaping											0.00	4.06	4.06	0.01	0.00	4.20
Total											**121.48**	**434.23**	**555.72**	**0.59**	**0.01**	**570.40**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											121.48	430.17	551.66	0.58	0.01	566.20
Landscaping											0.00	4.06	4.06	0.01	0.00	4.20
Total											**121.48**	**434.23**	**555.72**	**0.59**	**0.01**	**570.40**

7.0 Water Detail

7.1 Mitigation Measures Water

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					72.34	0.92	0.02	99.22
Unmitigated					72.34	0.92	0.02	99.22
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**72.34**	**0.92**	**0.03**	**99.22**

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
City Park	0 / 5.18294					5.28	0.00	0.00	5.31
General Office Building	8.61298 / 5.27892					19.03	0.26	0.01	26.69
Parking Lot	0 / 0					0.00	0.00	0.00	0.00
Single Family Housing	21.566 / 13.5959					48.03	0.66	0.02	67.22
Total						**72.34**	**0.92**	**0.03**	**99.22**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					74.55	4.41	0.00	167.08
Unmitigated					74.55	4.41	0.00	167.08
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**74.56**	**4.40**	**0.00**	**167.08**

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
City Park	0.37					0.08	0.00	0.00	0.17
General Office Building	45.07					9.15	0.54	0.00	20.50
Parking Lot	0					0.00	0.00	0.00	0.00
Single Family Housing	321.84					65.33	3.86	0.00	146.41
Total						**74.56**	**4.40**	**0.00**	**167.08**

9.0 Vegetation

Morgan Ranch Master Plan EIR

Stanislaus County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
Single Family Housing	330	Dwelling Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Utility Company**	Pacific Gas & Electric Company
Climate Zone	3	**Precipitation Freq (Days)**	46		

1.3 User Entered Comments

Project Characteristics - Phase_2020BAU

Land Use - Based on project's description.

Construction Phase - Based on construction assumptions.

Trips and VMT - One haul trip for removal of equipment.

Grading - "

Energy Use -

Sequestration -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Water Mitigation -

Waste Mitigation -

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2011											0.00	764.01	764.01	0.09	0.00	765.85
2012											0.00	623.93	623.93	0.07	0.00	625.34
2013											0.00	158.50	158.50	0.02	0.00	158.90
Total											**0.00**	**1,546.44**	**1,546.44**	**0.18**	**0.00**	**1,550.09**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2011											0.00	764.01	764.01	0.09	0.00	765.85
2012											0.00	623.93	623.93	0.07	0.00	625.34
2013											0.00	158.50	158.50	0.02	0.00	158.90
Total											**0.00**	**1,546.44**	**1,546.44**	**0.18**	**0.00**	**1,550.09**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											121.48	432.92	554.41	0.58	0.01	569.08
Energy											0.00	1,313.97	1,313.97	0.04	0.02	1,322.09
Mobile											0.00	5,451.76	5,451.76	0.50	0.00	5,462.19
Waste											68.98	0.00	68.98	4.08	0.00	154.60
Water											0.00	47.89	47.89	0.66	0.02	67.01
Total											**190.46**	**7,246.54**	**7,437.01**	**5.86**	**0.05**	**7,574.97**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											121.48	432.92	554.41	0.58	0.01	569.08
Energy											0.00	1,313.97	1,313.97	0.04	0.02	1,322.09
Mobile											0.00	5,451.76	5,451.76	0.50	0.00	5,462.19
Waste											68.98	0.00	68.98	4.08	0.00	154.60
Water											0.00	47.89	47.89	0.66	0.02	67.01
Total											**190.46**	**7,246.54**	**7,437.01**	**5.86**	**0.05**	**7,574.97**

3.0 Construction Detail

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2011

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	72.53	72.53	0.01	0.00	72.72
Total											**0.00**	**72.53**	**72.53**	**0.01**	**0.00**	**72.72**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	0.76	0.76	0.00	0.00	0.76
Total											**0.00**	**0.76**	**0.76**	**0.00**	**0.00**	**0.76**

3.2 Site Preparation - 2011

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	72.53	72.53	0.01	0.00	72.72
Total											**0.00**	**72.53**	**72.53**	**0.01**	**0.00**	**72.72**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	0.76	0.76	0.00	0.00	0.76
Total											**0.00**	**0.76**	**0.76**	**0.00**	**0.00**	**0.76**

3.3 Grading - 2011

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	221.54	221.54	0.02	0.00	222.05
Total											**0.00**	**221.54**	**221.54**	**0.02**	**0.00**	**222.05**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.90	1.90	0.00	0.00	1.91
Total											**0.00**	**1.90**	**1.90**	**0.00**	**0.00**	**1.91**

3.3 Grading - 2011

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	221.54	221.54	0.02	0.00	222.05
Total											**0.00**	**221.54**	**221.54**	**0.02**	**0.00**	**222.05**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.90	1.90	0.00	0.00	1.91
Total											**0.00**	**1.90**	**1.90**	**0.00**	**0.00**	**1.91**

3.4 Building Construction - 2011

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	357.30	357.30	0.05	0.00	358.31
Total											**0.00**	**357.30**	**357.30**	**0.05**	**0.00**	**358.31**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	60.86	60.86	0.00	0.00	60.90
Worker											0.00	49.11	49.11	0.00	0.00	49.20
Total											**0.00**	**109.97**	**109.97**	**0.00**	**0.00**	**110.10**

3.4 Building Construction - 2011

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	357.30	357.30	0.05	0.00	358.31
Total											**0.00**	**357.30**	**357.30**	**0.05**	**0.00**	**358.31**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	60.86	60.86	0.00	0.00	60.90
Worker											0.00	49.11	49.11	0.00	0.00	49.20
Total											**0.00**	**109.97**	**109.97**	**0.00**	**0.00**	**110.10**

3.4 Building Construction - 2012

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	478.23	478.23	0.06	0.00	479.48
Total											**0.00**	**478.23**	**478.23**	**0.06**	**0.00**	**479.48**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	81.46	81.46	0.00	0.00	81.51
Worker											0.00	64.24	64.24	0.01	0.00	64.35
Total											**0.00**	**145.70**	**145.70**	**0.01**	**0.00**	**145.86**

3.4 Building Construction - 2012

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	478.23	478.23	0.06	0.00	479.48
Total											**0.00**	**478.23**	**478.23**	**0.06**	**0.00**	**479.48**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	81.46	81.46	0.00	0.00	81.51
Worker											0.00	64.24	64.24	0.01	0.00	64.35
Total											**0.00**	**145.70**	**145.70**	**0.01**	**0.00**	**145.86**

3.4 Building Construction - 2013

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	80.62	80.62	0.01	0.00	80.81
Total											**0.00**	**80.62**	**80.62**	**0.01**	**0.00**	**80.81**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	13.74	13.74	0.00	0.00	13.74
Worker											0.00	10.58	10.58	0.00	0.00	10.59
Total											**0.00**	**24.32**	**24.32**	**0.00**	**0.00**	**24.33**

3.4 Building Construction - 2013

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	80.62	80.62	0.01	0.00	80.81
Total											**0.00**	**80.62**	**80.62**	**0.01**	**0.00**	**80.81**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	13.74	13.74	0.00	0.00	13.74
Worker											0.00	10.58	10.58	0.00	0.00	10.59
Total											**0.00**	**24.32**	**24.32**	**0.00**	**0.00**	**24.33**

3.5 Paving - 2013

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	46.31	46.31	0.01	0.00	46.47
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**46.31**	**46.31**	**0.01**	**0.00**	**46.47**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.04	0.04	0.00	0.00	0.04
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.06	1.06	0.00	0.00	1.06
Total											**0.00**	**1.10**	**1.10**	**0.00**	**0.00**	**1.10**

3.5 Paving - 2013

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.00	46.31	46.31	0.01	0.00	46.47
Paving											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**46.31**	**46.31**	**0.01**	**0.00**	**46.47**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.04	0.04	0.00	0.00	0.04
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.06	1.06	0.00	0.00	1.06
Total											**0.00**	**1.10**	**1.10**	**0.00**	**0.00**	**1.10**

3.6 Architectural Coating - 2013

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	4.46	4.46	0.00	0.00	4.48
Total											**0.00**	**4.46**	**4.46**	**0.00**	**0.00**	**4.48**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.70	1.70	0.00	0.00	1.70
Total											**0.00**	**1.70**	**1.70**	**0.00**	**0.00**	**1.70**

3.6 Architectural Coating - 2013

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	4.46	4.46	0.00	0.00	4.48
Total											**0.00**	**4.46**	**4.46**	**0.00**	**0.00**	**4.48**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	0.00	0.00	0.00	0.00	0.00
Worker											0.00	1.70	1.70	0.00	0.00	1.70
Total											**0.00**	**1.70**	**1.70**	**0.00**	**0.00**	**1.70**

4.0 Mobile Detail

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.00	5,451.76	5,451.76	0.50	0.00	5,462.19
Unmitigated											0.00	5,451.76	5,451.76	0.50	0.00	5,462.19
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	3,158.10	3,326.40	2894.10	9,216,200	9,216,200
Total	3,158.10	3,326.40	2,894.10	9,216,200	9,216,200

4.3 Trip Type Information

	Miles			Trip %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW
Single Family Housing	10.80	7.30	7.50	48.40	13.90	37.70

5.0 Energy Detail

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated											0.00	685.94	685.94	0.03	0.01	690.23
Electricity Unmitigated											0.00	685.94	685.94	0.03	0.01	690.23
NaturalGas Mitigated											0.00	628.03	628.03	0.01	0.01	631.86
NaturalGas Unmitigated											0.00	628.03	628.03	0.01	0.01	631.86
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

5.2 Energy by Land Use - NaturalGas

<u>Unmitigated</u>

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Single Family Housing	1.17689e+007											0.00	628.03	628.03	0.01	0.01	631.86
Total												**0.00**	**628.03**	**628.03**	**0.01**	**0.01**	**631.86**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU	tons/yr										MT/yr					
Single Family Housing	1.17689e+007											0.00	628.03	628.03	0.01	0.01	631.86
Total												**0.00**	**628.03**	**628.03**	**0.01**	**0.01**	**631.86**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Single Family Housing	2.35789e+006					685.94	0.03	0.01	690.23
Total						**685.94**	**0.03**	**0.01**	**690.23**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	kWh	tons/yr				MT/yr			
Single Family Housing	2.35789e+006					685.94	0.03	0.01	690.23
Total						**685.94**	**0.03**	**0.01**	**690.23**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											121.48	432.92	554.41	0.58	0.01	569.08
Unmitigated											121.48	432.92	554.41	0.58	0.01	569.08
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											121.48	428.88	550.36	0.58	0.01	564.90
Landscaping											0.00	4.05	4.05	0.01	0.00	4.18
Total											**121.48**	**432.93**	**554.41**	**0.59**	**0.01**	**569.08**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products											0.00	0.00	0.00	0.00	0.00	0.00
Hearth											121.48	428.88	550.36	0.58	0.01	564.90
Landscaping											0.00	4.05	4.05	0.01	0.00	4.18
Total											**121.48**	**432.93**	**554.41**	**0.59**	**0.01**	**569.08**

7.0 Water Detail

7.1 Mitigation Measures Water

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr				MT/yr			
Mitigated					47.89	0.66	0.02	67.01
Unmitigated					47.89	0.66	0.02	67.01
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Single Family Housing	21.5008 / 13.5549					47.89	0.66	0.02	67.01
Total						**47.89**	**0.66**	**0.02**	**67.01**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr				MT/yr			
Single Family Housing	21.5008 / 13.5549					47.89	0.66	0.02	67.01
Total						**47.89**	**0.66**	**0.02**	**67.01**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
	tons/yr				MT/yr			
Mitigated					68.98	4.08	0.00	154.60
Unmitigated					68.98	4.08	0.00	154.60
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Single Family Housing	339.84					68.98	4.08	0.00	154.60
Total						**68.98**	**4.08**	**0.00**	**154.60**

Mitigated

	Waste Disposed	ROG	NOx	CO	SO2	Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr				MT/yr			
Single Family Housing	339.84					68.98	4.08	0.00	154.60
Total						**68.98**	**4.08**	**0.00**	**154.60**

9.0 Vegetation

APPENDIX D

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RECONNAISSANCE-LEVEL BIOLOGICAL SURVEY FOR MORGAN RANCH MASTER PLAN PROJECT TURLOCK, STANISLAUS COUNTY, CALIFORNIA

Prepared for:

City of Turlock
Development Service Department
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April 2012

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TABLE OF CONTENTS

TABLES AND FIGURES

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SUMMARY OF FINDINGS AND CONCLUSIONS

The proposed Morgan Ranch Master Plan is located in the City of Turlock, Stanislaus County, California (Figure 1). A reconnaissance-level biological survey was conducted on the project site by Quad Knopf, Inc. biologists during April 2012 to evaluate the potential for occurrence of special status species. The project site currently supports a matrix of land that is under agricultural production, residential or commercial.

No sensitive natural communities occur within the boundaries of the project site. Special status plants or the habitat that would support special status plants do not occur on the project site. Seven special status wildlife species could potentially occur on the project site given its location and the marginal habitat it supports. The project site supports potential breeding habitat for the Swainson's hawk and burrowing owl, and potential foraging habitat for the tricolored blackbird, pallid bat, western red bat, San Joaquin kit fox, and American badger. None of these species were observed during the reconnaissance-level biological survey conducted on the project site. Implementation of the project could cause potentially significant impacts to these special status wildlife species. However, recommended mitigation measures will ensure that the level of impacts to these species is less than significant.

The project site does not contain any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or USFWS.

The project site contains an unvegetated, cement-lined irrigation lateral approximately 600 meters in length along the southern portion of the property near State Route 99 (SR 99). Given the artificial nature of this lateral, and its lack of connectivity with traditionally navigable waters, this feature is not expected to be under the jurisdiction of the USACE. Accordingly, the project site does not contain any federally protected wetlands subject to Section 404 of the Clean Water Act.

The project site occurs at the edge of an urbanized area, and it contains existing structures that have been previously used for agricultural and rural residential uses. There are no identifiable movement corridors within or adjacent to the project site.

The project has the potential to conflict with the City's policy requiring the protection of mature trees and natural vegetation where feasible in development areas; this is a potentially significant impact. A mitigation measure is recommended to reduce this impact to a less than significant level.

The project site is not within the boundaries of an adopted habitat conservation plan or natural community conservation plan.

INTRODUCTION

Project Description

The project is located in the City of Turlock in Stanislaus County, California (Figure 1). The project site is in the vicinity of the Lander Avenue/State Route 99 (SR 99) interchange and bounded by Lander Ave. on the West, Glenwood Ave. on the north, Golf Road on the east, and SR 99 on the south (Figure 2). The project site is located on the Turlock, California, United States Geological Survey 7.5-minute topographic quadrangle map, Township 5 South, Range 10 East, Section 26 (Latitude 37°28'18" North, Longitude 120°50'15"West) (Figure 3).

The project site is identified by the Stanislaus County Assessor's office with the Assessor's Parcel Numbers (APNs) shown in Table 1.

Table 1
Assessor Parcel Numbers (APNs)

044-023-005	044-025-003	044-028-010
044-023-006	044-025-006	044-028-013
044-023-018	044-025-007	044-028-014
044-023-031	044-025-008	044-065-001
044-023-032	044-025-010	044-065-002
044-023-035	044-025-016	044-065-003
044-023-037	044-025-017	044-065-004
044-023-038	044-028-007	044-065-005

Source: City of Turlock, Morgan Ranch Master Plan, 2012

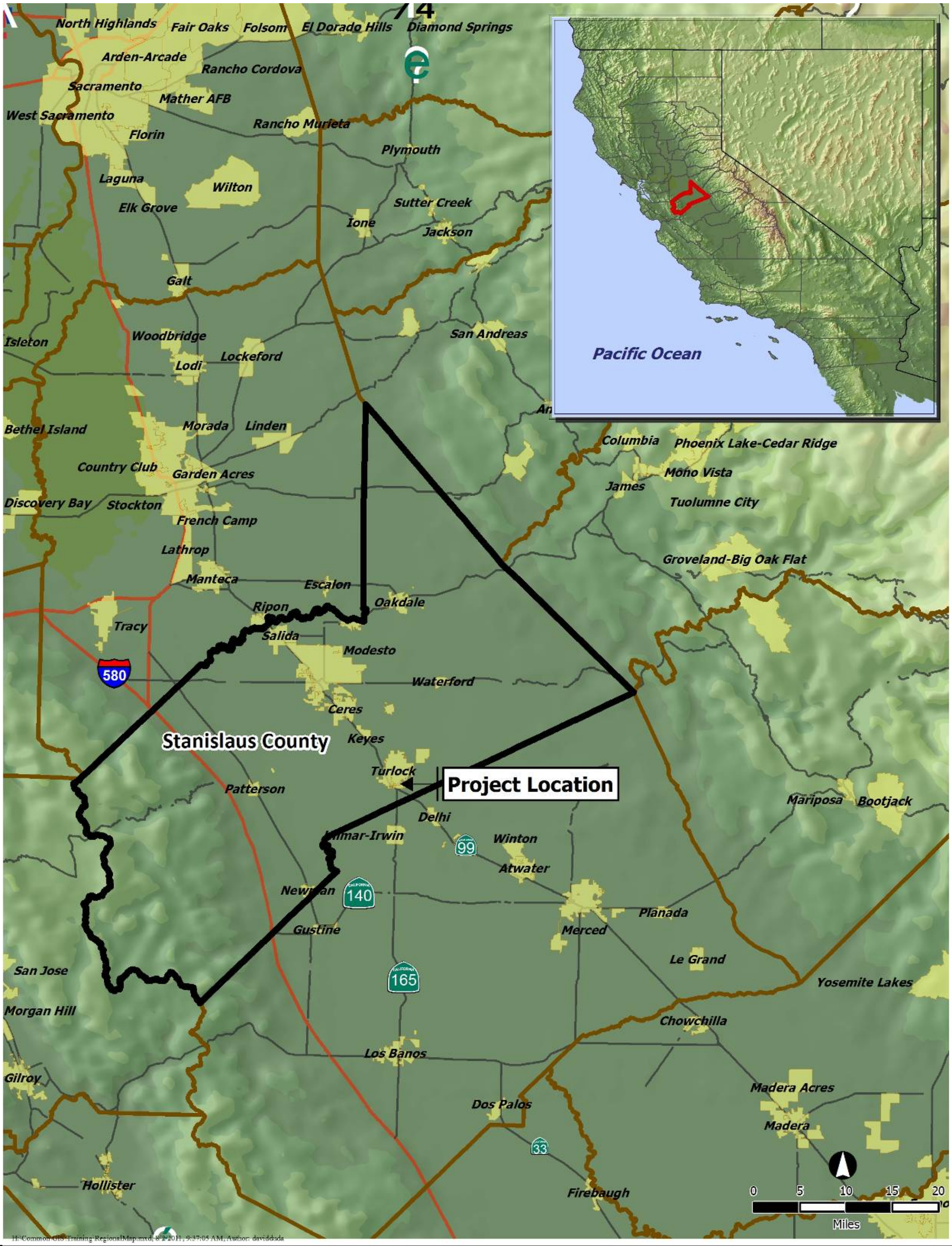
The proposed project consists of the adoption and implementation of the Morgan Ranch Master Plan. The Morgan Ranch Master Plan would modify the General Plan designations and zoning for approximately 170 acres. The Master Plan would designate the land uses for Community Commercial (CC), Office (O), High Density Residential (HDR), Medium Density Residential (MDR), Park (P), and Public/Semi-Public (PUB). The Master Plan would zone the land uses for Community Commercial (CC), Commercial Office (CO), High Density Residenital (RH), Medium Density Residential (RM), and Public/Semi-Public (PS) (Figure 2-9). Table 2 provides a summary of the proposed land uses.

A reconnaissance-level biological survey was conducted on the project site by Quad Knopf, Inc. biologists on April 26, 2012 to evaluate the potential for occurrence of special status species. Representative photographs of the project site are provided in Appendix A.

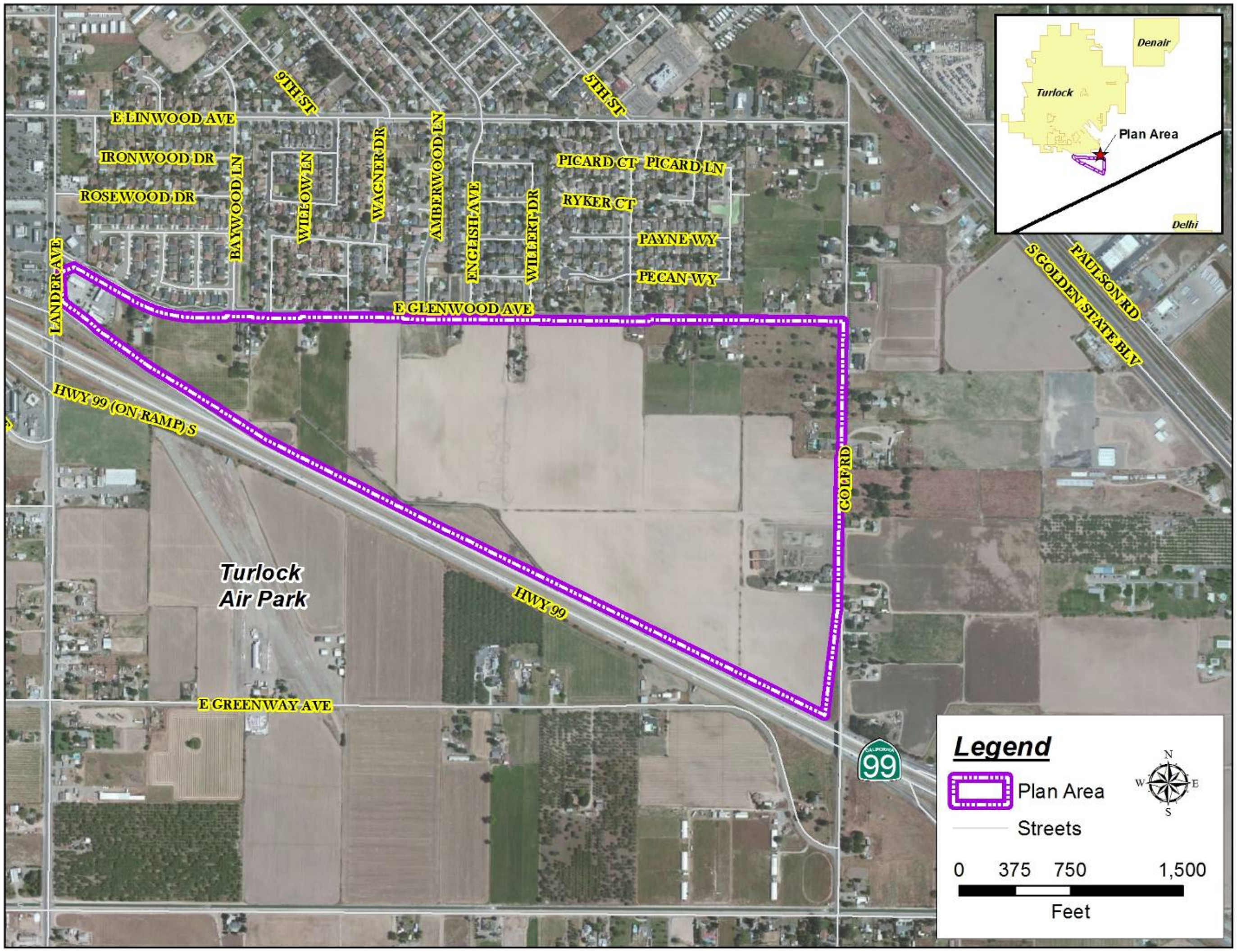
Table 2
Morgan Ranch Master Plan Land Use Summary

Land Use Designation	Approximate Acreage	Number of Units	Density	Allowed Density
Medium Density Residential	120.2	1,322 DU	11 DU/acre	7–15 DU/acre
High Density Residential	15.0	338 DU	22.5 DU/acre	15-30 DU/acre
Community Commercial	8.9	96.9 KSF	25% FAR	25%-35% FAR
Office	1.5	16.3 KSF	25% FAR	25%-35% FAR
Park	8.7	-	-	-
Detention Basin	4.4	-	-	-
Public (School)	11.1	300 students	-	-

Source: City of Turlock, Morgan Ranch Master Plan, 2012
Notes: DU = dwelling units, KSF = 1,000 square feet, FAR = Floor Area Ratio



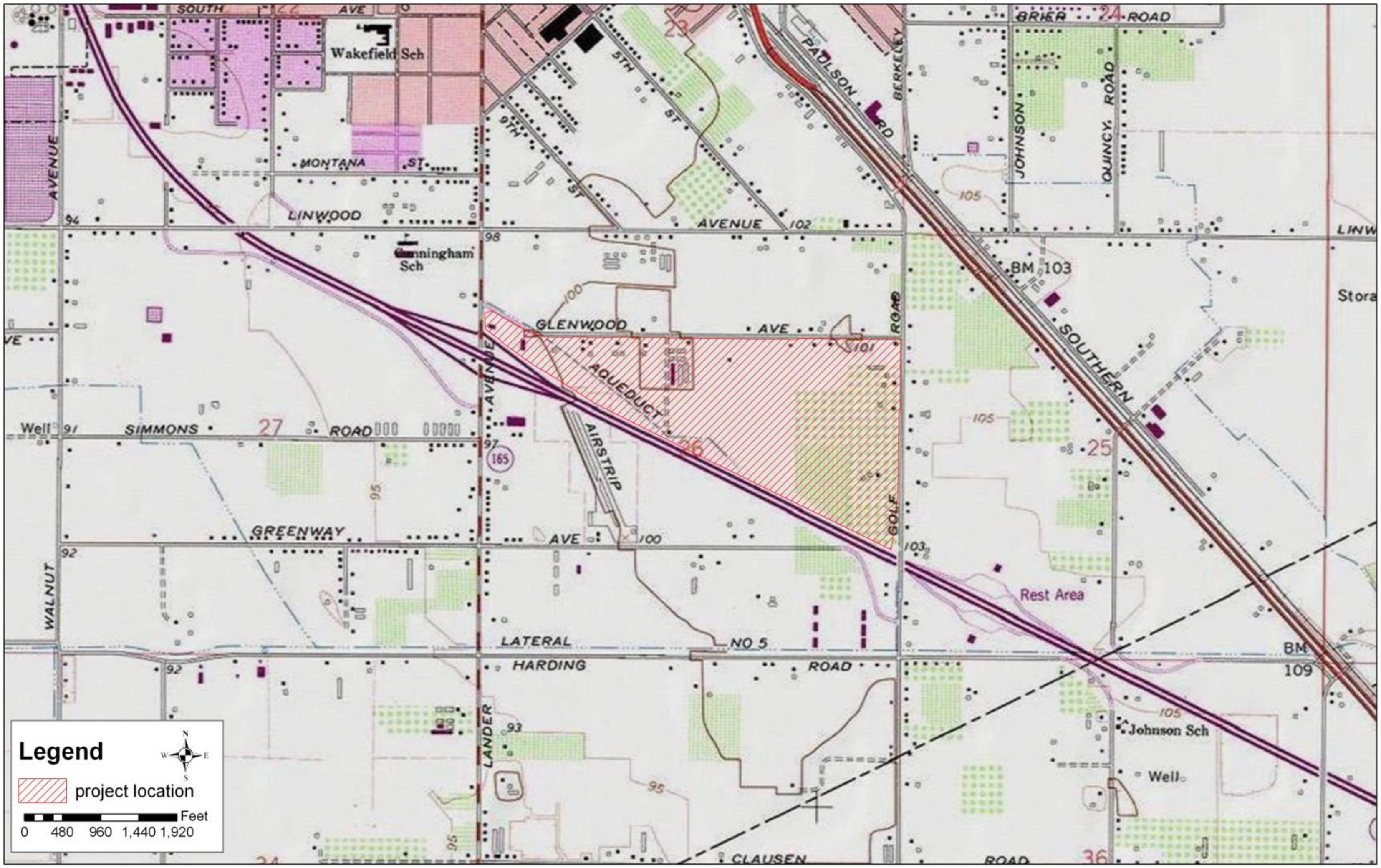
Quad Knopf	REGIONAL MAP	Figure 1



Quad Knopf

LOCAL VICINTY MAP – AERIAL BASE

Figure 2



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Quad Knopf	LOCAL VICINTY MAP – TOPOGRAPHIC BASE	Figure 3

Environmental Setting

ECOREGION

The project site is located in the Central California Valley ecoregion (Omernik 1987). This ecoregion is characterized by flat, intensively farmed plains with long, hot dry summers and cool, wet winters. The area averages approximately 14-20 inches of precipitation per year. The Central California Valley ecoregion includes the Sacramento Valley to the north and the San Joaquin Valley to the south, and extends from the Sierra Nevada foothills to the Coastal Range foothills. This area was historically dominated by oak woodlands and grasslands that have undergone extensive agricultural conversion. Nearly half of the region is actively farmed, of which approximately 75 percent is irrigated.

PROJECT SITE HABITAT

The project site is located along the valley floor. The valley floor is composed of a limited number of plant communities due to the long history of agricultural disturbance. The project site generally supports three habitat types. These include non-native grassland, agricultural land, and built land. Each of these habitats is described below.

Non-native Annual Grassland. Non-native annual grassland occurs in a variety of areas in the San Joaquin Valley. These areas are typically characterized by past disturbances, such as fire, grazing, tilling, etc. Therefore, species that occur in this habitat tend to be opportunistic species that readily adapt to urban and disturbed environments. Plant species commonly found in non-native grasslands include mustards (*Brassicaceae*), filarees (*Erodium spp*.), clovers (*Trifolium spp*.), wild oats (*Avena spp*.), bromes (*Bromus spp.),* foxtail barley (*Hordeum murinum spp*.), ryegrass (Lolium spp.), common tarweed (*Hemizonia spp*., *Holocarpha spp.),* and fiddle-neck (*Amsinckia menziesii*) among others. Non-native annual grassland occurs throughout approximately 10 percent of the project site. It primarily occurs in the northeastern corner of the site, but is also found in the western portion of the site adjacent to an almond orchard.

Agriculture. Agricultural land occurs in large portions of the San Joaquin Valley. These areas are typically characterized by continued ground disturbances such as tilling and harvesting. Because of the regular management of agricultural land, most plants are limited to the margins of the fields, with the exception of the crop. Plants that are found along field margins are typically similar to those found in non-native grasslands. Approximately 80 percent of the site is agriculturally developed. The central, southern, and southeastern portions of the site are currently being utilized for row-crop production. A small section of the western portion of the site is currently an active almond orchard.

Wildlife species associated with agricultural lands are usually habituated to human disturbances. Representative species often include the mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), and many species of rodents. More sensitive species such as raptors or mesocarnivores can also potentially utilize agricultural lands for foraging purposes.

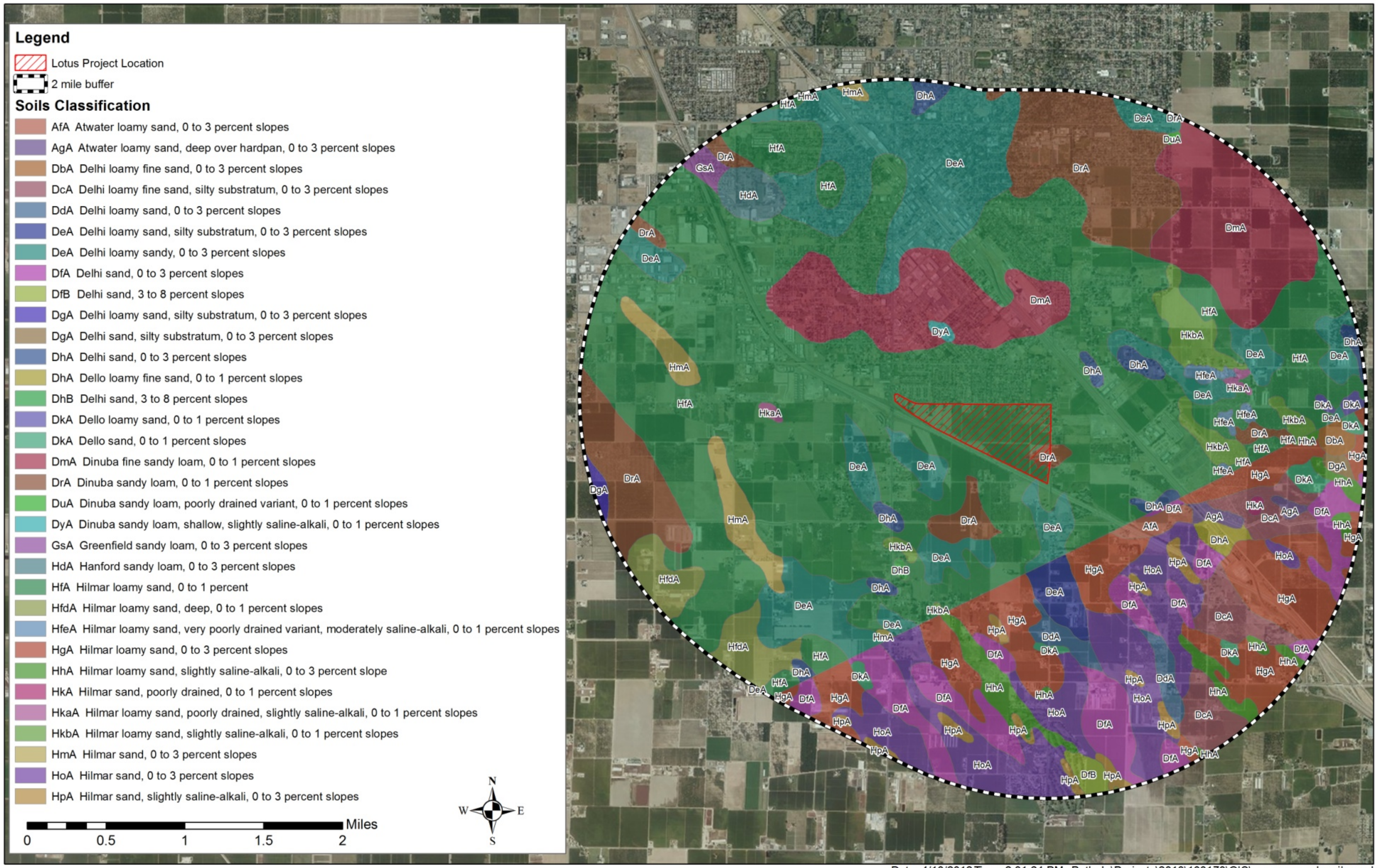
Built. Built areas consist of structures, roads, and parking areas. The plant diversity in this type of habitat is low and is primarily composed of non-native grasses and other ruderal plants. Wildlife in the area is generally very limited as food sources are scarce and human activity is frequent. Wildlife that is commonly found in these areas is generally passing through rather than occupying the area. Built areas comprise approximately 10 percent of the site, and generally consist of residences and their associated barns and outbuildings; a cement-lined irrigation lateral that is approximately three feet wide traverses the south portion of the project site.

SOILS

The primary soil types on the project site are Hilmar loamy sand and Dinuba sandy loam (Figure 4).

FLOOD ZONE

The project site does not occur within a 100-year flood plain (FEMA Flood Zone A, Figure 5). The 100 year flood plain is the maximum level of flood water expected to occur, within a given area, in a 100-year period.



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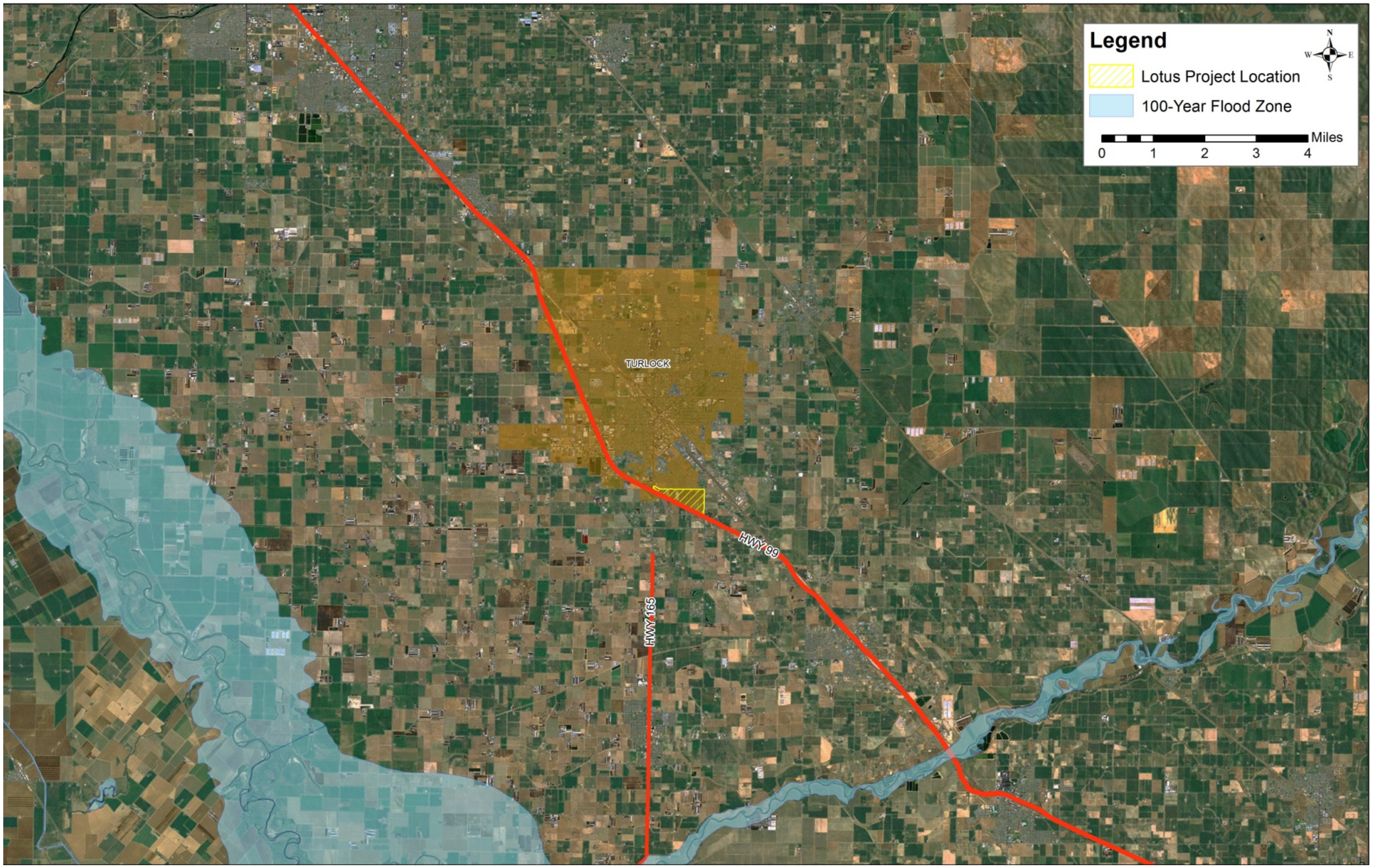
Quad Knopf

SOILS

Figure 4



Quad Knopf	100 YEAR FLOOD ZONE	Figure 5

Regulatory Setting

The natural vegetation communities of the southern San Joaquin Valley historically supported a diverse assemblage of plant and animal species. The conversion of native and naturalized plant communities by agricultural development, flood control, road construction, dam construction, and urbanization has significantly reduced available wildlife and plant habitat. As a result of this conversion, several species of both plants and animals have been extirpated from the region, and populations of other species have declined significantly. As directed by the State and federal legislation, the California Department of Fish and Game (CDFG) and the United States Fish and Wildlife Service (USFWS) have listed many species as threatened, endangered, or as candidates for State or Federal listing. Other species have been designated as "species of special concern" by the CDFG. The California Native Plant Society (CNPS) has developed its own set of lists of native plants considered rare, threatened, or endangered. Collectively, these plants and animals are referred to as "special-status species."

For this report, the terms "sensitive species", "special status species" or "species of concern" refer to those species viewed with special concern by the USFWS; the CDFG Natural Diversity Data Base (CNDDB) "Special Animals" (CDFG 2012); and the CNDDB "Special Vascular Plants, Bryophytes, and Lichens List" (CDFG 2012b). This report identifies and addresses potential project related effects on special-status animal and plant species that could potentially be present on the project site. Special status species included in the report may be listed under one or more of the following categories:
Federal Endangered - Listed as Endangered by the Federal Government.

Federal Threatened - Listed as Threatened by the Federal Government.

Federal Candidate - Candidate for federal listing (species for which the U.S. Fish and Wildlife Service has sufficient biological information to support a proposal to list as Endangered or Threatened).

Federal Species of Concern - Federal Species of Concern (species whose conservation status is of concern to the USFWS).

MBTA - Species protected under the auspices of the Migratory Bird Treaty Act.

State Endangered - Listed as Endangered by the State of California.

State Threatened - Listed as Threatened by the State of California.

State Rare - Plant species listed as Rare by the State of California and afforded protection under the Native Plant Protection Act.

State Species of Special Concern - California Department of Fish and Game Species of Special Concern.

Protected Species – those species that are fully protected by sections 3511 (birds), 4700 (mammals), and 5050 (reptiles and amphibians) of the California Fish and Game Code.

There are federal, State, and local laws, regulations and policies that may affect project approval and permitting. These regulations consist of:

Federal

FEDERAL ENDANGERED SPECIES ACT

The Federal Endangered Species Act (FESA) defines an *endangered species* as "any species or subspecies that is in danger of extinction throughout all or a significant portion of its range." A *threatened species* is defined as "any species or subspecies that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Proposed endangered or threatened species are those species for which a proposed regulation, but not a final rule, has been published in the Federal Register.

Once a species is listed, it is fully protected from take unless a take permit under section 10 (a) (1b) of the FESA is issued by the USFWS (for non-federal projects) or unless a consultation under section 7 of the FESA is completed (for federal projects). Take is defined as "the killing, capturing, trapping, or harassing of a species." Adverse modification of habitat can also be considered take.

MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act (MBTA) is an international treaty among the United States, Canada, Mexico, Japan, and Russia for the conservation and management of bird species that may migrate through more than one country. The MBTA (50 CFR Section 10) is enforced in the United States by the USFWS and covers 972 bird species. According to the provisions of the MBTA, it is unlawful to pursue, hunt, take, capture, or kill or attempt to do the same to any species covered by the MBTA, including their nests, eggs, or young. Any disturbance that causes nest abandonment or loss of reproductive effort is considered take and is potentially punishable by fines or imprisonment. Birds covered under this act include all waterfowl, shorebirds, gulls, wading birds, raptors, owls, hummingbirds, warblers, flycatchers, and most perching bird species.

CLEAN WATER ACT – SECTION 404

The goal of Section 404 of the Clean Water Act (1972) is to maintain, restore, and enhance the physical, chemical, and biological integrity of the nation's waters. Under Section 404 of the Clean Water Act, the US Army Corps of Engineers (USACE) regulates discharges of dredged and fill materials into "waters of the United States" (jurisdictional waters). Waters of the US include a wide variety of water bodies including waters used for interstate commerce, intrastate lakes, rivers, streams, sandflats, mudflats, playa lakes, sloughs, wet meadows, wetlands, natural ponds, and wetlands adjacent to any water of the US (33 CFR Part 328, Section 328.3). Impacts to jurisdictional waters, including wetlands (a special category of water of the US), require a permit from USACE and typically require mitigation. Impacts to wetlands often require compensation in kind to ensure no net loss of wetland function and value.

CLEAN WATER ACT – SECTION 401

Section 401 of the Clean Water Act requires an applicant who is seeking a 404 permit to first obtain a water quality certification from the RWQCB. To obtain the water quality certification, the RWQCB must indicate that the proposed discharge would be consistent with the standards set forth by the state.

State

CALIFORNIA ENDANGERED SPECIES ACT

Section 2080 of the California Endangered Species Act (CESA) prohibits the take of any state-listed threatened or endangered species. CESA defines *take* as "any action or attempt to hunt, pursue, catch, capture, or kill any listed species." If the proposed project results in a take of a listed species, a Management Agreement pursuant to Section 2080 of CESA is required from the CDFG.

CALIFORNIA NATIVE PLANT PROTECTION ACT

The California Native Plant Protection Act (CNPPA) protects endangered and rare species, subspecies, and varieties of wild plants native to California. A "native plant" is defined as a plant growing in a wild, uncultivated state which is normally found native to the vegetation of California. The CNPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare, and to require permits for collecting, transporting, or selling such plants.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

It is the policy of the California Environmental Quality Act (CEQA) to regulate projects to prevent environmental damage. The mechanism to ensure protection is the preparation and review of an Environmental Impact Report (EIR), which is used to disclose environmental information relevant to the project. Various responsible and trustee agencies provide review, comments, and input into the decision making process.

Under the CEQA guidelines, Appendix G, significant impacts to sensitive natural communities and special-status plant and wildlife species, including CNPS List 1 and 2 species and species of special concern must be fully considered. Avoidance measures or mitigation to reduce impacts to less than significant must be implemented. This report is developed specifically to provide the required biological information necessary to produce an Environmental Impact Report for the project.

BIRDS OF PREY

Under the California Fish and Game Code (Section 3503), all birds of prey (orders Falconiformes and Strigiformes) are protected. The code states that it is unlawful to take, possess, or destroy the nest or eggs of any such bird unless it is in accordance with the code. Any activity that would cause a nest to be abandoned or cause a reduction or loss in a reproductive effort is considered take.

STREAMBED ALTERATION AGREEMENTS

The CDFG is authorized under state Fish and Game Code Sections 1600-1607 to develop mitigation measures and enter into Streambed Alteration Agreements with applicants (both public and private) that propose a project that would divert or obstruct the natural flow or change the bed, channel, or bank of any lake or stream in which there is a fish or wildlife resource. Through this agreement, the CDFG may impose conditions to limit and fully mitigate impacts on fish and wildlife resources.

THE CALIFORNIA PORTER COLOGNE WATER QUALITY CONTROL ACT

The California Porter-Cologne Water Quality Control Act, Water Code Section 13260, requires that "any person discharging waste, or proposing to discharge waste, within any region that could affect the waters of the State to file a report of discharge" with the Regional Water Quality Control Board (RWQCB) through an application for waste discharge (Water Code Section 13260(a)(1). The term "waters of the state" is defined as any surface water or groundwater, including saline waters, within the boundaries of the State (Water Code Section 13050(e)). Pursuant to the Porter-Cologne Water Quality Control Act, the RWQCB also regulates "isolated wetlands," or those wetlands considered to be outside of the Corps jurisdiction as defined by the SWANCC decision (see the section above for the Clean Water Act).
The RWQCB generally considers filling in waters of the state to constitute "pollution." Pollution is defined as an alteration of the quality of the waters of the state by waste that unreasonably affects its beneficial uses (Water Code Section 13050(1)). The RWQCB litmus test for determining if a project should be regulated pursuant to the Porter-Cologne Water Quality Control Act is if the action could result in any "threat" to water quality.

Local

CITY OF TURLOCK GENERAL PLAN

The City of Turlock General Plan includes the following relevant of policies for the protection of native plants and wildlife and water resources:

Chapter 3 – New Growth Areas and Infrastructure

Policy 3.1-a Proactively manage growth. Proactively manage and plan for growth in an orderly, sequential, and contiguous fashion.

Policy 3.1-c Promote good design in new growth areas. Design new growth and development so that it is compact; preserves natural, environmental, and economic resources; and provides the efficient and timely delivery of infrastructure, public facilities, and services to new residents and businesses.

Policy 3.3-ad Low Impact Development (LID) and Water Quality Best Management Practices (WQBMPs). Require implementation of LID techniques and WQBMPs in new development projects and public works projects. Examples of these are use of porous pavement and pervious concrete, water quality swales, and rain gardens.

Policy 3.3-ae Encourage Use of Less Toxic Agricultural Chemicals. In cooperation with the Stanislaus County Agricultural Center, provide education and incentives to encourage the use of less toxic forms of pesticides, insecticides, herbicides, or other chemical substances by households and farmers.

Chapter 7 – Conservation

Policy 7.2-a Preserve Farmland. Promote the preservation and economic viability of agricultural land adjacent to the City of Turlock.

Policy 7.2-b Limit Urban Expansion. Retain Turlock's agricultural setting by limiting urban expansion to designated areas and minimizing conflicts between agriculture and urban activities.

Policy 7.2-c Protect Soil and Water. Work to protect and restore natural resources essential for agricultural production.

Policy 7.2-e Require Compact Development. Require development at densities higher than typical in recent years in order to limit conversion of agricultural land and minimize the urban/agricultural interface.

Policy 7.2-g Allow Agricultural Uses to Continue. Where agriculture exists within City limits, allow uses to continue until urban development occurs on these properties, including the establishment of community gardens serving the immediate neighborhood.

Policy 7.2-h Support Participation in Williamson Act Program. Support participation in the Williamson Act program by Study Area landowners.

Policy 7.2-I Support Right to Farm. Support the implementation of Stanislaus County's Agricultural Element and Right-to-Farm ordinance.

Policy 7.2-m Minimize Soil Erosion. Require new development to implement measures to minimize soil erosion related to construction. Identify erosion-minimizing site preparation and grading techniques in the zoning code.

Policy 7.4-a Increase Biological Diversity. Make efforts to enhance the diversity of Turlock's flora and fauna, including street trees.

Policy 7.4-b Sensitive Site Planning. Protect mature trees and natural vegetation and features wherever feasible in new development areas.

Policy 7.4-c Urban Trees. Protect and expand Turlock's urban forest through public education, sensitive maintenance practices, and a long-term financial commitment adequate to protect these resources. Continue to require the planting of appropriately-spaced street trees in new development areas.

Policy 7.4-d Special Review if New Information Becomes Available. Establish environmental review procedures, such as site reconnaissance and certification by a biologist, as part of the project development application process if new information to support existence of a Special Status species becomes available.

OBJECTIVES

The objectives of this reconnaissance level biological survey were to:

- describe existing biotic conditions on the proposed project site;
- determine the presence or likelihood of occurrence of significant biological resources including sensitive natural communities, special-status plant and animal species, wetland and riparian habitats, and wildlife nurseries and movement corridors, on the project site;
- identify potential impacts on significant biological resources that would result from implementation of the proposed project, and;
- identify mitigation measures that would avoid impacts or reduce impacts to a level that would be less than significant.

METHODOLOGY

Quad Knopf, Inc. was retained by the City of Turlock to conduct a reconnaissance-level biological survey of the project site. Prior to conducting the field survey, Quad Knopf biologists prepared a list of special-status plant and animal species that could potentially occur on the site (Table 3). That list was developed from:

- The CNDDB (CDFG 2012a). A data query was conducted for the Turlock, Denair, Ceres, Montpelier, Cressey, Hatch, Gustine, Stevinson, and Arena, California USGS 7.5-minute quadrangles (Figure 6).
- Special Animals list (CDFG 2012b).
- Special Vascular Plants, Bryophytes, and Lichens List (CDFG 2012c).

- The CNPS Online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2012). A data query was conducted for the Turlock, Denair, Ceres, Montpelier, Cressey, Hatch, Gustine, Stevinson, and Arena, California USGS 7.5-minute quadrangles.

- The USFWS (2012) list of Endangered and Threatened Species. A data query was conducted for the Turlock, Denair, Ceres, Montpelier, Cressey, Hatch, Gustine, Stevinson, and Arena, California USGS 7.5-minute quadrangles.

The list includes not only species that appear in the databases mentioned above, but also may include species which were determined, based on site conditions and respective range extents, to have a potential to occur on the site even though they have not been recorded in the area.

The USFWS National Wetland Inventory (NWI) Map was reviewed to determine the location and extent of known wetlands occurring in the project area (Figure 7).

On 26 April 2012, Quad Knopf biologists Andy Glass and Tyler Schade conducted a reconnaissance-level biological survey to determine whether special status plant and animal species or their habitats exist on the project site. The project site was surveyed by conducting pedestrian transects throughout the project site and within 500 feet of its perimeter. A vehicular windshield survey was also completed within 0.5 mile of the project site to identify potential raptor nests. All observed plants and wildlife were identified and were recorded (Table 4).

Table 3
Special Status Species Potentially Present on the
Morgan Ranch Master Plan Project Site, April 2012

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
SENSITIVE NATURAL COMMUNITIES				
Valley Sacaton Grassland	*Valley Sacaton Grassland*	RARE	Large (chest high) sporobolus airoides in high densities in mosaic with distichlis spicata, annual grasses (*Hordeum marinum ssp. gussonianum*), herbs (*erodium, orthocarpus*), vernal pools. Very alkaline with some scalds.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Valley Sink Scrub	*Valley Sink Scrub*	RARE	Scattered allenrolfea-suaeda in areas of scattered sacaton grassland and vernal pools.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Cismontane Alkali Marsh	*Cismontane Alkali Marsh*	RARE	Marsh mosaic with many freshwater marsh species and *Distichlis spicata var nana*, *Frankenia grandifolia* and *Salicornia pacifica*.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site There were no CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
Coastal and Valley Freshwater Marsh	*Coastal and Valley Freshwater Marsh*	RARE	Freshwater marsh that USFWS wetlands map show as areas with palustrine wetlands that are intermittently flooded forested wetlands or emergent wetland.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site. There was one CNDDB record of this natural community occurring within ten miles of the project site.
Northern Claypan Vernal Pool	*Northern Claypan Vernal Pool*	RARE	Northern Claypan Vernal Pools communities consist of a low, herbaceous community dominated by annual herbs and grasses. Germination and growth begin with winter rains, often continuing even when inundated. Rising spring temperatures evaporate the pools, leaving concentric bands of vegetation. Claypan vernal pools are typically small and contain less cover than northern hardpan vernal pools.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site There was one CNDDB record of this species occurring within ten miles of the project site.
Northern Hardpan Vernal Pool	*Northern Hardpan Vernal Pool*	RARE	A low, amphibious, herbaceous community dominated by annual herbs and grasses. Germination and growth begin with winter rains, often continuing even when inundated. Rising spring temperatures evaporate the pools, leaving concentric bands of vegetation that colorfully encircle the drying pool.	**Absent:** Soil type and topography on the project site were not suitable for this natural community, and therefore this community was not present on the project site. There was one CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
SPECIAL STATUS PLANTS				
Atriplex cordulata	heartscale	1B.2	This annual plant occurs in Chenopod scrubland and grassland habitats, but it also is known to occur in wet areas. It is most common on alkaline soils. It flowers between May and October and ranges in elevation from 1 to 1,000 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were two CNDDB records of this species occurring within ten miles of the project site.
Atriplex depressa	brittlescale	1B.2,	This annual plant occurs in Chenopod scrubland, grassland, and alkali sink habitats, but it also is known to occur in wet areas. It is most common on alkaline soils. It flowers between June and October and ranges in elevation from 1 to 1,055 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Atriplex joaquiniana	San Joaquin spearscale	1B.2	This species occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major streams draining from the inner Coast Ranges foothills. It is most common on clay soils. This species blooms between April and October. It is generally found at low elevations, but has been collected up to 1,055 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Atriplex minuscula	lesser saltscale	1B.1	This annual plant occurs in Chenopod scrubland, grassland, and alkali sink habitats, but it also is known to occur in wet areas. It	**Absent:** No suitable habitat for this species occurs on the site. There was one CNDDB record of this species occurring within ten miles of the

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			is most common on sandy soils in alkaline areas. It flowers between May and October and ranges in elevation from 1 to 330 feet.	project site.
Atriplex persistens	vernal pool smallscale	1B.2	This plant is restricted to alkaline vernal pools on the floor of the San Joaquin Valley and is endemic to California. It is most common in northern claypan soils. It flowers between July and September and ranges in elevation from 25 to 345 feet.	**Absent.** No suitable habitat for this species occurs on the site. The project site does not contain soils that would support this species. There was one CNDDB record of this species occurring within ten miles of the project site.
Atriplex subtilis	subtle orache	1B.2	This annual plant occurs in Chenopod scrubland, grassland, and alkali sink habitats, but it also is known to occur in wet areas. Its flowering period is from June through August and it ranges in elevation from 130 to 330 feet.	**Absent.** No suitable habitat for this species occurs on the site. There was one CNDDB record of this species occurring within ten miles of the project site.
Calycadenia hooveri	Hoover's calycadenia	1B.3	Hoover's calycadenia occurs in cismontane woodland, Valley and foothill grassland in thin soils and small, soil filled cracks on and around rocky outcroppings, primarily on Ione sandstone cappings. Its flowering period is from July through September and ranges in elevation from 1 to 985 feet.	**Absent.** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
Castilleja campestris ssp. succulenta	succulent owl's-clover	FT, CE, 1B.2	Succulent owl's clover occurs in the margins of vernal pools, swales and some seasonal wetlands, often on acidic soils. The flowering period is during April and May and it ranges in elevation from 80 to 2,300 feet.	**Absent:** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Chamaesyce hooveri	Hoover's spurge	FT, 1B.2	Hoover's spurge is restricted to vernal pools. The flowering period is between May and October and it ranges in elevation from 1 to 650 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Chloropyron molle ssp. hispidum	hispid bird's-beak	1B.1	This annual plant occurs in meadows and seeps, playas, and grasslands. The flowering period is from May to October and it ranges in elevation from 1 to 500 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Eryngium racemosum	Delta button-celery	CE, 1B.1	Delta button-celery occurs in riparian scrub, clay soils on sparsely vegetated margins of seasonally flooded flood plains. The flowering period is between June and September and it ranges in elevation from 15 to 75 feet.	**Absent:** No suitable habitat for this species occurs on the site. There was one CNDDB record of this species occurring within ten miles of the project site.
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	1B.1,	This plant occurs in coastal marshes and swamps and in playas and vernal pools. The blooming period is between February to June	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			and it ranges in elevation from 3 to 3,900 feet.	the project site.
Lepidium latipes var. heckardii	Heckard's pepper-grass	1B.2,	Heckard's peppergrass occurs in alkaline flats and alkaline grasslands along the edges of vernal pools on Pescadero Silty Clay, Pescadero Saline-alkali, Marvin soils, and Willows Clay soil types. The flowering period is between March and May and it ranges in elevation from 0 to 650 feet.	**Absent:** No suitable habitat for this species occurs on the site. Associated soils were absent. There were no CNDDB records of this species occurring within ten miles of the project site.
Monardella leucocephala	Merced monardella	1A	Merced monardella is restricted to grassland habitats in extremely sandy, subalkaline soils in low-lying riparian areas. It ranges in elevation from 50 to 260 feet and blooms from May through July.	**Absent:** Project site contains appropriate habitat for this species; however, species is believed to be extinct throughout its range. The species was not observed during surveys. There was one CNDDB record of this species occurring within ten miles of the project site from over 20 years ago.
Navarretia prostrata	prostrate vernal pool navarretia	1B.1	This species occurs in and near vernal pools and moist places. It is most common in rocky or clay soils. It flowers during April and May at elevations 0 to 2,000 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Neostapfia colusana	Colusa grass	FT, CE, 1B.1	Colusa grass occurs in vernal pools with adobe soils. It is most	**Absent:** No suitable habitat for this species occurs on the site. There

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			common in alkali or acidic soils. It flowers between May and July and ranges in elevation from 16 to 345 feet.	were no CNDDB records of this species occurring within ten miles of the project site.
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	FT, CE, 1B.1	San Joaquin Valley orcutt grass occurs in vernal pools. It is most common in acidic soils that vary in texture from clay to sandy loam. It flowers from May through August and ranges in elevation from 100 to 2,500 feet.	**Absent.** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were 3 CNDDB records of this species occurring within ten miles of the project site. Critical habitat has been established within ten miles of project site.
Orcuttia pilosa	hairy Orcutt grass	FE, CE, 1B.1	Hairy orcutt grass occurs in vernal pools. It is most common in acidic and saline-alkaline soils. It flowers between May and September and ranges in elevation from 75 to 375 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Sagittaria sanfordii	Sanford's arrowhead	1B.2	This perennial herb is endemic to California. It is occurs in sandy loam and clay soils. It is found in riparian habitats. It flowers between July and September and ranges in elevation from 10 to 100 feet.	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.
Tuctoria greenei	Greene's tuctoria	FE, 1B.1	Greene's tuctoria occurs in small or shallow vernal pools or the early drying sections of large, deep vernal pools in the Central Valley. It is most common in Anita clay	**Absent:** No suitable habitat for this species occurs on the site. There were no CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			and Tuscan loam soils. It flowers from May to July and ranges in elevation from 110 to 440 feet.	
SPECIAL STATUS INVERTEBRATES				
Branchinecta conservatio	Conservancy fairy shrimp	FE	Endemic to the grasslands of the northern two-thirds of the central valley; found in large, turbid pools. Inhabits astatic pools located in swales formed by old, braided alluvium; filled by winter/spring rains, last until June.	**Absent.** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Branchinecta longiantenna	longhorn fairy shrimp	FE	Endemic to the eastern margin of the central coast mountains, found seasonally in astatic grassland vernal pools. Inhabits small, clear-water depressions in sandstone and clear-to-turbid clay/grass-bottomed pools in shallow swales.	**Absent.** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Branchinecta lynchi	vernal pool fairy shrimp	FT	Vernal pool fairy shrimp occur in a variety of vernal pool habitats from small, clear sandstone rock pools to large, turbid, alkaline, grassland valley floor pools.	**Absent.** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT	Valley elderberry longhorn beetles are associated with elderberry bushes (*Sambucus spp.*) in the Central Valley.	**Absent.** No suitable habitat for this species occurs on the site. No elderberries were located within or near the project site. There were five CNDDB records of this species occurring within ten miles of the

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
				project site.
Lepidurus packardi	vernal pool tadpole shrimp	FE	Occur in vernal pools with clear to high turbidity.	**Absent.** No suitable habitat for this species occurs on the site. No vernal pools or vernal pool habitat is located within or near the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
SPECIAL STATUS FISH				
Acipenser medirostris	Green sturgeon	FT, CSC	Green sturgeons spawn in deep pools or "holes" in large, turbulent, freshwater river mainstems. Adults live in oceanic waters, bays, and estuaries when not spawning, foraging in estuaries and bays ranging from San Francisco Bay to British Columbia	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
Hypomesus transpacificus	Delta smelt	FE, CT	Delta smelt are found only in the Sacramento and San Joaquin estuaries of the San Francisco Bay.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
Mylopharodon conocephalus	hardhead	CSC	This small fish inhabits deep pools in slow moving streams and rivers in the San Joaquin and Sacramento Valleys from Modoc County in the north to Kern County in the south.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
Oncorhynchus mykiss	Central Valley steelhead	FT	Steelhead trout occur in stream and rivers with connections with the San Joaquin River.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
Oncorhynchus tshawytscha	Central Valley spring-run chinook salmon	FT	Few wild spawning populations remain in the Sacramento River system, California; native populations extirpated in San Joaquin River drainage; dams block spawning habitat, and remaining spawning habitat is degraded by human activities.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
Oncorhynchus tshawytscha	winter-run chinook salmon, Sacramento River	FE, CE,	These anadromous fish spawn in streams of the Sacramento and Joaquin river systems in California from July through August; threatened by habitat degradation, reduced water quality, loss of riparian and estuarine habitat, and the detrimental impacts of hatchery fishes.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
SPECIAL STATUS AMPHIBIANS				
Ambystoma californiense	California tiger salamander	FT, CT, CSC	California tiger salamanders occur in natural ephemeral pools or ponds that mimic them, that remain inundated for 12 weeks or more. They require nearby upland habitat containing small mammal	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			burrows or crevices that provide refugia.	
Rana aurora draytonii	California red-legged frog	FT, CSC	California red-legged frogs occur in small streams, ponds and marshes, preferably with dense shrubby vegetation such as cattails and willows near deep water pools	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
Spea hammondii	western spadefoot	CSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were no CNDDB records of this species occurring within ten miles of the project site.
SPECIAL STATUS BIRDS				
Agelaius tricolor	tricolored blackbird	CSC	Tricolored blackbirds live near fresh water, and prefer emergent wetland vegetation with tall, dense cattails or tules, but they also are found in thickets of willow, blackberry, wild rose, and tall herbs. They forage in grassland and agricultural fields.	**Possible as a transient forager:** Marginal foraging and upland habitat is available for this species within the project vicinity. However, this habitat is limited; no nesting habitat is present within the project site. There were five CNDDB records of this species occurring within ten miles of the project site.
Buteo swainsoni	Swainson's hawk	CT	Swainson's hawks occur in riparian forests and other forested areas. They roost in a variety of trees and forage widely over forests, grasslands, and shrublands. They are easily	**Possible.** Marginal foraging habitat is available for this species on the project site. The trees on and near the site also provide potential nesting habitat. There are ten CNDDB records of this species occurring within ten miles of the project site. The nearest is approximately 4.1 miles to the

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			disturbed by human activities.	northwest. No Swainson's hawks were observed during the survey.
Melospiza melodia maxillaris	Suisun song sparrow	CSC	Found in the Suisun Bay area in central California, Santa Clara County, with stragglers in Stanislaus County. Associated with upper marsh edges & higher elevation channel banks, and in areas with more shrubs	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. There was one CNDDB record of this species occurring within ten miles of the project site.
SPECIAL STATUS REPTILES				
Anniella pulchra pulchra	silvery legless lizard	CSC	Occurs in moist warm loose soil with plant cover. Moisture is essential. Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. There was one CNDDB record of this species occurring within ten miles of the project site.
Emys marmorata	western pond turtle	CSC	Western pond turtles can be found in ponds and small lakes with abundant vegetation; also found in marshes, slow moving streams, reservoirs, and brackish water. Require basking sites.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No aquatic resources exist on site. There were two CNDDB record of this species occurring within ten miles of the project site.
Gambelia sila	blunt-nosed leopard lizard	FE, CE,	Blunt-nosed leopard lizards occur in sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. They seek cover in mammal burrows, under	**Unlikely.** The small isolated fragment of grassland habitat on the project site is unlikely to support this species. There were no CNDDB records of this species occurring

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			shrubs, or structures such as fence posts.	within ten miles of the project site.
Phrynosoma blainvillii	Coast horned lizard	CSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Seeks open areas for sunning, bushes for cover, patches of loose soil for burial, & abundant supply of ants & other insects.	**Absent.** No suitable habitat (e.g. sandy washes) for this species occurs on or in the vicinity of the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Thamnophis gigas	giant garter snake	FT, CT,	Giant garter snakes require permanent or semi-permanent marshes and sloughs.	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. No permanent or semi-permanent marshes or sloughs occur within the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
SPECIAL STATUS MAMMALS				
Antrozous pallidus	pallid bat	CSC	This bat is found in deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Possible as a transient forager.** Marginal foraging habitat was present on the site, but no roosting habitat as water was scarce. There was one CNDDB record of this species occurring within ten miles of the project site.
Dipodomys nitratoides exilis	Fresno kangaroo rat	FE, CE,	Fresno kangaroo rats historically occurred in alkali sink and open grassland habitats on the valley	**Absent.** No suitable habitat for this species occurs on or in the vicinity of the project site. Alkali sink habitat

Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts
			floor in Fresno County and portions of Tulare, Kings, and Madera counties. The last confirmed specimen was captured in 1992 and they may be extinct.	was absent from the project site. There were no CNDDB records of this species occurring within ten miles of the project site.
Lasiurus blossevillii	western red bat	CSC	Roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer forests. Prefers riparian habitat edges with walnuts, oaks, willows, cottonwoods, and sycamores where they roost, and mosaics with trees protected from above and open below with open areas for foraging.	**Possible as a transient forager.** Marginal foraging and roosting habitat was present on the site, but no riparian habitat edges. There was one CNDDB record of this species occurring within ten miles of the project site.
Taxidea taxus	American Badger	CSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food and open, uncultivated ground. Preys on burrowing rodents and digs burrows.	**Possible as a transient forager.** Marginal foraging habitat was present on the site. No dens or sign of this species were observed during the site survey. There were no CNDDB records of this species occurring within ten miles of the project site.
Vulpes macrotis mutica	San Joaquin Kit fox	FE, CT	Found in annual grasslands or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing, and suitable prey base.	**Possible as a transient forager.** Marginal foraging habitat was present on the site. No dens or sign of this species were observed during the site survey. There were no CNDDB records of this species occurring within ten miles of the project site.

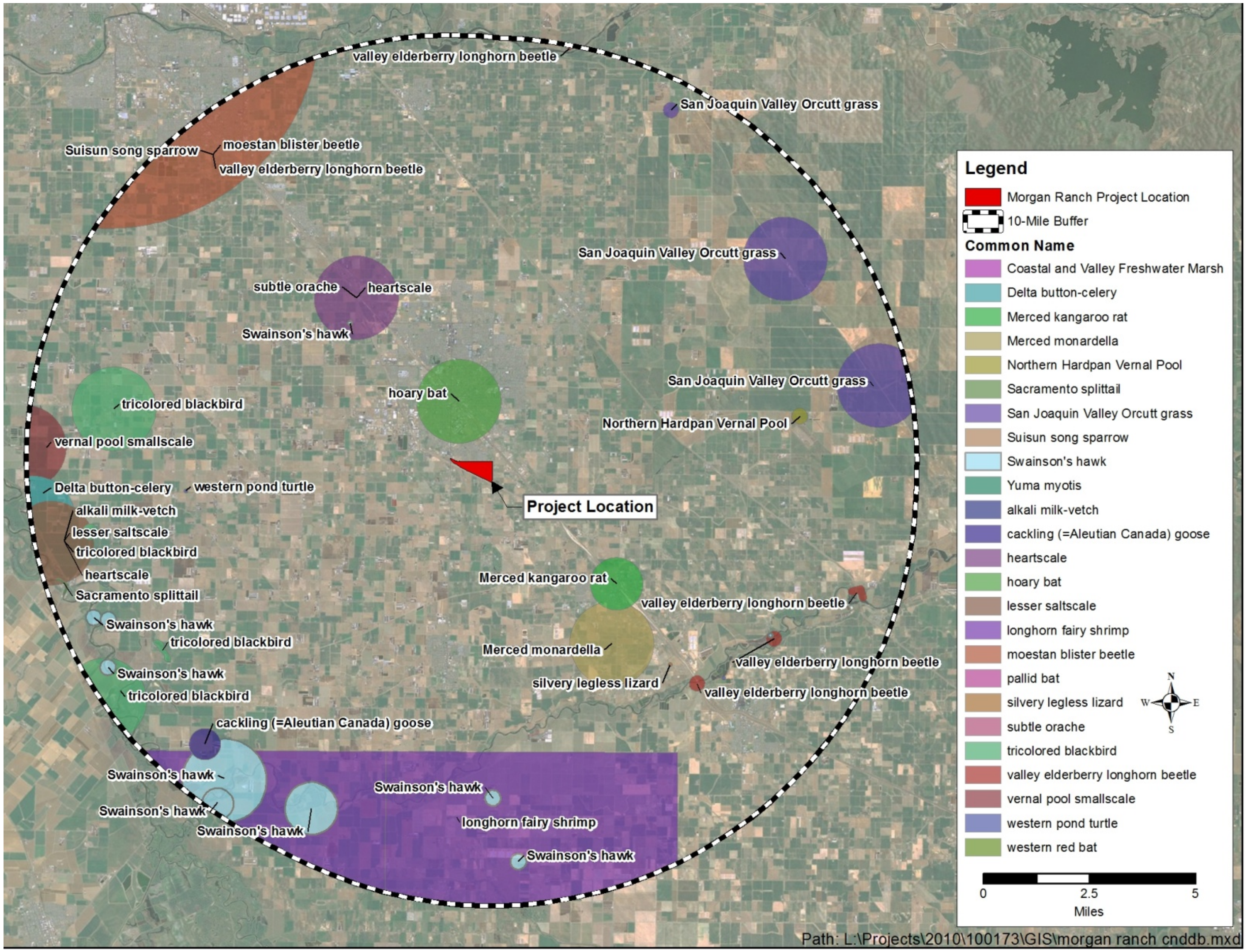
Scientific Name	Common Name	Status	Habitat Requirements	Probability of Occurrence and Assessment of Impacts

Sources:
California Department of Fish and Game. 2012. California Natural Diversity Data Base
California Native Plant Society (CNPS). 2012. Inventory of Rare and Endangered Plants, Rare Plant Scientific Advisory Committee.
United States Fish and Wildlife Service (USFWS). 2012. Critical Habitat Portal, Critical Habitat Map, United States Fish and Wildlife Service, Sacramento, CA.
United States Fish and Wildlife Service (USFWS). 2012. Federal Endangered and Threatened Species List, Sacramento Fish and Wildlife Office.

USGS 7.5 Minute Quadrangles:
Turlock, Denair, Ceres, Montpelier, Cressey, Hatch, Gustine, Stevinson, and Arena quadrangles.

Abbreviations:
FE Federal Endangered Species
FT Federal Threatened Species
MBTA Species Protected Under the Auspices of the Migratory Bird treaty Act
CE California Endangered Species
CT California Threatened Species
CSC California Department of Fish and Game Species of Special Concern
1B California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere
1B.1 California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere; Seriously Threatened in California
1B.2 California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere; Fairly Threatened in California
2.1 California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California, but More Common Elsewhere; Seriously Threatened in California

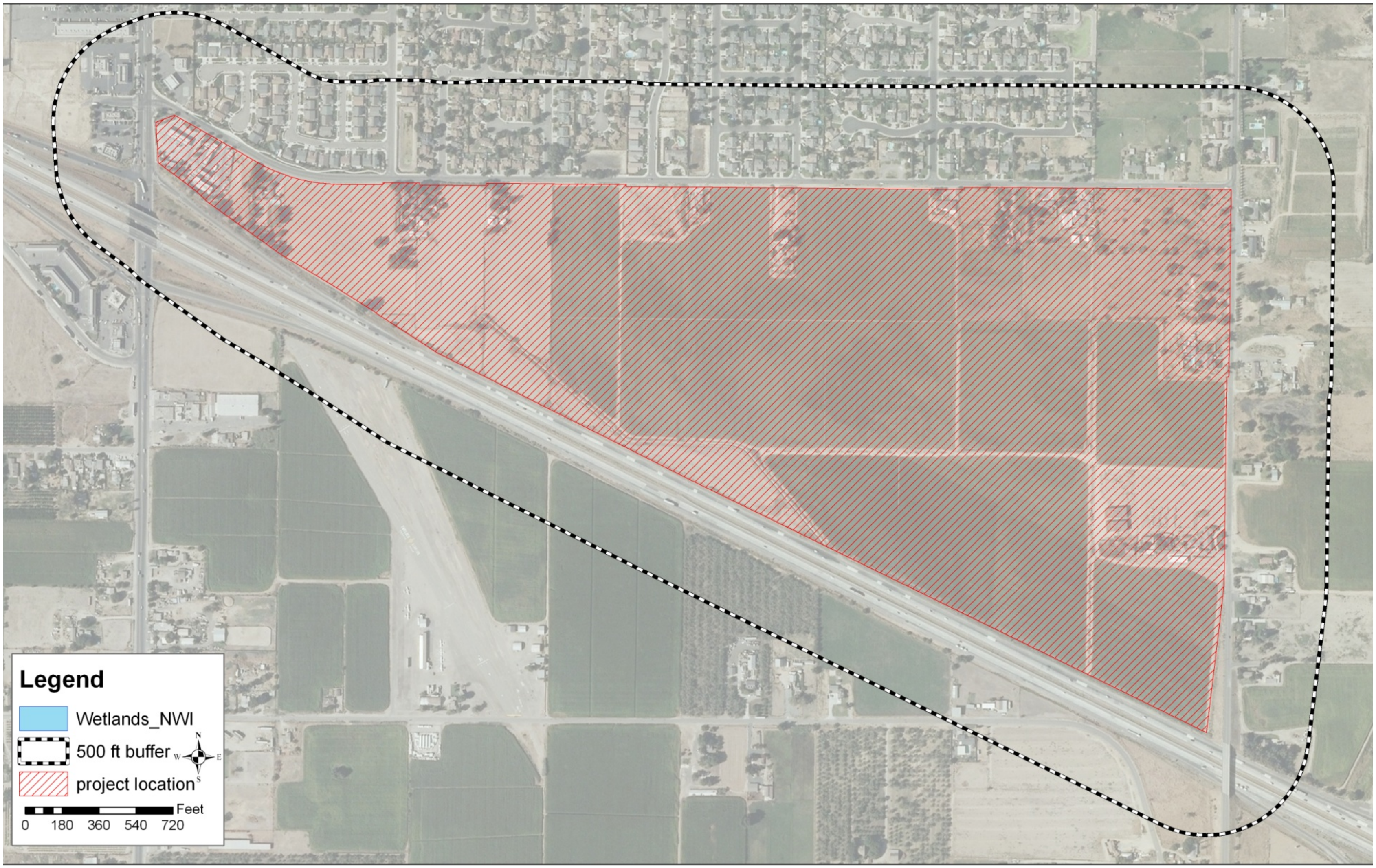
*Potential Occurrence Definitions:
Present: Species or sign of their presence observed on site at time of the field survey.
Likely: Species not observed on site, but may reasonably be expected to occur there on a regular basis. Or, species not observed on the site, exceptional habitat exists, and additional surveys needed to verify presence.
Possible: Species not observed on site, but could occur there from time to time. Or, species not observed on the site, suitable habitat exists, and additional surveys needed to verify presence.
Unlikely: Species not observed on site, and would not be expected to occur there except, perhaps, as a transient. Or, species not observed on the site, marginally suitable habitat exists, and additional surveys needed to verify presence.
Absent: Species or sign of their presence not observed on site, and precluded from occurring there because habitat requirements are not met.



Quad Knopf

LOCATION RECORDS OF SENSITIVE
BIOLOGICAL RESOURCES WITHIN 10 MILES OF THE PROJECT SITE

Figure
6



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WETLANDS KNOWN TO OCCUR ON THE PROJECT SITE FROM NWI 2012

Figure 7

OTHER SPECIAL STATUS SPECIES PRESENT IN THE REGION

Burrowing owl (*Athene cunicularia*) is a state species of special concern. Its habitat consists of open, dry grassland, desert habitats, and open shrub stages of pinyon juniper and ponderosa pine. The western burrowing owl uses rodent or other burrows for roosting and nesting. Breeding occurs March through August with the peak in April and May. The western burrowing owl feeds mostly on insects, small mammals, reptiles, birds, and carrion. Conversion of grassland to agriculture, development, and poisoning of ground squirrels has contributed to the reduction in numbers. Predators include prairie falcons, red-tailed hawks, northern harriers, golden eagles, foxes, coyotes, and domestic dogs and cats. No burrowing owls or burrowing owl sign were observed on the project site. However, several California ground squirrel (*Spermophilus beecheyi*) burrows were located within the non-native annual grassland habitat in the northeast portion of the project site. Such burrows can be modified by burrowing owls for their own habitation. Although considered unlikely, burrowing owls could potentially occupy similar burrows on the project site in the future.

Nesting raptors (birds of prey) are protected under the Migratory Bird Treaty Act (MBTA) and by California Fish and Game Code. All six families of raptors occurring in North America are protected:

- *Accipitridae* (kites, hawks, and eagles)
- *Cathartidae* (New World vultures)
- *Falconidae* (falcons and caracaras)
- *Pandionidae* (ospreys)
- *Strigidae* (typical owls)
- *Tytonidae* (barn owls)

Protection includes not only the birds themselves but also extends to their nests, young, and eggs. Relative to many other animal taxa, raptors naturally exist at low population levels and are widely dispersed within their habitats. Disturbances related to construction activities causing nest abandonment and/or loss of reproductive effort may be considered a "take" and is potentially punishable by fines and/or imprisonment. One inactive raptor nest was located in a California sycamore near the east perimeter of the project site, but no other raptor nests were observed within 0.5 mile of the project site.

Waterfowl annually migrate through Stanislaus County, which is part of the Pacific Flyway. The majority of these birds are not documented in the CNDDB, but they are known to occur along major waterways. No water features that would attract waterfowl are present on or adjacent to the project site, but migrating waterfowl could potentially use the project site for stopover purposes.

RESULTS AND DISCUSSION

The project site consists of 170 acres of agricultural, residential, and commercial uses. Some of the agricultural land is fallow, some has been used for row crops, and one area has an orchard. Within the project area, there are two occupied single-family residences fronting on Golf Road. There are ten, occupied single-family residences and one occupied mobile home fronting Glenwood Avenue. At the southeast corner of Lander Avenue and Glenwood Avenue is the existing, operating Lander Mini Mart with a Chevron gas station. Directly east of the Mini Mart is the existing, operating Fast Track Car Wash.

There is an open ditch running roughly parallel to SR 99. Another underground irrigation pipeline runs north/south about 500 feet west of Golf Road. This pipeline serves agricultural parcels north of the project area on the northwest corner of Golf Road and Glenwood Avenue. There are above ground electrical power lines running along Glenwood Avenue on the south side of the street. There is a small drainage basin within the project area that is owned by Caltrans and is used for drainage run-off coming from the highway right-of-way.

Approximately 80 percent of the site is agriculturally developed. The central, southern, and southeastern portions of the site are currently being utilized for row-crop production. A small section of the western portion of the site is currently an active almond orchard. Non-native annual grassland occurs throughout approximately 10 percent of the project site. It primarily occurs in the northeastern corner of the site, but is also found in the western portion of the site adjacent to an almond orchard. Disturbed/developed land occupies approximately 10 percent of the site, and generally consists of residences and their associated barns and outbuildings.

The structure of wildlife communities is determined, in large part, upon the structure of their respective vegetative communities. Not surprisingly, therefore, the project site lacks a diverse wildlife community. Most of the project site is dominated by agricultural crops, and the remainder of the project site either is developed or disturbed land. Most of the wildlife species observed included foraging passerines such as white-crowned sparrows (*Zonotrichia leucophyrys*) (Table 4). Several raptors, including two red-tailed hawks (*Buteo jamaicensis*), were observed foraging in the disked fields. The project site may also provide nesting habitat for a variety of ground-nesting and tree-nesting raptors and migratory birds. One of the sycamore trees near the eastern perimeter of the project site, for example, contained an inactive raptor nest. Fossorial wildlife sign was also present on the project site. Small mammal burrows were scattered along the edges of the disked fields. No animal species were observed at these burrows, but they are most likely used by Pocket gophers (*Thomomys bottae*), the house mouse (*Mus musculus*) and the deer mouse (*Peromyscus maniculatus*). California ground squirrel (*Spermophilus beecheyi*) burrows were also observed in the perimeter of the disked fields (Appendix A, Photographs 7-10). Domestic dog (*Canis lupus*) also frequents the project site, as evidenced by the numerous tracks observed.

Table 4
Plant and Animal Species Observed during the
Field Survey of the Morgan Ranch Master Plan Project, April 2012

SCIENTIFIC NAME	COMMON NAME
Plants	
Aesculus	American buckeye
Acer ginnala	Amur maple
not native Aira caryophyllea or native Deschampsia danthonioides	Hairgrass
Amsinckia intermedia	Common fiddleneck
Arundo donax	Giant reed
Avena barbata	Avena barbeta
Avena sp.	Wild oats
Brassica sp.	Mustard
Bromus diandrus	Ripgut
Carya illinoinensis	Pecan tree
Cedrus deodara	Deodar cedar
Cephalanthus occidentalis californica	Buttonwillow
Claytonia perfoliata	Miner's lettuce
Chenopodium album	Lamb's quarters
Cynodon dactylon	Bermuda grass
Erodium sp.	Filaree
Citrus sinensis	Poppy
Eucalyptus sp.	Eucalyptus tree
Ficus carica	Fig tree
Gnaphalium sp.	Cudweed
Hordeum murinum	Barley
Hosta	Groundclover
Hypochaeris glabra	Smooth cat's ear
Juglans	Walnut tree
Lolium perenne	Ryegrass
Malva parviflora	Mallow (cheeseweed)
Morus	Mulberry
Nerium oleander	Oleander
Olea europaea	Olive tree
Citrus sinensis	Orange tree
Pinus sabiniana	Gray pine
Platanus racemosa.	California sycamore
Populus fremontii	Fremont's cottonwood
Prunus armeniaca	Apricot tree
Prunus dulcis	Almond tree
Robinia pseudoacacia	Black locust
Salix babylonica	Weeping willow

SCIENTIFIC NAME	COMMON NAME
Salsola kali	Russian thistle
Senecio vulgaris	Groundsel
Schinus molle	Pepper tree
Sweetclover var.	Lotus
Washingtonia filifera	California fan palm
Vicia villosa Roth	Winter vetch
Birds	
Aphelocoma californica	Scrub jay
Buteo jamaicensis	Red-tailed hawk
Cathartes aura	Turkey vulture
Corvus brachyrhynchos	American crow
Hirundo rustica	Barn swallow
Mimus polyglottos	Northern mockingbird
Pica nuttalli	Yellow-billed magpie
Sturnus vulgaris	European starling
Zenaida macroura	Mourning dove
Zonotrichia leucophrys	White-crowned sparrow
Mammals	
Canis lupus familiaris	Domestic dog
Spermophilus beecheyi	California ground squirrel

Plant nomenclature follows Hickman (1993)
Avian nomenclature follows the A.O.U. Checklist of North American Birds (1998)
Mammalian nomenclature follows Baker et al. (2003)

Sensitive habitats, special-status plants, and special status wildlife

There are six sensitive natural communities, 20 special status plant species, and 28 special status wildlife species that are known to exist in the general vicinity of the project site (Table 3, Figure 6). The sensitive natural communities, Valley Sacaton Grassland, Valley Sink Scrub, Cismonte Alkali Marsh, Coastal and Valley Freshwater Marsh, Northern Claypan Vernal Pool, and Northern Hardpan Vernal Pool, do not occur on the project site or in the immediate vicinity of the site. Special status plants or the habitat that would support special status plants do not occur on the project site. There are no jurisdictional wetlands or riparian habitats located on the project site (Figure 7).

Twenty-eight special status wildlife species are known to historically occur in the project site region. The majority of these regionally occurring species were determined not to have potential to occur within the project site. This determination is based on the fact that either the distribution of the species does not extend into the project site vicinity, or the habitat and/or microsite conditions (e.g., caves, tall snags) required by the species are not present on the project. Of the 28 special status wildlife species occurring in the region, only seven species were determined to potentially occur on the site. The Swainson's hawk could potentially breed in the trees on and near the project site. The burrowing could potentially breed in the grassland fragment on the project site, but this would be unlikely. The tricolored blackbird, pallid bat, western red bat, San Joaquin kit fox, and American badger could potentially occur on the project site as transient foragers.

The project site contains suitable foraging habitat and nesting substrate for the Swainson's hawk, as well as other raptors and migratory birds that are protected by the Migratory Bird Treaty Act (Appendix B). An inactive raptor nest, for example, was observed in a sycamore tree along the eastern perimeter of the project site. Two red-tailed hawks were seen foraging on the property during field surveys. There are recorded occurences of Swainson's hawks within ten miles of the project site. Additionally, the project site occurs within its historical and accepted current range. The tricolored blackbird, another special status avian species, could forage transiently on the project site, but no nesting habitat for it is present. San Joaquin kit foxes are not known to occur within 10 miles of the project site; however, they may occur on the site as transient foragers. Similarly, American badgers could occasionally forage on the project site.

Jurisdictional Waters

Areas meeting the regulatory definition of "Waters of the US" (jurisdictional waters) are subject to the jurisdiction of the US Army Corps of Engineers (USACE). The USACE under provisions of Section 404 of the Clean Water Act (1972) has jurisdiction over "Waters of the US." These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the US", tributaries of waters otherwise defined as "Waters of the US", the territorial seas, and wetlands adjacent to "Waters of the US" (33 CFR, Part 328, § 328.3).

The project site contains an unvegetated, cement-lined irrigation lateral approximately 600 meters in length along the southern portion of the property near State Route 99 (SR 99). This irrigation lateral is fed by Lateral No.5, which is located approximately 0.5 mile south of the project site. The lateral terminates on the western portion of the project site (Turlock Irrigation District, pers. comm.). Given the artificial nature of this later, and its lack of connectivity with traditionally navigable waters, this feature is not expected to be under the jurisdiction of the USACE.

IMPACT EVALUATION AND RECOMMENDATIONS

Consistent with Appendix G of the CEQA Guidelines, the proposed project is considered to have a significant impact on the environment if it would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Impact Analysis

Impact Bio-1: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

The CNDDB search identified several documented special status species within the region, but there are no records of special status species occurring on the project site and none were observed during the reconnaissance survey. Because of the frequent disturbance regime from agricultural activities, the conditions at the project site are considered marginal habitat for plants and animals. However, there is the potential for special status wildlife to enter the project site and be subject to take. As such, project implementation has the potential to impact special status wildlife species; this would be a potentially significant impact. Standard mitigation measures for avoidance and minimization of biological impacts are required.

Conclusion: Impacts to special status species are ***potentially significant***.

Mitigation Measure BIO-1.1: Pre-construction surveys shall be performed on the project site in areas where there is a potential for nesting raptors and nesting migratory birds to occur; these include all areas of the project site that contain or are within 500 feet of power poles or trees that are suitable for the establishment of nests. If mature crops are present during the breeding season of migratory birds (the nesting period is loosely defined as February 15 to August 15), a pre-construction survey shall be performed within 14 days of construction to identify active nests and mark those nests for avoidance. During the nesting period, bird nests shall be avoided by 250 feet and raptor nests should be avoided by 500 feet.

Mitigation Measure BIO-1.2: Because there is the potential for San Joaquin kit foxes to occur on site, the USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance shall be followed. The measures that are listed below have been excerpted from those guidelines and will protect San Joaquin kit foxes from direct mortality and from destruction of active dens and natal or pupping dens. The City of Turlock shall determine the applicability of the following measures depending on specific construction activities and shall implement such measures when required. The measures below will also serve to protect American badger.

1. Pre-construction surveys shall be conducted no fewer than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities, or any project activity likely to impact the San Joaquin kit fox or American badger. Exclusion zones shall be placed in accordance with USFWS Recommendations using the following:

Potential Den	50 foot radius
Known Den	100 foot radius
Natal/Pupping Den (Occupied and Unoccupied)	Contact U.S. Fish and Wildlife Service for guidance
Atypical Den	50 foot radius

2. If dens must be removed, they must be appropriately monitored and excavated by a trained wildlife biologist. Replacement dens will be required. Destruction of natal dens and other "known" kit fox dens must not occur until authorized by USFWS.

3. Project-related vehicles shall observe a 20 miles per hour speed limit in all project areas, except on county roads and State and Federal highways; this is particularly important at night when kit foxes are most active. Nighttime construction shall be avoided, unless the construction area is appropriately fenced to exclude kit foxes. The area within any such fence must be determined to be uninhabited by San Joaquin Kit foxes prior to initiation of construction. Off-road traffic outside of designated project areas shall be prohibited.

4. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of the project, all excavated, steep-walled holes or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks.

Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the procedures under numbers 9 and 10 of this section must be followed.

5. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipe, becoming trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in anyway. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.

6. All food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of in closed containers and removed at least once a week from a construction or project site.

7. No firearms shall be allowed on the project site.

8. To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, no pets shall be permitted on the project sites.

9. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox, or who finds a dead, injured or entrapped individual. The representative's name and telephone number shall be provided to the USFWS and CDFG.

10. In the case of trapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape, or the USFWS and CDFG should be contacted for advice.

11. Any contractor, employee(s), or military or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or biologist.

12. The Sacramento Fish and Wildlife Office and CDFG will be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project-related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The USFWS contact is the Chief of the Division of Endangered Species, 2800 Cottage Way, Suite W2605, Sacramento, CA 95825-1846, and (916) 414-6620. The CDFG contact is Mr. Scott Osborn at 1416 9th Street, Sacramento, CA 95814, (916) 324-3564.

Mitigation Measure BIO-1.3: Standard measures for the protection of burrowing owls provided in Burrowing Owl Consortium's April 1995 Burrowing Owl Survey Protocol and Mitigation Guidelines and the CDFG's October 17, 1995 Staff Report on Burrowing Owl Mitigation shall be implemented. Active burrows will be avoided by 250 feet, compensation will be provided for the displacement of burrowing owls, and habitat acquisition and the creation of artificial dens for any burrowing owls removed from construction areas will be provided.

1. Pre-construction surveys for burrowing owls shall be conducted. Pre-construction surveys of construction areas and a 500 foot buffer shall be conducted no more than 30 days prior to ground disturbing activities. If more than 30 days lapse between the time of the preconstruction survey and the start of ground-disturbing activities, another preconstruction survey must be completed.

2. If burrowing owls are present on the construction site (or within 500 feet of the construction site) during the breeding season (April 15 through July 15), and appear to be engaged in nesting behavior, a fenced 500 foot buffer shall be installed between the nest site or active burrow and any earth-moving activity or other disturbance. This 500 foot buffer could be removed once it is determined by a qualified biologist that the young have fledged. Typically, the young fledge by August 31st. This date may be earlier than August 31st, or later, and would have to be determined by a qualified biologist.

3. If burrowing owls are present in the non-breeding season and must be passively relocated from the project site, passive relocation shall not commence until October 1st and must be completed by February 1st. Passive relocation may only be conducted by a qualified biologist or ornithologist and with approval by CDFG. After passive relocation, the area where owls occurred and its immediate vicinity (500 feet) will be monitored by a qualified biologist daily for one week and once per week for an additional two weeks to document that owls are not reoccupying the site.

4. Compensation for the loss of burrowing owl habitat shall be based upon the number of owls or pairs of owls located on the construction area during pre-construction surveys following the CDFG's October 17, 1995 Staff Report on Burrowing Owl Mitigation. The areas identified as land retirement areas and enhancement areas shall be used as compensation for the loss of habitat and for relocation of burrowing owls.

Effectiveness of Mitigation Measures: With the implementation of the above mitigation measures, potential impacts to special status species would be ***less than significant***.

Impact Bio-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

The project site does not contain any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or USFWS.

Conclusion: Implementation of the proposed project would have ***no impact*** on riparian or other sensitive habitat.

Mitigation Measures: No mitigation measures are required.

Impact Bio-3: Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

The project site contains an unvegetated, cement-lined irrigation lateral approximately 600 meters in length along the southern portion of the property near State Route 99 (SR 99). This irrigation lateral is fed by Lateral No.5, which is located approximately 0.5 mile south of the project site. The lateral terminates on the western portion of the project site (Turlock Irrigation District, pers. comm.). Given the artificial nature of this lateral, and its lack of connectivity with traditionally navigable waters, this feature is not expected to be under the jurisdiction of the USACE. Accordingly, the project site does not contain any federally protected wetlands subject to Section 404 of the Clean Water Act.

Conclusion: Implementation of the proposed project would have ***no impact*** on federally protected wetlands.

Mitigation Measures: No mitigation measures are required.

Impact Bio-4: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

The project site is within the Pacific Flyway and migratory birds may pass through the project site during their migration. Migratory birds on the Pacific Flyway generally land in areas with abundant water and forage. The project site does not contain preferable habitat for these migratory birds, and any occurrences would be short-lived. Movement corridors generally consist of riparian, woodlands, or forested habitats that span contiguous acres of undisturbed habitat, and are important elements of resident species' home ranges. The project site occurs at the edge of an urbanized area, and it contains existing structures that appear to have been previously used for agricultural and rural residential uses. There are no identifiable movement corridors within or adjacent to the project site. The biological survey did not find any evidence of wildlife nursery sites on the project site, and there is no aquatic habitat to support fish species. Accordingly, due to the lack of suitable habitat for migratory birds on the project site and that the project site does not serve as a wildlife movement corridor, development would not impede wildlife movement. Accordingly, the proposed project would have a less than significant impact.

Conclusion: Implementation of the proposed project would have a ***less than significant impact*** on the movement of migratory fish or wildlife species or with established native resident or migratory wildlife corridors or native wildlife nursery sites.

Mitigation Measures: No mitigation measures are required.

Impact Bio-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The proposed project would be developed in accordance with the General Plan policies. The project's consistency with the relevant General Plan policies is provided in Table 5.

Table 5
General Plan Consistency Analysis – Biological Resources

Chapter – Element	Policy No.	Policy Text	Consistency Determination
Chapter 3 – New Growth Areas and Infrastructure	3.1a	Proactively manage growth. Proactively manage and plan for growth in an orderly, sequential, and contiguous fashion.	**Consistent.** The project is contiguous to existing development and is in an area identified to be developed first as part of the General Plan implementation. The project site is designated as Master Plan development, SE-1.
	3.1-c	Promote good design in new growth areas. Design new growth and development so that it is compact; preserves natural, environmental, and economic resources; and provides the efficient and timely delivery of infrastructure, public facilities, and services to new residents and businesses.	**Consistent.** The project is the adoption of a Master Plan that will facilitate compact growth within the City's existing footprint and will ensure that site is developed in a efficient manner that ensures adequate infrastructure and public services are in place to support new residents and businesses.
	3.3-ad	Low Impact Development (LID) and Water Quality	**Consistent.** During review of development projects

Chapter – Element	Policy No.	Policy Text	Consistency Determination
		Best Management Practices (WQBMPs). Require implementation of LID techniques and WQBMPs in new development projects and public works projects. Examples of these are use of porous pavement and pervious concrete, water quality swales, and rain gardens.	within the Master Plan area, the City may require implementation of LID techniques and WQBMPs as conditions of approval.
	3.3-ae	Encourage Use of Less Toxic Agricultural Chemicals. In cooperation with the Stanislaus County Agricultural Center, provide education and incentives to encourage the use of less toxic forms of pesticides, insecticides, herbicides, or other chemical substances by households and farmers.	**Consistent.** This policy will be implemented on a city-wide basis; therefore, future development projects within the Master Plan area will be encouraged to use less toxic chemicals.
Chapter 7 - Conservation	7.2-a	Preserve Farmland. Promote the preservation and economic viability of agricultural land adjacent to the City of Turlock.	**Consistent.** The project site is located within an area designated for urban development by the City's General Plan. Furthermore, the project will incorporate the use of buffers via Golf Road and SR 99 to reduce

Chapter – Element	Policy No.	Policy Text	Consistency Determination
			conflicts between the existing agricultural land uses to the east and south.
	7.2-b	Limit Urban Expansion. Retain Turlock’s agricultural setting by limiting urban expansion to designated areas and minimizing conflicts between agriculture and urban activities.	**Consistent.** The project is located with the City limits and is in an area identified by the City of Turlock for urban development. The project incorporates the use of buffers to minimize potential conflicts with agricultural uses to the east and south of the Master Plan area.
	7.2-c	Protect Soil and Water. Work to protect and restore natural resources essential for agricultural production.	**Consistent.** This policy is being implemented on a city-wide basis, therefore future development projects within the Master Plan area will be required to implement measures, such as Storm Water Pollution Prevention Plans (SWPPPs) as part of regulatory requirements and LID techniques, and WQBMPs as the City requires in future approvals.
	7.2-e	Require Compact Development. Require development at densities higher than	**Consistent.** The project is the adoption of a Master Plan, which incorporates

Chapter – Element	Policy No.	Policy Text	Consistency Determination
		typical in recent years in order to limit conversion of agricultural land and minimize the urban/agricultural interface.	densities higher than typical densities within the City. The project is contiguous to existing development and is in area identified for urban uses. The project incorporates the use of buffers to minimize potential conflicts between urban and agricultural uses.
	7.2-g	Allow Agricultural Uses to Continue. Where agriculture exists within City limits, allow uses to continue until urban development occurs on these properties, including the establishment of community gardens serving the immediate neighborhood.	**Consistent.** Agricultural uses would be allowed to continue consistent with City policy until urban development occurs.
	7.2-h	Support Participation in Williamson Act Program. Support participation in the Williamson Act program by Study Area landowners.	**Consistent**. This measure is being implemented on a city-wide basis. The project site does not contain any Williamson Act lands nor is it located adjacent to any Williamson Act lands.
	7.2-i	Support Right to Farm. Support the implementation of Stanislaus County's	**Consistent.** Surrounding land to the south and to the east are designated for

Chapter – Element	Policy No.	Policy Text	Consistency Determination
		Agricultural Element and Right-to-Farm ordinance.	future urban development, however as the City requires, Right-to-Farm notices will be recorded on future tentative subdivision and parcel maps, and use permits.
	7.2-m	Minimize Soil Erosion. Require new development to implement measures to minimize soil erosion related to construction. Identify erosion-minimizing site preparation and grading techniques in the zoning code.	**Consistent.** As development projects proceed in the Master Plan area they will be required to implement SWPPPs to minimize erosion during site grading.
	7.4-a	Increase Biological Diversity. Make efforts to enhance the diversity of Turlock's flora and fauna, including street trees.	**Consistent.** Although the project does not specifically enhance the diversity of Turlock's flora and fauna, the site has been designated by the City's General Plan for urban development and will incorporate parks and landscaping that will provide habitat for species. Additional, the Master Plan will incorporate mitigation measures for the protection of special status wildlife species.
	7.4-b	Sensitive Site Planning. Protect	**Inconsistent.** As development projects

Chapter – Element	Policy No.	Policy Text	Consistency Determination
		mature trees and natural vegetation and features wherever feasible in new development areas.	are proposed for the Master Plan area, some mature trees and natural vegetation may be removed.
	7.4-c	Urban Trees. Protect and expand Turlock's urban forest through public education, sensitive maintenance practices, and a long-term financial commitment adequate to protect these resources. Continue to require the planting of appropriately-spaced street trees in new development areas.	**Consistent.** The Master Plan includes public landscaping standards that will incorporate street trees in accordance with City standards.
	7.4-d	Special Review if New Information Becomes Available. Establish environmental review procedures, such as site reconnaissance and certification by a biologist, as part of the project development application process if new information to support existence of a Special Status species becomes available.	**Consistent.** As development projects are proposed for the Master Plan area, the City will have the discretion to require additional project-specific biological reviews if new information becomes available to support the existence of special status species on the project site.

As shown in Table 5, the project would be consistent with most of the General Plan policies; however, development of future projects within the Master Plan area may require the removal of mature trees and natural vegetation. A mitigation measure has been incorporated into the project to ensure future projects consider mature trees and natural vegetation features in their site planning. The City will have the opportunity to review and evaluate a project's site planning and require the protection of natural resources as conditions of approval.

Conclusion: The project has the potential to conflict with the City's policy requiring the protection of mature trees and natural vegetation where feasible in development areas; this is a potentially significant impact.

Mitigation Measure BIO-5: Development applications shall avoid impact to mature trees and natural vegetation to the maximum extent practicable. Impact avoidance measures shall include one or more of the following: 1) Incorporation of existing trees and natural vegetation into development proposals 2) Avoidance of trenching and compaction of the area within tree drip lines through the use of protective fencing during construction, and 3) Compensation for trees removed or otherwise impacted through the planting of replacement trees at a ratio of one to one.

Effectiveness of Mitigation Measure: With implementation of the above mitigation measure, the project would not conflict with any local policies or ordinances protecting biological resources; impacts would be ***less than significant***.

Impact Bio-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

The project site is not within the boundaries of an adopted habitat conservation plan or natural community conservation plan.

Conclusion: No impacts would occur.

Mitigation Measures: No mitigation measures are required.

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APPENDIX A

SITE PHOTOGRAPHS

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Photograph 1: North view of agricultural fields

Photograph 2: View of irrigation canal

Quad Knopf

SITE PHOTOGRAPHS

Photos
1 & 2

Photograph 3: East view of agricultural field

Photograph 4: North view of pine trees and orchard near residence

Quad Knopf

SITE PHOTOGRAPHS

Photos 3 & 4

Photograph 5: Example rural residential home fronting Glenwood Avenue

Photograph 6: Example structures fronting Golf Road

Quad Knopf	SITE PHOTOGRAPHS	Photos 5 & 6

Photograph 7: Small burrow of deer or pocket mouse

Photograph 8: Small mammal activity along perimeter of disked field

Quad Knopf	SITE PHOTOGRAPHS	Photos 7 & 8

Photograph 9: Ground squirrel burrow complex

Photograph 10: Ground squirrel burrow

Quad Knopf

SITE PHOTOGRAPHS

Photos 9 & 10

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APPENDIX B

MIGRATORY BIRD TREATY ACT

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Migratory Bird Treaty Act of 1918

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960; 74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956

The original 1918 statute implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union (now Russia).

Specific provisions in the statute include:

- Establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

This prohibition applies to birds included in the respective international conventions between the U.S. and Great Britain, the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Russia.

- Authority for the Secretary of the Interior to determine, periodically, when, consistent with the Conventions, "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any . . .bird, or any part, nest or egg" could be undertaken and to adopt regulations for this purpose. These determinations are to be made based on "due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times of migratory flight." (16 U.S.C. 704)

- A decree that domestic interstate and international transportation of migratory birds which are taken in violation of this law is unlawful, as well as importation of any migratory birds which are taken in violation of Canadian laws. (16 U.S.C. 705)

- Authority for Interior officials to enforce the provisions of this law, including seizure of birds illegally taken which can be forfeited to the U.S. and disposed of as directed by the courts. (16 U.S.C. 706)

- Establishment of fines for violation of this law, including misdemeanor charges. (16 U.S.C. 707)

- Authority for States to enact and implement laws or regulations to allow for greater protection of migratory birds, provided that such laws are consistent with the respective Conventions and that open seasons do not extend beyond those established at the national level. (16 U.S.C. 708)

- A repeal of all laws inconsistent with the provisions of this Act. (16 U.S.C. 710)

- Authority for the continued breeding and sale of migratory game birds on farms and preserves for the purpose of increasing the food supply. (16 U.S.C. 711)

The 1936 statute implemented the Convention between the U.S. and Mexico for the Protection of Migratory Birds and Game Mammals. Migratory bird import and export restrictions between Mexico and the U.S. were also authorized, and in issuing any regulations to implement this section, the Secretary of Agriculture was required to consider U.S. laws forbidding importation of certain mammals injurious to agricultural and horticultural interests. Monies for the Secretary of Agriculture to implement these provisions were also authorized.

The 1960 statute (P.L. 86-732) amended the MBTA by altering earlier penalty provisions. The new provisions stipulated that violations of this Act would constitute a misdemeanor and conviction would result in a fine of not more than $500 or imprisonment of not more than six months. Activities aimed at selling migratory birds in violation of this law would be subject to fine of not more than $2000 and imprisonment could not exceed two years. Guilty offenses would constitute a felony. Equipment used for sale purchases was authorized to be seized and held, by the Secretary of the Interior, pending prosecution, and, upon conviction, be treated as a penalty.

Section 10 of the 1969 amendments to the Lacey Act (P.L. 91-135) repealed the provisions of the MBTA prohibiting the shipment of wild game mammals or parts to and from the U.S. or Mexico unless permitted by the Secretary of the Interior. The definition of "wildlife" under these amendments does not include migratory birds, however, which are protected under the MBTA.

The 1974 statute (P.L. 93-300) amended the MBTA to include the provisions of the 1972 Convention between the U.S. and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction. This law also amended the title of the MBTA to read: "An Act to give effect to the conventions between the U.S. and other nations for the protection of migratory birds, birds in danger of extinction, game mammals, and their environment."

Section 3(h) of the Fish and Wildlife Improvement Act of 1978 (P.L. 95-616) amended the MBTA to authorize forfeiture to the U.S. of birds and their parts illegally taken, for disposal by the Secretary of the Interior as he deems appropriate. These amendments also authorized the Secretary to issue regulations to permit Alaskan natives to take migratory birds for their subsistence needs during established seasons. The Secretary was required to consider the related migratory bird conventions with Great Britain, Mexico, Japan, and the Soviet Union in establishing these regulations and to establish seasons to provide for the preservation and maintenance of migratory bird stocks.

Public Law 95-616 also ratified a treaty with the Soviet Union specifying that both nations will take measures to protect identified ecosystems of special importance to migratory birds against pollution, detrimental alterations, and other environmental degradations. (See entry for the Convention Between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment; T.I.A.S. 9073; signed on November 19, 1976, and approved by the Senate on July 12, 1978; 92 Stat. 3110.)

Public Law 99-645, the 1986 Emergency Wetlands Resources Act, amended the Act to require that felony violations under the MBTA must be "knowingly" committed.

P.L. 105-312, Migratory Bird Treaty Reform Act of 1998, amended the law to make it unlawful to take migratory game birds by the aid of bait if the person knows or reasonably should know that the area is baited. This provision eliminates the "strict liability" standard that was used to enforce Federal baiting regulations and replaces it with a "know or should have known" standard. These amendments also make it unlawful to place or direct the placement of bait on or adjacent to an area for the purpose of taking or attempting to take migratory game birds, and makes these violations punishable under title 18 United States Code, (with fines up to $100,000 for individuals and $200,000 for organizations), imprisonment for not more than 1 year, or both. The new amendments require the Secretary of Interior to submit to the Senate Committee on Environment and Public Works and the House Committee on Resources a report analyzing the effect of these amendments and the practice of baiting on migratory bird conservation and law enforcement. The report to Congress is due no later than five years after enactment of the new law.

P.L. 105-312 also amends the law to allow the fine for misdemeanor convictions under the Migratory Bird Treaty Act to be up to $15,000 rather than $5000.

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APPENDIX C

STANDARDIZED RECOMMENDATIONS FOR THE PROTECTION OF THE SAN JOAQUIN KIT FOX

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U.S. FISH AND WILDLIFE SERVICE
STANDARDIZED RECOMMENDATIONS
FOR PROTECTION OF THE ENDANGERED SAN JOAQUIN KIT FOX
PRIOR TO OR DURING GROUND DISTURBANCE

Prepared by the Sacramento Fish and Wildlife Office
January 2011

INTRODUCTION

The following document includes many of the San Joaquin kit fox (*Vulpes macrotis mutica*) protection measures typically recommended by the U. S. Fish and Wildlife Service (Service), prior to and during ground disturbance activities. **However, incorporating relevant sections of these guidelines into the proposed project is not the only action required under the Endangered Species Act of 1973, as amended (Act) and does not preclude the need for section 7 consultation or a section 10 incidental take permit for the proposed project.** Project applicants should contact the Service in Sacramento to determine the full range of requirements that apply to your project; the address and telephone number are given at the end of this document. Implementation of the measures presented in this document may be necessary to avoid violating the provisions of the Act, including the prohibition against "take" (defined as killing, harming, or harassing a listed species, including actions that damage or destroy its habitat). These protection measures may also be required under the terms of a biological opinion pursuant to section 7 of the Act resulting in incidental take authorization (authorization), or an incidental take permit (permit) pursuant to section 10 of the Act. The specific measures implemented to protect kit fox for any given project shall be determined by the Service based upon the applicant's consultation with the Service.

The purpose of this document is to make information on kit fox protection strategies readily available and to help standardize the methods and definitions currently employed to achieve kit fox protection. The measures outlined in this document are subject to modification or revision at the discretion of the Service.

IS A PERMIT NECESSARY?

Certain acts need a permit from the Service which includes destruction of any known (occupied or unoccupied) or natal/pupping kit fox dens. Determination of the presence or absence of kit foxes and /or their dens should be made during the environmental review process. All surveys and monitoring described in this document must be conducted by a qualified biologist and these activities do not require a permit. A qualified biologist (biologist) means any person who has completed at least four years of university training in wildlife biology or a related science and/or has demonstrated field experience in the identification and life history of the San Joaquin kit fox. In addition, the biologist(s) must be able to identify coyote, red fox, gray fox, and kit fox tracks, and to have seen a kit fox in the wild, at a zoo, or as a museum mount. Resumes of biologists should be submitted to the Service for review and approval prior to an6y survey or monitoring work occurring.

SMALL PROJECTS

Small projects are considered to be those projects with small foot prints, of approximately one acre or less, such as an individual in-fill oil well, communication tower, or bridge repairs. These projects must stand alone and not be part of, or in any way connected to larger projects (i.e., bridge repair or improvement to serve a future urban development). The Service recommends that on these small projects, the biologist survey the proposed project boundary and a 200-foot area outside of the project footprint to identify habitat features and utilize this information as guidance to situate the project to minimize or avoid impacts. If habitat features cannot be completely avoided, then surveys should be conducted and the Service should be contacted for technical assistance to determine the extent of possible take.

Preconstruction/preactivity surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the San Joaquin kit fox. Kit foxes change dens four or five times during the summer months, and change natal dens one or two times per month (Morrell 1972). Surveys should identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, assess the potential impacts to the kit fox by the proposed activity. The status of all dens should be determined and mapped (see Survey Protocol). Written results of preconstruction/preactivity surveys must be received by the Service within five days after survey completion and prior to the start of ground disturbance and/or construction activities.

If a natal/pupping den is discovered within the project area or within 200-feet of the project boundary, the Service shall be immediately notified and under no circumstances should the den be disturbed or destroyed without prior authorization. If the preconstruction/preactivity survey reveals an active natal pupping or new information, the project applicant should contact the Service immediately to obtain the necessary take authorization/permit.

If the take authorization/permit has already been issued, then the biologist may proceed with den destruction within the project boundary, except natal/pupping den which may not be destroyed while occupied. A take authorization/permit is required to destroy these dens even after they are vacated. Protective exclusion zones can be placed around all known and potential dens which occur outside the project footprint (conversely, the project boundary can be demarcated, see den destruction section).

OTHER PROJECTS

It is likely that all other projects occurring within kit fox habitat will require a take authorization/permit from the Service. This determination would be made by the Service during the early evaluation process (see Survey Protocol). These other projects would include, but are not limited to: Linear projects; projects with large footprints such as urban development; and projects which in themselves may be small but have far reaching impacts (i.e., water storage or conveyance facilities that promote urban growth or agriculture, etc.).

The take authorization/permit issued by the Service may incorporate some or all of the protection measures presented in this document. The take authorization/permit may include measures specific to the needs of the project and those requirements supersede any requirements found in this document.

EXCLUSION ZONES

In order to avoid impacts, construction activities must avoid their dens. The configuration of exclusion zones around the kit fox dens should have a radius measured outward from the entrance or cluster of entrances due to the length of dens underground. The following distances are **minimums**, and if they cannot be followed the Service must be contacted. Adult and pup kit foxes are known to sometimes rest and play near the den entrance in the afternoon, but most above-ground activities begin near sunset and continue sporadically throughout the night. Den definitions are attached as Exhibit A.

Potential den**	50 feet
Atypical den**	50 feet
Known den*	100 feet
Natal/pupping den (occupied <u>and</u> unoccupied)	Service must be contacted

*<u>Known den</u>: To ensure protection, the exclusion zone should be demarcated by fencing that encircles each den at the appropriate distance and does not prevent access to the den by kit foxes. Acceptable fencing includes untreated wood particle-board, silt fencing, orange construction fencing or other fencing as approved by the Service as long as it has openings for kit fox ingress/egress and keeps humans and equipment out. Exclusion zone fencing should be maintained until all construction related or operational disturbances have been terminated. At that time, all fencing shall be removed to avoid attracting subsequent attention to the dens.

**Potential and Atypical dens: Placement of 4-5 flagged stakes 50 feet from the den entrance(s) will suffice to identify the den location; fencing will not be required, but the exclusion zone must be observed.

Only essential vehicle operation on existing roads and foot traffic should be permitted. Otherwise, all construction, vehicle operation, material storage, or any other type of surface-disturbing activity should be prohibited or greatly restricted within the exclusion zones.

DESTRUCTION OF DENS

Limited destruction of kit fox dens may be allowed, if avoidance is not a reasonable alternative, provided the following procedures are observed. The value to kit foxes of potential, known, and natal/pupping dens differ and therefore, each den type needs a different level of protection. **Destruction of any known or natal/pupping kit fox den requires take authorization/permit from the Service.**

Destruction of the den should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If at any point during excavation, a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den as described above should be resumed. Destruction of the den may be completed when in the judgment of the biologist, the animal has escaped, without further disturbance, from the partially destroyed den.

Natal/pupping dens: Natal or pupping dens which are occupied will not be destroyed until the pups and adults have vacated and then only after consultation with the Service. Therefore, project activities at some den sites may have to be postponed.

Known Dens: Known dens occurring within the footprint of the activity must be monitored for three days with tracking medium or an infra-red beam camera to determine the current use. If no kit fox activity is observed during this period, the den should be destroyed immediately to preclude subsequent use.

If kit fox activity is observed at the den during this period, the den should be monitored for at least five consecutive days from the time of the observation to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrances(s) with soil in such a manner that any resident animal can escape easily. Only when the den is determined to be unoccupied may the den be excavated under the direction of the biologist. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may have to be excavated when, in the judgment of a biologist, it is temporarily vacant, for example during the animal's normal foraging activities.

The Service encourages hand excavation, but realizes that soil conditions may necessitate the use of excavating equipment. However, extreme caution must be exercised.

Potential Dens: If a take authorization/permit has been obtained from the Service, den destruction may proceed without monitoring, unless other restrictions were issued with the take authorization/permit. If no take authorization/permit has been issued, then potential dens should be monitored as if they were known dens. If any den was considered to be a potential den, but is later determined during monitoring or destruction to be currently, or previously used by kit fox (e.g., if kit fox sign is found inside), then all construction activities shall cease and the Service shall be notified immediately.

CONSTRUCTION AND ON-GOING OPERATIONAL REQUIREMENTS

Habitat subject to permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities should be minimized by adhering to the following activities. Project designs should limit or cluster permanent project features to the smallest area possible while still permitting achievement of project goals. To minimize temporary disturbances, all project-related vehicle traffic should be restricted to established roads, construction areas, and other designated areas. These areas should also be included in preconstruction surveys and, to the extent possible, should be established in locations disturbed by previous activities to prevent further impacts.

1. Project-related vehicles should observe a daytime speed limit of 20-mph throughout the site in all project areas, except on county roads and State and Federal highways; this is particularly important at night when kit foxes are most active. Night-time construction should be minimized to the extent possible. However if it does occur, then the speed limit should be reduced to 10-mph. Off-road traffic outside of designated project areas should be prohibited.

2. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2-feet deep should be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks shall be installed. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the Service and the California Department of Fish and Game (CDFG) shall be contacted as noted under measure 13 referenced below.

3. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is

discovered inside a pipe, that section of pipe should not be moved until the Service has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped.

4. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in securely closed containers and removed at least once a week from a construction or project site.

5. No firearms shall be allowed on the project site.

6. No pets, such as dogs or cats, should be permitted on the project site to prevent harassment, mortality of kit foxes, or destruction of dens.

7. Use of rodenticides and herbicides in project areas should be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. All uses of such compounds should observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the Service. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.

8. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped kit fox. The representative will be identified during the employee education program and their name and telephone number shall be provided to the Service.

9. An employee education program should be conducted for any project that has anticipated impacts to kit fox or other endangered species. The program should consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and/or agency personnel involved in the project. The program should include the following: A description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information should be prepared for distribution to the previously referenced people and anyone else who may enter the project site.

10. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. should be

re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but after project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas should be determined on a site-specific basis in consultation with the Service, California Department of Fish and Game (CDFG), and revegetation experts.

11. In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for guidance.

12. Any contractor, employee, or military or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916)445-0045. They will contact the local warden or Mr. Paul Hoffman, the wildlife biologist, at (530)934-9309. The Service should be contacted at the numbers below.

13. The Sacramento Fish and Wildlife Office and CDFG shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The Service contact is the Chief of the Division of Endangered Species, at the addresses and telephone numbers below. The CDFG contact is Mr. Paul Hoffman at 1701 Nimbus Road, Suite A, Rancho Cordova, California 95670, (530) 934-9309.

14. New sightings of kit fox shall be reported to the California Natural Diversity Database (CNDDB). A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed should also be provided to the Service at the address below.

Any project-related information required by the Service or questions concerning the above conditions or their implementation may be directed in writing to the U.S. Fish and Wildlife Service at: Endangered Species Division
2800 Cottage Way, Suite W2605
Sacramento, California 95825-1846
(916) 414-6620 or (916) 414-6600

EXHIBIT "A" - DEFINITIONS

"Take" - Section 9 of the Endangered Species Act of 1973, as amended (Act) prohibits the "take" of any federally listed endangered species by any person (an individual, corporation, partnership, trust, association, etc.) subject to the jurisdiction of the United States. As defined in the Act, take means " . . . to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct". Thus, not only is a listed animal protected from activities such as hunting, but also from actions that damage or destroy its habitat.

"Dens" - San Joaquin kit fox dens may be located in areas of low, moderate, or steep topography. Den characteristics are listed below, however, the specific characteristics of individual dens may vary and occupied dens may lack some or all of these features. Therefore, caution must be exercised in determining the status of any den. Typical dens may include the following: (1) one or more entrances that are approximately 5 to 8 inches in diameter; (2) dirt berms adjacent to the entrances; (3) kit fox tracks, scat, or prey remains in the vicinity of the den; (4) matted vegetation adjacent to the den entrances; and (5) manmade features such as culverts, pipes, and canal banks.

"Known den" - Any existing natural den or manmade structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records, past or current radiotelemetry or spotlighting data, kit fox sign such as tracks, scat, and/or prey remains, or other reasonable proof that a given den is being or has been used by a kit fox. The Service discourages use of the terms "active" and "inactive" when referring to any kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens often, with the result that the status of a given den may change frequently and abruptly.

"Potential Den" - Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox. Potential dens shall include the following: (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use.

"Natal or Pupping Den" - Any den used by kit foxes to whelp and/or rear their pups. Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt and/or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two, therefore, for purposes of this definition either term applies.

"Atypical Den" - Any manmade structure which has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

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APPENDIX D

BURROWING OWL SURVEY PROTOCOL AND MITIGATION GUIDELINES

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BURROWING OWL SURVEY PROTOCOL AND MITIGATION GUIDELINES

Prepared by:

The California Burrowing Owl Consortium

April 1993

INTRODUCTION

The California Burrowing Owl Consortium developed the following Survey Protocol and Mitigation Guidelines to meet the need for uniform standards when surveying burrowing owl *(Speotyto cunicularia)* populations and evaluating impacts from development projects. The California Burrowing Owl Consortium is a group of biologists in the San Francisco Bay area who are interested in burrowing owl conservation. The following survey protocol and mitigation guidelines were prepared by the Consortium's Mitigation Committee. These procedures offer a decision-making process aimed at preserving burrowing owls in place with adequate habitat.

California's burrowing owl population is clearly in peril and if declines continue unchecked the species may qualify for listing. Because of the intense pressure for development of open, flat grasslands in California, resource managers frequently face conflicts between owls and development projects. Owls can be affected by disturbance and habitat loss, even though there may be no direct impacts to the birds themselves or their burrows. There is often inadequate information about the presence of owls on a project site until ground disturbance is imminent. When this occurs there is usually insufficient time to evaluate impacts to owls and their habitat. The absence of standardized field survey methods impairs adequate and consistent impact assessment during regulatory review processes, which in turn reduces the possibility of effective mitigation.

These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or the resources that support them. The process begins with a four-step survey protocol to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site. These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

Each project and situation is different and these procedures may not be applicable in some circumstances. Finally, these are not strict rules or requirements that must be applied in all situations. They are guidelines to consider when evaluating burrowing owls and their habitat, and they suggest options for burrowing owl conservation when land use decisions are made.

Section 1 describes the four phase Burrowing Owl Survey Protocol. Section 2 contains the Mitigation Guidelines. Section 3 contains a discussion of various laws and regulations that protect burrowing owls and a list of references cited in the text.

We have submitted these documents to the California Department of Fish and Game (CDFG) for review and comment. These are untested procedures and we ask for your comments on improving their usefulness.

SECTION 1 BURROWING OWL SURVEY PROTOCOL

PHASE I: HABITAT ASSESSMENT

The first step in the survey process is to assess the presence of burrowing owl habitat on the project site including a 150-meter (approx. 500 ft.) buffer zone around the project boundary (Thomsen 1971, Martin 1973).

Burrowing Owl Habitat Description
Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat: both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat
Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by an observation of at least one burrowing owl, or, alternatively, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeney 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

The Phase II burrow survey is required if burrowing owl habitat occurs on the site. If burrowing owl habitat is not present on the project site and buffer zone, the Phase II burrow survey is not necessary. A written report of the habitat assessment should be prepared (Phase IV), stating the reason(s) why the area is not burrowing owl habitat.

PHASE II: BURROW SURVEY

1. A survey for-burrows and owls should be conducted by walking through suitable habitat over the entire project site and in areas within 150 meters (approx 500 ft.) of the project impact zone. This 150-meter buffer zone is included to account for adjacent burrows and foraging habitat outside the project area and impacts from factors such as noise and vibration due to heavy equipment which could impact resources outside the project area.

2. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.), and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To efficiently survey projects larger than 100 acres, it is recommended that two or more surveyors conduct concurrent surveys. Surveyors should maintain a minimum distance of 50 meters (approx. 160 ft.) from any owls or occupied burrows. It is important to minimize disturbance near occupied burrows during all seasons.

3. If burrows or burrowing owls are recorded on the site, a map should be prepared of the burrow concentration areas. A breeding season survey and census (Phase III) of burrowing owls is the next step required.

4. Prepare a report (Phase IV) of the burrow survey stating whether or not burrows are present.

5. A preconstruction survey may be required by project-specific mitigations no more than 30 days prior to ground disturbing activity.

PHASE III: BURROWING OWL SURVEYS, CENSUS AND MAPPING

If the project site contains burrows that could be used by burrowing owls, then survey efforts should be directed towards determining owl presence on the site. Surveys in the breeding season are required to describe if, when, and how the site is used by burrowing owls. If no owls are observed using the site during the breeding season, a winter survey is required.

Survey Methodology
A complete burrowing owl survey consists of four site visits. During the initial site visit examine burrows for owl sign and map the locations of occupied burrows. Subsequent observations should be conducted from as many fixed points as necessary to provide visual coverage of the site using spotting scopes or binoculars. It is important to minimize disturbance near occupied burrows during all seasons. Site visits must be repeated on four separate days. Conduct these visits from two hours before sunset to one hour after or from one hour before to two hours after sunrise. Surveys should be conducted during weather that is conducive to observing owls outside their burrows. Avoid surveys during heavy rain, high winds (> 20 mph), or dense fog.

Nesting Season Survey. The burrowing owl nesting season begins as early as February 1 and continues through August 31 (Thomsen 1971, Zarn 1974). The timing of nesting activities may vary with latitude and climatic conditions. If possible, the nesting season survey should be conducted during the peak of the breeding season, between April 15 and July 15. Count and map all burrowing owl sightings, occupied burrows, and burrows with owl sign. Record numbers of pairs and juveniles, and behavior such as courtship and copulation. Map the approximate territory boundaries and foraging areas if known.

Survey for Winter Residents (non-breeding owls). Winter surveys should be conducted between December 1 and January 31, during the period when wintering owls are most likely to be present. Count and map all owl sightings, occupied burrows, and burrows with owl sign.

Surveys Outside the Winter and Nesting Seasons. Positive results, (i.e., owl sightings)- outside of the above survey periods would be adequate to determine presence of owls on site. However, results of these surveys may be inadequate for mitigation planning because the numbers of owls and their pattern of distribution may change during winter and nesting seasons. Negative results during surveys outside the above periods are not conclusive proof that owls do not use the site.

Preconstruction Survey. A preconstruction survey may be required by project-specific mitigations and should be conducted no more than 30 days prior to ground disturbing activity.

PHASE IV: RESOURCE SUMMARY, WRITTEN REPORT

A report should be prepared for CDFG that gives the results of each Phase of the survey protocol, as outlined below.

Phase I: Habitat Assessment

1. Date and time of visit(s) including weather and visibility conditions; methods of survey.

2. Site description including the following information: location, size, topography, vegetation communities, and animals observed during visit(s).

3. An assessment of habitat suitability for burrowing owls and explanation.

4. A map of the site.

Phase II: Burrow Survey

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.

2. A more detailed site description should be made during this phase of the survey protocol including a partial plant list of primary vegetation, location of nearest freshwater (on or within one mile of site), animals observed during transects.

3. Results of survey transects including a map showing the location of concentrations of burrow(s) (natural or artificial) and owl(s), if present.

Phase III: Burrowing Owl Surveys, Census and Mapping

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.

2. Report and map the location of all burrowing owls and owl sign. Burrows occupied by owl(s) should be mapped indicating the number of owls at each burrow. Tracks, feathers, pellets, or other items (prey remains, animal scat) at burrows should also be reported.

3. Behavior of owls during the surveys should be carefully recorded (from a distance) and reported. Describe and map areas used by owls during the surveys. Although not required, all behavior is valuable to document including feeding, resting, courtship, alarm, territorial, parental, or juvenile behavior.

4. Both winter and nesting season surveys should be summarized. If possible include information regarding productivity of pairs, seasonal pattern of use, and include a map of the colony showing territorial boundaries and home ranges.

5. The historical presence of burrowing owls on site should be documented, as well as the source of such information (local bird club, Audubon society, other biologists, etc.).

APPENDIX E

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CENTRAL CALIFORNIA INFORMATION CENTER
California Historical Resources Information System
Department of Anthropology – California State University, Stanislaus
One University Circle, Turlock, California 95382
(209) 667-3307 - FAX (209) 667-3324

Alpine, Calaveras, Mariposa, Merced, San Joaquin, Stanislaus & Tuolumne Counties

Date: 4/3/2012

CCIC File #: 8192N
Project: Morgan Ranch Master Plan, T5S R10E Section 26

Elena Nuno, Associate Planner
Quad Knopf, Inc.
6051 North Fresno Avenue, Suite 200
Fresno, CA 93710

Invoice to: Quad Knopf, Inc.
Accounts Payable
P.O. Box 3699
Visalia, CA 93278

Dear Ms. Nuno:

We have conducted a records search as per your request for the above-referenced project area located on the Turlock USGS 7.5-minute quadrangle map in Stanislaus County.

Search of our files includes review of our maps for the specific project area and the immediate vicinity of the project area, and review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the *California Inventory of Historic Resources* (1976), the *California Historical Landmarks* (1990), and the California Points of Historical Interest listing (May 1992 and updates), the Directory of Properties in the Historic Property Data File (HPDF) and the Archaeological Determinations of Eligibility (ADOE) (Office of Historic Preservation current electronic files dated 08-15 and 08-09-2011), the CALTRANS State and Local Bridge Survey (1989 and updates), the *Survey of Surveys* (1989), GLO Plats, and other pertinent historic data available at the CCIC for each specific county.

Please be advised that in accordance with the Procedural Manual issued by the Office of Historic Preservation, planning agencies such as your office are not allowed to receive exact locational information pertaining to archaeological resources--this information can only be released to a qualified professional historical resources consultant. Also, your office may have information pertaining to a specific project area only. In the event that your office retains a qualified professional at a future date to investigate the proposed project area, this individual may obtain any necessary documentation from our office based on the regular fee schedule.

The following details the results of the records search:

Prehistoric or historic resources within the project area:

(1) There are no formally recorded prehistoric or historic resources within the project area, but the project area has not been subject to previous investigations.

(2) The General Land Office Survey Plat for T5N R10E (Sheet #44-323, dated 1854-55) shows no historic features in Section 26.

(3) The *Official Map of the County of Stanislaus, California 1906* shows the north one-half of Section 26 divided into sixteen parcels and the southern half owned by Margaret Casey et al.

(4) The 1961 edition of the Turlock USGS 7.5' Quadrangle map shows numerous buildings and/or structures (including an aqueduct) that are at least 51 years in age within the proposed project area. We have no further information on file pertaining to these possible historical resources.

Prehistoric or historic resources within the immediate vicinity of the project area: None formally reported to the Information Center.

Resources that are known to have value to local cultural groups: None formally reported to the Information Center.

Previous investigations within the project area: None formally reported to the Information Center.

Previous investigations within the immediate vicinity of the project area: There have been two investigations conducted by the California Department of Transportation along the route of SR 99 adjacent to the southern boundary of the project area, referenced as follows:

CCIC Report # ST-	Author Date	Project
04198	Keefe (2001)	10-STA-99/10-MER-99, P.M. 0.0/1.09
O7537	Kuzak (2011)	10-STA-99, P.M. 0-24.6

Recommendations/Comments: Based on existing data in our files the project area has a low-moderate sensitivity for the possible discovery of prehistoric archaeological resources and a high sensitivity for the discovery of historical resources, including buildings and structures that are over 51 years in age that have not been previously documented or evaluated. Survey by a qualified archaeologist or historian is recommended prior to implementation of the project or issuance of any discretionary permit.

The Statewide Referral List for Historical Resources Consultants is posted for your use on the internet at http://chrisinfo.org

Please be advised that a historical resource is defined as a building, structure, object, prehistoric or historic archaeological site, or district possessing physical evidence of human activities over 45 years old. Since the project area has not been subject to previous investigations, there may be unidentified features involved in your project that are 45 years or older and considered as historical resources requiring further study and evaluation by a qualified professional of the appropriate discipline.

We advise you that in accordance with State law, if any historical resources are discovered during project-related activities, all work is to stop and the lead agency and a qualified professional are to be consulted to determine the importance and appropriate treatment of the find. If Native American remains are found the County Coroner and the Native American Heritage Commission, Sacramento (916-653-4082) are to be notified immediately for recommended procedures.

We further advise you that if you retain the services of a historical resources consultant, the firm or individual you retain is responsible for submitting any report of findings prepared for you to the Central California Information Center, including one copy of the narrative report and two copies of any records that document historical resources found as a result of field work. If the consultant wishes to obtain copies of materials not included with this records search reply, additional copy or records search fees may apply.

We thank you for contacting this office regarding historical resource preservation. Please let us know when we can be of further service. Billing is attached and has been forwarded to the Visalia office as per your request, payable within 60 days of receipt of the invoice.

Sincerely,

E A Greathouse

E. A. Greathouse, Coordinator
Central California Information Center
California Historical Resources Information System

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

April 3, 2012

Ms. Elena Nuño, Associate Senior Planner
Quad Knopf
6051 N. Fresno Street, Suite 200
Fresno, CA 93710

Sent by FAX to: 559-435-2905
No. of Pages: 5

Re: Sacred Lands File Search and Native American Contacts list for the **"Morgan Ranch Master Plan Project;"** located in the City of Turlock; Stanislaus County, California

Dear Ms. Nuño:

The Native American Heritage Commission (NAHC) conducted a Sacred Lands File search of the 'area of potential effect,' (APE) based on the USGS coordinates provided and **Native American cultural resources** were not identified in the project area of potential effect (e.g. APE): you specified. Also, please note; the NAHC Sacred Lands Inventory is not exhaustive and does not preclude the discovery of cultural resources during any project groundbreaking activity.

California Public Resources Code §§5097.94 (a) and 5097.96 authorize the NAHC to establish a Sacred Land Inventory to record Native American sacred sites and burial sites. These records are exempt from the provisions of the California Public Records Act pursuant to. California Government Code§6254 (r). The purpose of this code is to protect such sites from vandalism, theft and destruction. This project is also subject to mandatory consultation pursuant to §65352.3 (SB 18) due to the General Plan Amendment (GPA)

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites

The California Environmental Quality Act (CEQA – CA Public Resources Code §§ 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ...objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. CA Government Code §65040.12(e) defines "environmental justice" provisions and is applicable to the environmental review processes.

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway. Local Native Americans may have knowledge of the religious and cultural significance of the historic properties of the proposed project for the area (e.g. APE). Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). We urge consultation with those tribes and interested Native Americans on the list that the NAHC has provided in order to see if your proposed project might impact Native American cultural resources. Lead agencies should consider avoidance as defined in §15370 of the CEQA Guidelines when significant cultural resources as defined by the CEQA Guidelines §15064.5 (b)(c)(f) may be affected by a proposed project. If so, Section 15382 of the CEQA Guidelines defines a significant impact on the environment as "substantial," and Section 2183.2 which requires documentation, data recovery of cultural resources.

The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Partnering with local tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA (42 U.S.C 4321-43351) and Section 106 4(f), Section 110 (f)(k) of federal NHPA (16 U.S.C. 470 *et seq*), 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The NAHC remains concerned about the limitations and methods employed for NHPA Section 106 Consultation.

Also, California Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery', another important reason to have Native American Monitors on board with the project.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. An excellent way to reinforce the relationship between a project and local tribes is to employ Native American Monitors in all phases of proposed projects including the planning phases.

Confidentiality of "historic properties of religious and cultural significance" may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APE and possibility threatened by proposed project activity.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Attachment: Native American Contact List

Native American Contacts
Stanislaus County
April 3, 2012

Tule River Indian Tribe
Neil Peyron, Chairperson
P.O. Box 589 — Yokuts
Porterville, CA 93258
chairman@tulerivertribe-nsn.
(559) 781-4271
(559) 781-4610 FAX

North Valley Yokuts Tribe
Katherine Erolinda Perez
PO Box 717 — Ohlone/Costanoan, Northern Valley Yokuts, Bay Miwok
Linden, CA 95236
(209) 887-3415
canutes@verizon.net

Southern Sierra Miwuk Nation
Jay Johnson, Spiritual Leader
5235 Allred Road — Miwok, Pauite, Northern Valley Yokut
Mariposa, CA 95338
209-966-6038

Southern Sierra Miwuk Nation
Anthony Brochini, Chairperson
P.O. Box 1200 — Miwok, Pauite, Northern Valley Yokut
Mariposa, CA 95338
tony_brochini@nps.gov
209-379-1120
209-628-0085 cell

Buena Vista Rancheria
Rhonda Morningstar Pope, Chairperson
1418 20th Street, Suite 200 — Me-Wuk / Miwok
Sacramento, CA 95811
rhonda@buenavistatribe.
916 491-0011
916 491-0012 - fax

Tuolumne Band of Me-Wuk
Kevin Day, Chairperson
P.O. Box 699 — Me-Wuk - Miwok
Tuolumne, CA 95379
receptionist@mlode.com
(209) 928-3475 - Tribal Office
(209) 928-1677 - Fax

California Valley Miwok Tribe
Silvia Burley, Chairperson
10601 N Escondido PL — Miwok
Stockton, CA 95212
office@cvmt.net
209-931-4567
209-931-4333

Tuolumne Band of Me-Wuk
Mary Camp, Tribal Administrator
P.O. Box 699 — Me-Wuk - Miwok
Tuolumne, CA 95379
receptionist@mlode.com
(209) 928-3475 - Tribal Office
(209) 928-1677 - Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Morgan Ranch Master Plan Project; located in the city of Turlock; Stanislaus County, California for which a Sacred Lands File search and Native American Contacts list were requested.

Native American Contacts
Stanislaus County
April 3, 2012

Southern Sierra Miwuk Nation
Les James, Spiritual Leader
PO Box 1200
Mariposa , CA 95338
209-966-3690
Miwok
Pauite
Northern Valley Yokut

Tuolumne Band of Me-Wuk
Stanley Cox, Cultural Resources Dr
P.O. Box 699
Tuolumne , CA 95379
receptionist@mlode.com
(209) 928-3475 - Tribal Office
(209) 928-1677 - Fax
Me-Wuk - Miwok

Tuolumne Band of Me-Wuk
Reba Fuller
P.O. Box 699
Tuolumne , CA 95379
rfuller@mlode.com
(209) 928-3475 - Tribal Office
(209) 928-1677 - Fax
Me-Wuk - Miwok

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Morgan Ranch Master Plan Project; located in the city of Turlock; Stanislaus County, California for which a Sacred Lands File search and Native American Contacts list were requested.

APPENDIX F

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Memorandum

To: Ron Mauck, Quad Knopf

From: Brad Musinski and Ken Brody

Date: August 6, 2007

Subject: Turlock Airpark Risk Assessment for Morgan Ranch

Background

Mead & Hunt has been presented with the task of determining if the proposed Morgan Ranch Development north of the Turlock Airpark is compatible with guidelines established in the California Airport Land Use Planning Handbook and Stanislaus County Airport Land Use Commission (ALUC) Plan. Mead & Hunt analyzed the State Handbook and the ALUC's Turlock Airpark Plan safety zones, and contacted various representatives of the Airpark, State, and County agencies to determine Airpark operations and development characteristics. After taking these actions Mead & Hunt has concluded that the project's land uses do not fall into the recommended uses set forth in the state Handbook or the ALUC's Plan. However, taking into account the Airpark's specific operations, Mead & Hunt believes there is room for a reasonable compromise between Morgan Ranch and the ALUC on land uses in disputed safety zones.

A letter dated July 11, 2005 from the Stanislaus County ALUC expresses the findings of the ALUC with regard to the Morgan Ranch proposal. The ALUC determined that a portion of the Morgan Ranch Project falls within Area 3 of the Plan. Area 3 of the ALUC Plan is an area under approach and take-off extensions. The primary concern within Area 3 is safety. The ALUC also determined that land uses proposed by the Morgan Ranch Development which fall beneath Area 3 do not conform to the standards recommended in the ALUC Plan. The proposed land uses are heavy commercial, high density residential, and light and medium density residential. The project is described in more detail below and shown in Figures 1 and 2. The ALUC concluded that the proposed heavy commercial and residential uses are incompatible with the ALUC Plan in Area 3. The ALUC letter also states that the developers have provided an alternative which replaces any residential uses within Area 3 with unspecified commercial development. This alternative solution is also not compatible according to the ALUC.

The Stanislaus County ALUC determined that the proposed uses for Morgan Ranch outside of the Plan's Area 3 are acceptable land uses. After investigation, Mead & Hunt has also found the proposed development outside of Area 3 would be compatible with the State Handbook and the ALUC Plan.

As part of this investigation we spoke with, and thank for their time and cooperation: Ms. Elaine Wilson, Owner of the Turlock Airpark; Mr. Patrick Miles and Mr. Dan Gargas of the California Division of Aeronautics; Mr. Josh Mann with the Stanislaus County ALUC; Ms. Debbie Whitmore, City of Turlock Planning Director; and Mr. John Fletcher of Fletcher's Ultralights.

Turlock Airpark

Turlock Airpark is a private airport, with a single runway that is 2,075 feet long and 60 feet wide with a load bearing capacity of 4,000 pounds for single wheel aircraft. The Airpark averages fewer than 10 aircraft operations per week and has 3 single engine aircraft based on the field.

The runway, designated 13-31, is oriented north-northwest to south-southeast. The western regional climatic center reports annual wind for this area prevailing from the northwest. This would result in the majority of flights taking off and landing from south to north, and flight traffic patterns to the north, south and west of the airport. Turlock Airpark is bordered to the north by State Highway 99, with residential and commercial development beyond that. The proposed Morgan Ranch Project is immediately north of State Highway 99 and north to northeast of the Airpark.

Mr. Patrick Miles of the California Division of Aeronautics stated the Division classifies the Airpark as a private use airport. By definition, private use airports are to be used only by personal aircraft and occasional invited guests (transient aircraft). Because Turlock Airpark is a private use airport, it is not required to be included in a county's airport land use plan. However, Stanislaus County has chosen to adopt a compatibility plan for the Airpark.

Ms. Elaine Wilson, the owner of Turlock Airpark, confirmed that three general aviation, single-engine aircraft are based at the Airpark. Ms. Wilson described single engine operations as, "very seldom" with local operations averaging approximately one per day. Transient flights average approximately four operations per month. Additionally, one helicopter used for crop dusting is based at the field and operates when needed, but does not fill up with agricultural spray at the Airpark. No fuel facilities exist on site to service aircraft. Due to a low volume of aircraft operations, the owner hinted at the possible sale of the Airpark, which would most likely result in a change of land use. However, at this time there is no confirmation or guarantee of a sale.

An ultralight fixed base operator with approximately 20 ultralights is also located at the Airpark. The ultralights average about 12 operations per week and also approach from the south, and depart to the north. The ultralight operation count is not figured into the total count for Airpark. Ultralights are differentiated from traditional aircraft due to the fact that the Federal Aviation Administration (FAA) does not classify ultralights as general aviation aircraft. Ultralights are not subject to federal aircraft certification and maintenance standards. The FAA classifies ultralights in Advisory Circular 103-7 as, "aircraft of simple design and intended exclusively for pleasure and personal use. These aircraft (airplanes, gliders, rotorcraft, manned free balloons, etc.) would be unpowered or powered by a single, naturally aspirated engine having a certificated takeoff rating of 200 horsepower or less, would have a maximum weight of 2,500 pounds or less, and would have unpressurized cabins."

Morgan Ranch

The City of Turlock has been requested by the project applicant to amend the Turlock General Plan to allow development of 168 acres of single-family residential, multi-family residential, heavy commercial and public land uses at Morgan Ranch. This amendment would result in a majority of the Morgan Ranch project to be classified as low or medium density residential.

Morgan Ranch will be developed in three phases. Phase I is over half the size of the entire development at approximately 116 acres in size. Phase I will consist of low, medium and high density residential, heavy commercial uses, and public space which includes a park, school, and a stormwater basin along Highway 99. Phase II is planned for low, medium and high density residential development on approximately 16 acres. Phase III would consist of low and medium density residential uses and be approximately 37 acres in size. According to the Project Description, the Development Agreement between the City of Turlock and affected property owners will establish the timing of the phasing of development.

Safety Compatibility Zones

For the purposes of safety around an airport, the California Airport Land Use Planning Handbook has suggested different categories of Safety Compatibility Zones. These Zones differ in size depending on the operations of a specific airport. The characteristics of the Turlock Airpark fall within the standards established in the Handbook for a Low-Activity General Aviation Runway. These include less than 2,000 take-offs and landings per year at an individual runway end, a runway length less than 4,000 feet, and a visual only approach. Using these characteristics, the Safety Compatibility Zones for the Turlock Airpark are shown in Figure 1. The westerly segment of Morgan Ranch Phase I breaches three Safety Compatibility Zones for a low-activity general aviation runway.

The most restrictive area is Zone One, the Runway Protection Zone (RPZ). According to the Handbook, the RPZ is defined in size by the FAA and classified as a very high risk area. Airport ownership of RPZ property is encouraged and new structures along with residential and nonresidential uses are strongly discouraged. The only exception to RPZ land use is a nonresidential use, with very low intensity and is confined to the boundary of the RPZ. The RPZ extends into 0.8 acres of the Morgan Ranch development where the developers have proposed a heavy commercial land use within the most westerly end of Phase I.

A portion of Morgan Ranch also overlaps Zone Two, the Handbook's Inner Approach/Departure Zone. This area extends out and around the sides of the RPZ and contains the area in which 30 to 50% of near-airport accident sites occur. With the exception of agriculture parcels, residential uses should be prohibited, along with any nonresidential uses which attract more than a few people (shopping malls, schools, eating establishments, labor intensive offices and plants, etc.) in the Inner Approach/Departure Zone. The Morgan Ranch developers have proposed heavy commercial land use within 4.8 acres of the Inner Approach/Departure Zone.

Zone Three of the State Handbook, entitled the Inner Turning Zone, also overlaps the Morgan Ranch project. In Zone Three, aircraft are typically turning onto their approach, or departing aircraft transition are transitioning from takeoff to climb and adjusting their heading in correlation to their destination. Much like in Zone Two, nonresidential uses with medium to high intensities of use, such as shopping malls, restaurants, theatres, and buildings with more then three aboveground habitable floors should be prohibited. Residential uses other then very low densities should be prohibited. The developers have also proposed heavy commercial land uses within 3.0 acres of Zone 3.

The primary traffic pattern for Runway 31 is left, meaning the majority of flights turn left, away from Morgan Ranch following departure. When looking at Figure 1, there are two Inner Turning Zones (Zone 3), one to the east and the other to the west of Zone 2. When the flight pattern is taken into account, Zone 3 of the State Handbook only becomes significant on one side, the west side. The east Inner Turning Zone which overlays Morgan Ranch may be eliminated from discussion along with any restrictions it may propose.

Stanislaus County ALUC Plan

Stanislaus County ALUC has created a Plan with recommendations for the area immediately surrounding the Airpark. The ALUC Plan establishes an area, entitled Area 3, which overlaps a larger portion of Morgan Ranch then any of the State Handbook Zones (Figure 2). According to the ALUC Plan, Area 3 is an, "area under the approach and take-off extensions and transitional surfaces as defined by the flight paths in use at the airport and Federal regulations. This area is primarily concerned with safety." With the exception of rural residential uses, (10 acres or more) all residential land uses inside Area 3 are prohibited in the ALUC Plan. Area 3 overlaps portions of Phase I of Morgan Ranch where Low Density and High Density Residential land uses have been proposed.

In addition to being restrictive on residential uses within Area 3, the ALUC Plan also limits many commercial uses within the same space. Morgan Ranch has proposed 10.9 acres of heavy commercial land use at the westerly end of Phase I, inside of Area 3. The ALUC breaks down the criteria for Area 3 into types of general commercial uses, not by land use intensity. Many commercial uses are prohibited by the Plan, specifically gas stations, hotels, shopping centers, theaters, and other areas that may draw a high concentration of people. Some commercial activities may be conditionally approved based on their function, such as office buildings and retail stores, and other specific uses such as auto parking, aircraft sales and repair, and truck terminals are compatible according to the ALUC Plan. Because the Plan allows some commercial use within Area 3, based on the function and concentration of people within the use, Mead & Hunt recommends that Morgan Ranch describe the specific commercial uses proposed and keep the activities at a low intensity where heavy commercial is now proposed.

Conclusions and Recommendations

When evaluated with respect to safety zones in both the California Airport Land Use Planning Handbook and the Stanislaus County ALUC Plan, conflicts between the proposed Morgan Ranch development and the Turlock Airpark are evident. However, several characteristics of the airport and its operation minimize this conflict:

- The Airpark is a privately owned, personal-use facility. As such, an airport land use compatibility plan is not required under state law.
- The activity level is very low—fewer than 10 airplane operations per week.
- With the normal direction of operations being from south to north, the usual traffic pattern is on the west side of the airport, away from the Morgan Ranch site.
- The airport owner has indicated that there are no plans to improve the facilities or expand operations and indeed the airport could be closed within the next several years.

Given these circumstances, Mead & Hunt concludes that a reduction in safety compatibility restrictions is reasonable. This conclusion notwithstanding, we believe that certain safety-related limitations on the Mogan Ranch development are necessary more as a matter of public safety than for protection of the airport from encroachment by incompatible land uses. As long as Turlock Airpark remains open for operations, we recommend that the following measures be implemented:

- No buildings should be constructed within Safety Zone 1, the Runway Protection Zone (RPZ). Roads and automobile parking lots are acceptable uses. Landscaping, light fixtures, signs, and other objects must be limited in height so as not to be obstructions to the airport airspace as defined by Part 77 of the Federal Aviation Regulations (FAR).
- Development within Safety Zone 2—the Inner Approach/Departure Zone—as defined by the State Handbook should be limited to low-intensity commercial or industrial uses. Specifically, in accordance with Handbook guidance, the usage intensity should be no more than 40 people per acre on average over the 4.9-acre area affected (196 people total) and no more than 80 people in any single 1.0-acre area. The height of all objects must comply with FAR Part 77 criteria.
- Because of the low activity and lack of a traffic pattern on the northwest side of the airport, land use restrictions on the 3.0 acres within Safety Zone 3—the Inner Turning Zone—can be eliminated.
- Airport-related land use restrictions on the remainder of the project site are not necessary other than with respect to height limits in accordance with FAR Part 77 standards.
- Based upon the information provided to us by the airport owner and our understanding of the Morgan Ranch development proposal, the airport may close before the development occurs. Thus, an option that the Morgan Ranch developers may wish to consider is to delay development within the restricted safety zones until the airport has been permanently closed. However, because the timing of both of these events is uncertain at present, the City of Turlock should condition any approval of development not in compliance with the above limitations upon the airport's closure.

With respect to the Stanislaus County ALUC's finding that the Morgan Ranch project is inconsistent with ALUC criteria, two potential responses by the City of Turlock are apparent. One is for the city to follow the steps established by state law and overrule the ALUC action. The required findings could take note of the limited nature of the airport operations as outlined in this memo. A second option is for the city to resubmit the project to the ALUC and request reconsideration in light of the information provided here. Mead & Hunt recommends this second option. The ALUC could in turn then grant exceptions to its criteria as applied to this project, modify its compatibility plan for the airport to reflect current airport characteristics, or rescind the plan as being no longer required.

In summary, we believe that the Morgan Ranch development as proposed can be accommodated provided that development within the areas of aviation-related risk is timed to occur after the airport closes. If development cannot be delayed until that time, then it must be restricted as described here. While the risk of an aircraft accident within the project site is low, the risk is greatest within the areas close to the runway end and the public should be protected from the potential consequences of such an event.

Attachments (2)

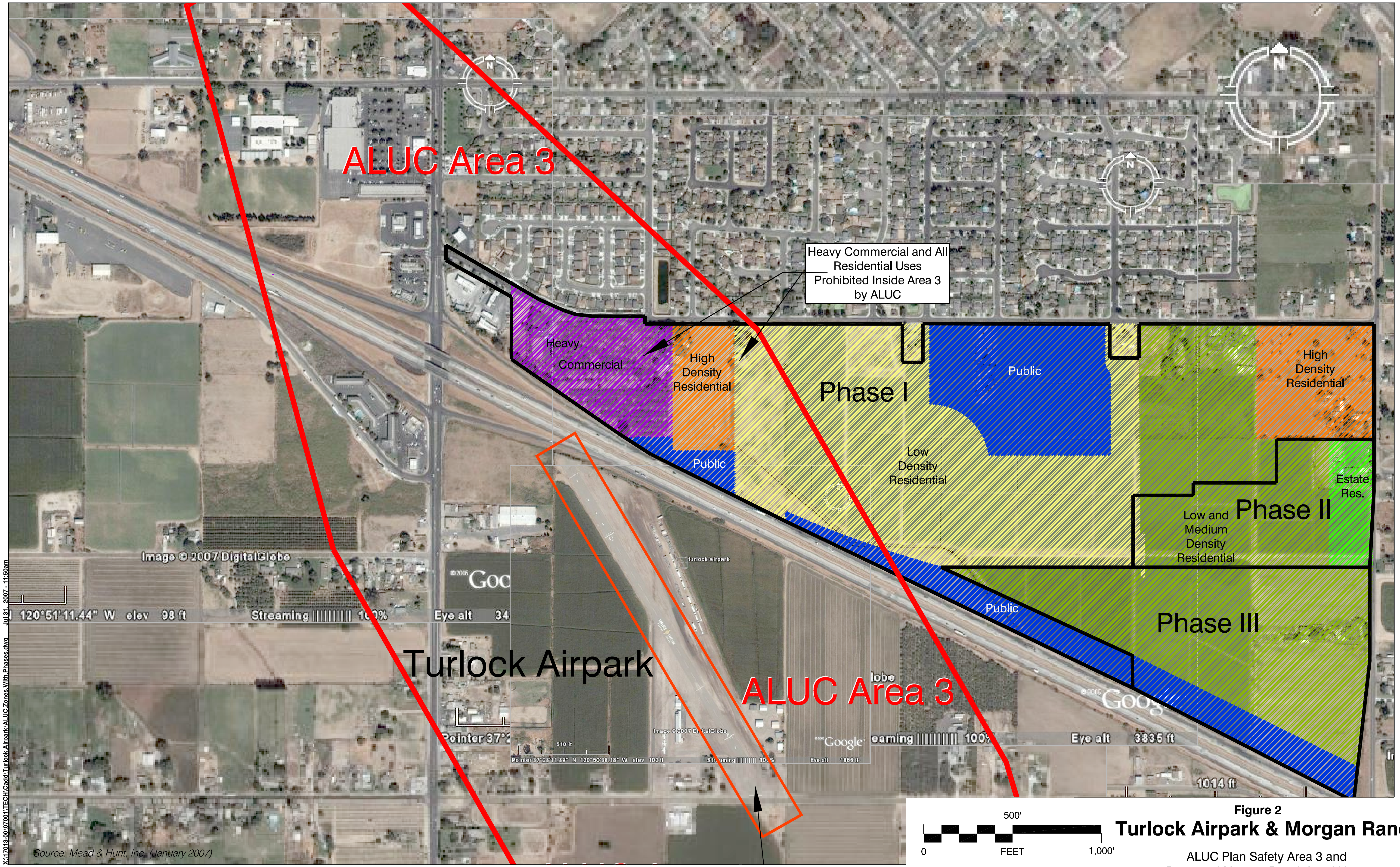

Figure 2
Turlock Airpark & Morgan Ranch
ALUC Plan Safety Area 3 and
Proposed Morgan Ranch Land Uses

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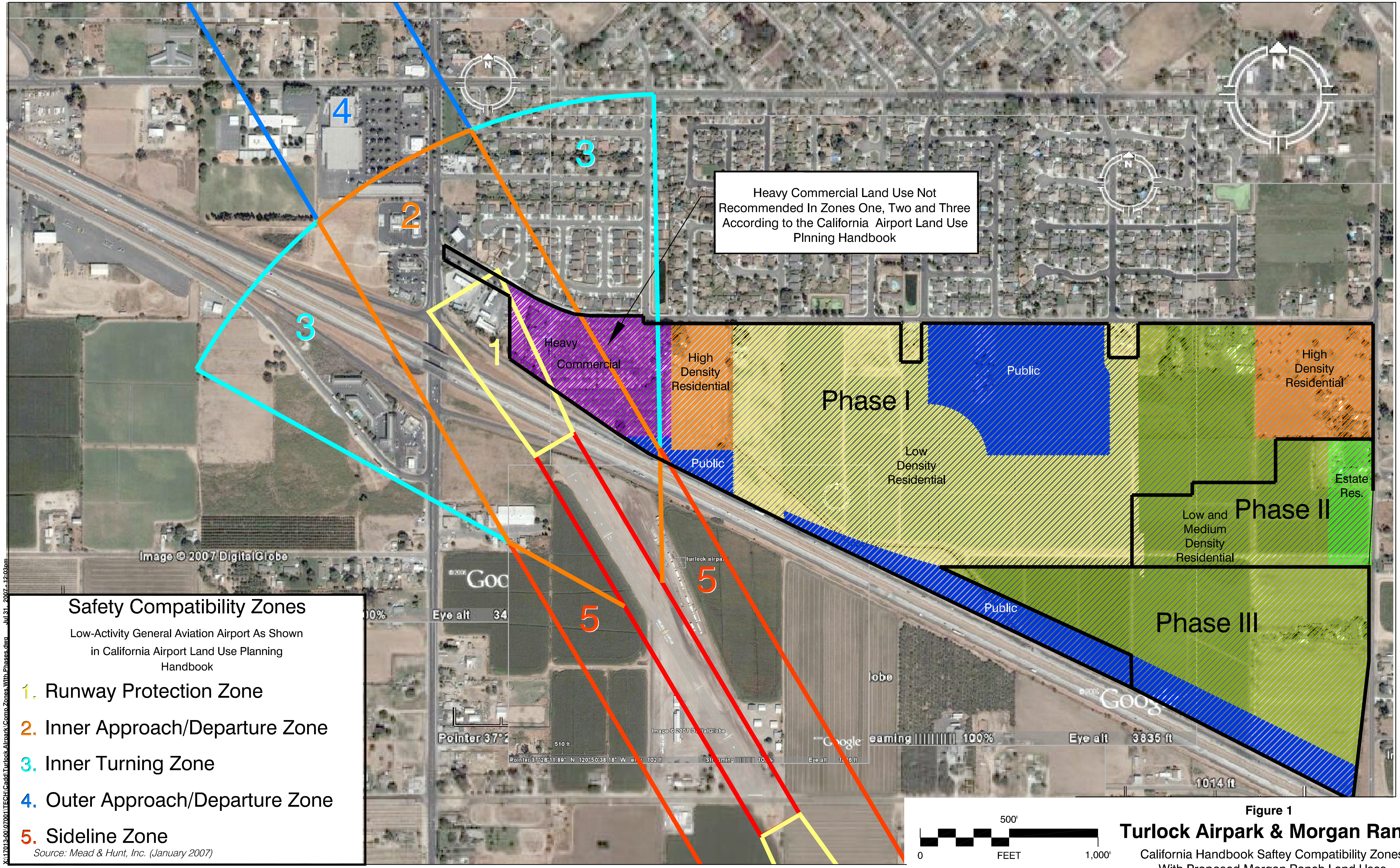

Figure 1

Turlock Airpark & Morgan Ranch

California Handbook Saftey Compatibility Zones With Proposed Morgan Ranch Land Uses

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APPENDIX G

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Environmental Noise Assessment

Morgan Ranch EIR

Turlock, California

Job # 2010-151

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July 29, 2013

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NOISE

INTRODUCTION

This report has been prepared to address the noise impacts due to and upon the proposed Morgan Ranch development located within the City of Turlock in Stanislaus County, California. The proposed Morgan Ranch development consists of 170 acres of residential, public school, and commercial development. The project site is located south of East Glenwood Avenue, east of Lander Avenue, north of State Route 99, and west of Golf Road.

Figure 1 shows the project site.

ENVIRONMENTAL SETTING

BACKGROUND ON NOISE AND ACOUSTICAL TERMINOLOGY [1]

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

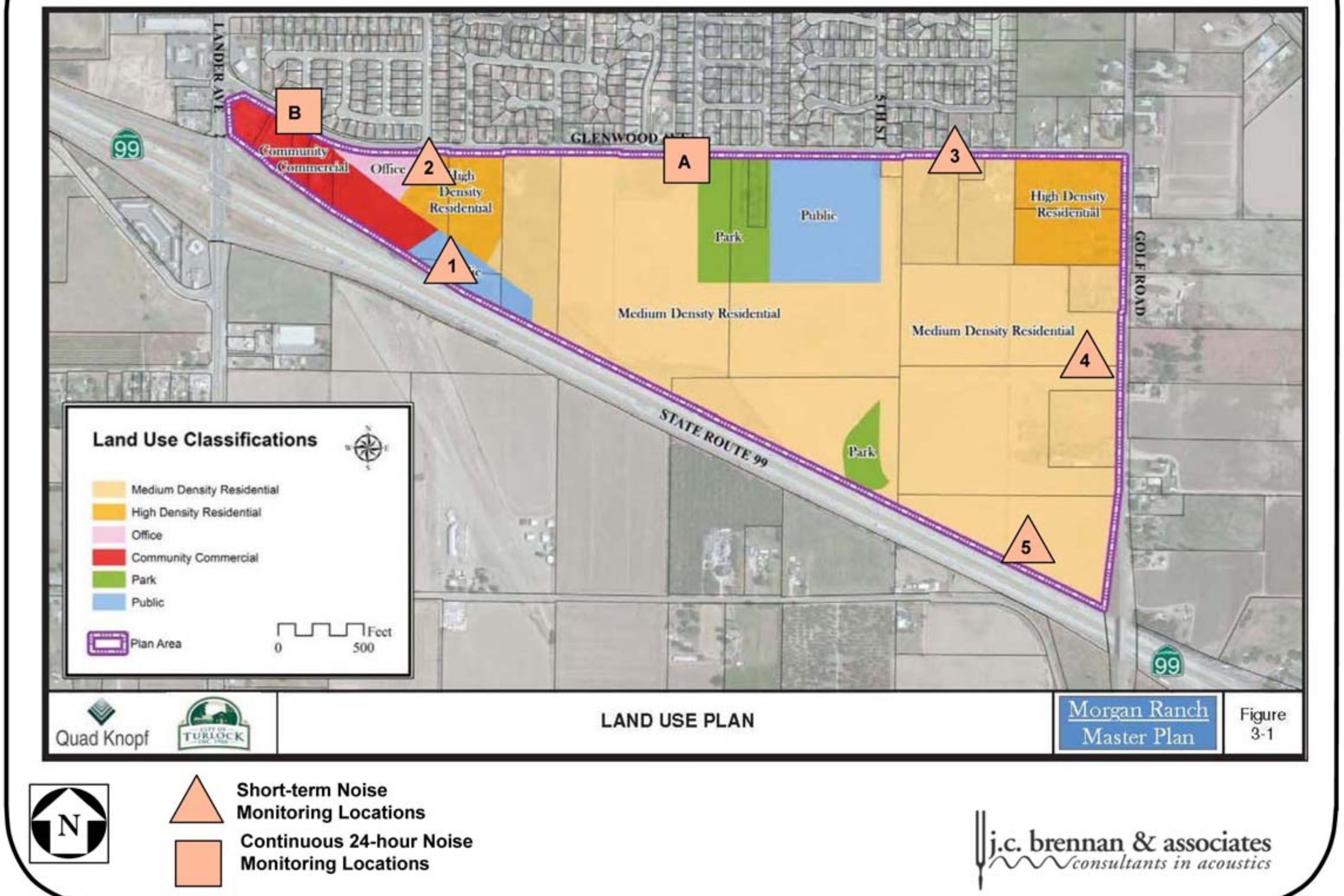
Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise can be highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

[1] For an explanation of these terms, see Appendix A: "Acoustical Terminology"

Figure 1
Morgan Ranch
Site Plan and Noise Measurement Sites



The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. Appendix A provides a summary of acoustical terms used in this report.

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Table 1
Typical Noise Levels

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. November, 2009.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

Major Noise Sources in the Project Vicinity

Transportation:

Motor vehicle traffic is the major contributors to the existing noise environment in the project vicinity. Vehicular noise within the project vicinity occurs primarily along State Route 99 and local surface streets. A secondary transportation noise source which is evaluated for this analysis includes aviation noise from the Turlock Airpark. Turlock Airpark operations have a potential to occur along the northwestern portion of the proposed project site.

Non-Transportation:

Commercial operations in the vicinity of the project were not occupied during the survey and therefore are not considered contributors to the existing noise environment. Agricultural operations are currently located on the project site and to the south and east of the project site.

Noise-Sensitive Land Uses in the Project Vicinity

Noise sensitive land uses in the immediate project vicinity consist of single-family residential uses located adjacent to the northwest portion of the project site. Future noise sensitive uses associated with the project include residential uses and an elementary school.

Existing Noise Environment in the Project Vicinity

Existing Traffic Noise Levels

To determine the existing traffic noise levels at the identified sensitive receivers within the project vicinity, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used with the California Vehicle Noise Emission Levels. The FHWA Model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. Traffic volumes were provided by the project traffic consultant, Omni Means. Truck usage and vehicle speeds on the project roadways were estimated from field observations and Caltrans data where available.

Table 2 shows the predicted existing traffic noise levels in terms of the Day/Night Average Level descriptor (Ldn) at a standard distance of 100 feet from the centerlines of the existing immediate project-area roadways for existing conditions, as well as distances to existing traffic noise contours. The extent of which existing land uses in the project vicinity are affected by existing traffic noise depends on their respective proximity to the roadways and their individual sensitivity to noise. Appendix B provides the complete inputs and results to the FHWA model.

Table 2
Existing Traffic Noise Levels and Distance to Contours

Roadway	Segment	Ldn @ 100 feet	Distance to Contours (feet)		
			70 dB L_{dn}	65 dB L_{dn}	60 dB L_{dn}
Lander Ave.(SR 165)	SR 99 S to Simmons Rd.	65 dB	49	105	226
Lander Ave.(SR 165)	East Linwood to SR 99 N	66 dB	55	119	257
Lander Ave.(SR 165)	North of Linwood Ave.	66 dB	51	110	237
Golden State Blvd.	North of Berkeley Ave.	63 dB	32	68	147
Golden State Blvd.	South of Berkeley Ave.	63 dB	33	72	154
Golf Rd.	Glenwood Ave. to E Linwood Ave.	58 dB	17	37	79
Golf Rd.	South of Glenwood Ave.	57 dB	14	31	66
E. Linwood Ave.	Lander Ave. to Golf Rd.	60 dB	21	45	98
Glenwood Ave.	Golf Rd. to Lander Ave.	59 dB	20	42	91
SR 99	SR 99 at the Project Site	79 dB	421	907	1955

Notes: Distances to traffic noise contours are measured in feet from the centerlines of the roadways.
Source: j.c. brennan & associates, Inc., 2013

Existing Aviation Noise Levels

The Morgan Ranch project falls within the Airport Land Use Planning Boundary as specified within the Stanislaus County Airport Land Use Commission (ALUC) Plan. Turlock Airpark is a private airport, with a single runway that is 2,075 feet long and 60 feet wide. The runway, designated 13-31, is oriented north-northwest to south-southeast. The Airpark is reported to have an average of 29 aircraft operations per week. There are approximately 32 aircraft based at the airpark, with 12 single engine aircraft and 20 ultralights. The ultralights average about 12 operations per week. The ultralight operation count is not figured into the total count for Airpark. Additionally, one helicopter which is used for crop dusting is based at the field, and operates when needed. .

Aviation activity associated with the Turlock Airpark has the potential to occur over the northwestern boundary of the project site. On July 17, 2007 j.c. brennan & associates, Inc. conducted continuous hourly noise measurements in the vicinity of the northern project boundary, directly under the ALUC approach and transitional surface area. The noise measurements were conducted for a 24-hour period with the sound level meter programmed to collect single event noise level data due to aircraft flyovers, as well as overall hourly noise level data. See Figure 1 for the location of the noise measurement site.

Instrumentation consisted of LDL Model 820 precision integrating sound level meters. The measurement systems were calibrated using a LDL Model CAL200 acoustical calibrator before testing. The measurement equipment meets all of the pertinent requirements of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters.

The results indicated that measured aircraft events resulted in sound exposure levels (SEL) ranging from 76 dB to 85 dB in the ALUC approach and transition surface area. The results also indicated that typical operation resulted in a mean SEL of 80.7 dB at an approximate distance of 1000 feet from the north end of the runway, and an assumed elevation of 500 feet above ground level (AGL). Assuming a worst case of 7 aircraft events occur per day along the northwestern project boundary, with all of the aviation events occurring during daytime hours (7 a.m. to 10 p.m), the CNEL value can be calculated on the project site.

The CNEL may be calculated as follows:

$$\textbf{CNEL = SEL + 10 log } \mathbf{N_{eq}} \textbf{ - 49.4 dB, where:}$$

SEL is the mean SEL of the event, N_{eq} is the sum of the number of daytime events (7 a.m. to 10 p.m.) per day plus ten times the number of nighttime events (10 p.m. to 7 a.m.) per day, and 49.4 is ten times the logarithm of the number of seconds per day. Based upon the above-described noise level data, number of operations and methods of calculation, the CNEL value for aviation events at the noise measurement site is 40 dB. Therefore, the predicted aviation exterior noise level on the project site will not exceed 45 dB CNEL.

Existing Ambient Noise Levels:

To quantify existing ambient noise levels in the vicinity of the project site, j.c. brennan & associates, Inc. staff conducted short-term noise level measurements at five locations on the project site, and continuous 24-hour noise level measurements at two locations. See Figure 1 for noise measurement locations. The noise level measurements were conducted during the weekdays in July 2007. The noise level measurements were conducted to determine typical background noise levels and for comparison to the project related noise levels. Table 3 shows a summary of the noise measurement results.

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the noise level measurement survey. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

Table 3 Existing Ambient Noise Monitoring Results									
			Average Measured Hourly Noise Levels, dBA						
				Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm - 7 am)		
Site	Location	Date	Ldn	Leq	L50	Lmax	Leq	L50	Lmax
Short-term Noise Measurement Sites									
1	Southwest Portion of Project Site	July 07, 2007	---	67.4	66.9	73.9			
2	Northwest Portion of Project Site	July 07, 2007	---	62.4	52.6	82.4			
3	Northeast Portion of Project Site	July 07, 2007	---	56.05	48.8	71.4			
4	Eastern Project Boundary	July 07, 2007	---	60.0	47.8	74.6			
5	Southeast Portion of Project Site	July 07, 2007	---	76.9	75.7	83.9			
Continuous 24-hour Noise Measurement Sites									
A	Northern Project Boundary	July 04, 2007	67.0	61.7	53.3	82.2	60.4	55.2	79.9
A	Northern Project Boundary	July 04, 2007	67.8	61.9	55.0	82.7	61.3	56.9	81.1
B	Under ALUC Transitional Surface	July 17, 2007	63.3	56.0	55.1	69.9	57.0	52.5	69.7
Source – j.c. brennan & associates, Inc. - 2007									

REGULATORY SETTING

City of Turlock General Plan Criteria:

For the purposes of evaluating noise impacts due to new projects, the criteria contained within the Noise Element of the General Plan are used. The City of Turlock General Plan establishes acceptable noise level criteria for both transportation and non-transportation noise sources.

Figure 2 shows the acceptable noise level criteria for land uses within the City of Turlock with respect to transportation noise sources. In addition, an interior noise level criterion of 45 dB Ldn is applied to new residential, transient lodging, school, library, church, hospital, and convalescent home uses.

For non-transportation noise sources, the City of Turlock establishes noise level performance standards, as they affect noise-sensitive land uses. Figure 3 provides the noise level performance criteria.

Figure 2
Land Use Compatibility Standards for Transportation Noise Sources

TABLE 9–2: ALLOWABLE NOISE EXPOSURE		
LAND USE	OUTDOOR ACTIVITY[1, 2] AREAS (CNEL)	INTERIOR SPACES (CNEL)[1]
Residential	60	45
Motels, Hotels	60	45
Hospitals, Nursing Homes, Schools, Libraries, Museums, Churches	60	45
Playgrounds, Parks, Recreation Uses	65	50
Commercial and Office Uses	65	50
Industrial Uses	70	65

Notes:

1 For non-residential uses, where an outdoor activity area is not proposed, the standard does not apply. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving use.

2 Where it is not possible to reduce noise in outdoor activity areas to the allowable maximum, levels up to 5 dB higher may be allowed provided that available exterior noise level reduction measures have been im-ple-mented and interior noise levels are in compliance with this table.

Source: California Office of Planning and Research, 2011

Figure 3
Noise Level Performance Standards for Non-Transportation Noise Sources

TABLE 9–3: NOISE LEVEL PERFORMANCE STANDARDS FOR NON-TRANSPORTATION SOURCES		
NOISE LEVEL DESCRIPTOR	DAYTIME (7 A.M. TO 10 P.M.)	NIGHTTIME (10 P.M. TO 7 A.M.)
Hourly L_{eq}, dB	55	45
Maximum Level, dB	75	65

Note:

Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting pri-marily of speech or music, or for recurring impulsive noises.

Determination of a Significant Increase in Noise Levels

Another means of determining a potential noise impact is to assess a person's reaction to changes in noise levels due to a project. Table 5 is commonly used to show expected public reaction to changes in environmental noise levels. This table was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

Table 5 Subjective Reaction to Changes in Noise Levels of Similar Sources		
Change in Level, dBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or half) as Loud	10.0
Source: Architectural Acoustics, M. David Egan, 1988.		

IMPACTS AND MITIGATION MEASURES

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

STANDARDS OF SIGNIFICANCE

CEQA guidelines state that implementation of the project would result in significant noise impacts if the project would result in either of the following:

a. Exposure of persons to or generation of noise levels in excess of standards established in the City of Turlock General Plan, as described earlier in this report.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. Specifically, a threshold of 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, typically defined as greater than 5 dB.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, typically defined as greater than 5 dB.

e. For a project located within an airport land use plan or, where such a plan has not be adopted, within two miles of a public airport or public use airport, where the project would expose people residing or working in the area to excessive noise levels.

f. For a project within the vicinity of a private airstrip, where the project would expose people residing or working in the project area to excessive noise levels.

For this project, the significance of anticipated noise effects are based on a comparison between predicted noise levels and noise criteria defined by the City. For this project, noise impacts on the project site are considered significant if the proposed noise sensitive land uses would be exposed to noise levels in excess of the City of Turlock Noise Element standards as described earlier in this report, or if the project results in a traffic noise level increase at existing residences consistent with Table 5 of this report. This project site is located within an airport land use plan and therefore aviation noise is potentially significant.

NOISE IMPACT ASSESSMENT METHODOLOGY

Traffic Noise Impact Assessment Methodology

To assess noise impacts due to project-related traffic increases on the existing local roadway network, traffic noise levels are predicted at a representative distance for both existing and cumulative without and with project conditions.

The FHWA traffic noise prediction model was used to predict existing plus project traffic noise levels at a representative distance of 100 feet from the roadway centerline. Table 6 shows the predicted traffic noise level increases on the local roadway network for existing plus project conditions. Table 7 shows the predicted traffic noise levels and potential traffic noise level increases on the local roadway network for the future with project and without project scenarios.

Table 6
Existing Plus Project Traffic Noise Levels and Distance to Contours

Roadway	Segment	Ldn @ 100 feet	Distance to Contours (feet)		
			70 dB L_{dn}	65 dB L_{dn}	60 dB L_{dn}
Lander Ave.(SR 165)	SR 99 S to Simmons Rd.	65 dB	50	107	231
Lander Ave.(SR 165)	East Linwood to SR 99 N	68 dB	70	152	327
Lander Ave.(SR 165)	North of Linwood Ave.	67 dB	60	129	278
Golden State Blvd.	North of Berkeley Ave.	64 dB	37	80	173
Golden State Blvd.	South of Berkeley Ave.	64 dB	37	81	174
Golf Rd.	Glenwood Ave. to E Linwood Ave.	63 dB	33	71	152
Golf Rd.	South of Glenwood Ave.	62 dB	28	60	130
E. Linwood Ave.	Lander Ave. to Golf Rd.	60 dB	21	45	98
Glenwood Ave.	Golf Rd. to Lander Ave.	63 dB	34	74	159
Eastside Parkway	On Project Site	57 dB	14	30	65
SR 99	SR 99 at the Project Site	79 dB	421	907	1955

Notes: Distances to traffic noise contours are measured in feet from the centerlines of the roadways.
Source: j.c. brennan & associates, Inc., 2013

Table 7 Cumulative Year 2030 Traffic Noise Levels and Distance to Contours					
		Ldn @ 100 feet	Distance to Contours (feet)		
Roadway	Segment		70 dB L_{dn}	65 dB L_{dn}	60 dB L_{dn}
Lander Ave.(SR 165)	SR 99 S to Simmons Rd.	67 dB	59	126	272
Lander Ave.(SR 165)	East Linwood to SR 99 N	68 dB	79	171	368
Lander Ave.(SR 165)	North of Linwood Ave.	66 dB	58	125	270
Golden State Blvd.	North of Berkeley Ave.	65 dB	45	97	209
Golden State Blvd.	South of Berkeley Ave.	64 dB	37	80	173
Golf Rd.	Glenwood Ave. to E Linwood Ave.	63 dB	37	79	171
Golf Rd.	South of Glenwood Ave.	63 dB	32	70	150
E. Linwood Ave.	Lander Ave. to Golf Rd.	62 dB	32	68	146
Glenwood Ave.	Golf Rd. to Lander Ave.	63 dB	35	75	161
Eastside Parkway	On Project Site	57 dB	14	31	67
SR 99	SR 99 at the Project Site	83 dB	710	1,529	3,294
Notes: Distances to traffic noise contours are measured in feet from the centerlines of the roadways. Source: j.c. brennan & associates, Inc., 2013					

Based upon comparing Tables 2 and 6, the proposed project will result in an increase in traffic noise levels of 5 dB along Golf Road. The project will not result in increases in traffic noise of 5 dB on other roadways.

Based upon Tables 6 and 7, proposed residential land uses on the project site will be exposed to traffic noise levels associated with S.R. 99, Glenwood Avenue and Golf Road in excess of the City of Turlock generally acceptable noise level standard of 60 dB Ldn. In addition, proposed residential land uses on the project site will be exposed to traffic noise levels associated with S.R. 99 in excess of the conditionally acceptable noise level standard of 65 dB Ldn.

Turlock Airpark Noise Impact Assessment Methodology

The assessment of noise impacts associated with the Turlock Airpark operations on the project site are based upon noise measurement data and operational information discussed earlier in this report. Based upon the noise measurement data and the operational information, no portion of the project site will be exposed to aircraft noise levels in excess of 60 dB Ldn. Therefore, no noise impacts associated with the Turlock Airpark are anticipated.

Future Noise-Producing Uses Developed Within the Project Area Noise Impact Assessment Methodology

There are a variety of noise sources associated with future development within the project area which have the potential to create noise levels in excess of the applicable noise standards or result in annoyance at existing and future noise-sensitive developments within the project area. Such uses include commercial and retail uses, and public service uses.

At this time specific uses are not known and detailed site and grading plans have not yet been developed. As a result, it is not feasible to identify specific noise impacts associated with each of the proposed uses. However, a general discussion and assessment of impacts can be conducted based upon the possible types of uses associated with these land use designations. The following is a discussion of the potentially significant noise sources associated with the various types of proposed uses:

Commercial Retail Land Uses

Commercial and Retail Land Use activities can produce noise which may affect adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components which may be annoying to individuals who live in the nearby vicinity. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day and existing ambient noise levels. The Morgan Ranch includes land uses which are designated community commercial (CC). The primary noise sources generally include medium and heavy duty truck deliveries, trash pickup, parking lot use, and heating, air conditioning and ventilation (HVAC) equipment.

To determine noise levels associated with trucks circulating on the project site combined with loading dock activities, j.c. brennan & associates, Inc. collected noise level data associated with the Natomas Center in Sacramento, California. The Natomas Center is a large commercial center similar in size to the proposed project. The loading dock and truck unloading area on the west side of the Natomas Center includes six large store loading docks for a Ross Dress for Less, Michael's, Wal-Mart, Pet's Mart, Staples, and a Home Depot.

The noise measurements were conducted during the busy morning hours between 7:00 a.m. and 10:00 a.m. During the noise measurement survey, the primary noise sources associated with the Natomas Center was loading dock activities, heavy and medium delivery trucks circulating on the site, trash compactors, palate jacks, trash pick-up activities and truck air brakes. In addition, the noise measurement data included aircraft over-flights and off-site traffic.

During the noise measurement periods, the measured hourly noise levels ranged between 54 dB and 60 dB L50 and between 79 dB and 85 dB Lmax, at a distance of approximately 40 feet from the center of the truck circulation service road. Based upon the site plan, the nearest residences facing the Heavy Commercial Zoning are located across Glenwood Avenue to the north. Based upon the noise measurement data, the predicted loading dock and truck circulation noise levels are expected to exceed the hourly noise level performance criteria. However, since site plans and specific uses have not been determined, the potential impacts cannot be determined.

HVAC equipment can be a primary noise source associated with commercial or retail uses. These types of equipment are often mounted on roof tops, located on the ground or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers or cooling towers.

Noise levels from these types of equipment can vary significantly. Noise levels from these types of sources generally range between 45 dB to 65 dB at a distance of 50 feet. However, numerous noise control strategies can be utilized to mitigate noise levels to less than significant levels.

Public Use Land Uses

Public Use land uses can include infrastructure such as water well pumps or lift stations, and schools. Noise levels for pumps and motors for public service infrastructure can vary significantly depending on size of the equipment, if the equipment is located inside of buildings or submersed below ground.

School and parks can be a source of noise and include children playing at neighborhood parks school playgrounds. Typical noise levels associated with groups of approximately 50 children playing at a distance of 50 feet generally range from 55 to 60 dB Leq, with maximum noise levels ranging from 70 to 75 dB. It is expected that the playground areas would be utilized during daytime hours. Therefore, noise levels from the playgrounds would need to comply with the City of Turlock 55 dB Leq and 75 dB Lmax exterior noise level standards at the nearest residential uses. Based upon the reference noise level data discussed above, the 55 dB Leq noise contour would be located approximately 100 feet from the center of playgrounds. The 75 dB Lmax contour would be located at approximately 50 feet from the edge of playgrounds. Given the proximity of most parks or elementary schools to residential uses, and the separation between the residential uses by streets, the potential for exceedence of the noise standards is not expected, unless the playgrounds or parks are located adjacent to residential uses.

Construction Noise Impact Assessment Methodology

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 8, ranging from 85 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours.

Noise would also be generated during the construction phase by increased truck traffic on area roadways and on-site grading. A significant project-generated noise source would include truck traffic associated with transport of heavy materials and equipment to and from construction sites and the movement of heavy construction equipment on the project site, especially during site grading. This noise increase would be of short duration, and would likely occur primarily during daytime hours.

Table 8
Construction Equipment Noise

Type of Equipment	Maximum Level, dB at 50 feet
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

Source: *Roadway Construction Noise Model User's Guide*. Federal Highway Administration. FHWA-HEP-05-054. January 2006.

Construction Vibration Impact Assessment Methodology

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 9, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second. Table 9 indicates that the threshold for damage to structures ranges from 2 to 6 in/sec. One-half this minimum threshold or 1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could occur is notes as 0.1 in/sec p.p.v.

Table 9
Effects of Vibration on People and Buildings

Peak Particle Velocity inches/second	Peak Particle Velocity mm/second	Human Reaction	Effect on Buildings
0-.006	0.15	Imperceptible by people	Vibrations unlikely to cause damage of any type
.006-.02	0.5	Range of Threshold of perception	Vibrations unlikely to cause damage of any type
.08	2.0	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected
0.1	2.54	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings
0.2	5.0	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
1.0	25.4		Architectural Damage
2.0	50.4		Structural Damage to Residential Buildings
6.0	151.0		Structural Damage to Commercial Buildings

Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans 1976.

Typical vibration levels associated with construction equipment are as follows, and shown in Table 10.

TABLE 10 VIBRATION LEVELS FOR VARYING CONSTRUCTION EQUIPMENT		
Type of Equipment	Peak Particle Velocity @ 25 feet	Approximate Velocity Level @ 25 feet
Large Bulldozer	0.089 (inches/second)	87 (VdB)
Loaded Trucks	0.076 (inches/second)	86 (VdB)
Small Bulldozer	0.003 (inches/second)	58 (VdB)
Auger/drill Rigs	0.089 (inches/second)	87 (VdB)
Jackhammer	0.035 (inches/second)	79 (VdB)
Vibratory Hammer	0.070 (inches/second)	85 (VdB)
Vibratory Compactor/roller	0.210 (inches/second)	94 (VdB)
Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Guidelines, May 2006		

Overview of Noise Mitigation Options

The following overview is provided since the site plan is in the specific plan stage, and may be of use during finalization of the project site plans.

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. The appropriate acoustical treatment for a given project should consider the nature of the noise source and the sensitivity of the receiver. The problem should be defined in terms of appropriate criteria (Ldn, Leq, or Lmax), the location of the sensitive receiver (inside or outside), and when the problem occurs (daytime or nighttime). Noise control techniques should then be selected to provide an acceptable noise environment for the receiving property while remaining consistent with local aesthetic standards and practical structural and economic limits. Fundamental noise control options include the following:

Use of Setbacks:

Noise exposure may be reduced by increasing the distance between the noise source and the receiving use. Setback areas can take the form of open space, frontage roads, recreational areas, storage yards, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally about 4 to 6 dB per doubling of distance from the source.

Use of Barriers:

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 3 lbs./square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line of sight to all significant noise sources. Earth, in the form of berms or the face of a depressed area, is also an effective barrier material.

There are practical limits to the noise reduction provided by barriers. For vehicle traffic or railroad noise, a 5 to 10 dB noise reduction may often be reasonably attained. A 15 dB noise reduction is sometimes possible, but a 20 dB noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall may provide up to 3 dB additional attenuation over that attained by a solid wall alone, due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons.

Site Design:

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise level caused by reflections. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise.

Site design should guard against the creation of reflecting surfaces which may increase onsite noise levels. For example, two buildings placed at an angle facing a noise source may cause noise levels within that angle to increase by up to 3 dB. The open end of "U"-shaped buildings should point away from noise sources for the same reason. Landscaping walls or noise barriers located within a development may inadvertently reflect noise back to a noise-sensitive area unless carefully located. Avoidance of these problems while attaining an aesthetic site design requires close coordination between local agencies, the project engineer and architect, and the noise consultant.

Noise Reduction by Building Facades:

When interior noise levels are of concern in a noisy environment, noise reduction may be obtained through acoustical design of building facades. Standard construction practices provide 10-15 dB noise reduction for building facades with open windows, and approximately 25 dB noise reduction when windows are closed. Thus a 25 dB exterior-to-interior noise reduction can be obtained by the requirement that building design include adequate ventilation systems, allowing windows on a noise-impacted facade to remain closed under any weather condition.

Where greater noise reduction is required, acoustical treatment of the building facade is necessary. Reduction of relative window area is the most effective control technique, followed by providing acoustical glazing (thicker glass or increased air space between panes) in low air infiltration rate frames, use of fixed (non-movable) acoustical glazing or the elimination of windows. Noise transmitted through walls can be reduced by increasing wall mass (using stucco or brick in lieu of wood siding), isolating wall members by the use of double or staggered stud walls, or mounting interior walls on resilient channels. Noise control for exterior doorways is provided by reducing door area, using solid-core doors, and by acoustically sealing door perimeters with suitable gaskets.
An additional measure to prevent sound from entering through attic vents would be to acoustically baffle all attic vents. The baffles should introduce at least one 90 degree obstruction to the flow of air through the vent. The baffle should be lined with an acoustically absorbent material such as, one-inch thick, 3 PCF fiberglass duct liner. Please see Appendix I for an example of an acoustical attic vent baffle.

Use of Vegetation:

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of traffic noise. Thus the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected. It should be noted, however, that trees planted on the top of a noise control berm can actually slightly degrade the acoustical performance of the barrier. This effect can occur when high frequency sounds are diffracted (bent) by foliage and directed downward over a barrier.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.

PROPOSED PROJECT SPECIFIC IMPACTS AND MITIGATION MEASURES

Impact 1: **Traffic Noise Level Increases Due to the Project at Existing Land Uses in the Project Area.** Existing residences located along major roadways in the vicinity of the project area will be exposed to elevated traffic noise levels under existing and cumulative buildout conditions. The project will increase traffic noise levels at existing residences along Golf Road of 5 dB Ldn. Pursuant to the project's Significance Criteria, a significant increase in traffic noise levels is defined as in 5 dB or higher. **Therefore, this impact is considered significant.**

Mitigation for Impact 1:

MM 1: The use of rubberized asphalt or open gap asphalt has been shown to reduce roadway noise levels between 4 and 5 dB. When Golf Road is scheduled to be resurfaced, the road resurfacing should include rubberized asphalt or open gap asphalt from 1st Street to Highway 99.

Significance after Mitigation: **Less than Significant**

Impact 2: **Exterior Traffic Noise Impacts at Future Noise-Sensitive Land Uses Developed Within the Project Area.** Proposed residential land uses located adjacent to Golf Road, Glenwood Avenue, and S.R. 99 will be exposed to traffic noise levels which exceed the City of Turlock exterior noise level standards. **Therefore, this impact is considered significant.**

Mitigation for Impact 2:

MM 2: Based upon the Proposed Project Site Plan, medium and high density residential uses will be located adjacent to Golf Road, Glenwood Avenue and S.R. 99. A sound wall 6-feet in height will be sufficient to reduce traffic noise levels at residential areas adjacent to Golf Road and Glenwood Avenue.

If the anticipated S.R. 99 traffic volumes in the Year 2030 (140,000 ADT), as reported in the Turlock General Plan occur, it may not be practical to achieve the exterior noise level standard of 60 dB Ldn. Barriers in excess of 18 feet may be required to achieve the noise level standard of 60 dB Ldn. As a means of complying with the conditionally acceptable standard of 65 dB Ldn, barrier heights would need to be approximately 12-feet in height, while assuming a setback of approximately 250 to 300 feet from the S.R. 99 centerline.

Since grading plans and tentative maps have not been completed for the project site, a more detailed analysis of required barrier heights would be required when those plans are available.

MM 3: High Density residential units may also apply the exterior noise level standard of 60 dB Ldn at a common outdoor area such as a club house. In this case, site design which locates the common outdoor areas away from the roads or shields the common outdoor areas with the building facades can also achieve the noise level standards.

Since grading plans and tentative maps have not been completed for the project site, a more detailed analysis of site design would be required when those plans are available.

Significance after Mitigation: Less than Significant

Impact 3: **Interior Traffic Noise Impacts at Future Noise-Sensitive Land Uses Developed Within the Project Area.** Typical construction practices result in an exterior to interior noise level reduction of 25 dB. The first row of residential uses adjacent to Golf Road and Glenwood Avenue are exposed to traffic noise levels of less than 70 dB Ldn. Therefore, they are not expected to be exposed to interior traffic noise levels in excess of 45 dB Ldn. However, residential uses located within the S.R. 99, 70 dB Ldn noise level contour could be exposed to interior noise levels in excess of 45 dB Ldn. **Therefore, this impact is considered potentially significant in need of mitigation.**

MM 4: An analysis of projected future interior traffic noise levels indicate that proposed residential uses with direct exposure to State Route 99 would require window assembly and/ or building façade upgrades at the second floor to comply with the City's 45 dB Ldn interior noise level standard. In order to achieve compliance with an interior noise level standard of 45 dB Ldn, residences located within 700 feet of the S.R. 99 centerline would require exterior-to-interior noise level reductions ranging from 30 dB to 35 dB. A 30 dB exterior to interior noise level reduction may be achieved through the use of STC 35 rated window assemblies for all second floor windows with a view of SR 99. A 35 dB exterior to interior noise level reduction may be achieved through the use of STC 40 to 42 rated window assemblies for all second floor windows with a view of SR 99. As an alternative to this requirement, a detailed analysis of interior noise levels can be conducted when building plans are available.

MM 5: In lieu of Mitigation Measure MM4, a portion of the site could limit residential uses to single-story units which receive shielding from the noise barriers. Therefore, residential uses located within 700 feet of the S.R. 99 centerline could be restricted to single story units, and residential units located beyond 700 feet from the S.R. 99 centerline could include two-story units and would not require upgraded STC rated windows.

Significance after Mitigation: **Less than Significant**.

Impact 4: **Impacts of Commercial Retail Noise Sources on Existing and Proposed Noise-Sensitive Uses in the Project Area.** As stated in the methodology section of this report, noise impacts associated with future uses developed within the commercial retail areas cannot practically be evaluated due to the wide range of variables which will affect such noise generation. Because the zoning of the commercial retail villages would allow for certain uses which could generate significant noise levels, the potential for off-site adverse noise impacts exists, even though it cannot practically be quantified at this time. **Therefore, this impact is considered potentially significant in need of mitigation.**

Mitigation for Impact 4:

MM 6: During project review, the Planning Director shall make a determination as to whether or not the proposed use would likely generate noise levels which could adversely affect the adjacent residential areas. If it is determined from this review that proposed uses could generate excessive noise levels at noise-sensitive uses, the applicant shall be required to prepare an acoustical analysis to ensure that all appropriate noise control measures are incorporated into the project design so as to mitigate any noise impacts. Such noise control measures include, but are not limited to, use of noise barriers, site-redesign, silencers, partial or complete enclosures of critical equipment, etc.

Significance after Mitigation: **Less than Significant**.

Impact 5: **Impact of Public Use Land Uses.** Noise from Public Use land uses could generate noise levels in excess of the City of Turlock standards. **Therefore, this impact is considered potentially significant.**

Mitigation for Impact 5:

MM 7: Active recreation areas such as neighborhood parks and school playgrounds should be located as far as possible from residential property lines. Park activities should be limited to the hours of 7:00 a.m. to 10:00 p.m. Noise analyses should be conducted for public works areas which contain noise sources which may exceed the City of Turlock noise level standards.

Significance after Mitigation: **Less than Significant**.

Impact 6: **Construction Noise.** Activities associated with construction will result in elevated noise levels, with maximum noise levels ranging from 85-90 dB at 100 feet, as shown in Table 8. Construction activities would be temporary in nature and would likely occur during normal daytime working hours. Nonetheless, because construction activities would result in periods of elevated noise levels, **this impact is considered potentially significant in need of mitigation.**

Mitigation for Impact 6:

MM 8: Construction activities should adhere to the requirements of the City of Turlock with respect to hours of operation. In addition, all equipment shall be fitted with factory equipped mufflers, and in good working order.

Significance after Mitigation: Less than Significant

Impact 7 Construction vibration at sensitive receptors

The primary construction activities associated with the project would occur when the infrastructure such as buildings and utilities are constructed. However, it is expected that they would occur at considerable distances from existing occupied residences and would be removed from future on-site uses. Comparing Table 9 which contains the criteria for acceptable vibration levels to Table 10, which shows potential vibration impacts, it is not expected that vibration impacts would occur which would cause any structural damage. **This impact is considered to be less than significant.**

Mitigation for Impact 7 None required

Appendix A

Acoustical Terminology

Acoustics The science of sound.

Ambient Noise The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.

Attenuation The reduction of an acoustic signal.

A-Weighting A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.

Decibel or dB Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.

CNEL Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.

Frequency The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.

Ldn Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

Leq Equivalent or energy-averaged sound level.

Lmax The highest root-mean-square (RMS) sound level measured over a given period of time.

L(n) The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one hour period.

Loudness A subjective term for the sensation of the magnitude of sound.

Noise Unwanted sound.

Peak Noise The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.

RT_{60} The time it takes reverberant sound to decay by 60 dB once the source has been removed.

Sabin The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.

Threshold of Hearing The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.

Threshold of Pain Approximately 120 dB above the threshold of hearing.

Impulsive Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.

Simple Tone Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2010-151
Description: Morgan Ranch Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	13,500	85		15	0.5	4	45	100	
2	Lander Ave (SR 165)	East Linwood to SR 99 N	16,360	85		15	0.5	4	45	100	
3	Lander Ave (SR 165)	North of Linwood Ave.	14,410	85		15	0.5	4	45	100	
4	Golden State Blvd	North of Berkeley Ave.	9,530	85		15	2	1	45	100	
5	Golden State Blvd	South of Berkeley Ave.	10,240	85		15	2	1	45	100	
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	3,780	85		15	2	1	45	100	
7	Golf Rd.	South of Glenwood Ave.	2,890	85		15	2	1	45	100	
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	5,180	85		15	2	1	45	100	
9	Glenwood Ave.	Golf Rd. to Lander Ave.	4,620	85		15	2	1	45	100	
10	S.R. 99	At Project Site	64,000	71		29	4	12	65	100	
11											
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25											

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consultants in acoustics

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2010-151
Description: Morgan Ranch Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	62.7	48.2	61.7	65
2	Lander Ave (SR 165)	East Linwood to SR 99 N	63.6	49.0	62.5	66
3	Lander Ave (SR 165)	North of Linwood Ave.	63.0	48.4	62.0	66
4	Golden State Blvd	North of Berkeley Ave.	61.3	52.7	54.2	63
5	Golden State Blvd	South of Berkeley Ave.	61.6	53.0	54.5	63
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	57.3	48.6	50.1	58
7	Golf Rd.	South of Glenwood Ave.	56.1	47.5	49.0	57
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	58.6	50.0	51.5	60
9	Glenwood Ave.	Golf Rd. to Lander Ave.	58.1	49.5	51.0	59
10	S.R. 99	At Project Site	75.4	68.3	76.5	79

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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2010-151
Description: Morgan Ranch Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	23	49	105	226	488
2	Lander Ave (SR 165)	East Linwood to SR 99 N	26	55	119	257	555
3	Lander Ave (SR 165)	North of Linwood Ave.	24	51	110	237	510
4	Golden State Blvd	North of Berkeley Ave.	15	32	68	147	317
5	Golden State Blvd	South of Berkeley Ave.	15	33	72	154	333
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	8	17	37	79	171
7	Golf Rd.	South of Glenwood Ave.	7	14	31	66	143
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	10	21	45	98	211
9	Glenwood Ave.	Golf Rd. to Lander Ave.	9	20	42	91	196
10	S.R. 99	At Project Site	195	421	907	1955	4212

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2010-151
Description: Morgan Ranch Existing Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	13,890	85		15	0.5	4	45	100	
2	Lander Ave (SR 165)	East Glenwood to SR 99 N	23,450	85		15	0.5	4	45	100	
3	Lander Ave (SR 165)	North of Linwood Ave.	18,360	85		15	0.5	4	45	100	
4	Golden State Blvd	North of Berkeley Ave.	12,190	85		15	2	1	45	100	
5	Golden State Blvd	South of Berkeley Ave.	12,210	85		15	2	1	45	100	
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	10,050	85		15	2	1	45	100	
7	Golf Rd.	South of Glenwood Ave.	7,930	85		15	2	1	45	100	
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	5,180	85		15	2	1	45	100	
9	Glenwood Ave.	Golf Rd. to Lander Ave.	10,750	85		15	2	1	45	100	
10	S.R. 99	At Project Site	64,000	71		29	4	12	65	100	
11	Eastside Parkway	At Project Site	5,640	85		15	2	0.5	35	100	
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2010-151
Description: Morgan Ranch Existing Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	62.8	48.3	61.8	65
2	Lander Ave (SR 165)	East Glenwood to SR 99 N	65.1	50.6	64.1	68
3	Lander Ave (SR 165)	North of Linwood Ave.	64.1	49.5	63.0	67
4	Golden State Blvd	North of Berkeley Ave.	62.3	53.7	55.2	64
5	Golden State Blvd	South of Berkeley Ave.	62.3	53.7	55.2	64
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	61.5	52.9	54.4	63
7	Golf Rd.	South of Glenwood Ave.	60.5	51.9	53.4	62
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	58.6	50.0	51.5	60
9	Glenwood Ave.	Golf Rd. to Lander Ave.	61.8	53.2	54.7	63
10	S.R. 99	At Project Site	75.4	68.3	76.5	79
11	Eastside Parkway	At Project Site	55.9	48.7	47.9	57

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2010-151
Description: Morgan Ranch Existing Plus Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	23	50	107	231	497
2	Lander Ave (SR 165)	East Glenwood to SR 99 N	33	70	152	327	705
3	Lander Ave (SR 165)	North of Linwood Ave.	28	60	129	278	599
4	Golden State Blvd	North of Berkeley Ave.	17	37	80	173	374
5	Golden State Blvd	South of Berkeley Ave.	17	37	81	174	374
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	15	33	71	152	328
7	Golf Rd.	South of Glenwood Ave.	13	28	60	130	280
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	10	21	45	98	211
9	Glenwood Ave.	Golf Rd. to Lander Ave.	16	34	74	159	343
10	S.R. 99	At Project Site	195	421	907	1955	4212
11	Eastside Parkway	At Project Site	6	14	30	65	140

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Data Input Sheet

Project #: 2010-151
Description: Morgan Ranch Fugure 2030
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	17,750	85		15	0.5	4	45	100	
2	Lander Ave (SR 165)	East Linwood to SR 99 N	28,000	85		15	0.5	4	45	100	
3	Lander Ave (SR 165)	North of Linwood Ave.	17,550	85		15	0.5	4	45	100	
4	Golden State Blvd	North of Berkeley Ave.	16,100	85		15	2	1	45	100	
5	Golden State Blvd	South of Berkeley Ave.	12,150	85		15	2	1	45	100	
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	11,900	85		15	2	1	45	100	
7	Golf Rd.	South of Glenwood Ave.	9,800	85		15	2	1	45	100	
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	9,450	85		15	2	1	45	100	
9	Glenwood Ave.	Golf Rd. to Lander Ave.	10,910	85		15	2	1	45	100	
10	S.R. 99	At Project Site	140,000	71		29	4	12	65	100	
11	Eastside Parkway	At Project Site	5,900	85		15	2	0.5	35	100	
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FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2010-151
Description: Morgan Ranch Fugure 2030
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	63.9	49.3	62.9	67
2	Lander Ave (SR 165)	East Linwood to SR 99 N	65.9	51.3	64.9	68
3	Lander Ave (SR 165)	North of Linwood Ave.	63.9	49.3	62.8	66
4	Golden State Blvd	North of Berkeley Ave.	63.5	54.9	56.4	65
5	Golden State Blvd	South of Berkeley Ave.	62.3	53.7	55.2	64
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	62.2	53.6	55.1	63
7	Golf Rd.	South of Glenwood Ave.	61.4	52.8	54.3	63
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	61.2	52.6	54.1	62
9	Glenwood Ave.	Golf Rd. to Lander Ave.	61.9	53.3	54.7	63
10	S.R. 99	At Project Site	78.8	71.7	79.9	83
11	Eastside Parkway	At Project Site	56.1	48.9	48.1	57

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2010-151
Description: Morgan Ranch Fugure 2030
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Lander Ave (SR 165)	SR 99 to Simmons Rd	27	59	126	272	586
2	Lander Ave (SR 165)	East Linwood to SR 99 N	37	79	171	368	793
3	Lander Ave (SR 165)	North of Linwood Ave.	27	58	125	270	581
4	Golden State Blvd	North of Berkeley Ave.	21	45	97	209	450
5	Golden State Blvd	South of Berkeley Ave.	17	37	80	173	373
6	Golf Rd.	Glenwood Ave. to E Linwood Ave	17	37	79	171	368
7	Golf Rd.	South of Glenwood Ave.	15	32	70	150	323
8	E. Linwood Ave.	Lander Ave. to Golf Rd.	15	32	68	146	315
9	Glenwood Ave.	Golf Rd. to Lander Ave.	16	35	75	161	347
10	S.R. 99	At Project Site	329	710	1529	3294	7097
11	Eastside Parkway	At Project Site	7	14	31	67	144

Appendix C

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2007-058
Description: Yr 2030 GP + Project
Roadway Name: SR 99
Location(s): 5

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 71
Medium Truck L_{dn}, dB: 64
Heavy Truck L_{dn}, dB: 72

Site Geometry:

Receiver Description: 200 foot open space setback
Centerline to Barrier Distance (C_1): 325
Barrier to Receiver Distance (C_2): 25
Automobile Elevation: 100
Medium Truck Elevation: 102
Heavy Truck Elevation: 110
Pad/Ground Elevation at Receiver: 100
Receiver Elevation[1]: 105
Base of Barrier Elevation: 100
Starting Barrier Height 10

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
		-------------------- L_{dn}, dB --------------------				Barrier Breaks Line of Sight to…		
110	10	62	55	64	**66**	Yes	Yes	Yes
111	11	61	54	63	**65**	Yes	Yes	Yes
112	12	60	53	62	**64**	Yes	Yes	Yes
113	13	60	53	61	**64**	Yes	Yes	Yes
114	14	59	52	60	**63**	Yes	Yes	Yes
115	15	58	51	60	**62**	Yes	Yes	Yes
116	16	57	51	59	**62**	Yes	Yes	Yes
117	17	57	50	58	**61**	Yes	Yes	Yes
118	18	57	50	58	**61**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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APPENDIX H

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WATER SUPPLY ASSESSMENT
FOR THE
MORGAN RANCH MASTER PLAN PROJECT

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January 2014

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LIST OF TABLES AND FIGURES

INTRODUCTION

The proposed project consists of the adoption and implementation of the Morgan Ranch Master Plan (Master Plan). The City of Turlock proposes to use the Master Plan to direct the development of new growth within the City of Turlock. The Master Plan provides land use locations, development standards, circulation patterns, and infrastructure plans to direct future development within the Morgan Ranch Master Plan Area. The Master Plan area consists of approximately 170 acres.

The City of Turlock has determined that a water supply assessment is required under the provisions of Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221), which became effective January 1, 2002. The proposed project is subject to CEQA, and is a "project," defined in Water Code Section 10912, and therefore a water supply assessment is required. Since the City is the water supplier to areas within its city limits, the City is responsible for preparing the water supply assessment.

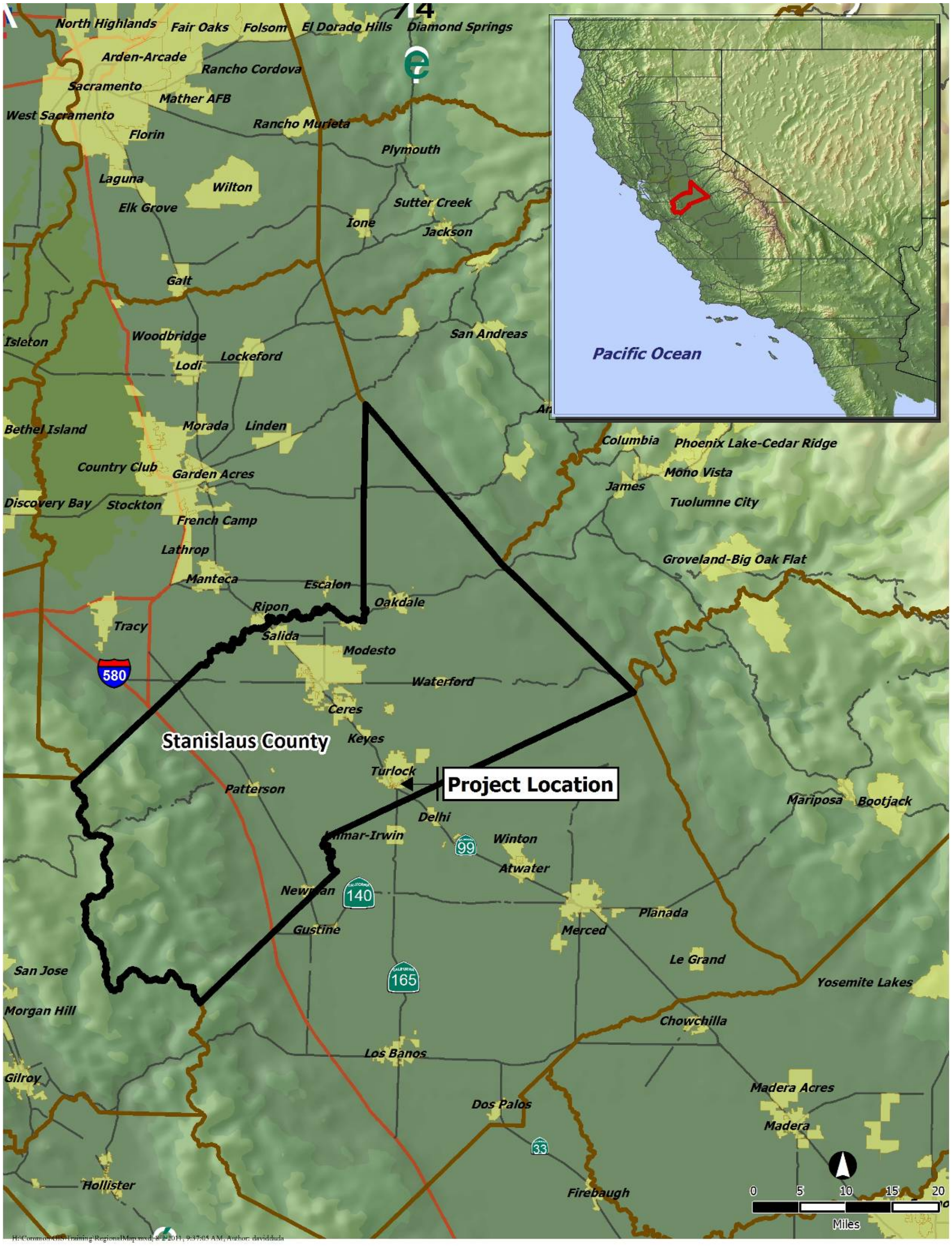
The City has also determined that the provisions of SB 221 apply because the proposed project involves a "subdivision" as defined in Government Code Section 66473.7(a)(1) and does not qualify for an exemption (Government Code Section 66473.7(i)). Therefore, the City is required to provide written verification of a sufficient water supply. This water supply assessment will constitute that written verification. This assessment draws upon the following sources of information:

- City of Turlock Consumer Confidence Report 2010;
- City of Turlock Urban Water Management Plan 2011;
- City of Turlock Water Master Plan Update, May 2009;
- DWR Bulletin 118, San Joaquin Valley Groundwater Basin, Turlock Subbasin; and
- Turlock Groundwater Basin Association, Turlock Groundwater Basin Draft Groundwater Management Plan, January 2008.

PROJECT DESCRIPTION

The proposed project is located in the City of Turlock in Stanislaus County, California (Figure 1). The project site is in the vicinity of the Lander Avenue/State Route 99 (SR 99) interchange and bounded by Lander Ave. on the west, Glenwood Ave. on the north, Golf Road on the east, and SR 99 on the south (Figure 2).

The project site is identified by the Stanislaus County Assessor's office with the Assessor's Parcel Numbers (APNs) shown in Table 1.



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REGIONAL MAP

Figure 1

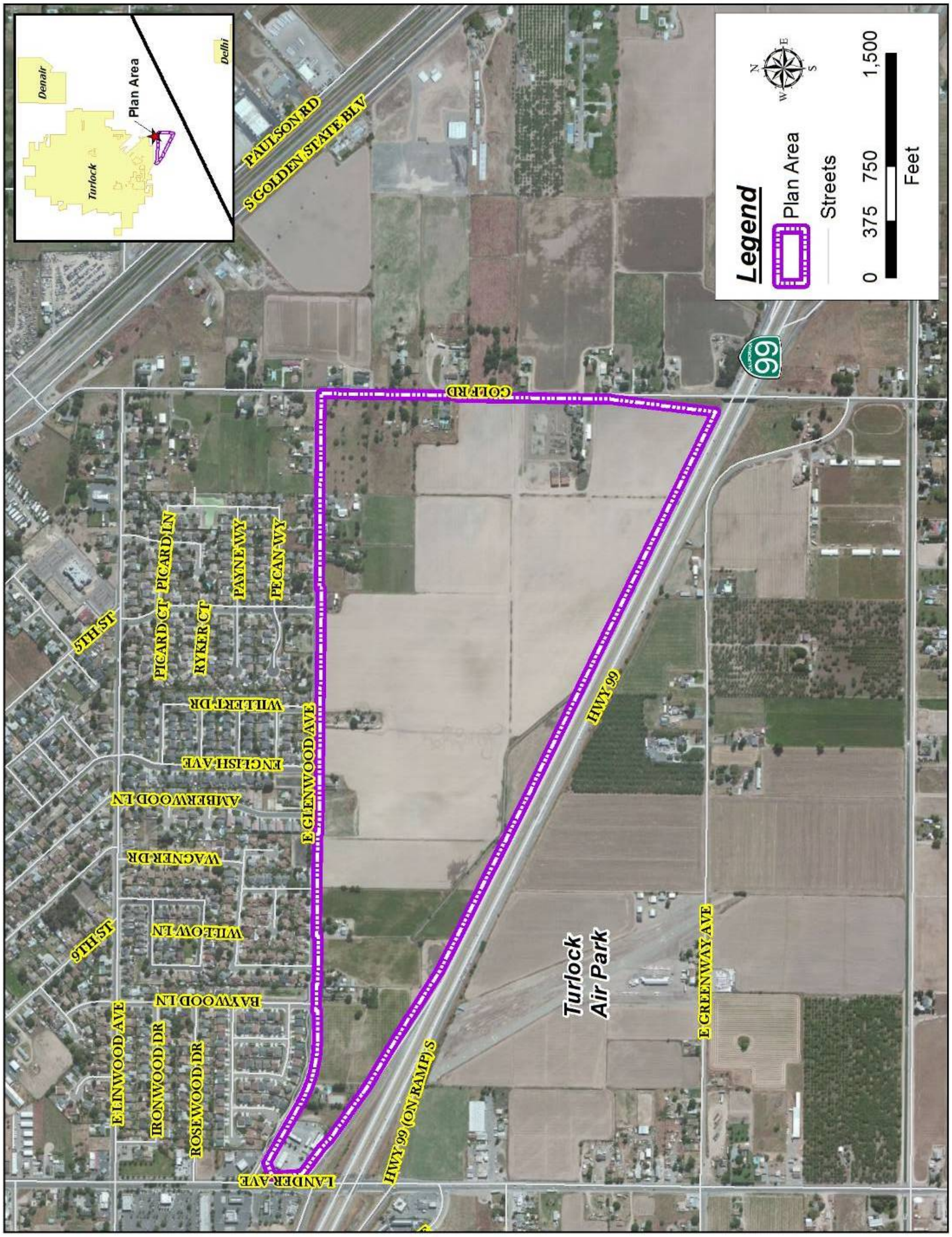

Figure 2

LOCAL VICINITY MAP – AERIAL BASE

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Table 1
Assessor Parcel Numbers (APNs)

044-023-005	044-023-037	044-025-010	044-028-014
044-023-006	044-023-038	044-025-016	044-065-001
044-023-018	044-025-003	044-025-017	044-065-002
044-023-031	044-025-006	044-028-007	044-065-003
044-023-032	044-025-007	044-028-010	044-065-004
044-023-035	044-025-008	044-028-013	044-065-005

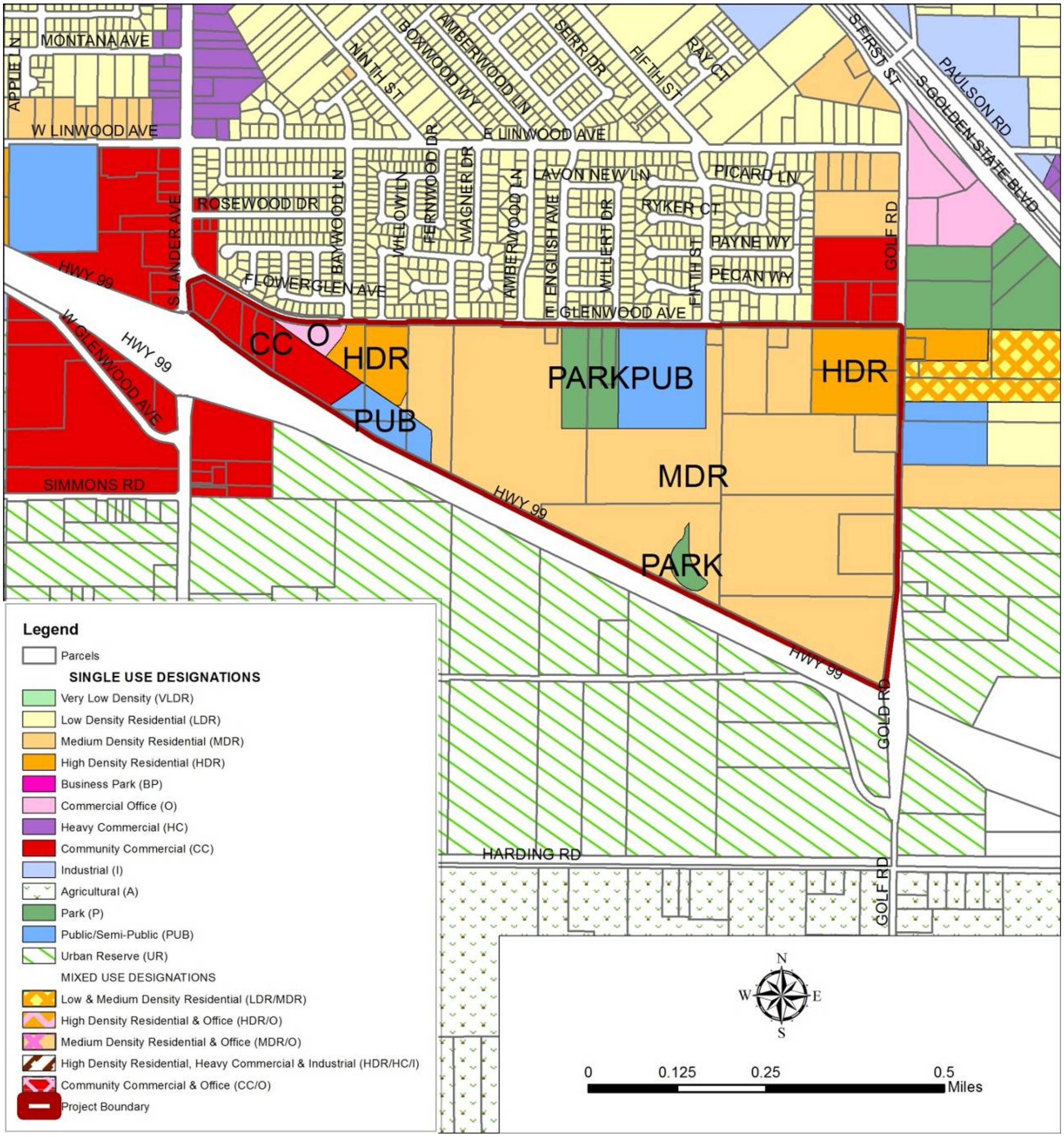
The proposed project consists of the adoption and implementation of the Morgan Ranch Master Plan. The Morgan Ranch Master Plan would modify the General Plan designations and zoning for approximately 170 acres. The Master Plan would designate the land uses for Community Commercial (CC), Office (O), High Density Residential (HDR), Medium Density Residential (MDR), Park (P), and Public/Semi-Public (PUB) (Figure 3). The Master Plan would zone the land uses for Community Commercial (CC), Commercial Office (CO), High Density Residential (RH), Medium Density Residential (RM), and Public/Semi-Public (PS) (Figure 4). Table 2 provides a summary of the proposed land uses.

Table 2
Land Use Summary

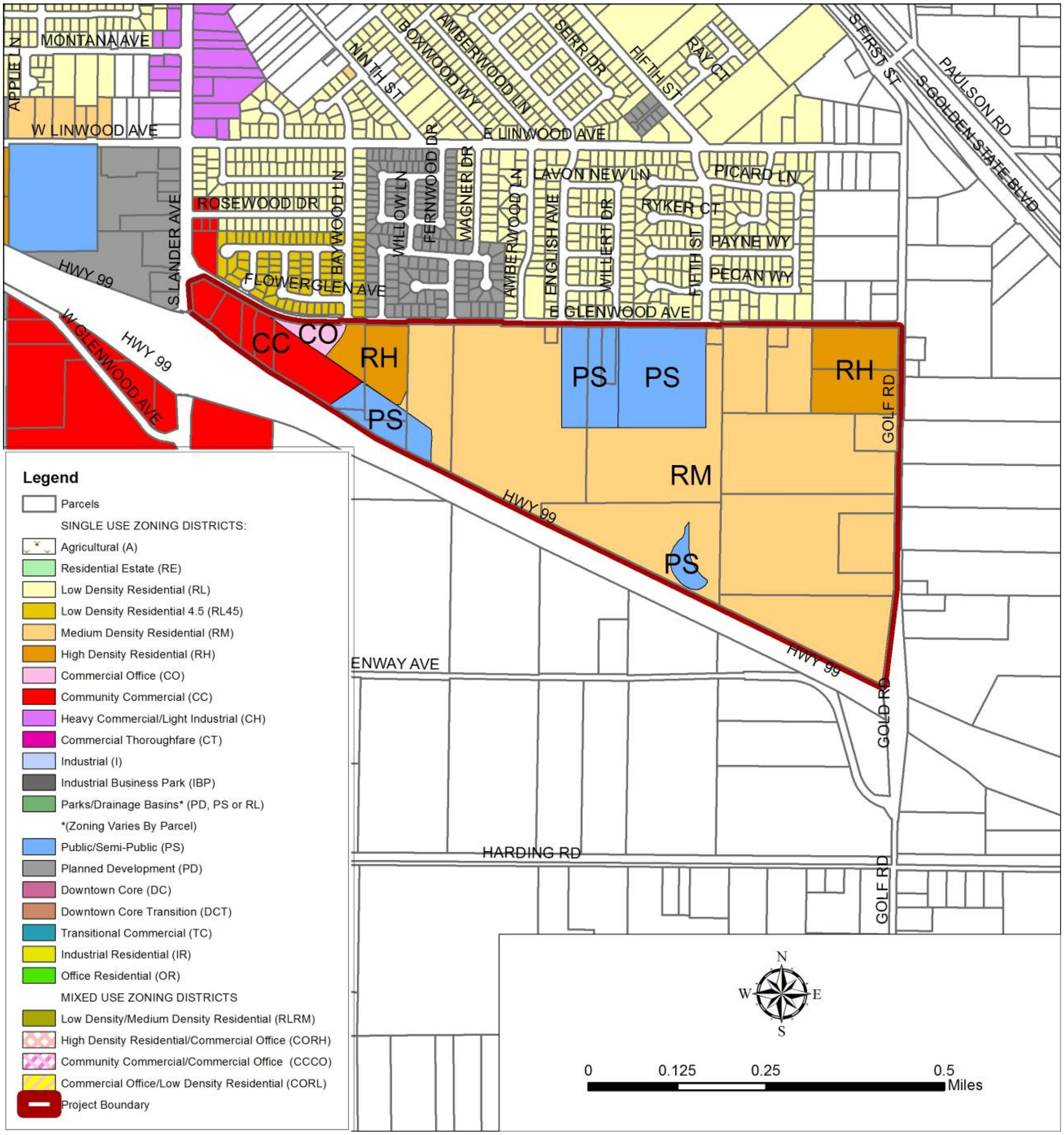
Land Use Designation	Approximate Acreage	Number of Units	Density	Allowed Density
Medium Density Residential	120.2	1,322 DU	11 DU/acre	7–15 DU/acre
High Density Residential	15.0	338 DU	22.5 DU/acre	15-30 DU/acre
Community Commercial	8.9	96.9 KSF	25% FAR	25%-35% FAR
Office	1.5	16.3 KSF	25% FAR	25%-35% FAR
Park	8.7	-	-	-
Detention Basin	4.4	-	-	-
Public (School)	11.1	300 students	-	-

Source: City of Turlock, Morgan Ranch Master Plan, 2012
Notes: DU = dwelling units, KSF = 1,000 square feet, FAR = Floor Area Ratio

The Master Plan provides development standards and design guidelines to ensure consistency in the quality and character of the project area neighborhoods as the Plan is implemented. It is the intent of the Master Plan to facilitate development by providing a framework to ensure that, over time, the built environment of the project area will be cohesive and consistent with the overall vision of the City. The Master Plan will be used as a tool in the review and approval process of precise development proposals such as tentative subdivision maps, site plans, and improvement plans as they are proposed for the project area. Responsibility for interpretation of these development standards and design guidelines will reside with the City of Turlock and be administered by the Turlock Planning Division.



Quad Knopf	PROPOSED GENERAL PLAN LAND USE DESIGNATIONS	Figure 3



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PROPOSED ZONING DESIGNATIONS

Figure 4

WATER DEMAND FROM PROPOSED PROJECT

Table 3 provides an estimate of the total water demand for the project based on Appendix C Hydrology and Utilities Supporting Data Tables prepared for the City of Turlock General Plan Draft EIR.

Table 3
Proposed Project – Water Demand

Land Use	Dwelling Units/SF	Acres	Demand Factor ac-ft/yr/acre	Water Demand (ac-ft/year)
Medium Density Residential	1,322	120.2	3.98	478
High Density Residential	338	15	11.76	176
Community Commercial	96, 921 sf	8.9	1.9	17
Office	16,335 sf	1.5	1.9	3
Park	--	8.7	3.29	29
Detention Basin	--	4.4	3.29	14
Public (School)	300 students	11.1	1.9	21
Total				**739**

Notes: SF = square feet, ac-ft/year = acre-feet per year
Source: City of Turlock General Plan Draft EIR, 2012

Based on the demand factors used in the General Plan Draft EIR, the proposed project would demand 739 acre-feet per year (659,737 gallons per day or 458 gallons per minute). According to the General Plan Draft EIR, the Morgan Ranch Master Plan area, identified as SE1 in the General Plan would have an annual demand of 737 acre-feet per year, essentially equivalent to this Water Supply Assessment. The estimated annual consumption using the General Plan demand factors is the equivalent of 3.4 percent of the current 21,771 acre-feet per year the City produced from its groundwater supply.

SERVICE AREA AND SUPPLIES

According to the 2011 UWMP, the City of Turlock produced 21,771 acre-feet in 2010 from its 24 deep groundwater wells. The water is obtained from the aquifer below a protective clay layer that separates the City's water source from the lower quality water above. These wells draw water from a deep aquifer, and have casing depths ranging from about 200 to 580 feet. These wells have capacities of 650 to 2,800 gallons per minute (gpm). The City also has two storage tanks, each with a storage capacity of one million gallons. The City's water is distributed through over 250 miles of water pipelines ranging in size from 6 to 16 inches in diameter. The City currently has plans for expansion of the distribution system for the growth of the City both with and without the Regional Surface Water Supply Project (RSWSP).

The major potable water infrastructure includes the water supply from the RSWSP, a water storage reservoir, a booster pump station, transmission mains, connections to the existing water distribution system, one new well in the northeast Master Plan Area (MPA), and three new wells in the southeast MPAs (includes the proposed Morgan Ranch Master Plan area).

Urban Water Management Plan

In 1983, the California Legislature enacted the Urban Water Management Planning Act (Water Code Sections 10610 - 10656). The Act states that every urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 acre-feet of water annually, should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The Act describes the contents of the Urban Water Management Plans as well as how urban water suppliers should adopt and implement the plans.

The City of Turlock prepared the most recent update of its Urban Water Management Plan during 2011 (see Appendix A). The updated plan was adopted by the City Council in July 2011 and was submitted to the California Department of Water Resources.

The City is evaluating wellhead treatment at two wells for the treatment of arsenic at an initial cost of $1 million per well – this would allow the two wells to be taken off stand-by mode and returned to full operation. According to the City's Water Master Plan, additional wells and reservoirs are necessary in the future, but no new wells or additional facilities are being actively planned at this time.

In 2006, the Turlock Regional Water Quality Control Facility (RWQCF) was upgraded to tertiary treatment, producing recycled water for beneficial reuse as the recycled water from the RWQCF complies with Title 22 standards. Currently, two million gallon per day (MGD) of recycled water is supplied to the TID for cooling purposes at the Walnut Energy Center. Approximately 20 million gallons of recycled water per year is used for irrigation purposes at Pedretti Baseball Park. The City does use a number of non-potable wells for irrigation purposes only in a number of City parks, sports facilities and other landscaped areas. In 2010, 188.3 million gallons of non-potable water were used to irrigate public green spaces. This small volume is accounted for in Table 4.

Table 4
City of Turlock Water Supplies – Current and Projected

Water Supply Sources		2010	2015	2020	2025	2030	2035 (Optional)
Water Purchased From:	Wholesaler supplied volume (yes/no)						
Wholesaler: Turlock Irrigation District	yes	0	0	5,475	5,475	5,475	5,475
Supplier-produced groundwater		7,094	8,784	4,066	5,320	6,652	8,246
Supplier-produced surface water		0	0	0	0	0	0
Transfers In		0	0	0	0	0	0
Exchanges In		0	0	0	0	0	0
Recycled Water		368	400	400	400	400	400
Total		**7,462**	**9,184**	**9,941**	**11,195**	**12,527**	**14,121**

Notes: Units: million gallons per year; The Turlock Irrigation District will provide surface water to the Cities of Ceres, Hughson, Modesto, and Turlock through the Turlock Regional Surface Water Supply Project.
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Current and projected water supplies are summarized above in Table 4. To meet the future water demands, the cities of Turlock, Modesto, and Ceres have been evaluating a Regional Surface Water Supply Project (RSWSP) that will produce potable water from the Tuolumne River. The RSWSP has formally created a Joint Powers Authority (JPA), the Stanislaus Regional Water Authority (SRWA). The SRWA will pursue funding for various phases of the project. Extensive planning work has been performed for the RSWSP, but some additional work is still needed to update some aspects of the environmental review of the RSWSP. By being a member of the JPASRWA, Turlock continues to be committed to the project. The SRWA is negotiating an agreement with TID for the provision of raw water for the project. The RSWSP would initially provide the City with up to 16,800 acre-feet per year (15 mgd) of potable water, but could ultimately provide up to 22,400 acre-feet per year (20 mgd). The RSWSP facilities would include a surface water treatment plant and water transmission mains. The total cost of the RSWSP is estimated to be in the range of $145-154 million. The City of Turlock's share of this cost is estimated to be about $81-86 million.

The City would also have to construct a water storage reservoir (an enclosed water tank), a booster pump station and water transmission mains within the City at a cost of about $20 15 million. This potential surface water supply would provide over half of the City's future water needs.
Table 5 shows a breakdown of projected water use by type of land use. Single-family homes are the largest consumers, accounting for 58 percent of total water usage in 2010. The industrial sector was the next largest consumer at 15.3 percent. Multi-family usage accounted for 9.6 percent of total water consumption in 2010.

Table 5
Current and Projected Water Use by Land Use Type (MGD)

Water Use Sector	2010	2015	2020	2025	2030	2035 (Optional)
Single-Family Residential	4,115.9	5,097	5,536	6,263	7,036	7,961
Multi-Family Residential	686.5	850	923	1,045	1,174	1,328
Commercial	585.2	725	787	890	1,000	1,132
Industrial	1,091.9	1,352	1,469	1,662	1,867	2,112
Institutional/Governmental)	41.8	52	56	64	71	81
Landscape (includes municipal)	572.6	709	770	871	979	1,107
Agriculture	0.0	0.0	0	0	0	0
Other	0.0	0.0	0	0	0	0
Total	7,093.9	8,784	9,541	10,795	12,127	13,721

Units: million gallons per year
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

GROUNDWATER SUPPLY

Water Code Section 10910 requires additional specific information if the water sources that will serve the proposed project includes groundwater. Amendments to the Urban Water Management

Planning Act (Water Code Section 10631), effective January 1, 2002, specify the required information. The 2010 water supply assessment provides the required information as it relates to the City domestic water system and the proposed project.

Required Information on Groundwater

GROUNDWATER MANAGEMENT PLAN

The Turlock Groundwater Basin Association (TGBA) was established in 1995 as a formal group for coordinating groundwater management activities in the Turlock Subbasin. The TGBA developed the first basin-wide Groundwater Management Plan in 1997. Although the founding Memorandum of Understanding expired upon completion of the Groundwater Management Plan, TGBA members continued to meet and discuss basin wide planning activities. In 2001 the TGBA was formally reestablished to provide a mechanism to implement groundwater management activities and provide guidance for the management, preservation, protection, and enhancement of the Turlock Subbasin.

In 2008, the TGBA prepared an updated Plan to reflect the changes to the Groundwater Management Act (California Water Code Section 10750 et seq.) resulting from the enactment of Senate Bill 1938 in 2002. The Plan was adopted by the Turlock City Council on February 26, 2008.

DESCRIPTION OF THE GROUNDWATER BASIN

The California Department of Water Resources Bulletin 118 describes the Turlock Subbasin (Appendix B). The basin lies between the Tuolumne and Merced Rivers and is bounded on the west by the San Joaquin River and on the east by crystalline basement rock of the Sierra Nevada foothills (Figure 5). The northern, western, and southern boundaries are shared with the Modesto, Delta-Mendota, and Merced Groundwater Subbasins, respectively. The subbasin includes lands in the Turlock Irrigation District, the Ballico-Cortez Water District, the Eastside Water District, and a small portion of the Merced Irrigation District. Average annual precipitation is typically 11 to 13 inches, increasing to 15 inches in the Sierra foothills.

ADJUDICATION

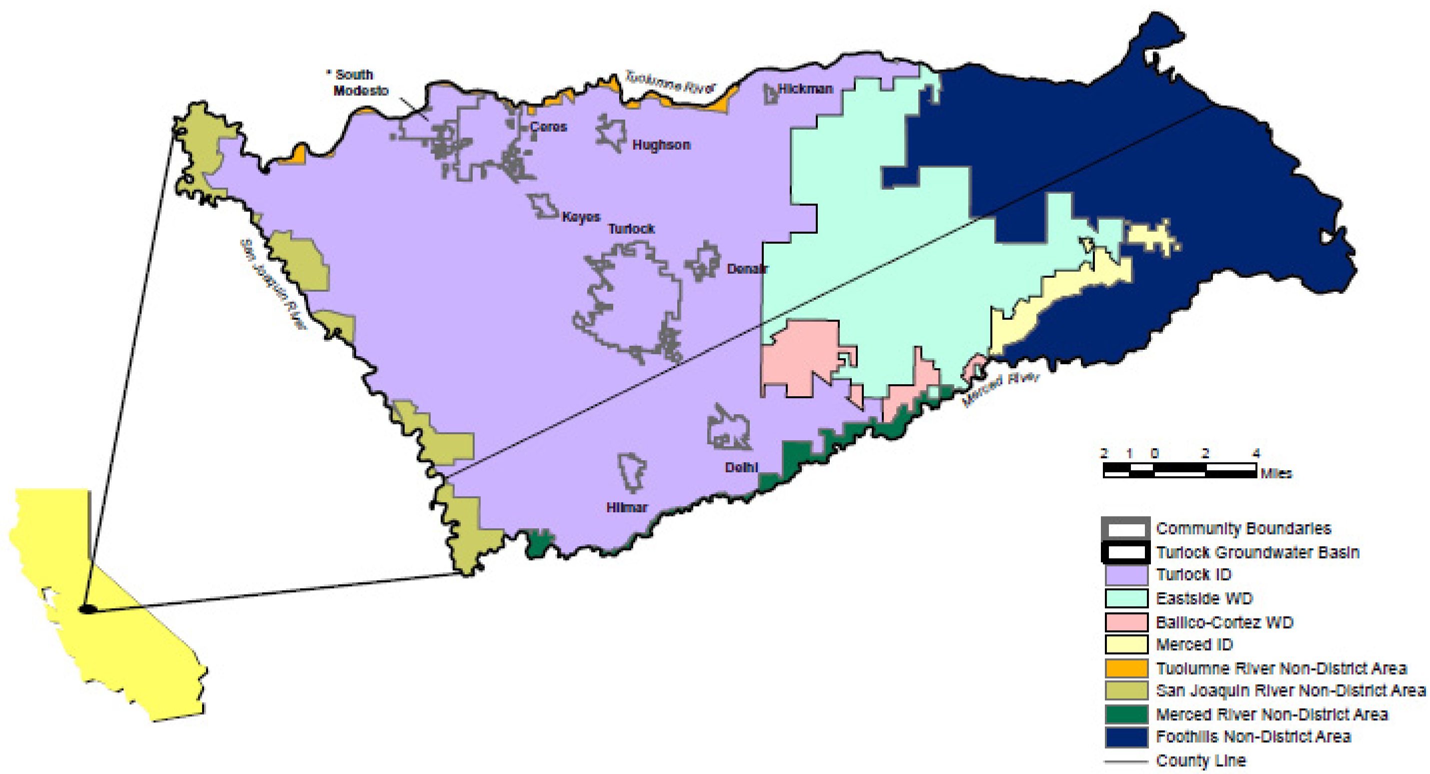
The groundwater basin is not adjudicated.

GROUNDWATER OVERDRAFT

Groundwater overdraft is defined as the condition of a groundwater basin or subbasin in which, over a period of years, the amount of water withdrawn by pumping exceeds groundwater replenishment during approximate average water supply conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts.

A water balance study of the Turlock Subbasin was prepared in 2003 and updated in 2007 to estimate the inflows and outflows from the Subbasin between 1952 and 2006. Outflows from the Subbasin result from municipal, domestic, and agricultural supply and drainage well pumping, discharge to the local rivers, discharges from subsurface agricultural drains, and consumption by riparian vegetation. The estimated average total outflow for the 1997-2006 period is 541,000 acre-feet/year. The majority of outflow comes from estimated agricultural, municipal and rural residential, and drainage well pumping, which collectively averaged 457,000 acre-feet/year for the 1997-2006 period.

Inflows to the Subbasin result primarily from deep percolation of agricultural and landscape irrigation water and infiltration of precipitation. The estimated average total inflow for the 1997-2006 period is 519,000 acre-feet/year. Approximately 72 percent of this quantity occurs on 245,000 irrigated acres of cropland within the Subbasin.



* South Modesto represents the City of Modesto Service Area South of the Tuolumne River

Quad Knopf

TURLOCK GROUNDWATER BASIN LOCATION AND BOUNDARIES

Figure 5

Most of the inflows and outflows can be estimated for the Turlock Basin. The net discharge to rivers is an unknown outflow and must be derived through a mass balance calculation of the known inflows, outflows, and storage change in the Basin. Storage change is calculated from the groundwater contour maps derived from local monitoring data, and confirmed using the groundwater model.

The contour maps used in the water budget study indicate that estimated groundwater storage decreased by approximately 21,500 acre-feet/year between 1997 and 2006. Recent reductions in the California Department of Water Resources (DWR) monitoring network have introduced uncertainty in the measurement of groundwater levels. Uncertainty in the estimated groundwater elevation translates into uncertainty in storage estimates. Therefore, the magnitude and direction of changes in groundwater storage cannot be fully characterized through an analysis based solely on the groundwater contours. The Turlock Subbasin groundwater model was used to supplement this analysis and confirm that groundwater storage has decreased slightly in recent years, particularly between 2002 and 2006.

The estimated reduction in storage between 2002 and 2006 suggests that the Subbasin may no longer be in the equilibrium state that existed in the 1990s. Increases in land use types that rely on groundwater for supply have increased the net discharge from the Subbasin. Slight decreases in storage are likely to continue if urban or irrigated land uses are developed in areas dependent upon groundwater.

The effect of the depletion is the creation of a cone of depression centered over the Eastside Water District, whose western boundary is approximately four (4) miles east of Turlock city limits. Currently, the City's ability to pump groundwater may be impaired by this depression, particularly in the long-term. Therefore, the City continues to monitor the situation and participates in regional efforts to manage groundwater supplies.

PROGRAMS TO ELIMINATE GROUNDWATER OVERDRAFT

The City of Turlock is a member of the Turlock Groundwater Basin Association and supports the association's programs for protecting the quality and quantity of water in the basin. The City itself has few, if any options for groundwater recharge, which are being pursued by other members of the association, such as Eastside Water District. However, the City is considering a plan to add surface water to its well system, which would reduce its reliance on groundwater storage capacity and potentially reduce the impact on the declining groundwater levels to the east.

In 1991, a Memorandum of Understanding (MOU) regarding urban water conservation in California formed the California Urban Water Conservation Council (CUWCC). Council members can submit their most recent Best Management Practices (BMP) reports with their Urban Water Management Plans to address the urban water conservation issues in the UWMPA. In August 2009, the City of Turlock became a member of the California Urban Water Conservation Council (CUWCC) and in May 2011 submitted its 2009-2010 BMP annual report to the Council.

The development of shallow groundwater wells could also be used to supply some landscape irrigation needs. Currently, the City is recycling nuisance (over-watering runoff) water for use in watering park turf areas. Water conservation programs include educational programs and participation by the City in the Turlock Groundwater Basin Association and the California Urban Water Conservation Council.

The City completed water meter installation on all accounts in 2010 and commenced meter-based billing for water accounts on January 1, 2011. The City Council chose to go beyond the mandate of AB 2572 (2004), the State Law that mandates meter-based water bills, and required meter-based billing at all accounts, not just for buildings constructed after 1991. In conjunction with a thorough public education campaign, the move to meter-based billing has had a significant impact on water consumption. It appears that the installation of meters has already modified customer behavior and may be largely responsible for the 17 percent reduction in per capita water use since 2007.

CURRENT GROUNDWATER EXTRACTIONS

The City of Turlock pumped a total of 21,771 acre acre-feet in 2010 from its domestic groundwater service area. This water was pumped from 24 deep groundwater wells.

SUFFICIENCY OF SUPPLY

The City expects to be able to meet water demand through groundwater extraction through 2020 by adding wells to extract the available water and infrastructure to deliver the water to the new facilities as the demand increases with buildout of the General Plan. In 2020, the City is planning to supplement its groundwater supply with a surface water supply from the RSWSP. Table 6 shows the City's historic groundwater volume pumped. Table 7 shows the City's projections for groundwater volume pumped.

Table 6
Groundwater – Volume Pumped

Basin Name	2006	2007	2008	2009	2010
Turlock Subbasin	8,254	8,359	8,128	7,726	7,094
Total Groundwater Pumped	8,254	8,359	8,128	7,726	7,094
Groundwater as a percent of total water supply	100	100	100	100	100

Units: million gallons per year
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Table 7
Groundwater – Volume Projected to be Pumped

Basin Name	2015	2020	2025	2030	2035 (Optional)
Turlock Subbasin	8,784	4,066	5,320	6,652	8,246
Total Groundwater Pumped	8,784	4,066	5,320	6,652	8,246
Total Water Supplied	9,184	9,941	11,195	12,527	14,121
Groundwater as a percent of total water supply	95.64	40.90	47.52	53.10	58.40

Units: million gallons per year

Note: Considerable reduction in groundwater demand beginning in 2020 is due to significant projected increase in surface and recycled water use in accordance with the City's 2010 Urban Water Management Plan
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

DRY YEAR SUPPLY ANALYSIS

Water Code section 10631(c) requires a description of the reliability of the water supply and the vulnerability of the water supply to seasonal or climatic shortage, to the extent practicable, as well as data for 1) an average water year, 2) a single dry water year, and 3) multiple dry water years. Water Code section 10632(b) requires an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

Supply Context

Currently, the City of Turlock's entire water supply is drawn from the portion of the Turlock Groundwater Subbasin beneath its city limits. In addition to Turlock, eight other cities, four irrigation districts, and rural residences pumped an average of 541,000 acre-feet of water during the 1997 to 2006 time period. Turlock's share of that total, based on its current pumping rate of 21,771 acre-feet is approximately four percent.

The Turlock Groundwater Basin is managed jointly by these irrigation districts and cities as a conjunctive system in which use of surface and groundwater supplies are coordinated to optimize resource use and minimize adverse effects of using a single source. During normal and wet years, the groundwater basin is recharged with run-off from precipitation, run-off from irrigation of crops using surface water, and groundwater recharge programs that apply surface water to percolation areas. In dryer years and during periods of drought, farmers rely more on groundwater pumping to make up for cutbacks in surface water supplies.

Dry-Year Conditions

During drought years, water use patterns will typically change. Outdoor water use will typically increase as irrigation is used as a replacement for decreased rainfall. To determine the impact of drought years on the City's annual demands, the City's historical per capita water usage was evaluated.

The normal year water demands through 2030 are estimated based on the historical daily use criteria and populations projections for the Turlock General Plan Update. The actual demand projections for 2015, 2020, 2025, and 2030 are included in Table 7. The projected normal water year demands are provided in Table 8 in acre-feet per year, not MG.

Table 9 shows water supply and demands during a single dry year over the planning period. The single dry year was based on 1991 water supply and demand conditions. As documented by DWR, 1991 was the fifth year of five-year drought.

Table 8
Supply and Demand Comparison – Normal Year (acre-feet/year)

	2015	2020	2025	2030	2035 (Optional)
Groundwater Supply	26,959	12,479	16,328	20,416	25,308
Surface Water Supply	0	16,803	16,803	16,803	16,803
Recycled Water Supply	1,228	1,228	1,228	1,228	1,228
Supply Totals	28,187	30,510	34,359	38,447	43,339
Demand Totals	28,187	30,510	34,359	38,447	43,339
Difference	0	0	0	0	0

Units are in acre-feet per year
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Table 9
Supply and Demand – Single Dry Year

	2015	2020	2025	2030	2035 (Optional)
Groundwater Supply	26,959	12,479	16,328	20,416	25,308
Surface Water Supply	0	16,803	16,803	16,803	16,803
Recycled Water Supply	1,228	1,228	1,228	1,228	1,228
Supply Totals	28,187	30,510	34,359	38,447	43,339
Demand Totals	28,187	30,510	34,359	38,447	43,339
Difference	0	0	0	0	0

Units are in acre-feet per year
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Table 10 shows water supply and demands during multiple dry year events over the planning period. The City assumes, conservatively, that surface water supplies from the TID will be reduced by 25 percent during the second and third dry years. To offset reduced surface water supplies and to meet water demands during this period, the City will increase groundwater production. It is anticipated that groundwater levels will increase significantly in the years 2020 through 2035 as surface water is added to the City's water supply portfolio and groundwater pumping is reduced. Using its water supplies conjunctively, this "banked" groundwater could be used to offset the reduction in surface water supply.

Rather than addressing a theoretical shortage, the City will respond to any problem of dropping water levels in the wells by lowering the elevation of pumps within their well casings to maintain current pumping rates. If there are multiple well failures for any reason, the Emergency Water Shortage Plan will take effect with mandatory restrictions until full water supplies can be restored.

Table 10
Supply and Demand Comparison – Multiple Dry Year Events

		2015	2020	2025	2030	2035 (Optional)
Multiple Dry Year First Year Supply	Groundwater Supply	26,959	12,479	16,328	20,416	25,308
	Surface Water Supply	0	16,803	16,803	16,803	16,803
	Recycled Water Supply	1,228	1,228	1,228	1,228	1,228
	Supply Totals	28,187	30,510	34,359	38,447	43,339
	Demand Totals	28,187	30,510	34,359	38,447	43,339
	Difference	0	0	0	0	0
Multiple Dry Year Second Year Supply (assumes 25 percent reduction in surface water supply)	Groundwater Supply	26,959	16,680	20,528	24,616	29,509
	Surface Water Supply	0	12,602	12,602	12,602	12,602
	Recycled Water Supply	1,228	1,228	1,228	1,228	1,228
	Supply Totals	28,187	30,510	34,359	38,447	43,339
	Demand Totals	28,187	30,510	34,359	38,447	43,339
	Difference	0	0	0	0	0
Multiple Dry Year Third Year Supply (assumes 25 percent reduction in surface water supply)	Groundwater Supply	26,959	16,680	20,528	24,616	29,509
	Surface Water Supply	0	12,602	12,602	12,602	12,602
	Recycled Water Supply	1,228	1,228	1,228	1,228	1,228
	Supply Totals	28,187	30,510	34,359	38,447	43,339
	Demand Totals	28,187	30,510	34,359	38,447	43,339
	Difference	0	0	0	0	0

Units are in acre-feet per year
Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Water Shortage Contingency Planning

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses a catastrophic interruption of water supplies. The City has a Water System Emergency Response Plan, which prepares for an interruption in the drinking water supply and potential consequences to water system integrity and public health. This plan was prepared in June 2004 and updated in January 2008. Further, Turlock Municipal Code (Section 6-7-401) contains an "Emergency Water Shortage Plan" which is implemented in response to water shortages, including those precipitated by a catastrophic interruption.

The City's use of groundwater as its primary water source creates redundancy to limit dependence of a geographic area on a single water supply source (i.e. areas are served by multiple groundwater wells). The City maintains redundant power supplies at a number of its well sites through the use of emergency power generators. Emergency actions are implemented by the Municipal Services Department.

In 1991, the City adopted a "Water Conservation and Education Ordinance" that included a program of mandatory prohibitions related to water conservation. The City adopted this ordinance in response to the water shortage emergency associated with the drought of 1987 through 1991. This ordinance constitutes the City's water shortage contingency plan. Recognizing that water is a diminishing resource, the City has elected to remain in State 1 "Mandatory Compliance" since the ordinance was first adopted. There are several prohibitions that go into effect during water shortages. As any water shortage becomes more severe, the penalties and prohibitions increase.

Table 11 shows the various rationing stages based on the severity of the water supply shortage.

Table 11
Water Shortage Contingency – Rationing Stages to Address Water Supply Shortage

Stage Number	Water Supply Conditions	Percent Shortage
1	Year Round Mandatory Conservation	0
2	Water Pressure < 35 psig during peak hours	10
3	Water Pressure < 30 psig during peak hours	20
4	Well failure(s) that result in an ability to meet peak demand and/or provide adequate reserve for fire fighting	30
5	Major disaster severely limiting water production	50

Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Table 12 shows the mandatory prohibitions during various stages of a declared Water Emergency.

Table 12
Water Shortage Contingency – Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Using a water hose for outside cleaning	All
Watering when raining	All
Using potable water for once through cooling systems	All
Allowing leaks to go unrepaired	All
Excessive watering	All
Washing vehicles during restricted hours	All
Odd/even landscape watering 3 days/week	1
Reduced hours for landscape watering but still 3 days/week	2
Individual schedules required for large landscapes	2
Landscape watering limited to 2 days/week	3
Landscape watering limited to 1 day/week	4
New or recently drained pools not allowed to be filled	4
Construction water from hydrants banned	4
Discontinue use of decorative ponds and fountains	4
Private vehicle washing prohibited. Commercial facilities ok.	4
All landscape watering banned	5
Commercial and industrial users will be required to curtail production	5

Source: City of Turlock, 2010 Urban Water Management Plan, 2011

During a water shortage, the City has the right to implement various consumption reduction methods; these are summarized in Table 13.

Table 13
Water Shortage Contingency – Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (Percentage)
Odd/even landscape watering 3 days/week	1	5
Reduced hours for landscape watering but still 3 days/week	2	5
Individual schedules required for large landscapes	2	5
Landscape watering limited to 2 days/week	3	15
Landscape watering limited to 1 day/week	4	20
New or recently drained pools not allowed to be filled	4	1
Construction water from hydrants banned	4	2
Discontinue use of decorative ponds and fountains	4	2
Private vehicle washing prohibited. Commercial facilities ok.	4	5
All landscape watering banned	5	40
Commercial and industrial users will be required to curtail production	5	10

Source: City of Turlock, 2010 Urban Water Management Plan, 2011

Finally, during a water shortage, the City has the right to assess various penalties and charges for violating water shortage restrictions or prohibitions; these are summarized in Table 14.

Table 14
Water Shortage Contingency Analysis – Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Penalty for Excess Use	All
$25 for 1st violation	All
$50 for 2nd violation	All
$100 for 3rd violation	All
$259 for 4th and any subsequent violations within a 12-month period	All
Discontinue service for failure to comply	All

Source: City of Turlock, 2010 Urban Water Management Plan, 2011

CONCLUSION

The population increase as a result of the Morgan Ranch Master Plan implementation is within the planned population growth for the City, which anticipates a population of 126,800 at build-out. This population increase is accounted for in the supply and demand projections shown in Table 8, 9, and 10 for a normal year, single-dry year, and multiple-dry year, respectively. The City expects to be able to meet water demand through groundwater extraction through 2020 by adding wells to extract the available water and infrastructure to deliver the water to the new facilities as the demand increases with buildout of the General Plan. By 2020, the City plans to supplement its groundwater with surface water from the RSWSP. Buildout of the General Plan without the RSWP will result in the depletion of the groundwater supply and a lowering of the local groundwater table level.

The Draft EIR for the General Plan includes mitigation measures to ensure that the RSWSP and other water supplies will be implemented before the time that groundwater exceeds 24,550 acre-feet per year (estimated to be the year 2017). Because availability of water supplies is not completely assured, the City found the impact of General Plan buildout to be a significant impact on water supplies.

The following are the findings of the water supply assessment for the Morgan Ranch Master Plan project:

- The projected water demand of the proposed project was accounted for in the City of Turlock 2010 Urban Water Management Plan;
- The projected water demand for the proposed project is approximately 739 acre-feet per year;
- Groundwater may not be available in sufficient supply to meet the project and other planned future water demands. However, the City is planning for the option of supplementing groundwater with recycled and surface water supplies;
- If the City is able to augment its water supply through the RSWSP, the groundwater supply will be sufficient in a normal-year, single-dry-year, and multiple-dry-year scenarios; and
- If the City is able to augment its water supply through the RSWSP, the proposed project will have no impact on the overall water balance in the Turlock Subbasin.

REFERENCES

City of Turlock Water Master Plan Update, June 2003

City of Turlock Annual Water Report 2006

City of Turlock Urban Water Management Plan 2010

City of Turlock General Plan Draft EIR, June 2012

DWR Bulletin 118, San Joaquin Valley Groundwater Basin, Turlock Subbasin

Turlock Groundwater Basin Water Budget (1952-2002), Turlock Groundwater Basin Association, December 2003

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APPENDIX I

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Morgan Ranch Master Plan Traffic Impact Analysis Report

Prepared for:

City of Turlock

Prepared by:

Morgan Ranch Master Plan Traffic Impact Analysis Report

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APPENDIX

Introduction

This report has been prepared for the City of Turlock to present the results of a Transportation Impact Analysis Report (TIAR) performed by OMNI-MEANS in support of the Environmental Impact Report (EIR) for the proposed Morgan Ranch project. The term “project”, as used in this report, refers to the proposed Morgan Ranch development. The project is a 170 acre residential, public school, and commercial development located near the southern border of the City, east of State Route 99. Figure 1 illustrates the Project Location and Vicinity Map.

Included in this report is a description of the existing transportation setting, the current AM and PM peak hour traffic operations at key intersections identified by Caltrans and the City of Turlock, and the proposed project trip generation and trip distribution. Also included in this report is an analysis and discussion of the following items:

- Project impacts on existing AM and PM peak hour intersection and daily roadway segment operations.
- The projected *Cumulative* peak hour intersection and daily roadway segment operations with current General Plan (GP) land uses and at the project site.
- Project-related improvements needed to mitigate project impacts at the study intersections and roadway segments, under conditions without and with the development of the proposed project.

Analysis Time Periods

The AM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 7:00 AM and 9:00 AM on a typical weekday. The PM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 4:00 PM and 6:00 PM on a typical weekday. These time periods generally correspond with peak commute hours. For the roadway segments, the daily traffic counts obtained over a continuous 24-hour period (and recorded at 15-minute intervals) on a typical weekday were reported as the average daily traffic (ADT).

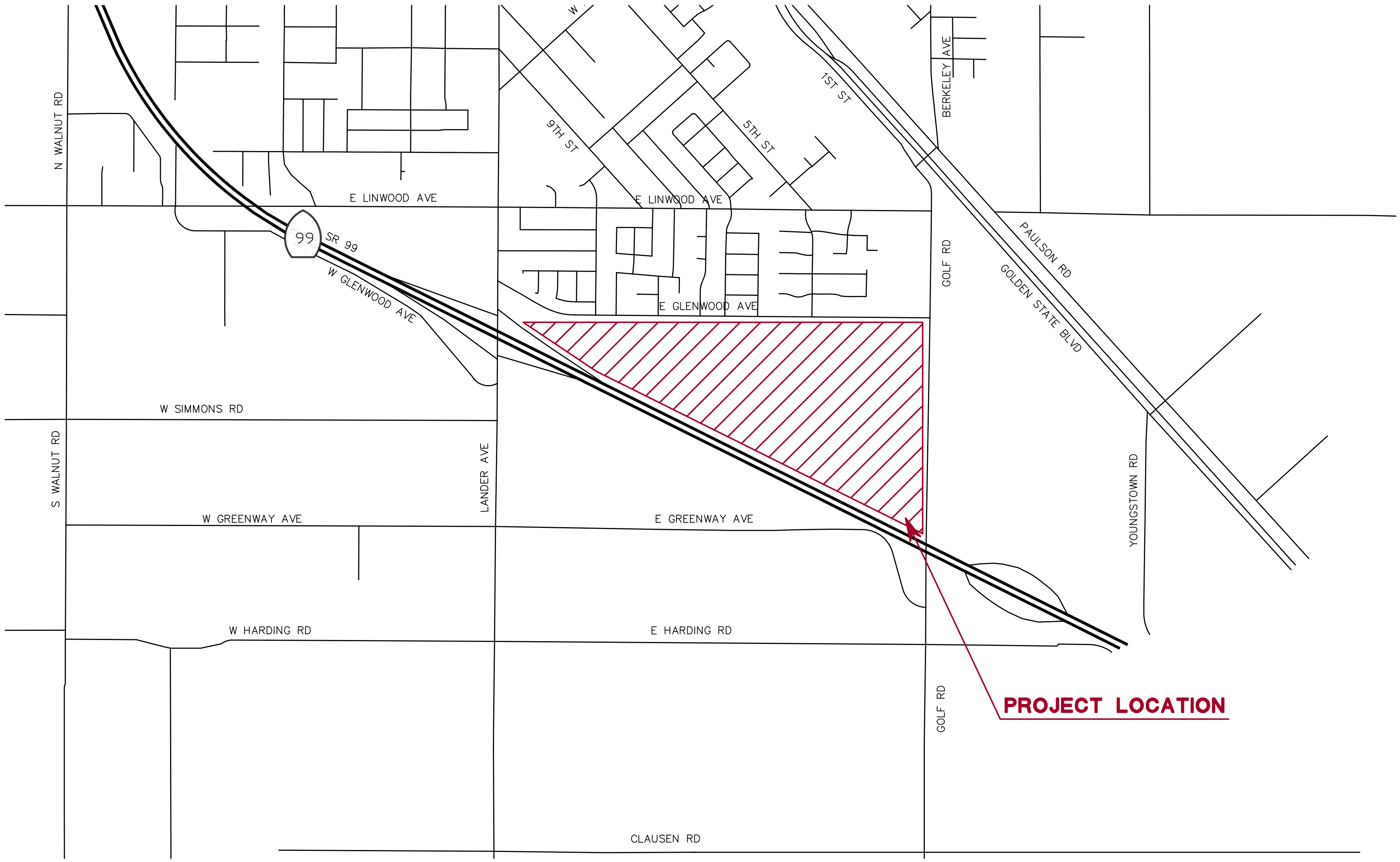
Analysis Scenarios

The following traffic scenarios are analyzed as a part of this report:

- *Existing* Conditions
- *Existing Plus Project* Conditions
- *Cumulative GP Build-Out* Conditions

The *Existing* conditions analysis investigates the traffic operations that currently exist within the study area. *Existing Plus Project* adds the project-generated trips to the existing traffic volume counts to simulate a near term traffic scenario with the project.

Cumulative traffic volumes are forecasted using the City model and assumes full build-out of the City’s recently adopted 2030 General Plan, including the areas contained in adopted specific plans outside the City Limits. Improvements in the City Capital Improvement Program are assumed as part of the 2030 street network. The *Cumulative* condition simulates the future traffic scenario with the project-generated trips associated with full development of Morgan Ranch.



City of Turlock - Morgan Ranch Master Plan

Figure 1

Project Location and Vicinity Map

Job No: 25-7328-43

Existing Conditions

Existing Transportation System

The City of Turlock is located in southern Stanislaus County, California. The City is located along State Route 99, approximately 15 miles south of the City of Modesto and approximately 25 miles north of the City of Merced. State Route 99 (SR 99) is the primary north-south State highway providing access to the City as a whole, as well as connecting the City with other parts of the Central Valley and the State. The City of Turlock falls under the jurisdiction of Caltrans District 10. According to California 2010 census data, the population of the City of Turlock is 68,549.

The following roadways provide primary circulation within the vicinity of the Morgan Ranch project.

State Route 99 (SR 99) is a major state freeway facility that traverses in the north-south direction through Central and Northern California. SR 99 serves as the principal inter regional auto and truck travel route that connects the Central Valley population centers, including the Cities of Stockton, Modesto, Merced and Fresno within the Sacramento urban area to the north and the Los Angeles/Bakersfield urban basin to the south. SR 99 provides the primary connection between the cities of Modesto and Turlock within Stanislaus County. SR 99 serves as a major commuter route providing vital north-south circulation within the City of Turlock. SR 99 has a general six-lane divided freeway type cross-section with posted speed limits of 65 mph within Turlock City limits. SR 99 forms full-access interchange with SR 165/Lander Avenue immediately west of the Morgan Ranch project area.

State Route 165 (SR 165)-Lander Avenue (within Turlock city limits) is a state highway facility that traverses north-south through Merced and Stanislaus Counties. SR 165 intersects with Interstate 5 (I-5), about 10 miles south of the town of Los Banos at its southern terminal. SR 165 intersects with SR 99 in Turlock at its northern terminal. SR 165 becomes Lander Avenue north of the SR 165-SR 99 interchange; a major four-lane divided arterial traversing north-south through central Turlock. Lander Avenue is the primary north south access to the western portion of the project site.

Golden State Boulevard, also referred to as the “Old Highway 99”, is a four- to six-lane divided expressway/arterial facility that runs parallel to both SR 99 and a major north-south Union Pacific Railroad (UPRR) mainline. Golden State Boulevard represents a major arterial route within the City and connects to SR 99 at both ends. In the project area, Golden State Boulevard represents an important link from its southern interchange at SR 99 to the majority of the City of Turlock to the north.

Linwood Avenue is a principal east-west collector that currently serves the southern portion of the City. This roadway has a general two-lane cross-section and provides a connection between areas east of SR 99 in the southern portion of the City to areas west of SR 99.

East Glenwood Avenue is a two lane collector traversing in the east-west direction and represents the primary access road and northern boundary to the proposed development property. East Glenwood Avenue connects to Lander Avenue to the west and Golf Road to the west.

Golf Road is a two-lane north-south collector located adjacently east to the project site and provides the primary access to and from the eastern portion of the project site. To the north, Golf Road becomes First Street, which intersects with ***Berkeley Avenue***, a principal northwest-southeast arterial that provides access into central Turlock.

Existing Traffic Volumes

Existing AM and PM peak hour traffic volume counts (turning movements) were conducted by OMNI-MEANS in March 2007 at the following study intersections and roadway segments. Typically, traffic counts older than 3 years are not considered current for the purposes of traffic impact study baseline conditions. However, statewide traffic levels have come to a plateau and in some cases decreased since that time. A memorandum, which summarized “spot” 2012 traffic counts at selected locations, dated March 28, 2012 by OMNI-MEANS confirms that 2012 traffic volumes were generally lower than 2007 traffic volumes in the study area. From this assessment, 2007 counts were used at the earlier key intersections to provide a reasonably conservative estimate of baseline conditions for the traffic study. This technical memo is attached in the appendix.

The AM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 7:00 AM and 9:00 AM on a typical weekday. The PM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 4:00 PM and 6:00 PM on a typical weekday. For the roadway segments, the daily traffic counts obtained over a continuous 24-hour period (and recorded at 15-minute intervals) on a typical weekday were reported as the average daily traffic (ADT).

Intersections

The following critical study intersections were established for this study in coordination with Caltrans and City of Turlock staff, and are analyzed within this study for weekday AM and PM peak hour conditions:

- SR 99 SB Ramps/Lander Avenue
- SR 99 NB Ramps/Lander Avenue
- Lander Avenue/East Glenwood Avenue
- Lander Avenue/Linwood Avenue
- East Glenwood Avenue/Golf Road
- East Linwood Avenue/Golf Road
- Berkeley Road/First Street
- Berkeley Road/Golden State Boulevard
- Morgan Ranch Arterial./Golf Road (Analyzed under Build-Out conditions)
- Morgan Ranch Arterial./East Glenwood Avenue (Analyzed under Build-Out conditions)

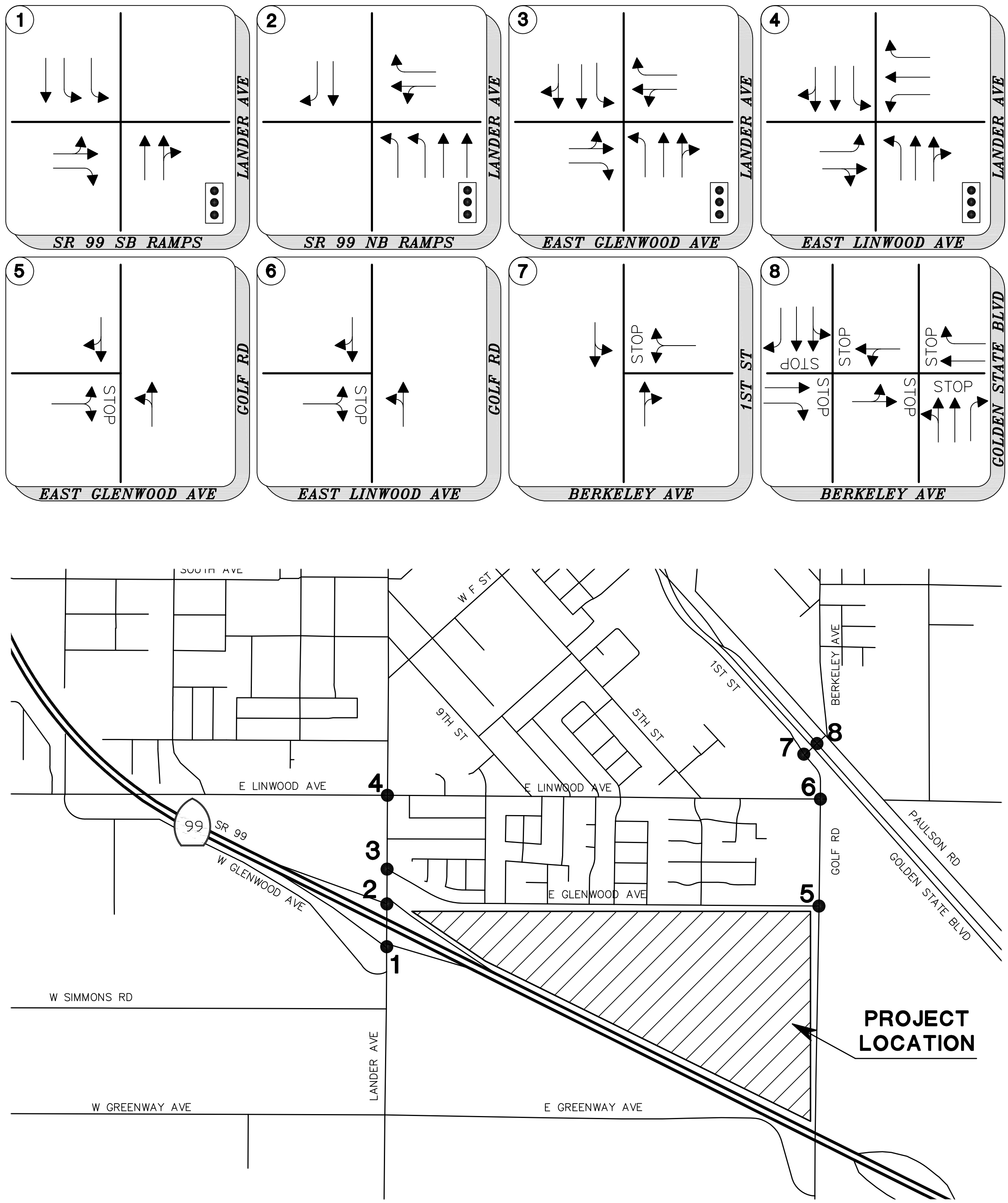
Roadway Segments

The following roadway segments have been analyzed on a daily volume to capacity ratio basis in coordination with Caltrans and City of Turlock staff:

- Lander Avenue, from SR 99 SB Ramps to East Glenwood Avenue
- Lander Avenue, from East Glenwood Avenue to Linwood Avenue
- East Glenwood Avenue, east of Lander Avenue
- Golf Road, from East Glenwood Avenue to Linwood Avenue

- Golf Road, south of East Glenwood Avenue

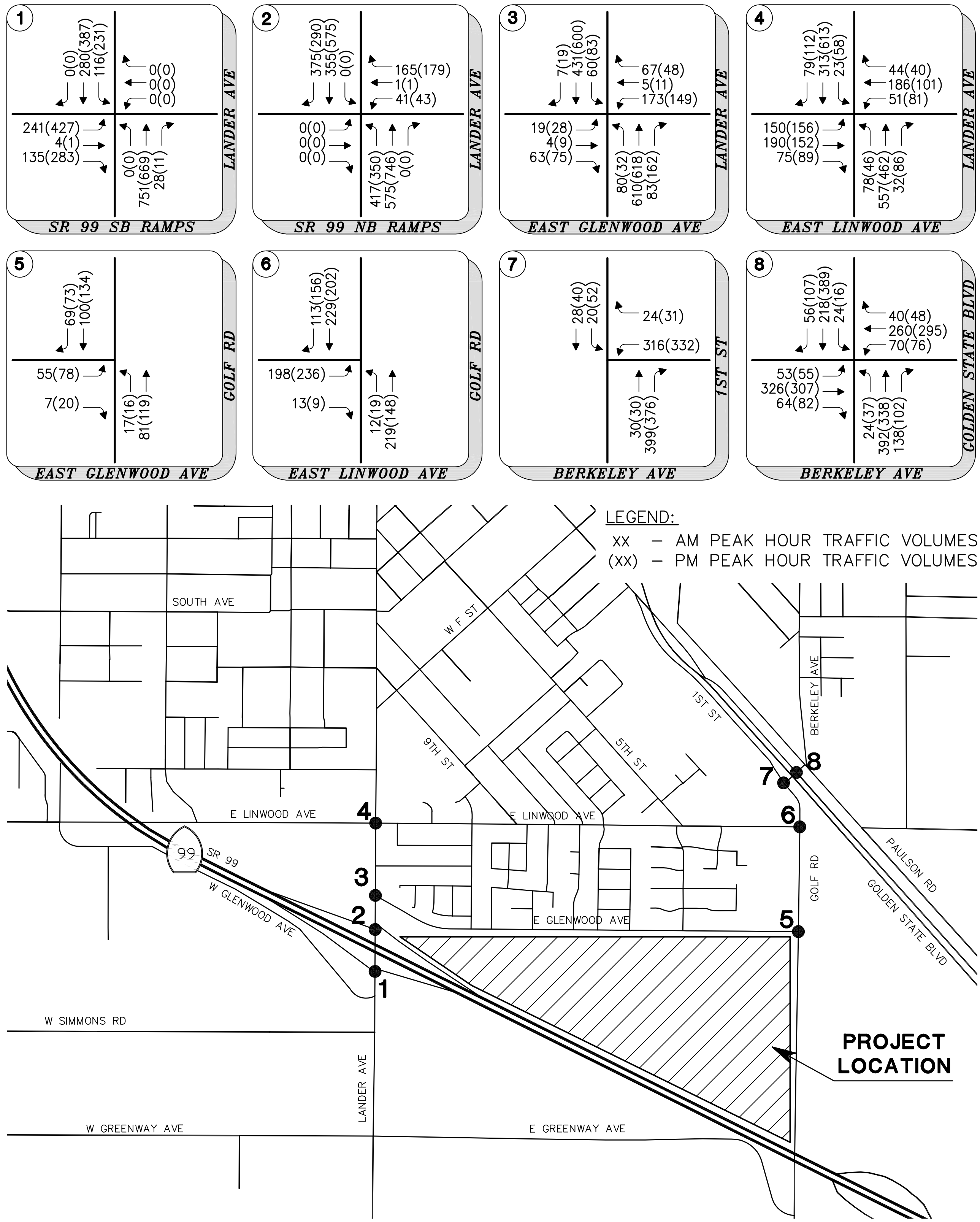
Lane geometrics of the study intersections are illustrated on Figure 2. Existing AM and PM peak hour traffic volumes at the study intersections and ADT volumes along study roadway segments are shown on Figure 3.



City of Turlock - Morgan Ranch Master Plan

Figure 2

Existing Lane Geometrics and Control



City of Turlock - Morgan Ranch Master Plan

Figure 3

Existing Peak Hour Traffic Volumes

Level of service Methodologies and Policies

Traffic operations are quantified through the determination of "Level of Service" (LOS). Level of Service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure of the effect of a number of factors including roadway geometrics, speed, travel delay, freedom to maneuver, and safety. LOS provides an index to the operational qualities of a roadway segment or intersection.

LOS A, B and C indicate traffic conditions whereby traffic can move relatively freely. LOS D describes conditions where delay is more noticeable and average travel speeds are as low as 40 percent of the free flow speed. LOS E indicates significant delays and average travel speeds of one third the free flow speed or lower; traffic volumes are generally at or close to capacity. Finally, LOS F characterizes arterial flow at very low speeds (stop and go), and large delays (more than one minute) with queuing at signalized intersections; in effect traffic demand on the roadway exceeds the roadway's capacity.

Intersection and Roadway LOS Methodologies

Levels of Service (LOS) have been calculated for all intersection control types using the methods documented in the Transportation Research Board Publication *Highway Capacity Manual, Fourth Edition, 2000*. For signalized intersections and All-Way Stop-Controlled (AWSC) intersections, the intersection delays and LOS are average values for all intersection movements. For Two-Way Stop-Controlled (TWSC) intersections, the intersection delays and LOS are representative of those for the worst-case movement. LOS definitions for different types of intersection controls are outlined in Table 1. The average daily traffic based roadway LOS thresholds are shown in Table 2.

The *City of Turlock 2030 General Plan, Circulation Element* includes the following policies as they relate to traffic flow, LOS thresholds, and acceptable operations:

Policy 5.2-a: ***A safe and efficient roadway system****. Promote a safe and efficient roadways system for the movement of both people and goods.*

Policy 5.2-b: ***Implement planned roadway improvements****. Use Figure 5-2: Circulation System, and Table B-1 in Appendix B, Major Circulation Improvements, to identify, schedule, and implement roadway improvements as development occurs in the future; evaluate future development and roadway improvement plans against standards for the classifications as set forth in Tables 5-4, 5-5, and 5-6.*

Policy 5.2-c: ***Complete Streets****. Maintain and update street standards that provide for the design, construction, and maintenance of "Complete Streets." Turlock's Complete Streets shall enable safe, comfortable, and attractive access for all users: pedestrians, motorists, bicyclists, and transit riders of all ages and abilities, in a form that is compatible with and complementary to adjacent land uses, and promotes connectivity between uses and areas.*

Policy 5.2-d: ***Design for street improvements****. The roadway facility classifications indicated on the General Plan circulation diagram (Figure 5-2) shall be the standard to which roads needing improvements are built. The circulation diagram depicts the facility types that are necessary to match the traffic generated by the General Plan 2030 land use buildout, and therefore represent the maximum standards to which a road segment or intersection shall be improved. LOS is* not *used as a standard for determining the ultimate design of roadway facilities.*

Policy 5.2-h: ***Circulation System Enhancements****. Maintain projected levels of service where possible, and ensure that future development and the circulation system are in balance. Improve the* *circulation system as necessary, in accordance with the circulation diagram and spacing/access standards, to support multimodal travel of all users and goods.*

Policy 5.2-r: ***Follow circulation plan diagram****. Locate freeways, expressways, and arterials according to the general alignment shown in the Circulation Plan Diagram. Slight variation from the depicted alignments for collectors will not require a General Plan amendment.*

Policy 5.2-s: ***Trigger for improvements****. Require improvements to be constructed where adequate ROW is available and impacts to adjacent land uses can be avoided or adequately mitigated to General Plan standards when LOS is projected to drop below LOS D (on an average daily trips basis).*

Police 5.2-aa: ***Exceptions to Standards****. In infill areas, where existing rights of way may not conform to the roadway standards set forth in the General Plan, but where improvements are necessary, reasonable deviations from roadway standards may be allowed by the City Engineer.*

Policy 5.2-ab: ***Downtown exempted from LOS trigger****. Exempt Downtown from LOS trigger for improvements in order to encourage infill development, the creation of a pedestrian friendly urban design character, and the densities and intensities of development necessary to support transit and local business development. Development decisions Downtown should be based on community design and livability goals, rather than traffic LOS. Downtown is defined by the Downtown designation on the Land Use Diagram (Figure 2-2).*

The Caltrans published *Guide for the Preparation of Traffic Impact Studies* (dated June 2001) states the following:

"Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities ..."

For purposes of this traffic study, and consistent with City and Caltrans policies stated above, LOS "D" has been taken as the minimum acceptable LOS standard at critical study intersections and roadway segments falling within City and State right-of-way. Appropriate circulation, capacity or and/or control improvements have been identified for instances when study area facilities are projected to operate below acceptable standards.

TABLE 1
LEVEL OF SERVICE (LOS) CRITERIA FOR INTERSECTIONS

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle		
				Signalized	Un signalized	All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	< 10.0	< 10.0	< 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0 and < 20.0	>10.0 and < 15.0	>10.0 and < 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and < 35.0	>15.0 and < 25.0	>15.0 and < 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and < 55.0	>25.0 and < 35.0	>25.0 and < 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and < 80.0	>35.0 and < 50.0	>35.0 and < 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0	> 50.0	> 50.0

References: Highway Capacity Manual

TABLE 2
LEVEL OF SERVICE (LOS) CRITERIA FOR ROADWAYS

Roadway Type	Average Daily Traffic (ADT) – Total of Both Directions				
	LOS "A"	LOS "B"	LOS "C"	LOS "D"	LOS "E"
6-Lane Freeway	75,000	90,000	105,000	120,000	135,000
4-Lane Freeway	50,000	60,000	70,000	80,000	90,000
6-Lane Expressway (high access control)	36,000	42,000	48,000	54,000	60,000
4-Lane Expressway (high access control)	24,000	28,000	32,000	36,000	40,000
6-Lane Divided Arterial (with left-turn lane)	32,000	38,000	43,000	49,000	54,000
4-Lane Divided Arterial (with left-turn lane)	22,000	25,000	29,000	32,500	36,000
4-Lane Undivided Arterial (no left-turn lane)	18,000	21,000	24,000	27,000	30,000
2-Lane Arterial (with left-turn lane)	11,000	12,500	14,500	16,000	18,000
2-Lane Arterial (no left-turn lane)	9,000	10,500	12,000	13,500	15,000
4-Lane Collector	12,000	15,000	18,000	21,000	24,000
2-Lane Collector	6,000	7,500	9,000	10,500	12,000

Notes: 1. Based on Highway Capacity Manual, Fourth Edition, Transportation Research Board, 2000.

2. All volume thresholds are approximate and assume ideal roadway characteristics. Actual thresholds for each LOS listed above may vary depending on a variety of factors including (but not limited to) roadway curvature and grade, intersection or interchange spacing, driveway spacing, percentage of trucks and other heavy vehicles, lane widths, signal timing, on-street parking, volume of cross traffic and pedestrians, etc.

"A supplemental traffic signal “warrant” analysis has also been completed to determine whether “significance” should be associated with unsignalized intersection operations. The term “signal warrants” refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the need for installation of a traffic signal at an otherwise unsignalized intersection. This study has employed the signal warrant criteria presented in the latest edition of the California Manual on Uniform Traffic Control Devices (MUTCD) for all study intersections. The signal warrant criteria are based upon several factors, including the volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas.

The California MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Specifically, this study utilizes the peak hour volume-based Warrant 3 as one representative type of traffic signal warrant analysis. Since Warrant 3 provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating at above 40 mph), study intersections which use this specialized criteria are clearly identified.

Technical Analysis Parameters

Peak Hour periods represent the most critical period for operations and have the highest capacity requirements. The selection of an appropriate hour for planning, design and operational purposes is a compromise between providing an adequate LOS for every hour (or almost every hour) of the year and economic efficiency.

Peak Hour Factors (PHF) are calculated as the hourly volume during the maximum-volume hour of the day divided by the peak 15-minute flow rate within the peak hour. The PHF is a measure of traffic demand fluctuation within the peak hour.

Average Daily Traffic is defined as the total volume passing a point or segment of a roadway facility, in both directions, during a 24-hour period. It is commonly obtained during a given time period, in whole days greater than one day and less than one year, divided by the number of days in that time period. Average Daily Traffic is commonly referred to as ADT.

This TIAR provides a “planning level” evaluation of traffic operating conditions, which is considered sufficient for CEQA/NEPA purposes. The “planning level” evaluation incorporates appropriate heavy vehicle adjustment factors, peak hour factors, and signal lost-time factors, and reports the resulting intersection delays and LOS as estimated using HCM-2000 based analysis methodologies. In this study, a general Peak Hour Factor (PHF) of 0.92 (as recommended by HCM-2000) was applied in the analysis of all study intersections under all analysis scenarios. The HCM-recommended suburban traffic signal default cycle length of 100 seconds is used for analysis of signalized intersections, with 4 seconds of "lost time" per critical signal phase. The *Synchro 7* (Trafficware) software program was used to implement the HCM-2000 analysis methodologies. A “design level” evaluation (including queuing on intersection lane groups, stacking length requirements, coordinated signal operations analyses etc.) is not included in this planning-level study.

The heavy vehicle percentage on SR 165/Lander Avenue was provided by the Caltrans-published 2010 *Annual Average Daily Truck Traffic on the California State Highway System.* The truck percentage at the count station on SR 165 nearest to SR 99 is listed as 4.9 percent. However, further study and site observations indicate that the truck percentage along Lander Avenue is far higher. Study intersections along Lander Avenue were analyzed with a conservative truck percentage estimate of 10%. All other study intersections were analyzed with a truck percentage estimate of 5%.

Existing Traffic Operations

Intersections

Existing AM and PM peak hour intersection traffic operations were quantified utilizing the existing traffic volumes (shown on Figure 3) and the existing intersection lane geometrics and control (shown on Figure 2). Table 3 contains a summary of the existing intersection LOS conditions.

TABLE 3
EXISTING CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?	Delay	LOS	Warrant Met?
1	Lander Avenue/SR 99 SB Ramps	Signal	D	21.0	C	-	25.0	C	-
2	Lander Avenue/SR 99 NB Ramps	Signal	D	16.5	B	-	14.3	B	-
3	Lander Avenue/E. Glenwood	Signal	D	21.0	C	-	20.3	C	-
4	Lander Avenue/Linwood Avenue	Signal	D	23.5	C	-	23.4	C	-
5	Golf Road/E Glenwood Avenue	TWSC	D	10.5	B	No	11.4	B	No
6	Golf Road/Linwood Avenue	TWSC	D	19.2	C	No	19.1	C	No
7	1st Street/Berkeley Avenue	TWSC	D	17.2	C	No	22.7	C	No
8	Golden State Blvd/Berkeley Avenue	AWSC	D	16.6	C	No	17.0	C	No

Notes:
TWSC = Two Way Stop Control AWSC = All Way Stop Control
LOS = Worst case movement's LOS for TWSC intersections; OVR = overflow
Warrant = Caltrans Peak hour volume based signal warrant

As indicated in Table 3, all study intersections are currently operating at acceptable LOS "D" or better on a daily basis with the existing capacity configurations.

Roadways

Existing daily roadway segment traffic operations have been quantified utilizing roadway ADT-based LOS thresholds presented in Table 2. Table 4 contains a summary of the existing roadway segment LOS conditions.

TABLE 4
EXISTING CONDITIONS: ROADWAY SEGMENT LEVELS OF SERVICE

Roadway Segment	Capacity Configuration	Target LOS	Average Daily Traffic (ADT)	LOS
Lander Avenue, from SR 99 to E. Glenwood Avenue	Four-Lane Divided Arterial	D	19,600	A
Lander Avenue, from E. Glenwood Avenue to Linwood Avenue	Four-Lane Divided Arterial	D	19,900	A
E. Glenwood Avenue, from Lander Avenue to Golf Road	Two-Lane Collector	D	2,300	A
Golf Road, from E. Glenwood Avenue to Linwood Avenue	Two-Lane Collector	D	4,300	A
Golf Road, from E. Glenwood Avenue to SR 99 Overcrossing	Two-Lane Collector	D	2,900	A

As indicated in Table 4, all study roadway segments are currently operating at acceptable LOS "D" or better on a daily basis with the existing capacity configurations.

Issues raised by the City of Turlock as significant circulation concerns are the neighborhood traffic capacity and safety impacts to East Glenwood Avenue. This two-lane collector is more accurately classified as a local residential road and has existing single-family residences that front the road. The impact of traffic volumes along East Glenwood Avenue should not be quantified by the capacity-based criteria presented by HCM 2000 alone, but should also consider the impacts of traffic speed and volume on pedestrian safety and area noise levels. Traffic calming concepts consider a “livability” limit of 3000 vehicles per day as the maximum traffic volume on a residential roadway before residents begin to consider traffic volumes “excessive” or “unsafe”. The diversion of existing traffic along East Glenwood Avenue is projected to result in noise levels and safety conditions within acceptable limits for residents occupying the existing residential units fronting East Glenwood Avenue.

Existing Plus Project Conditions

The *Existing Plus Project* condition is the analysis scenario in which traffic impacts associated with the proposed project (i.e. Morgan Ranch) is investigated in comparison to the *Existing* condition scenario.

Project Description

The proposed Morgan Ranch project consists of approximately 146.7 acres (the “Project Area”) on which a mixture of single-family residential, multi-family residential, and highway commercial land uses will be developed. In the 2030 General Plan, the project is identified as “Southeast 1” Master Plan area.

The site’s proposed land uses are presented in Table 5. The acreages were derived from the land use figure provided by the project applicant illustrated in Figure 4. Residential densities chosen for analysis are consistent with average residential densities in the 2030 General Plan Land Use & Economic Development Element, the adopted 2007-2014 Housing Element, and the project description provided by the applicant.

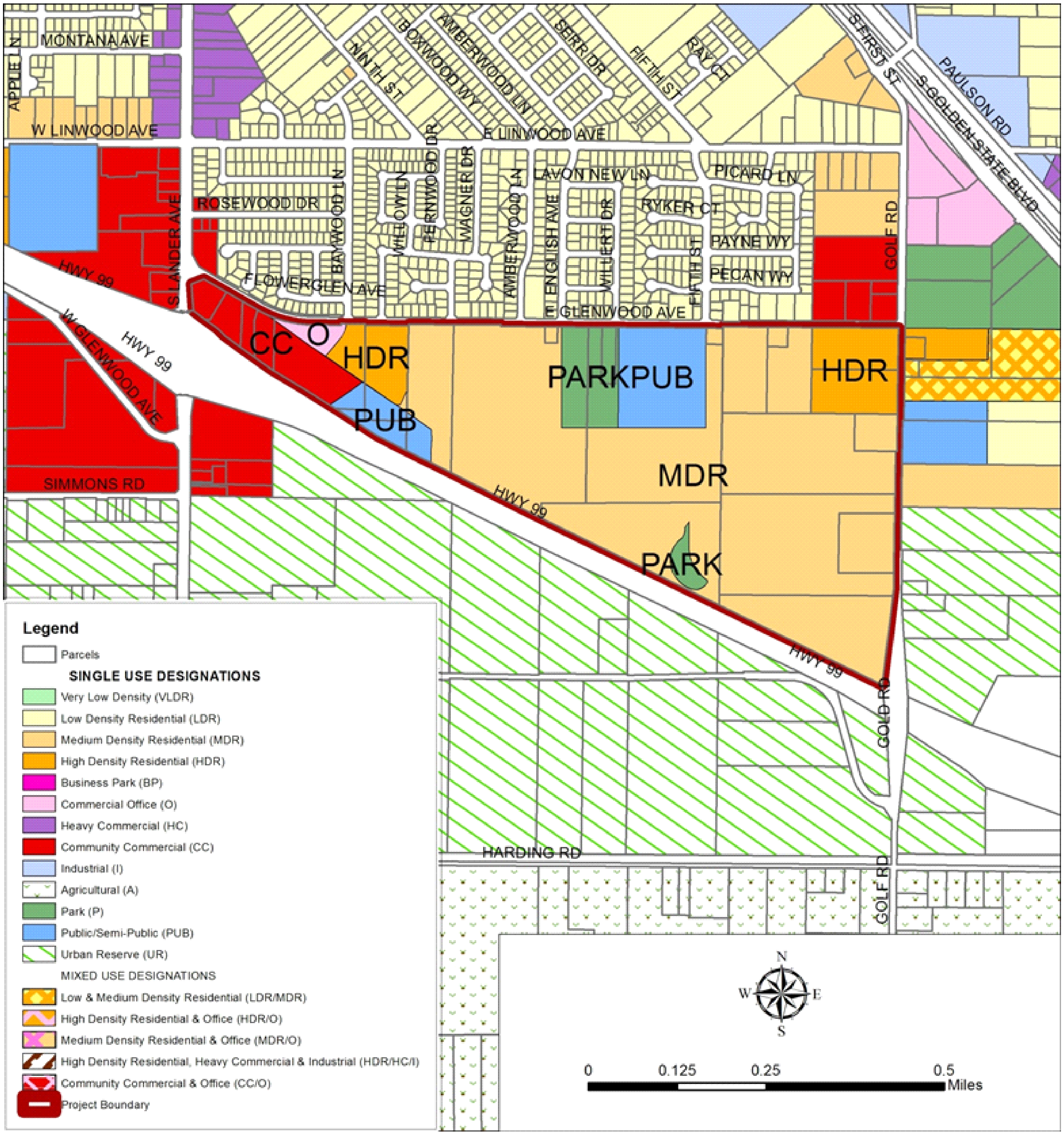
TABLE 5
PROJECT AREA GENERAL PLAN LAND USES

Land Use Designation	Proposed GPA (acres)	Proposed GPA (units)	Density	Allowed Density
Medium Density Residential	97.10	875 DU	9.0 DU/acre	7.5-9 DU/acre
High Density Residential	15.00	450 DU	30.0 DU/acre	15-30 DU/acre
Community Commercial	8.90	96.9 KSF	25% FAR	25%-35% FAR
Office	1.50	16.3 KSF	25% FAR	25%-35% FAR
Park	8.70	-	-	-
Detention Basin	27.50	-	-	-
Public (School)	11.10			
Total	**169.80**			

Note: Average residential land use densities assumed from City of Turlock Housing Element

DU = Dwelling Unit; KSF = 1,000 square feet; FAR = Floor Area Ratio

The proposed project on Table 5 is estimated to build out 875 medium density residential units, 450 high-density residential units, 113 KSF of commercial space, and 11 acres for a public school.



City of Turlock - Morgan Ranch Master Plan Figure 4

Proposed Project Site Plan

Project Trip Generation

Table 6A provides a listing of proposed land uses and summarizes the trip generation rates used to project the trip generation volumes from currently vacant lands within the project area. Residential dwelling unit quantities were taken from the project description. The commercial land use quantities were adjusted using a 25 percent Floor Area Ratio (FAR), a typical ratio used to reflect the actual selling floor area compared to the plot size.

Trip generation volumes were estimated based upon trip rate data presented in the Institute of Transportation Engineers (ITE) Publication *Trip Generation (Ninth Edition)*. The trip generation volumes, which are derived by multiplying the trip generation rates with the proposed land use quantities, are presented in Table 6B.

TABLE 6A
PROJECT TRIP GENERATION RATES

Land Use Category (ITE Code)	Unit	Daily Trip Rate/Unit[1]	AM Trip Rate/Unit			PM Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Single-Family Residential (ITE 210)	DU	9.52	0.75	25%	75%	1.01	63%	37%
Multifamily Residential (ITE 220)	DU	6.65	0.51	20%	80%	0.62	65%	35%
School	Site	1.29	0.33	55%	45%	0.24	45%	55%
Shopping Center (ITE 820, PRJ)[2]	KSF	68.65	1.58	62%	38%	6.06	48%	52%
General Office Building (ITE 710)	KSF	20.26	2.75	88%	12%	5.94	17%	83%
County Park (ITE 412)	Acre	2.28	0.02	61%	39%	0.09	61%	39%
1. Trip rates based on fitted curve equations for commercial and school land use, average rates for housing and park land use.								
2. General Plan Amendment commercial area is 113.3 KSF.								

TABLE 6B
PROPOSED PROJECT TRIP GENERATION

Land Use Description	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			Total	In	Out	Total	In	Out
Project Buildout								
Medium Density Residential	875 DU	8,330	656	164	492	884	557	327
High Density Residential	450 DU	2,993	230	46	184	279	181	98
Elementary School		387	100	55	45	71	32	39
Community Commercial	96.9 KSF	6,654	153	95	58	587	282	305
Office	16.3 KSF	331	45	40	5	97	16	81
Park	8.7 acres	20	0	0	0	1	1	0
Total Morgan Ranch Residential	1325 DU	11,323	886	210	676	1,163	738	425
School Trip Matching[1]	*50%*	*194*	*50*	*28*	*22*	*35*	*16*	*19*
Commercial Trip Matching	*5%*	*566*	*44*	*11*	*34*	*58*	*37*	*21*
Morgan Ranch Commercial	113.3 KSF	6,985	198	135	63	684	298	386
Internal Trip Matching Reduction	*5%*	*566*	*44*	*34*	*11*	*58*	*21*	*37*
Pass-By Trip Reduction	*15%*	*963*	*23*	*15*	*8*	*94*	*42*	*52*
Net Trip Total		**16,019**	**923**	**257**	**664**	**1,602**	**920**	**682**

Notes: 1. Remaining school trips are absorbed by nearby surrounding residential areas

As shown in Table 6B, build-out of the Morgan Ranch project site is estimated to result in approximately 16,019 daily, 923 AM peak hour, and 1,602 PM peak hour trips. The proposed Morgan Ranch GPA trips were checked and found consistent with build-out assumptions forecasted in the City of Turlock Travel Demand Model.

Internal Trip Matching

A portion of the "new" trips produced by the project are expected to begin and end entirely within the project site because the Morgan Ranch project is planned to have both residential and commercial land uses. An internal trip-matching factor was applied to the daily and peak hour trip rates to account for such intra-project trips. However, because both the residential and non-residential land uses in the project generate internal trips, the total number of project trips estimated is subject to estimation "overlap" (i.e. the internal trips generated by residential land uses are essentially the same internal trips generated by the non-residential land uses, produced and attracted between each other). To account for the "overlap" in the project trip generation estimate, only the internal trips associated with residential land uses contributed toward the total generated trips listed in Table 6B; non-residential land use internal trips did not.

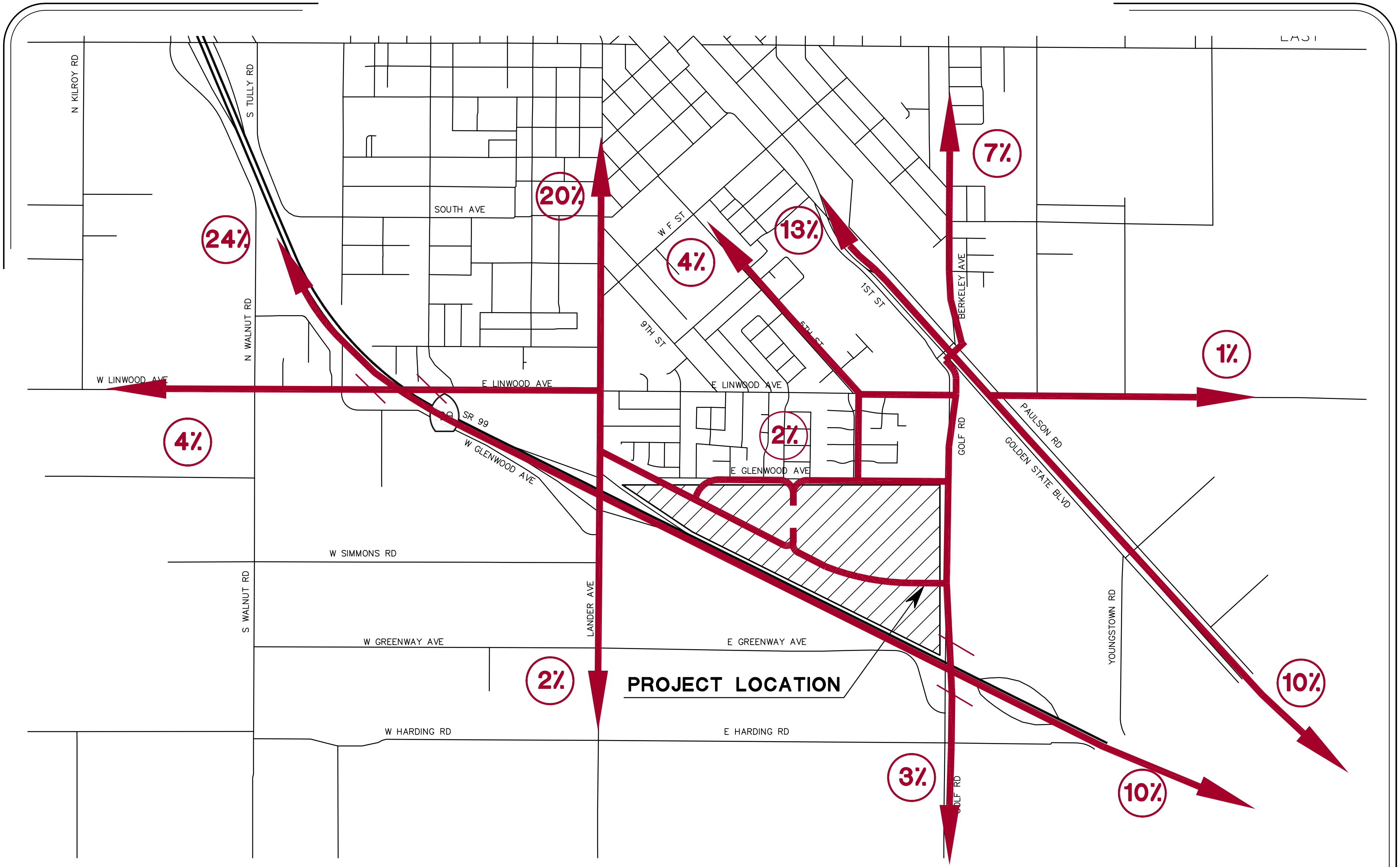
Project Trip Distribution and Assignment

The project trip distribution was forecasted using the City of Turlock Travel Demand Model (Omni-Means, 2008). Figures 5 and 6 show forecasted project trip distribution for the Existing Plus Project and Cumulative Project GP Build-out scenarios. The project trip distribution is expected to change as the City of Turlock and surrounding communities further develop.

Project Site Access

The Morgan Ranch Specific Plan area will be accessed via both East Glenwood Avenue and a proposed new roadway, hereafter referred to as the "Morgan Ranch Arterial." The creation of this new roadway was specifically designed to minimize traffic impacts to the neighborhood along the existing East Glenwood Avenue. East Glenwood Avenue will be realigned within the project area to intersect the new Morgan Ranch Arterial, to maintain existing traffic flow through existing neighborhood without increasing traffic. At project opening, Morgan Ranch Arterial will be constructed with roundabouts at East Glenwood Avenue and at the proposed extension of 5th Avenue through the project site. These are considered the major internal intersections of the project.

Ultimately, roundabouts will also be constructed at the intersections of Morgan Ranch Arterial and Golf Road, and at East Glenwood Avenue and Golf Road. The construction of these intersections is not considered a part of the proposed project, but they will be assumed to be constructed at buildout of the City's circulation plan (Year 2030 conditions).



City of Turlock - Morgan Ranch Master Plan

Figure 5

Project Trip Distribution, Existing Plus Project

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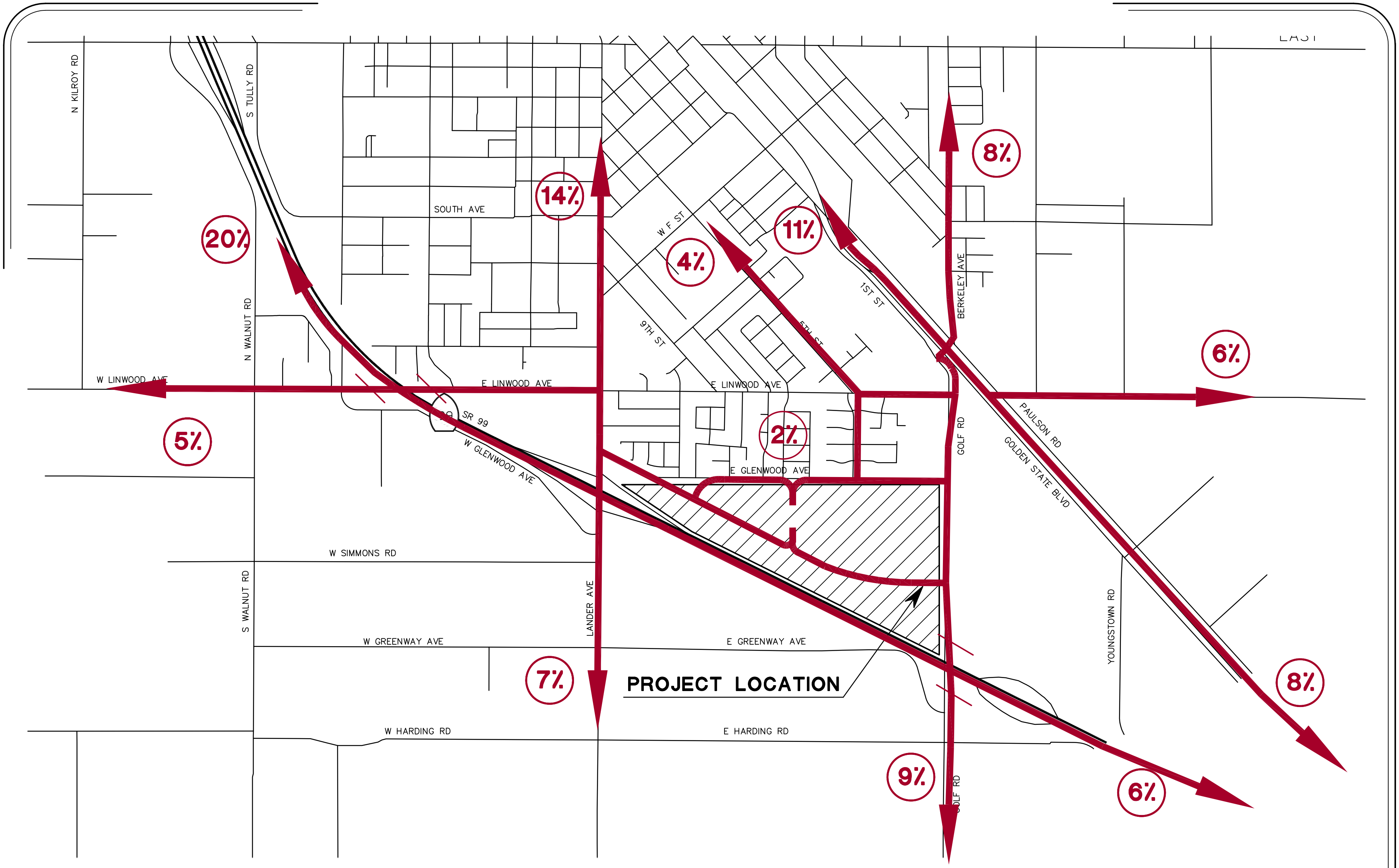

City of Turlock - Morgan Ranch Master Plan

Figure 6

Project Trip Distribution, Year 2030 Conditions

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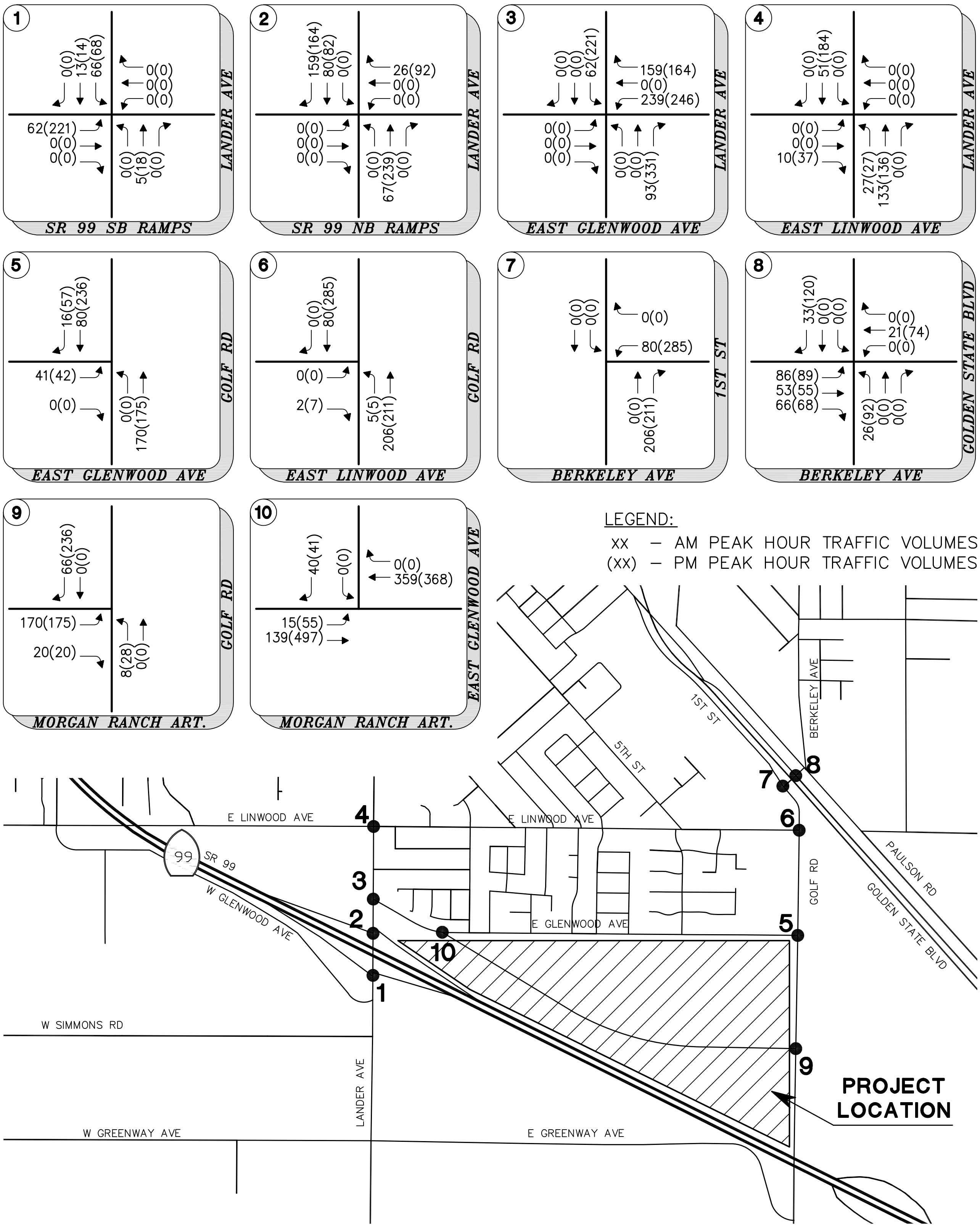


City of Turlock - Morgan Ranch Master Plan Figure 7

Project Only Traffic Volumes

Existing Plus Project Traffic Operations

Existing Plus Project conditions have been simulated by superimposing traffic generated by the proposed project onto *Existing Project* intersection and roadway traffic volumes (Figure 3). The resulting *Existing Plus Project* traffic volumes are illustrated on Figure 8.

Intersections

Existing Plus Project AM and PM peak hour traffic operations were quantified utilizing the *Existing Plus Project* peak hour intersection traffic volumes (Figure 8). Table 7 contains a summary of the resulting *Existing Plus Project* intersection levels of service.

TABLE 7
EXISTING PLUS PROJECT CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?	Delay	LOS	Warrant Met?
1	Lander Avenue/SR 99 SB Ramps	Signal	D	20.5	C	-	37.8	D	-
2	Lander Avenue/SR 99 NB Ramps	Signal	D	13.3	B	-	21.2	C	-
3	**Lander Avenue/E. Glenwood Avenue**	**Signal**	**D**	32.3	C	-	**67.7**	**E**	-
4	Lander Avenue/Linwood Avenue	Signal	D	22.9	C	-	25.9	C	-
5	Golf Road/E Glenwood Avenue	TWSC	D	14.1	B	-	22.6	C	-
6	**Golf Road/Linwood Avenue**	**TWSC**	**D**	**43.0**	**E**	**No**	**133.2**	**F**	**Yes**
7	**1st Street/Golf Road**	**TWSC**	**D**	33.0	D	-	**226.1**	**F**	**Yes**
8	**Golden State Blvd/Berkeley Avenue**	**AWSC**	**D**	**35.7**	**E**	**Yes**	**38.0**	**E**	**Yes**
9	Morgan Ranch Arterial / Golf Road	TWSC	D	12.1	B	-	17.2	C	-
10	Morgan Ranch Arterial / E. Glenwood Avenue	RDBT	D	6.4	A	-	6.5	A	-

Notes:
TWSC = Two Way Stop Control *AWSC = All Way Stop Control* *RDBT = Roundabout*
LOS = Worst case movement's LOS for TWSC intersections; OVR = overflow
Warrant = Caltrans Peak hour volume based signal warrant

As indicated in Table 7, the following intersections are projected to operate at unacceptable LOS during at least one peak hour period under *Existing Plus Project* conditions:

- Lander Avenue/East Glenwood Avenue (PM peak hour only)
- Golf Road/Linwood Avenue (AM and PM peak hour)
- First Street/Berkeley Avenue (PM peak hour only)
- Golden State Boulevard/Berkeley Avenue (AM and PM peak hour)

All unsignalized intersections operating at unacceptable LOS are projected to meet MUTCD Peak Hour Volume Warrant-3 (Urban Areas) based upon at least one peak hour intersection traffic demand volume.

All mitigation measures are discussed in a subsequent section of this report.

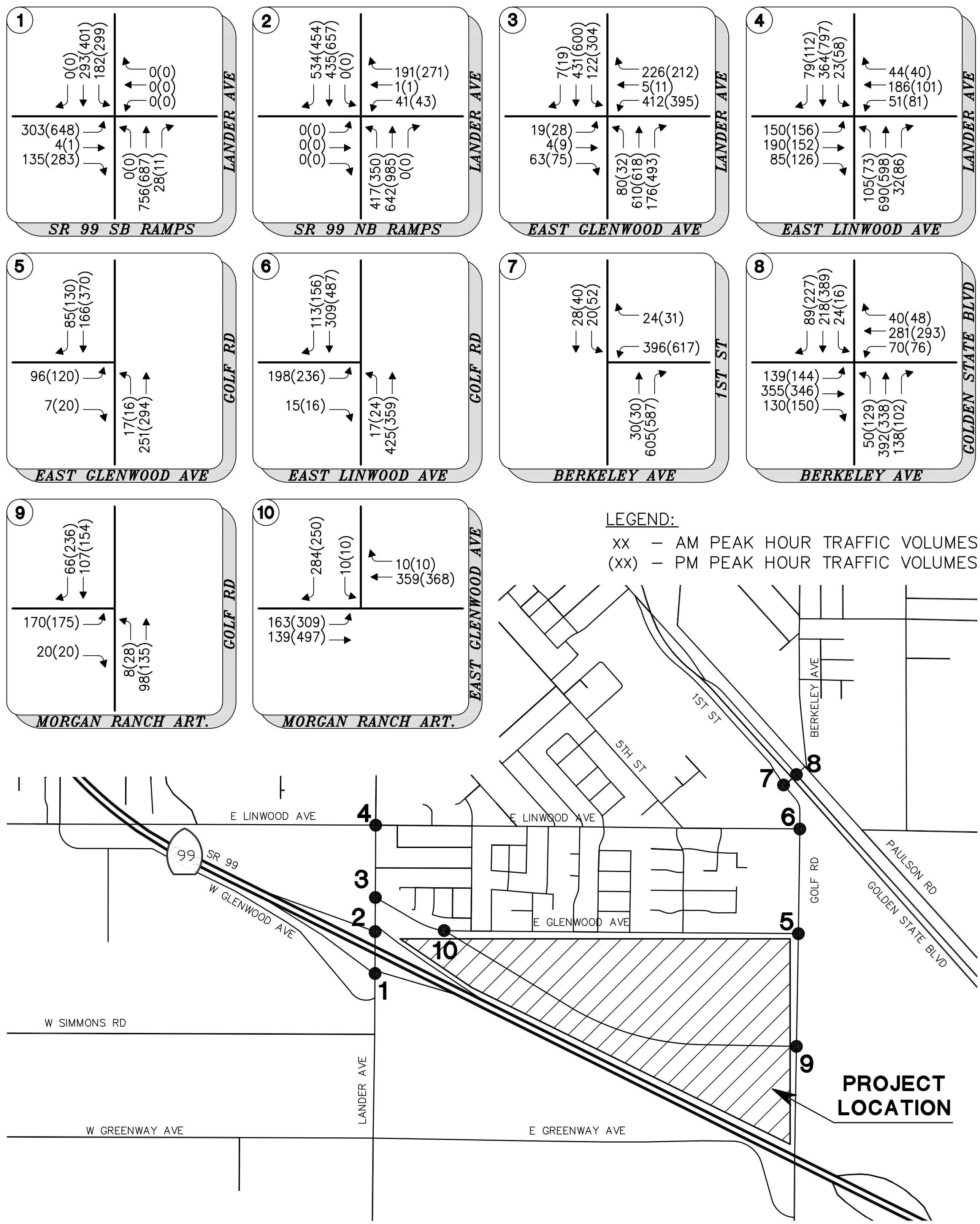
Roadways

Existing Plus Project daily roadway segment traffic operations were quantified utilizing roadway ADT-based LOS thresholds presented in Table 2. Table 8 contains a summary of the resulting *Existing Plus Project* roadway segment LOS conditions.

TABLE 8
EXISTING PLUS PROJECT CONDITIONS: ROADWAY LEVELS OF SERVICE

Roadway Segment	Capacity Configuration	Target LOS	Average Daily Traffic (ADT)	LOS
Lander Avenue, from SR 99 to E. Glenwood Avenue	Four-Lane Divided Arterial	D	25,900	C
Lander Avenue, from E. Glenwood Avenue to Linwood Avenue	Four-Lane Divided Arterial	D	24,100	B
E. Glenwood Ave., from Lander Ave. to Morgan Ranch Arterial	**Two-Lane Collector**	**D**	**12,900**	**F**
E. Glenwood Avenue, from Morgan Ranch Arterial to Golf Road	Two-Lane Collector	D	3,500	A
Golf Road, from E. Glenwood Avenue to Linwood Avenue	Two-Lane Collector	D	9,800	D
Golf Road, from E. Glenwood Avenue to SR 99 Overcrossing	Two-Lane Collector	D	8,300	C
Morgan Ranch Arterial, from E. Glenwood Ave. to Golf Rd.	Two-Lane Divided Arterial	D	10,300	A

As indicated in Table 8, the East Glenwood roadway segment, between Lander and Morgan Ranch Arterial is forecasted to operate with unacceptable LOS. The Morgan Ranch Arterial is forecasted to divert approximately 10,000 daily trips from East Glenwood Avenue, which should alleviate traffic impacts for residents occupying the existing residential units fronting East Glenwood Avenue.



City of Turlock - Morgan Ranch Master Plan

Figure 8

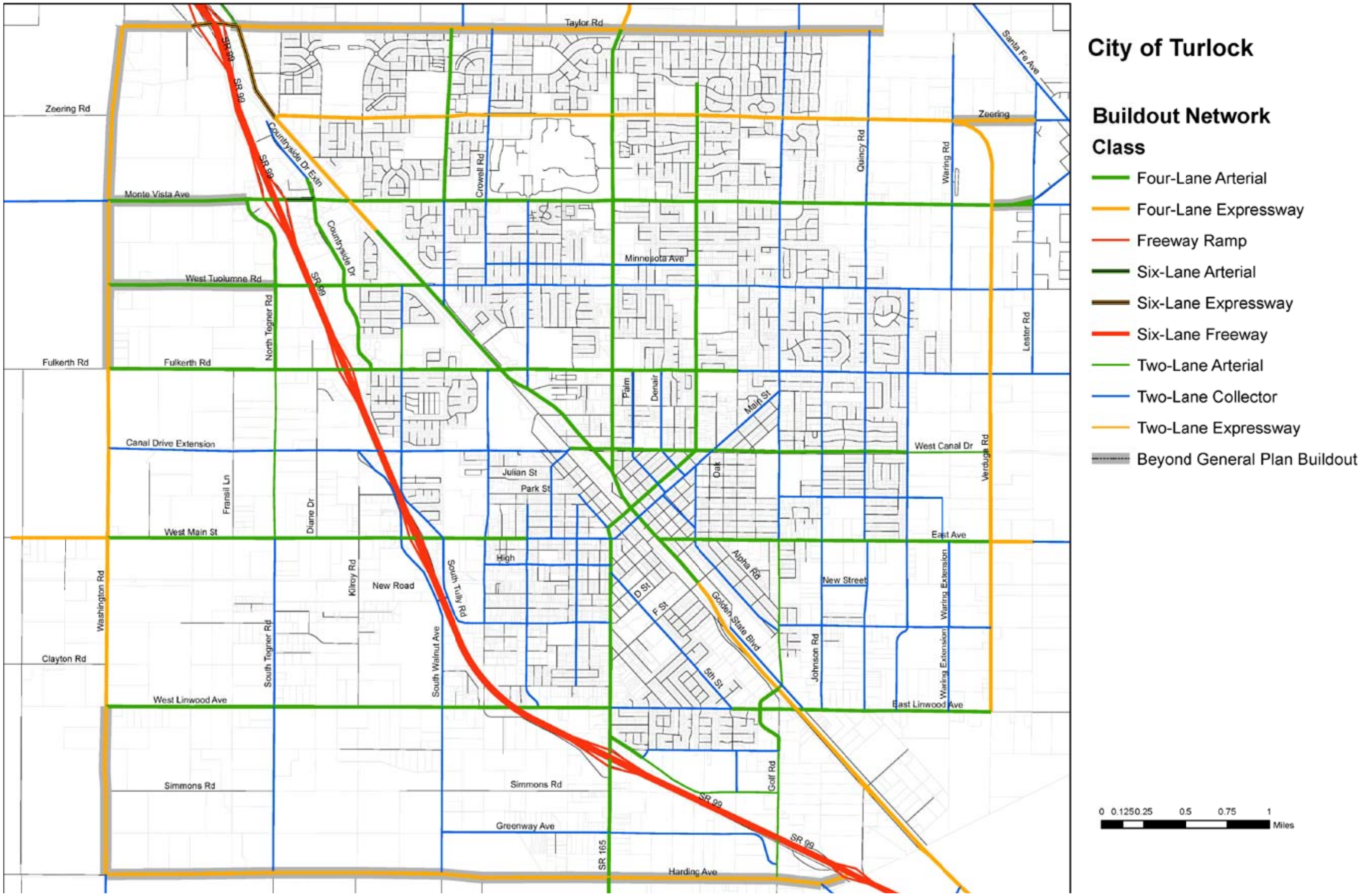
Existing Plus Project Traffic Volumes

Cumulative General Plan Build-Out Conditions

Cumulative GP Build-Out conditions refer to analysis scenarios at a future planning horizon year, typically assumed to be approximately 20 years in the future. This time frame is consistent with the recently adopted 2030 General Plan. Within this analysis, the *Cumulative GP Build-Out* condition is a year 2030 scenario that analyzes the build-out of the 2030 General Plan that includes full development of the proposed Morgan Ranch site and all other land uses inside the General Plan study area boundary. In the 2030 General Plan, the Morgan Ranch project site is identified as “Southeast 1” Master Plan area.

The long-term future year traffic forecasts for this study have been developed using the City of Turlock’s traffic model (last major update in 2008). The project area was modeled with improvements to the transportation network consistent with the City of Turlock’s 2030 General Plan and Circulation Element. Figure 9 shows future roadway facilities from the City’s General Plan Update while Figure 10 shows future lane geometrics and control at the study intersections. The circulation improvements near the project area include the following:

- Construct a grade separated interchange at Youngstown Road and SR 99 (will not have a connection to City of Turlock streets north of SR 99)
- Connect East Linwood Ave across Golden State Blvd via a grade separated overcrossing. Reconstruct the East Linwood Ave / Golf Road intersection and Golf Road alignment to match the new facility
- Improve East Linwood Ave between 5th St and Verduga Road to a four-lane divided arterial
- Improve East Glenwood Avenue between Lander Avenue and the East Glenwood Avenue / Morgan Ranch Arterial intersection to a four-lane divided arterial
- Improve Golf Road between East Glenwood Avenue and Golden State Blvd to a four-lane divided arterial
- Construct a signalized intersection and at-grade railroad crossing at Golden State Blvd / Berkeley Ave. Reconstruct the 1st St / Berkeley Ave intersection to match the new facility
- Construct roundabout at East Glenwood Avenue / Golf Road and at Morgan Ranch Arterial / Golf Road.

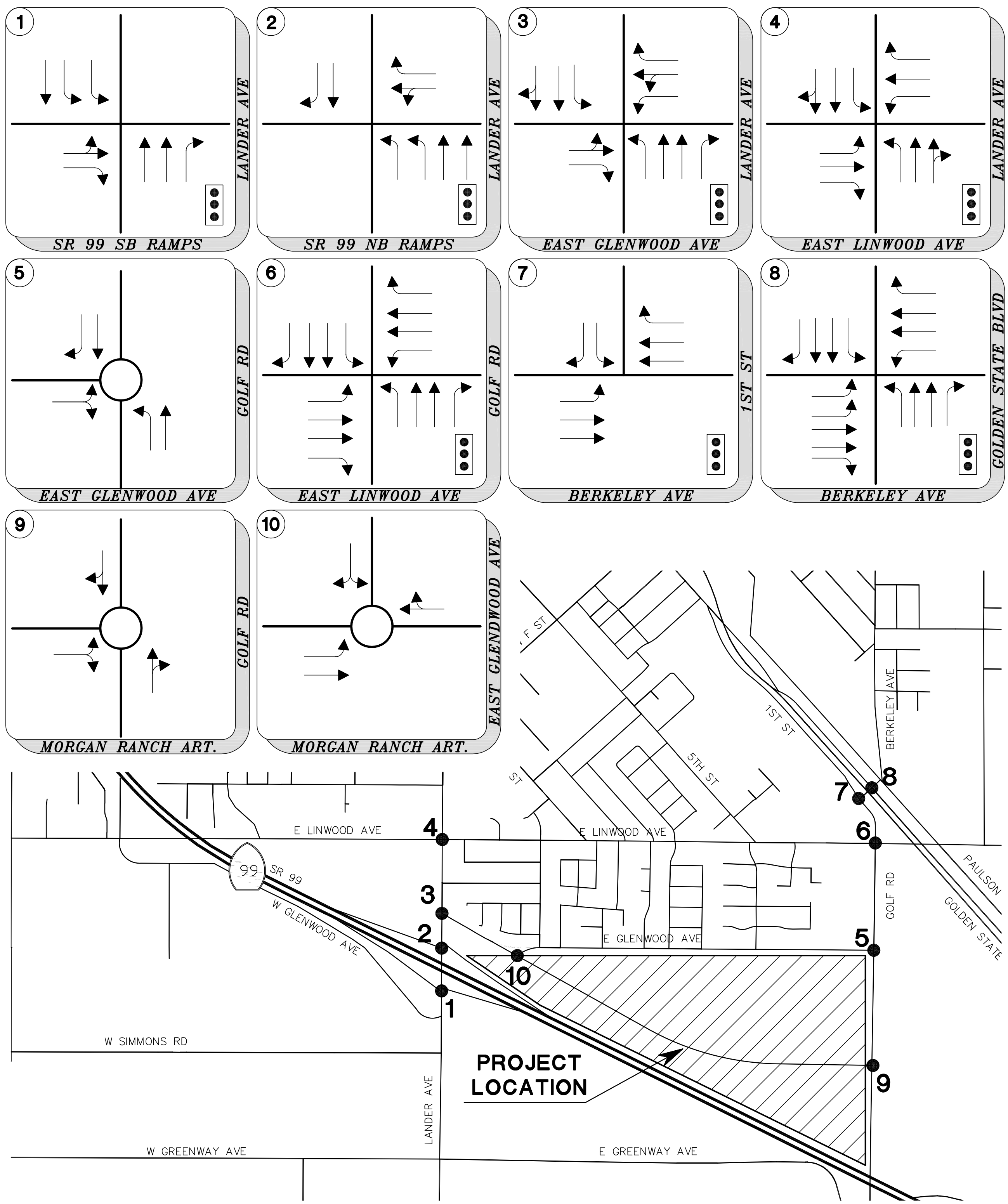


City of Turlock - Morgan Ranch Master Plan

Figure 9

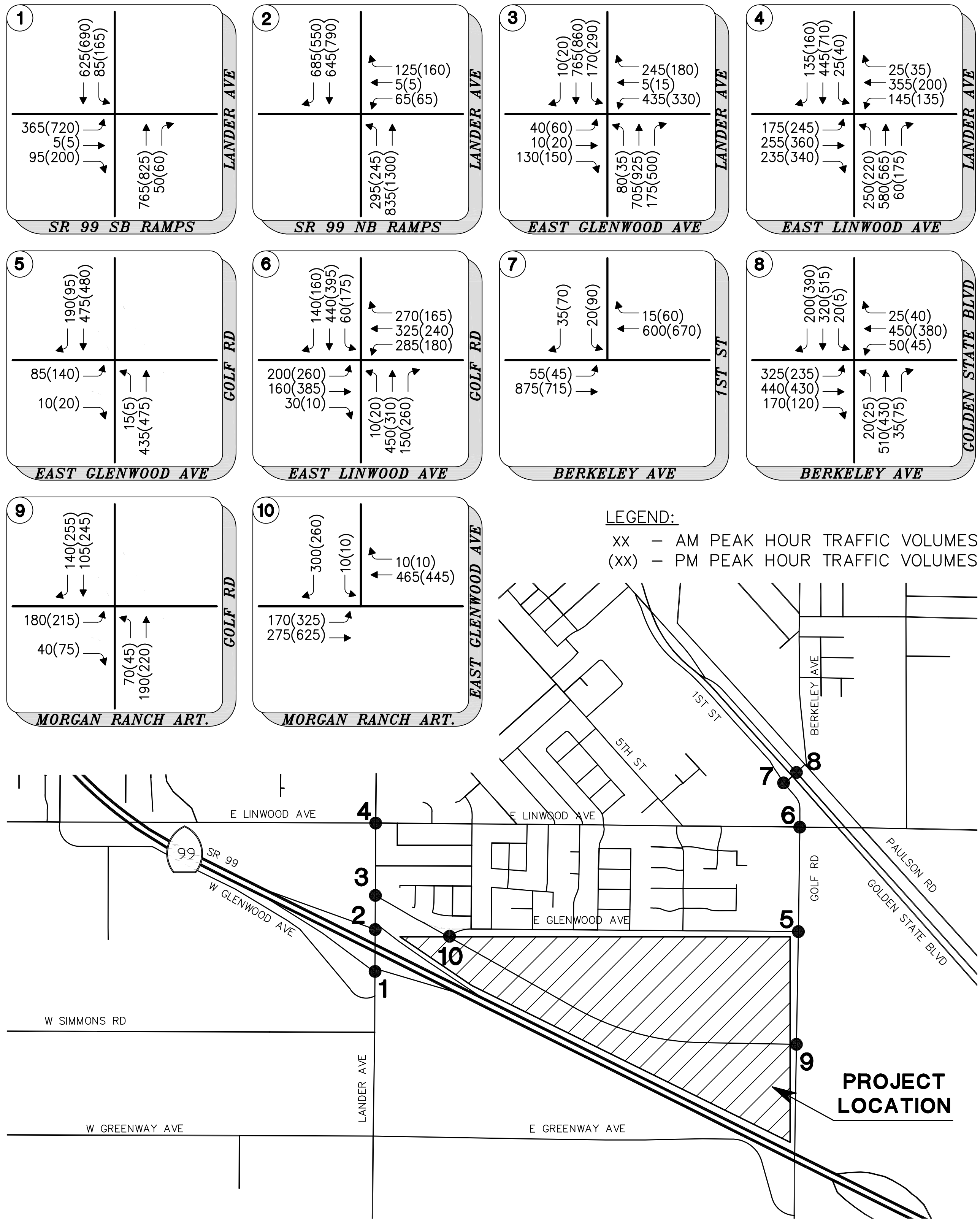
Buildout City Traffic Network

Job No: 25-7328-43



City of Turlock - Morgan Ranch Master Plan Figure 10

Year 2030 Lane Geometrics and Control



City of Turlock - Morgan Ranch Master Plan

Figure 11

Year 2030 Peak Hour Traffic Volumes

Cumulative General Plan Build-Out Traffic Operations

Intersections

Cumulative General Plan Build-Out AM and PM peak hour intersection traffic operations were quantified utilizing the *Cumulative GP Build-Out* peak hour intersection traffic volumes shown on Figure 11 and cumulative year network lane geometrics and control (Figure 10) at the study intersections. Table 9 contains a summary of the resulting intersection LOS conditions.

TABLE 9
CUMULATIVE GP BUILD-OUT CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?	Delay	LOS	Warrant Met?
1	Lander Avenue/SR 99 SB Ramps	Signal	D	17.2	B	-	46.4	D	-
2	Lander Avenue/SR 99 NB Ramps	Signal	D	12.7	B	-	10.5	B	-
3	Lander Avenue/E. Glenwood Avenue	Signal	D	26.0	C	-	33.4	C	-
4	Lander Avenue/Linwood Avenue	Signal	D	36.1	D	-	40.2	D	-
5	Golf Road/E Glenwood Avenue	RDBT	D	5.2	A	-	5.3	A	-
6	Golf Road/Linwood Avenue	Signal	D	23.9	C	-	25.5	C	-
7	1st Street/Berkeley Avenue	Signal	D	17.5	B	-	17.5	B	-
8	Golden State Blvd/Berkeley Avenue	Signal	D	22.7	C	-	23.1	C	-
9	Morgan Ranch Arterial / Golf Road	RDBT	D	7.1	A	-	6.9	A	-
10	Morgan Ranch Arterial / E. Glenwood Avenue	RDBT	D	6.6	A	-	6.8	A	-

Notes:
TWSC = Two Way Stop Control AWSC = All Way Stop Control RDBT = Roundabout
LOS = Worst case movement's LOS for TWSC intersections; OVR = overflow
Warrant = Caltrans Peak hour volume based signal warrant

As indicated in Table 9, all the study intersections are projected to operate at acceptable LOS D or better during the peak hour period under *Cumulative GP Build-Out* conditions:

Roadways

Cumulative GP Build-Out daily roadway segment traffic operations were quantified utilizing roadway ADT-based LOS thresholds presented in Table 2. Table 10 contains a summary of the *Cumulative GP Build-Out* roadway segment LOS conditions.

TABLE 10
CUMULATIVE GP BUILD-OUT CONDITIONS: ROADWAY LEVELS OF SERVICE

Roadway Segment	Capacity Configuration	Target LOS	Average Daily Traffic (ADT)	LOS
Lander Avenue, from SR 99 to E. Glenwood Avenue	**Four-Lane Divided Arterial**	**D**	**35,200**	**E**
Lander Avenue, from E. Glenwood Avenue to Linwood Avenue	Four-Lane Divided Arterial	D	29,300	D
E. Glenwood Ave., from Lander Ave. to Morgan Ranch Arterial	Four-Lane Divided Arterial	D	14,300	A
E. Glenwood Avenue, from Morgan Ranch Arterial to Golf Road	Two-Lane Collector	D	7,600	C
Golf Road, from E. Glenwood Avenue to Linwood Avenue	Four-Lane Divided Arterial	D	13,900	A
Golf Road, from E. Glenwood Avenue to SR 99 Overcrossing	Two-Lane Divided Arterial	D	11,700	B
Morgan Ranch Arterial, from E. Glenwood Ave. to Golf Rd.	Two-Lane Divided Arterial	D	13,600	C

As indicated in Table 10, all roadway segments with the exception of Lander Ave from SR 99 to East Glenwood Ave are projected to operate at LOS D or better under *Cumulative GP Build-Out* conditions.

Mitigation Measures

This section presents recommended base improvements as well as project-related mitigation measures at the study intersections and roadway segments, developed based on the findings from the analyses presented in the prior sections of this report.

Existing Plus Project Conditions

Intersections

Lander Avenue / East Glenwood Avenue – This signalized intersection is projected to operate at an unacceptable LOS "E" during the PM peak hour period under *Existing Plus Project* conditions. The following improvements will provide adequate capacity for the forecasted peak hour traffic volumes to result in acceptable LOS "D" or better:

- Widen the northbound approach (Lander Avenue) to provide an exclusive right turn lane. With this improvement the northbound approach includes one left turn only lane, two through lanes, and one right turn only lane.

This improvement may require right of way acquisition on the adjacent gas station located in the south east quadrant of the intersection. Based on recent aerial photos, constructing a right turn pocket will probably involve landscape, signal, and utility relocation. Additional analysis and right of way coordination will be required to determine the true feasibility of this improvement.

Mitigation Measure:

The proposed project's mitigation measure is to construct the recommended improvement. The timing of the improvement's construction will be determined by a separate traffic analysis prepared as specific development proposals are received for individual projects within the Morgan Ranch Master Plan. When a traffic analysis determines the improvement is needed to support a specific development proposal, the improvement must be constructed.

This improvement is being considered for inclusion in the City's Capital Improvement Program update. As such, reimbursement for the construction of this improvement beyond the project's fair share may be possible at a later date when the City has collected sufficient development impact fees for reimbursement.

Golf Road / Linwood Avenue - This unsignalized intersection is found to be operating at an unacceptable LOS "E" and LOS "F" during AM and PM peak hour respectively under *Existing Plus Project* conditions. This intersection meets the peak hour volume signal warrant under *Existing Plus Project* conditions during PM peak hour. The following improvements will provide adequate capacity for the forecasted peak hour traffic volumes to result in acceptable LOS "D" or better:

- Signalize the intersection

Mitigation Measure:

The proposed project's mitigation measure is to construct the recommended improvement. The timing of the improvement's construction will be determined by a separate traffic analysis prepared as specific development proposals are received for individual projects within the Morgan Ranch Master Plan. When a traffic analysis determines the improvement is needed to support a specific development proposal, the improvement must be constructed.

This improvement is being considered for inclusion in the City's Capital Improvement Program update. As such, reimbursement for the construction of this improvement beyond the project's fair share may be possible at a later date when the City has collected sufficient development impact fees for reimbursement.

Golden State Boulevard and Berkeley Avenue/Golf Road – This unsignalized intersection is found to be operating at an unacceptable LOS "E" during both the AM and PM peak hour periods under *Existing* conditions. This intersection meets the peak hour volume signal warrant under *Existing Plus Project* conditions. The intersection of Golden State Boulevard/Golf Road/Berkeley Avenue is closely spaced with the intersections of First Street/Golf Road and Paulson Road/Berkeley Avenue and improvements at this intersection should consider to accommodate queuing of the vehicles and not to block the adjacent intersections. First Street/Golf Road intersection is located about 100 feet west and Paulson Road/Berkeley Avenue intersection is located about 110 feet east of the Golden State Boulevard/Berkeley Avenue intersection. A Union Pacific Railroad also runs parallel to Golden State Boulevard and crosses Berkeley Avenue about 40 feet east from the Golden State Boulevard/Berkeley Avenue intersection.

The following improvements will provide adequate capacity for the forecasted peak hour traffic volumes to result in acceptable LOS "D" or better:

- Signalize the intersection
- Widen the eastbound and westbound approach (Berkeley Avenue) to provide an exclusive left turn lane. With this improvement, both approaches includes one left turn lane, one through lane and a right turn lane.
- Realign Golf Road and Paulson Road in order to provide adequate spacing between these intersections and the Golden State Boulevard intersection.

An alternative improvement is to construct a roundabout at the Golden State / Berkeley intersection. The County is currently working to determine the feasibility and preferred geometrics at this location, which may go beyond the improvements described herein and may be designed for a later design year.

Mitigation Measure:

The proposed project's mitigation measure is to construct the recommended improvement. The timing of the improvement's construction will be determined by a separate traffic analysis prepared as specific development proposals are received for individual projects within the Morgan Ranch Master Plan. When a traffic analysis determines the improvement is needed to support a specific development proposal, the improvement must be constructed.

This intersection is in the jurisdiction of Stanislaus County. Partial funding of this improvement is being considered for inclusion in the City's Capital Improvement Program update. As such, reimbursement for the construction of this improvement beyond the project's fair share may be possible at a later date when the City and/or County have collected sufficient development impact fees for reimbursement.

<u>First Street / Golf Road</u> – This unsignalized intersection is projected to operate at an unacceptable LOS "F" during PM peak hour period under *Existing Plus Project* conditions. This intersection meets the peak hour volume signal warrant under *Existing Plus Project* conditions.

To improve the operations at Golden State Boulevard/Berkeley Avenue intersection, it is recommended that First Street be realigned and the following improvements be provided at the intersection:

- This intersection will be improved in conjunction with Golden State Boulevard/Berkeley Avenue. This improvement will likely include signalization and realignment.

Mitigation Measure:

The proposed project's mitigation measure is to construct the recommended improvement. The timing of the improvement's construction will be determined by a separate traffic analysis prepared as specific development proposals are received for individual projects within the Morgan Ranch Master Plan. When a traffic analysis determines the improvement is needed to support a specific development proposal, the improvement must be constructed.

This intersection is in the jurisdiction of Stanislaus County. Partial funding of this improvement is being considered for inclusion in the City's Capital Improvement Program update as a part of the Golden State Boulevard/Berkeley Avenue intersection improvement. As such, reimbursement for the construction of this improvement beyond the project's fair share may be possible at a later date when the City and/or County have collected sufficient fees.

All other study intersections are estimated to operate at an acceptable LOS under *Existing Plus Project* conditions. Figure 12 and Table 11 summarizes the recommended intersection improvements and mitigated LOS conditions.

TABLE 11
EXISTING PLUS PROJECT: MITIGATED INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met?	Delay	LOS	Warrant Met?
1	Lander Avenue/SR 99 SB Ramps	Signal	D						
2	Lander Avenue/SR 99 NB Ramps	Signal	D						
3	Lander Avenue/E. Glenwood Avenue	Signal	D				51.5	D	-
4	Lander Avenue/Linwood Avenue	Signal	D						
5	Golf Road/E Glenwood Avenue	TWSC	D						
6	Golf Road/Linwood Avenue	Signal	D	12.5	B	-	15.2	B	-
7	1st Street/Berkeley Avenue	Signal	D	20.1	C	-	24.0	C	-
8	Golden State Blvd/Berkeley Avenue	Signal	D	41.3	D	-	36.8	D	-
9	Morgan Ranch Arterial / Golf Road	TWSC	D						
10	Morgan Ranch Arterial / E. Glenwood Avenue	RDBT	D						

Notes:
TWSC = Two Way Stop Control AWSC = All Way Stop Control
LOS = Worst case movement's LOS for TWSC intersections; OVR = overflow
Warrant = Caltrans Peak hour volume based signal warrant

Roadways

East Glenwood Avenue, from Lander Avenue to Morgan Ranch Arterial– This segment of East Glenwood Avenue, which currently operates as a two lane collector, is forecasted to operate at unacceptable LOS “F” on a daily basis under *Existing Plus Project* conditions. Widening East Glenwood Ave to a two-lane arterial will provide adequate capacity and result in acceptable LOS “D” or better. Consistent with General Plan Policy 5.2-s, LOS “F” conditions will trigger improvement construction at this location.

> *Policy 5.2-s:* ***Trigger for improvements****. Require improvements to be constructed where adequate ROW is available and impacts to adjacent land uses can be avoided or adequately mitigated to General Plan standards when LOS is projected to drop below LOS D (on an average daily trips basis).*

Mitigation Measure:

The proposed project’s mitigation measure is to construct the recommended improvement. The timing of the improvement’s construction will be determined by a separate traffic analysis prepared as specific development proposals are received for individual projects within the Morgan Ranch Master Plan. When a traffic analysis determines the improvement is needed to support a specific development proposal, the improvement must be constructed.

This improvement is being considered for inclusion in the City’s Capital Improvement Program update. As such, reimbursement for the construction of this improvement beyond the project’s fair share may be possible at a later date when the City has collected sufficient development impact fees for reimbursement.

All other study roadway segments are estimated to operate at an acceptable LOS under *Existing Plus Project* Conditions. A summary of the mitigated roadway LOS is presented in Table 12.

TABLE 12
EXISTING PLUS PROJECT: MITIGATED ROADWAY LEVELS OF SERVICE

Roadway Segment	Capacity Configuration	Target LOS	Average Daily Traffic (ADT)	LOS
Lander Avenue, from SR 99 to E. Glenwood Avenue	Four-Lane Divided Arterial			
Lander Avenue, from E. Glenwood Avenue to Linwood Avenue	Four-Lane Divided Arterial			
E. Glenwood Ave., from Lander Ave. to Morgan Ranch Arterial	Two-Lane Divided Arterial	D	12,900	C
E. Glenwood Avenue, from Morgan Ranch Arterial to Golf Road	Two-Lane Collector			
Golf Road, from E. Glenwood Avenue to Linwood Avenue	Two-Lane Collector			
Golf Road, from E. Glenwood Avenue to SR 99 Overcrossing	Two-Lane Collector			
Morgan Ranch Arterial, from E. Glenwood Ave. to Golf Rd.	Two-Lane Divided Arterial			

Cumulative General Plan Buildout Conditions:

Consistent with 2030 General Plan policies, no mitigation measures besides payment of appropriate development impact fees are required for the proposed project under General Plan Buildout Conditions. Although the Lander Ave roadway segment from SR 99 to East Glenwood Ave is projected to operate at LOS E, the roadway segment is already built as a 4-Lane Arterial and therefore no further improvements are required, as described in Policy 5.2-d of the General Plan Circulation Element.

Policy 5.2-d: ***Design for street improvements****. The roadway facility classifications indicated on the General Plan circulation diagram (Figure 5-2) shall be the standard to which roads needing improvements are built. The circulation diagram depicts the facility types that are necessary to match the traffic generated by the General Plan 2030 land use buildout, and therefore represent the maximum standards to which a road segment or intersection shall be improved. LOS is* not *used as a standard for determining the ultimate design of roadway facilities.*

Mitigation Measure:

The proposed project's mitigation measure should be payment of appropriate development impact fees towards General Plan circulation system improvements.

City of Turlock - Morgan Ranch Master Plan Figure 12

Mitigated Existing Plus Project Lane Geometrics and Control

APPENDIX

APPENDIX A: 2007 AND 2012 TRAFFIC COUNT COMPARISON

APPENDIX B: LOS WORKSHEETS

APPENDIX C: SIGNAL WARRANTS

APPENDIX A:

2007 and 2012 Traffic Count Comparison Memorandum

MEMORANDUM

To:	City of Turlock	**Date:**	March 28, 2012
Attn:	Mike Pitcock, Debbie Whitmore	**Project:**	Morgan Ranch
From:	Marty Inouye, Todd Tregenza		Traffic Impact Analysis Report
Re:	2007 and 2012 Traffic Count Comparison	**Job No.:**	25-7328-43
		File No.:	C832MEM006.DOCX
CC:			

In 2007, OMNI-MEANS took citywide intersection turning movement counts in the City of Turlock. Typically, traffic counts older than 3 years are not considered current for the purposes of traffic impact studies baseline conditions. However, statewide traffic levels have come to a plateau and in some cases decreased since that time. For this reason, OMNI-MEANS believes the 2007 traffic counts will be appropriate for use in the traffic study despite being slightly older than typically preferable. New traffic counts at two critical locations were taken in February 2012 in order to determine the increase or decrease in traffic during AM and PM peak hours.

The traffic counts taken by OMNI-MEANS are summarized by turning movement in Tables 1 and 2, as well as attached to this memorandum.

TABLE 1:
BERKELEY AVENUE @ GOLDEN STATE BOULEVARD

Date	Peak Hour	Berkeley Avenue						Golden State Boulevard					
		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
3/6/2007	AM	53	302	48	70	260	40	24	218	56	24	392	138
	PM	55	291	62	76	219	48	16	389	107	37	338	102
2/2/2012	AM	42	225	47	71	218	16	23	192	53	32	342	52
	PM	52	239	52	69	205	41	24	394	82	50	321	113
Change	AM	-11	-77	-1	1	-42	-24	-1	-26	-3	8	-50	-86
	PM	-3	-52	-10	-7	-14	-7	8	5	-25	13	-17	11

TABLE 2:
LANDER AVENUE @ WEST GLENWOOD AVENUE

Date	Peak Hour	Lander Avenue				West Glenwood Avenue	
		Northbound		Southbound		Eastbound	
		Left	Through	Through	Right	Left	Right
8/28/2007	AM	47	734	532	86	42	34
	PM	43	648	831	99	62	77
2/2/2012	AM	49	655	520	78	38	32
	PM	19	635	701	70	56	47
Change	AM	2	-79	-12	-8	-4	-2
	PM	-24	-13	-130	-29	-6	-30

As presented in Tables 1 and 2, the traffic volumes taken in 2012 are generally lower than those taken in 2007. For these reasons, OMNI-MEANS believes the 2007 counts will provide a reasonably conservative estimate of baseline traffic conditions.

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APPENDIX B:

Level Of Service Worksheets

Existing

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	241	4	135	0	0	0	0	751	28	116	280	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1646	1468					3264		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1646	1468					3264		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	262	4	147	0	0	0	0	816	30	126	304	0
RTOR Reduction (vph)	0	0	115	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	266	32	0	0	0	0	844	0	126	304	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		21.7	21.7					56.3		10.0	70.3	
Effective Green, g (s)		21.7	21.7					56.3		10.0	70.3	
Actuated g/C Ratio		0.22	0.22					0.56		0.10	0.70	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		357	319					1838		318	1214	
v/s Ratio Prot		c0.16						c0.26		c0.04	0.18	
v/s Ratio Perm			0.02									
v/c Ratio		0.75	0.10					0.46		0.40	0.25	
Uniform Delay, d1		36.6	31.3					12.9		42.2	5.4	
Progression Factor		1.00	1.00					1.00		0.91	1.40	
Incremental Delay, d2		8.2	0.1					0.8		0.8	0.5	
Delay (s)		44.8	31.5					13.7		39.1	8.0	
Level of Service		D	C					B		D	A	
Approach Delay (s)		40.0			0.0			13.7			17.1	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	41	1	165	417	575	0	0	355	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1647	1468	3183	3282			1727	1468
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1647	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	45	1	179	453	625	0	0	386	408
RTOR Reduction (vph)	0	0	0	0	0	164	0	0	0	0	0	163
Lane Group Flow (vph)	0	0	0	0	46	15	453	625	0	0	386	245
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					8.6	8.6	19.4	83.4			60.0	60.0
Effective Green, g (s)					8.6	8.6	19.4	83.4			60.0	60.0
Actuated g/C Ratio					0.09	0.09	0.19	0.83			0.60	0.60
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					142	126	618	2737			1036	881
v/s Ratio Prot					c0.03		c0.14	0.19			c0.22	
v/s Ratio Perm						0.01						0.17
v/c Ratio					0.32	0.12	0.73	0.23			0.37	0.28
Uniform Delay, d1					43.0	42.2	37.9	1.7			10.3	9.6
Progression Factor					1.00	1.00	0.67	0.85			0.72	1.78
Incremental Delay, d2					1.3	0.4	4.0	0.2			1.0	0.8
Delay (s)					44.3	42.7	29.4	1.6			8.4	17.9
Level of Service					D	D	C	A			A	B
Approach Delay (s)		0.0			43.0			13.3			13.3	
Approach LOS		A			D			B			B	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	4	63	173	5	67	80	610	83	60	431	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1658	1468		1647	1468	1641	3223		1641	3274	
Flt Permitted		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1658	1468		1647	1468	1641	3223		1641	3274	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	4	68	188	5	73	87	663	90	65	468	8
RTOR Reduction (vph)	0	0	64	0	0	60	0	8	0	0	1	0
Lane Group Flow (vph)	0	25	4	0	193	13	87	745	0	65	475	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		6.1	6.1		16.8	16.8	9.3	53.1		8.0	51.8	
Effective Green, g (s)		6.1	6.1		16.8	16.8	9.3	53.1		8.0	51.8	
Actuated g/C Ratio		0.06	0.06		0.17	0.17	0.09	0.53		0.08	0.52	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		101	90		277	247	153	1711		131	1696	
v/s Ratio Prot		c0.02			c0.12		c0.05	c0.23		c0.04	0.15	
v/s Ratio Perm			0.00			0.01						
v/c Ratio		0.25	0.05		0.70	0.05	0.57	0.44		0.50	0.28	
Uniform Delay, d1		44.8	44.2		39.2	34.9	43.4	14.3		44.1	13.6	
Progression Factor		1.00	1.00		1.00	1.00	0.77	0.66		1.00	1.00	
Incremental Delay, d2		1.3	0.2		7.4	0.1	4.7	0.8		2.9	0.4	
Delay (s)		46.0	44.4		46.6	35.0	38.2	10.3		47.0	14.0	
Level of Service		D	D		D	D	D	B		D	B	
Approach Delay (s)		44.9			43.4			13.2			18.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	190	75	51	186	44	78	557	32	23	313	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1640		1641	1727	1447	1641	3250		1641	3168	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1640		1641	1727	1447	1641	3250		1641	3168	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	207	82	55	202	48	85	605	35	25	340	86
RTOR Reduction (vph)	0	14	0	0	0	32	0	5	0	0	25	0
Lane Group Flow (vph)	163	275	0	55	202	16	85	635	0	25	401	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	12.7	24.5		4.6	16.4	16.4	9.5	23.3		1.8	15.6	
Effective Green, g (s)	12.7	24.5		4.6	16.4	16.4	9.5	23.3		1.8	15.6	
Actuated g/C Ratio	0.18	0.35		0.07	0.23	0.23	0.14	0.33		0.03	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	297	572		108	403	338	222	1079		42	704	
v/s Ratio Prot	c0.10	c0.17		0.03	0.12		c0.05	c0.20		0.02	0.13	
v/s Ratio Perm						0.01						
v/c Ratio	0.55	0.48		0.51	0.50	0.05	0.38	0.59		0.60	0.57	
Uniform Delay, d1	26.1	17.9		31.7	23.3	20.8	27.7	19.5		33.8	24.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.6		3.7	1.0	0.1	1.1	0.8		20.6	1.1	
Delay (s)	28.2	18.5		35.5	24.3	20.9	28.8	20.3		54.4	25.4	
Level of Service	C	B		D	C	C	C	C		D	C	
Approach Delay (s)		22.0			25.8			21.3			27.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	55	7	17	81	100	69
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	8	18	88	109	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	271	146	109			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	271	146	109			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	99			
cM capacity (veh/h)	703	893	1463			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	67	107	184
Volume Left	60	18	0
Volume Right	8	0	75
cSH	720	1463	1700
Volume to Capacity	0.09	0.01	0.11
Queue Length 95th (ft)	8	1	0
Control Delay (s)	10.5	1.4	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	1.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	198	13	12	219	229	113
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	215	14	13	238	249	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	574	310	372			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	574	310	372			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	54	98	99			
cM capacity (veh/h)	470	723	1170			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	229	251	372
Volume Left	215	13	0
Volume Right	14	0	123
cSH	480	1170	1700
Volume to Capacity	0.48	0.01	0.22
Queue Length 95th (ft)	63	1	0
Control Delay (s)	19.2	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	19.2	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	316	24	30	399	20	28
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	343	26	33	434	22	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	323	249			466	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	323	249			466	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	97			98	
cM capacity (veh/h)	651	782			1080	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	370	466	52
Volume Left	343	0	22
Volume Right	26	434	0
cSH	659	1700	1080
Volume to Capacity	0.56	0.27	0.02
Queue Length 95th (ft)	87	0	2
Control Delay (s)	17.2	0.0	3.6
Lane LOS	C		A
Approach Delay (s)	17.2	0.0	3.6
Approach LOS	C		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	53	326	0	0	330	40	24	392	138	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	354	0	0	359	43	26	426	150	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3
Volume Total (vph)	412	402	168	284	150
Volume Left (vph)	58	0	26	0	0
Volume Right (vph)	0	43	0	0	150
Hadj (s)	0.11	0.02	0.16	0.08	-0.62
Departure Headway (s)	6.1	6.0	7.0	6.9	3.2
Degree Utilization, x	0.70	0.67	0.33	0.55	0.13
Capacity (veh/h)	569	570	493	490	1121
Control Delay (s)	22.0	20.7	12.2	16.7	5.5
Approach Delay (s)	22.0	20.7	12.6		
Approach LOS	C	C	B		

Intersection Summary			
Delay	17.7		
HCM Level of Service	C		
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	355	64	70	284	0	0	0	0	24	218	56
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	386	70	76	309	0	0	0	0	26	237	61

Direction, Lane #	EB 1	WB 1	SB 1	SB 2	SB 3
Volume Total (vph)	455	385	105	158	61
Volume Left (vph)	0	76	26	0	0
Volume Right (vph)	70	0	0	0	61
Hadj (s)	-0.01	0.12	0.21	0.09	-0.62
Departure Headway (s)	5.3	5.6	6.9	6.8	3.2
Degree Utilization, x	0.68	0.59	0.20	0.30	0.05
Capacity (veh/h)	653	628	484	492	1121
Control Delay (s)	18.7	16.3	10.4	11.4	5.2
Approach Delay (s)	18.7	16.3	9.9		
Approach LOS	C	C	A		

Intersection Summary			
Delay	15.5		
HCM Level of Service	C		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	427	1	283	0	0	0	0	669	11	231	387	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					1.00		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1645	1468					3274		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1645	1468					3274		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	464	1	308	0	0	0	0	727	12	251	421	0
RTOR Reduction (vph)	0	0	201	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	465	107	0	0	0	0	738	0	251	421	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		34.8	34.8					40.9		12.3	57.2	
Effective Green, g (s)		34.8	34.8					40.9		12.3	57.2	
Actuated g/C Ratio		0.35	0.35					0.41		0.12	0.57	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		572	511					1339		392	988	
v/s Ratio Prot		c0.28						c0.23		c0.08	0.24	
v/s Ratio Perm			0.07									
v/c Ratio		0.81	0.21					0.55		0.64	0.43	
Uniform Delay, d1		29.6	22.9					22.5		41.7	12.1	
Progression Factor		1.00	1.00					1.00		0.71	0.64	
Incremental Delay, d2		8.6	0.2					1.6		3.0	1.1	
Delay (s)		38.3	23.1					24.2		32.4	8.8	
Level of Service		D	C					C		C	A	
Approach Delay (s)		32.2			0.0			24.2			17.6	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	43	1	179	350	746	0	0	575	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1647	1468	3183	3282			1727	1468
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1647	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	47	1	195	380	811	0	0	625	315
RTOR Reduction (vph)	0	0	0	0	0	178	0	0	0	0	0	122
Lane Group Flow (vph)	0	0	0	0	48	17	380	811	0	0	625	193
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					8.8	8.8	18.0	83.2			61.2	61.2
Effective Green, g (s)					8.8	8.8	18.0	83.2			61.2	61.2
Actuated g/C Ratio					0.09	0.09	0.18	0.83			0.61	0.61
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					145	129	573	2731			1057	898
v/s Ratio Prot					c0.03		c0.12	0.25			c0.36	
v/s Ratio Perm						0.01						0.13
v/c Ratio					0.33	0.13	0.66	0.30			0.59	0.21
Uniform Delay, d1					42.8	42.1	38.2	1.9			11.8	8.7
Progression Factor					1.00	1.00	0.86	0.78			0.65	0.83
Incremental Delay, d2					1.3	0.5	2.3	0.2			2.3	0.5
Delay (s)					44.2	42.6	35.3	1.7			10.0	7.7
Level of Service					D	D	D	A			B	A
Approach Delay (s)		0.0			42.9			12.4			9.2	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	9	75	149	11	48	32	618	162	83	600	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1665	1468		1650	1468	1641	3180		1641	3266	
Flt Permitted		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1665	1468		1650	1468	1641	3180		1641	3266	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	10	82	162	12	52	35	672	176	90	652	21
RTOR Reduction (vph)	0	0	76	0	0	44	0	18	0	0	2	0
Lane Group Flow (vph)	0	40	6	0	174	8	35	830	0	90	671	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		6.8	6.8		15.7	15.7	5.0	51.1		10.4	56.5	
Effective Green, g (s)		6.8	6.8		15.7	15.7	5.0	51.1		10.4	56.5	
Actuated g/C Ratio		0.07	0.07		0.16	0.16	0.05	0.51		0.10	0.56	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		113	100		259	230	82	1625		171	1845	
v/s Ratio Prot		c0.02			c0.11		0.02	c0.26		c0.05	0.21	
v/s Ratio Perm			0.00			0.01						
v/c Ratio		0.35	0.06		0.67	0.04	0.43	0.51		0.53	0.36	
Uniform Delay, d1		44.5	43.6		39.7	35.7	46.1	16.2		42.5	11.9	
Progression Factor		1.00	1.00		1.00	1.00	0.96	0.73		1.00	1.00	
Incremental Delay, d2		1.9	0.2		6.7	0.1	3.4	1.1		2.9	0.6	
Delay (s)		46.4	43.8		46.4	35.8	47.6	12.9		45.4	12.5	
Level of Service		D	D		D	D	D	B		D	B	
Approach Delay (s)		44.7			44.0			14.3			16.3	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	152	89	81	101	40	46	462	86	58	613	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1613		1641	1727	1447	1641	3192		1641	3195	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1613		1641	1727	1447	1641	3192		1641	3195	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	165	97	88	110	43	50	502	93	63	666	122
RTOR Reduction (vph)	0	22	0	0	0	34	0	16	0	0	15	0
Lane Group Flow (vph)	170	240	0	88	110	9	50	579	0	63	773	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.3	17.3		7.0	14.0	14.0	3.4	22.7		6.2	25.5	
Effective Green, g (s)	10.3	17.3		7.0	14.0	14.0	3.4	22.7		6.2	25.5	
Actuated g/C Ratio	0.15	0.25		0.10	0.20	0.20	0.05	0.33		0.09	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	403		166	349	293	81	1047		147	1177	
v/s Ratio Prot	c0.10	c0.15		0.05	0.06		0.03	0.18		c0.04	c0.24	
v/s Ratio Perm						0.01						
v/c Ratio	0.70	0.60		0.53	0.32	0.03	0.62	0.55		0.43	0.66	
Uniform Delay, d1	28.0	22.9		29.5	23.5	22.1	32.3	19.1		29.8	18.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	2.4		3.2	0.5	0.0	13.2	0.6		2.0	1.3	
Delay (s)	36.3	25.2		32.8	24.0	22.2	45.4	19.7		31.8	19.5	
Level of Service	D	C		C	C	C	D	B		C	B	
Approach Delay (s)		29.6			26.9			21.7			20.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	78	20	16	119	134	73
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	22	17	129	146	79
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	349	185	146			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349	185	146			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	97	99			
cM capacity (veh/h)	634	849	1418			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	107	147	225
Volume Left	85	17	0
Volume Right	22	0	79
cSH	668	1418	1700
Volume to Capacity	0.16	0.01	0.13
Queue Length 95th (ft)	14	1	0
Control Delay (s)	11.4	1.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.4	1.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	236	9	19	148	202	156
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	257	10	21	161	220	170
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	507	304	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	507	304	389			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	50	99	98			
cM capacity (veh/h)	511	728	1153			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	266	182	389
Volume Left	257	21	0
Volume Right	10	0	170
cSH	517	1153	1700
Volume to Capacity	0.52	0.02	0.23
Queue Length 95th (ft)	73	1	0
Control Delay (s)	19.1	1.1	0.0
Lane LOS	C	A	
Approach Delay (s)	19.1	1.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	332	31	30	376	52	40
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	361	34	33	409	57	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	393	237			441	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	393	237			441	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	37	96			95	
cM capacity (veh/h)	574	795			1103	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	395	441	100
Volume Left	361	0	57
Volume Right	34	409	0
cSH	588	1700	1103
Volume to Capacity	0.67	0.26	0.05
Queue Length 95th (ft)	126	0	4
Control Delay (s)	22.7	0.0	5.0
Lane LOS	C		A
Approach Delay (s)	22.7	0.0	5.0
Approach LOS	C		

Intersection Summary			
Average Delay	10.1		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	55	307	0	0	295	48	37	338	102	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	334	0	0	321	52	40	367	111	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3
Volume Total (vph)	393	373	163	245	111
Volume Left (vph)	60	0	40	0	0
Volume Right (vph)	0	52	0	0	111
Hadj (s)	0.12	0.00	0.21	0.09	-0.62
Departure Headway (s)	5.9	5.8	6.9	6.7	3.2
Degree Utilization, x	0.64	0.60	0.31	0.46	0.10
Capacity (veh/h)	590	600	501	499	1121
Control Delay (s)	18.8	17.2	11.7	14.1	5.3
Approach Delay (s)	18.8	17.2	11.5		
Approach LOS	C	C	B		

Intersection Summary			
Delay	15.4		
HCM Level of Service	C		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	346	82	76	256	0	0	0	0	16	389	107
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	376	89	83	278	0	0	0	0	17	423	116

Direction, Lane #	EB 1	WB 1	SB 1	SB 2	SB 3
Volume Total (vph)	465	361	158	282	116
Volume Left (vph)	0	83	17	0	0
Volume Right (vph)	89	0	0	0	116
Hadj (s)	-0.03	0.13	0.14	0.08	-0.62
Departure Headway (s)	5.9	6.2	7.0	6.9	3.2
Degree Utilization, x	0.76	0.62	0.31	0.54	0.10
Capacity (veh/h)	597	551	481	488	1121
Control Delay (s)	25.0	18.8	11.9	16.7	5.4
Approach Delay (s)	25.0	18.8	12.9		
Approach LOS	C	C	B		

Intersection Summary			
Delay	18.5		
HCM Level of Service	C		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

Existing Plus Project

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	303	4	135	0	0	0	0	756	28	182	293	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1646	1468					3264		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1646	1468					3264		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	329	4	147	0	0	0	0	822	30	198	318	0
RTOR Reduction (vph)	0	0	108	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	333	39	0	0	0	0	849	0	198	318	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		23.7	23.7					44.3		10.0	58.3	
Effective Green, g (s)		23.7	23.7					44.3		10.0	58.3	
Actuated g/C Ratio		0.26	0.26					0.49		0.11	0.65	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		433	386					1606		353	1118	
v/s Ratio Prot		c0.20						c0.26		c0.06	0.18	
v/s Ratio Perm			0.03									
v/c Ratio		0.77	0.10					0.53		0.56	0.28	
Uniform Delay, d1		30.6	25.1					15.7		37.9	6.8	
Progression Factor		1.00	1.00					1.00		0.79	0.17	
Incremental Delay, d2		8.0	0.1					1.3		1.8	0.6	
Delay (s)		38.6	25.2					16.9		31.7	1.7	
Level of Service		D	C					B		C	A	
Approach Delay (s)		34.5			0.0			16.9			13.2	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	41	1	191	417	642	0	0	435	534
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1647	1468	3183	3282			1727	1468
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1647	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	45	1	208	453	698	0	0	473	580
RTOR Reduction (vph)	0	0	0	0	0	188	0	0	0	0	0	232
Lane Group Flow (vph)	0	0	0	0	46	20	453	698	0	0	473	348
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					8.6	8.6	19.0	73.4			50.4	50.4
Effective Green, g (s)					8.6	8.6	19.0	73.4			50.4	50.4
Actuated g/C Ratio					0.10	0.10	0.21	0.82			0.56	0.56
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					157	140	671	2676			967	822
v/s Ratio Prot					c0.03		c0.14	0.21			c0.27	
v/s Ratio Perm						0.01						0.24
v/c Ratio					0.29	0.14	0.68	0.26			0.49	0.42
Uniform Delay, d1					37.9	37.3	32.7	1.9			12.0	11.4
Progression Factor					1.00	1.00	0.94	0.13			0.31	0.67
Incremental Delay, d2					1.0	0.5	2.3	0.2			1.5	1.4
Delay (s)					38.9	37.8	33.0	0.5			5.2	9.0
Level of Service					D	D	C	A			A	A
Approach Delay (s)		0.0			38.0			13.3			7.3	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	4	63	412	5	226	80	610	176	122	431	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1658	1468		1646	1468	1641	3172		1641	3274	
Flt Permitted		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1658	1468		1646	1468	1641	3172		1641	3274	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	4	68	448	5	246	87	663	191	133	468	8
RTOR Reduction (vph)	0	0	64	0	0	102	0	29	0	0	1	0
Lane Group Flow (vph)	0	25	4	0	453	144	87	825	0	133	475	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		5.9	5.9		32.1	32.1	8.0	27.0		9.0	28.0	
Effective Green, g (s)		5.9	5.9		32.1	32.1	8.0	27.0		9.0	28.0	
Actuated g/C Ratio		0.07	0.07		0.36	0.36	0.09	0.30		0.10	0.31	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		108	96		587	523	145	951		164	1018	
v/s Ratio Prot		c0.02			c0.28		0.05	c0.26		c0.08	0.14	
v/s Ratio Perm			0.00			0.10						
v/c Ratio		0.23	0.05		0.77	0.28	0.60	0.87		0.81	0.47	
Uniform Delay, d1		39.9	39.4		25.7	20.7	39.5	29.8		39.7	25.0	
Progression Factor		1.00	1.00		1.00	1.00	0.80	0.75		1.00	1.00	
Incremental Delay, d2		1.1	0.2		6.2	0.3	6.3	10.3		25.3	1.5	
Delay (s)		41.0	39.6		31.9	20.9	37.9	32.5		64.9	26.5	
Level of Service		D	D		C	C	D	C		E	C	
Approach Delay (s)		40.0			28.1			33.0			34.9	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	190	85	51	186	44	105	690	32	23	364	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1633		1641	1727	1447	1641	3256		1641	3181	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1633		1641	1727	1447	1641	3256		1641	3181	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	207	92	55	202	48	114	750	35	25	396	86
RTOR Reduction (vph)	0	21	0	0	0	38	0	4	0	0	22	0
Lane Group Flow (vph)	163	278	0	55	202	10	114	781	0	25	460	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	9.2	20.0		3.5	14.3	14.3	9.0	24.5		1.6	17.1	
Effective Green, g (s)	9.2	20.0		3.5	14.3	14.3	9.0	24.5		1.6	17.1	
Actuated g/C Ratio	0.14	0.30		0.05	0.22	0.22	0.14	0.37		0.02	0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	497		87	376	315	225	1216		40	829	
v/s Ratio Prot	c0.10	c0.17		0.03	0.12		c0.07	c0.24		0.02	0.14	
v/s Ratio Perm						0.01						
v/c Ratio	0.71	0.56		0.63	0.54	0.03	0.51	0.64		0.62	0.55	
Uniform Delay, d1	26.9	19.1		30.4	22.7	20.2	26.2	16.9		31.7	21.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.6	1.4		14.0	1.5	0.0	1.8	1.2		26.7	0.8	
Delay (s)	36.5	20.5		44.4	24.2	20.2	28.0	18.1		58.4	21.8	
Level of Service	D	C		D	C	C	C	B		E	C	
Approach Delay (s)		26.1			27.2			19.4			23.6	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	65.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	96	7	17	251	166	85
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	104	8	18	273	180	92
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	536	227	180			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536	227	180			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	99	99			
cM capacity (veh/h)	493	805	1377			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	112	291	273
Volume Left	104	18	0
Volume Right	8	0	92
cSH	507	1377	1700
Volume to Capacity	0.22	0.01	0.16
Queue Length 95th (ft)	21	1	0
Control Delay (s)	14.1	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	14.1	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	198	15	17	425	309	113
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	215	16	18	462	336	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	896	397	459			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896	397	459			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	29	97	98			
cM capacity (veh/h)	302	646	1087			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	232	480	459
Volume Left	215	18	0
Volume Right	16	0	123
cSH	313	1087	1700
Volume to Capacity	0.74	0.02	0.27
Queue Length 95th (ft)	138	1	0
Control Delay (s)	43.0	0.5	0.0
Lane LOS	E	A	
Approach Delay (s)	43.0	0.5	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	396	24	30	605	20	28
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	430	26	33	658	22	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	435	361			690	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	435	361			690	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	23	96			98	
cM capacity (veh/h)	558	677			891	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	457	690	52
Volume Left	430	0	22
Volume Right	26	658	0
cSH	564	1700	891
Volume to Capacity	0.81	0.41	0.02
Queue Length 95th (ft)	200	0	2
Control Delay (s)	33.0	0.0	3.9
Lane LOS	D		A
Approach Delay (s)	33.0	0.0	3.9
Approach LOS	D		

Intersection Summary			
Average Delay	12.7		
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	494	130	70	331	0	0	0	0	24	218	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	537	141	76	360	0	0	0	0	26	237	97

Direction, Lane #	EB 1	WB 1	SB 1	SB 2	SB 3
Volume Total (vph)	678	436	105	158	97
Volume Left (vph)	0	76	26	0	0
Volume Right (vph)	141	0	0	0	97
Hadj (s)	-0.04	0.12	0.21	0.09	-0.61
Departure Headway (s)	5.5	5.9	7.5	7.3	3.2
Degree Utilization, x	1.0	0.71	0.22	0.32	0.09
Capacity (veh/h)	658	597	468	476	1121
Control Delay (s)	69.5	22.2	11.3	12.6	5.3
Approach Delay (s)	69.5	22.2	10.3		
Approach LOS	F	C	B		

Intersection Summary			
Delay	41.0		
Level of Service	E		
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	139	379	0	0	351	40	50	392	138	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	151	412	0	0	382	43	54	426	150	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3
Volume Total (vph)	563	425	196	284	150
Volume Left (vph)	151	0	54	0	0
Volume Right (vph)	0	43	0	0	150
Hadj (s)	0.14	0.02	0.22	0.08	-0.61
Departure Headway (s)	6.4	6.6	7.7	7.5	3.2
Degree Utilization, x	1.0	0.78	0.42	0.59	0.13
Capacity (veh/h)	563	546	470	471	1121
Control Delay (s)	64.3	28.8	14.9	19.7	5.5
Approach Delay (s)	64.3	28.8	14.8		
Approach LOS	F	D	B		

Intersection Summary			
Delay	35.7		
Level of Service	E		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	170	0	20	0	0	0	8	98	0	0	107	66
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	0	22	0	0	0	9	107	0	0	116	72
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	276	276	152	298	312	107	188			107		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276	276	152	298	312	107	188			107		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	100	98	100	100	100	99			100		
cM capacity (veh/h)	667	622	886	630	594	940	1368			1466		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	185	22	9	107	188
Volume Left	185	0	9	0	0
Volume Right	0	22	0	0	72
cSH	667	886	1368	1700	1700
Volume to Capacity	0.28	0.02	0.01	0.06	0.11
Queue Length 95th (ft)	28	2	0	0	0
Control Delay (s)	12.5	9.2	7.6	0.0	0.0
Lane LOS	B	A	A		
Approach Delay (s)	12.1		0.6		0.0
Approach LOS	B				

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

INTERSECTION SUMMARY

Site: E+P Intersection 10 (AM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Travel Speed (Average)	36.0	mph	36.0	mph
Travel Distance (Total)	663.6	veh-mi/h	796.4	pers-mi/h
Travel Time (Total)	18.4	veh-h/h	22.1	pers-h/h
Demand Flows (Total)	1049	veh/h	1259	pers/h
Percent Heavy Vehicles (Demand)	5.0	%		
Degree of Saturation	0.394			
Practical Spare Capacity	115.7	%		
Effective Intersection Capacity	2662	veh/h		
Control Delay (Total)	1.86	veh-h/h	2.23	pers-h/h
Control Delay (Average)	6.4	sec	6.4	sec
Control Delay (Worst Lane)	9.9	sec		
Control Delay (Worst Movement)	12.6	sec	12.6	sec
Geometric Delay (Average)	5.1	sec		
Stop-Line Delay (Average)	1.3	sec		
Idling Time (Average)	0.0	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	2.2	veh		
95% Back of Queue - Distance (Worst Lane)	56.1	ft		
Queue Storage Ratio (Worst Lane)	0.05			
Total Effective Stops	593	veh/h	711	pers/h
Effective Stop Rate	0.57	per veh	0.57	per pers
Proportion Queued	0.36		0.36	
Performance Index	29.7		29.7	
Cost (Total)	304.78	$/h	304.78	$/h
Fuel Consumption (Total)	28.6	gal/h		
Carbon Dioxide (Total)	257.8	kg/h		
Hydrocarbons (Total)	0.021	kg/h		
Carbon Monoxide (Total)	0.305	kg/h		
NOx (Total)	0.568	kg/h		

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	503,478	veh/y	604,174	pers/y
Delay	893	veh-h/y	1,072	pers-h/y
Effective Stops	284,509	veh/y	341,411	pers/y
Travel Distance	318,551	veh-mi/y	382,261	pers-mi/y
Travel Time	8,844	veh-h/y	10,612	pers-h/y
Cost	146,292	$/y	146,292	$/y
Fuel Consumption	13,744	gal/y		
Carbon Dioxide	123,755	kg/y		
Hydrocarbons	10	kg/y		
Carbon Monoxide	146	kg/y		
NOx	273	kg/y		

SIDRA INTERSECTION 6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	648	1	283	0	0	0	0	687	11	299	401	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					1.00		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1645	1468					3274		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1645	1468					3274		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	704	1	308	0	0	0	0	747	12	325	436	0
RTOR Reduction (vph)	0	0	133	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	705	175	0	0	0	0	758	0	325	436	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		67.8	67.8					42.2		18.0	64.2	
Effective Green, g (s)		67.8	67.8					42.2		18.0	64.2	
Actuated g/C Ratio		0.48	0.48					0.30		0.13	0.46	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		796	710					986		409	791	
v/s Ratio Prot		c0.43						c0.23		c0.10	0.25	
v/s Ratio Perm			0.12									
v/c Ratio		0.89	0.25					0.77		0.79	0.55	
Uniform Delay, d1		32.6	21.1					44.5		59.2	27.5	
Progression Factor		1.00	1.00					1.00		0.64	0.34	
Incremental Delay, d2		11.6	0.2					5.8		8.0	2.1	
Delay (s)		44.2	21.3					50.2		46.1	11.5	
Level of Service		D	C					D		D	B	
Approach Delay (s)		37.2			0.0			50.2			26.3	
Approach LOS		D			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	43	1	271	350	985	0	0	657	454
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1647	1468	3183	3282			1727	1468
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1647	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	47	1	295	380	1071	0	0	714	493
RTOR Reduction (vph)	0	0	0	0	0	136	0	0	0	0	0	163
Lane Group Flow (vph)	0	0	0	0	48	159	380	1071	0	0	714	330
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					19.6	19.6	22.0	112.4			86.4	86.4
Effective Green, g (s)					19.6	19.6	22.0	112.4			86.4	86.4
Actuated g/C Ratio					0.14	0.14	0.16	0.80			0.62	0.62
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					230	205	500	2634			1065	905
v/s Ratio Prot					0.03		c0.12	0.33			c0.41	
v/s Ratio Perm						c0.11						0.22
v/c Ratio					0.21	0.78	0.76	0.41			0.67	0.36
Uniform Delay, d1					53.3	58.1	56.5	4.0			17.5	13.2
Progression Factor					1.00	1.00	1.15	1.08			0.42	0.00
Incremental Delay, d2					0.5	16.7	4.0	0.3			2.8	0.9
Delay (s)					53.8	74.8	68.7	4.6			10.2	1.0
Level of Service					D	E	E	A			B	A
Approach Delay (s)		0.0			71.8			21.4			6.4	
Approach LOS		A			E			C			A	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	9	75	395	11	212	32	618	493	304	600	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.93		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1665	1468		1647	1468	1641	3063		1641	3266	
Flt Permitted		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1665	1468		1647	1468	1641	3063		1641	3266	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	10	82	429	12	230	35	672	536	330	652	21
RTOR Reduction (vph)	0	0	77	0	0	71	0	104	0	0	2	0
Lane Group Flow (vph)	0	40	5	0	441	159	35	1104	0	330	671	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		8.8	8.8		41.2	41.2	5.6	46.2		27.8	68.4	
Effective Green, g (s)		8.8	8.8		41.2	41.2	5.6	46.2		27.8	68.4	
Actuated g/C Ratio		0.06	0.06		0.29	0.29	0.04	0.33		0.20	0.49	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		104	92		484	432	65	1010		325	1595	
v/s Ratio Prot		c0.02			c0.27		0.02	c0.36		c0.20	0.21	
v/s Ratio Perm			0.00			0.11						
v/c Ratio		0.38	0.06		0.91	0.37	0.54	1.09		1.02	0.42	
Uniform Delay, d1		63.0	61.7		47.6	39.1	65.9	46.9		56.1	23.1	
Progression Factor		1.00	1.00		1.00	1.00	1.11	0.63		1.00	1.00	
Incremental Delay, d2		2.4	0.3		21.3	0.5	7.5	56.0		53.9	0.8	
Delay (s)		65.4	61.9		68.9	39.6	80.7	85.5		110.0	23.9	
Level of Service		E	E		E	D	F	F		F	C	
Approach Delay (s)		63.1			58.9			85.4			52.2	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	67.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	152	126	81	101	40	73	598	86	58	797	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1589		1641	1727	1447	1641	3210		1641	3212	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1589		1641	1727	1447	1641	3210		1641	3212	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	165	137	88	110	43	79	650	93	63	866	122
RTOR Reduction (vph)	0	41	0	0	0	36	0	14	0	0	14	0
Lane Group Flow (vph)	170	261	0	88	110	7	79	729	0	63	974	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.4	15.4		5.0	10.0	10.0	3.5	26.6		3.1	26.2	
Effective Green, g (s)	10.4	15.4		5.0	10.0	10.0	3.5	26.6		3.1	26.2	
Actuated g/C Ratio	0.16	0.23		0.08	0.15	0.15	0.05	0.40		0.05	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	258	370		124	261	218	86	1291		76	1273	
v/s Ratio Prot	c0.10	c0.16		0.05	0.06		c0.05	0.23		0.04	c0.30	
v/s Ratio Perm						0.00						
v/c Ratio	0.66	0.71		0.71	0.42	0.03	0.92	0.56		0.83	0.77	
Uniform Delay, d1	26.2	23.3		29.8	25.4	23.9	31.2	15.3		31.2	17.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	6.0		17.0	1.1	0.1	69.7	0.6		49.7	2.8	
Delay (s)	32.2	29.3		46.8	26.5	24.0	100.8	15.8		80.9	20.1	
Level of Service	C	C		D	C	C	F	B		F	C	
Approach Delay (s)		30.3			33.5			24.0			23.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	120	20	16	294	370	130
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	22	17	320	402	141
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	827	473	402			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	827	473	402			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	61	96	98			
cM capacity (veh/h)	332	585	1140			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	152	337	543
Volume Left	130	17	0
Volume Right	22	0	141
cSH	354	1140	1700
Volume to Capacity	0.43	0.02	0.32
Queue Length 95th (ft)	52	1	0
Control Delay (s)	22.6	0.6	0.0
Lane LOS	C	A	
Approach Delay (s)	22.6	0.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	236	16	24	359	487	156
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	257	17	26	390	529	170
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1057	614	699			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1057	614	699			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	96	97			
cM capacity (veh/h)	239	486	884			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	274	416	699
Volume Left	257	26	0
Volume Right	17	0	170
cSH	247	884	1700
Volume to Capacity	1.11	0.03	0.41
Queue Length 95th (ft)	299	2	0
Control Delay (s)	133.2	0.9	0.0
Lane LOS	F	A	
Approach Delay (s)	133.2	0.9	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	26.5		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	617	31	30	587	52	40
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	671	34	33	638	57	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	508	352			671	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	508	352			671	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	95			94	
cM capacity (veh/h)	487	685			906	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	704	671	100
Volume Left	671	0	57
Volume Right	34	638	0
cSH	494	1700	906
Volume to Capacity	1.43	0.39	0.06
Queue Length 95th (ft)	852	0	5
Control Delay (s)	226.1	0.0	5.5
Lane LOS	F		A
Approach Delay (s)	226.1	0.0	5.5
Approach LOS	F		

Intersection Summary			
Average Delay	108.4		
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	490	150	76	422	0	0	0	0	16	389	227
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	533	163	83	459	0	0	0	0	17	423	247

Direction, Lane #	EB 1	WB 1	SB 1	SB 2	SB 3
Volume Total (vph)	696	541	158	282	247
Volume Left (vph)	0	83	17	0	0
Volume Right (vph)	163	0	0	0	247
Hadj (s)	-0.06	0.12	0.14	0.08	-0.61
Departure Headway (s)	6.4	6.5	7.7	7.6	3.2
Degree Utilization, x	1.0	0.98	0.34	0.60	0.22
Capacity (veh/h)	570	541	461	458	1122
Control Delay (s)	142.6	57.6	13.4	20.2	5.9
Approach Delay (s)	142.6	57.6	13.5		
Approach LOS	F	F	B		

Intersection Summary			
Delay	72.6		
Level of Service	F		
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	144	362	0	0	369	48	129	338	102	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	157	393	0	0	401	52	140	367	111	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3
Volume Total (vph)	550	453	263	245	111
Volume Left (vph)	157	0	140	0	0
Volume Right (vph)	0	52	0	0	111
Hadj (s)	0.14	0.02	0.35	0.08	-0.61
Departure Headway (s)	6.6	6.6	7.9	7.6	3.2
Degree Utilization, x	1.0	0.84	0.57	0.52	0.10
Capacity (veh/h)	550	543	449	475	1121
Control Delay (s)	64.9	34.9	19.8	17.3	5.3
Approach Delay (s)	64.9	34.9	16.2		
Approach LOS	F	D	C		

Intersection Summary			
Delay	38.0		
Level of Service	E		
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	175	0	20	0	0	0	28	135	0	0	154	236
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	0	22	0	0	0	30	147	0	0	167	257
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	503	503	296	525	632	147	424			147		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	503	503	296	525	632	147	424			147		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	59	100	97	100	100	100	97			100		
cM capacity (veh/h)	464	454	737	436	383	892	1119			1417		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	190	22	30	147	424
Volume Left	190	0	30	0	0
Volume Right	0	22	0	0	257
cSH	464	737	1119	1700	1700
Volume to Capacity	0.41	0.03	0.03	0.09	0.25
Queue Length 95th (ft)	49	2	2	0	0
Control Delay (s)	18.0	10.0	8.3	0.0	0.0
Lane LOS	C	B	A		
Approach Delay (s)	17.2		1.4		0.0
Approach LOS	C				

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

INTERSECTION SUMMARY

Site: E+P Intersection 10 (PM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	36.1 mph	36.1 mph
Travel Distance (Total)	997.5 veh-mi/h	1197.0 pers-mi/h
Travel Time (Total)	27.6 veh-h/h	33.1 pers-h/h
Demand Flows (Total)	1570 veh/h	1883 pers/h
Percent Heavy Vehicles (Demand)	5.0 %	
Degree of Saturation	0.456	
Practical Spare Capacity	86.5 %	
Effective Intersection Capacity	3444 veh/h	
Control Delay (Total)	2.84 veh-h/h	3.41 pers-h/h
Control Delay (Average)	6.5 sec	6.5 sec
Control Delay (Worst Lane)	10.0 sec	
Control Delay (Worst Movement)	12.5 sec	12.5 sec
Geometric Delay (Average)	5.3 sec	
Stop-Line Delay (Average)	1.2 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	2.8 veh	
95% Back of Queue - Distance (Worst Lane)	72.6 ft	
Queue Storage Ratio (Worst Lane)	0.06	
Total Effective Stops	860 veh/h	1032 pers/h
Effective Stop Rate	0.55 per veh	0.55 per pers
Proportion Queued	0.31	0.31
Performance Index	43.5	43.5
Cost (Total)	456.46 $/h	456.46 $/h
Fuel Consumption (Total)	42.8 gal/h	
Carbon Dioxide (Total)	385.2 kg/h	
Hydrocarbons (Total)	0.032 kg/h	
Carbon Monoxide (Total)	0.455 kg/h	
NOx (Total)	0.846 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	753,391 veh/y	904,070 pers/y
Delay	1,362 veh-h/y	1,635 pers-h/y
Effective Stops	412,690 veh/y	495,228 pers/y
Travel Distance	478,811 veh-mi/y	574,573 pers-mi/y
Travel Time	13,248 veh-h/y	15,897 pers-h/y
Cost	219,099 $/y	219,099 $/y
Fuel Consumption	20,537 gal/y	
Carbon Dioxide	184,920 kg/y	
Hydrocarbons	15 kg/y	
Carbon Monoxide	218 kg/y	
NOx	406 kg/y	

SIDRA INTERSECTION 6

Cumulative

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	365	5	95	0	0	0	0	765	50	85	625	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1646	1468					3252		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1646	1468					3252		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	397	5	103	0	0	0	0	832	54	92	679	0
RTOR Reduction (vph)	0	0	72	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	402	31	0	0	0	0	881	0	92	679	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		24.2	24.2					39.8		4.0	47.8	
Effective Green, g (s)		24.2	24.2					39.8		4.0	47.8	
Actuated g/C Ratio		0.30	0.30					0.50		0.05	0.60	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		497	444					1617		159	1031	
v/s Ratio Prot		c0.24						0.27		0.03	c0.39	
v/s Ratio Perm			0.02									
v/c Ratio		0.81	0.07					0.54		0.58	0.66	
Uniform Delay, d1		25.8	19.9					13.9		37.2	10.7	
Progression Factor		1.00	1.00					1.00		0.73	0.40	
Incremental Delay, d2		9.4	0.1					1.3		3.9	2.5	
Delay (s)		35.2	19.9					15.2		30.8	6.9	
Level of Service		D	B					B		C	A	
Approach Delay (s)		32.1			0.0			15.2			9.7	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	65	5	125	295	835	0	0	645	685
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1650	1468	3183	3282			1727	1468
Flt Permitted					0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1650	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	71	5	136	321	908	0	0	701	745
RTOR Reduction (vph)	0	0	0	0	0	121	0	0	0	0	0	258
Lane Group Flow (vph)	0	0	0	0	76	15	321	908	0	0	701	487
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					9.0	9.0	11.0	63.0			48.0	48.0
Effective Green, g (s)					9.0	9.0	11.0	63.0			48.0	48.0
Actuated g/C Ratio					0.11	0.11	0.14	0.79			0.60	0.60
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					185	165	437	2584			1036	880
v/s Ratio Prot					c0.05		c0.10	0.28			c0.41	
v/s Ratio Perm						0.01						0.33
v/c Ratio					0.41	0.09	0.73	0.35			0.68	0.55
Uniform Delay, d1					33.0	31.8	33.1	2.5			10.8	9.6
Progression Factor					1.00	1.00	1.05	0.68			0.27	1.31
Incremental Delay, d2					1.5	0.2	5.2	0.3			2.9	2.0
Delay (s)					34.5	32.1	40.1	2.0			5.7	14.6
Level of Service					C	C	D	A			A	B
Approach Delay (s)		0.0			33.0			12.0			10.3	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	10	130	435	5	245	80	705	175	170	765	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1661	1468	1559	1564	1468	1641	3282	1468	1641	3275	
Flt Permitted		0.96	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1661	1468	1559	1564	1468	1641	3282	1468	1641	3275	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	11	141	473	5	266	87	766	190	185	832	11
RTOR Reduction (vph)	0	0	127	0	0	204	0	0	129	0	1	0
Lane Group Flow (vph)	0	54	14	241	237	62	87	766	61	185	842	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)		8.1	8.1	18.3	18.3	18.3	5.6	25.5	25.5	12.1	32.0	
Effective Green, g (s)		8.1	8.1	18.3	18.3	18.3	5.6	25.5	25.5	12.1	32.0	
Actuated g/C Ratio		0.10	0.10	0.23	0.23	0.23	0.07	0.32	0.32	0.15	0.40	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		168	148	356	357	335	114	1046	467	248	1310	
v/s Ratio Prot		c0.03		c0.15	0.15		0.05	c0.23		c0.11	0.26	
v/s Ratio Perm			0.01			0.04			0.04			
v/c Ratio		0.32	0.10	0.68	0.66	0.18	0.76	0.73	0.13	0.75	0.64	
Uniform Delay, d1		33.4	32.6	28.2	28.1	24.8	36.5	24.2	19.4	32.5	19.4	
Progression Factor		1.00	1.00	1.00	1.00	1.00	0.74	0.66	0.66	1.00	1.00	
Incremental Delay, d2		1.1	0.3	5.0	4.6	0.3	24.6	4.3	0.5	11.5	2.4	
Delay (s)		34.5	32.9	33.2	32.7	25.1	51.7	20.4	13.3	44.0	21.8	
Level of Service		C	C	C	C	C	D	C	B	D	C	
Approach Delay (s)		33.4			30.1			21.7			25.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	175	255	235	145	355	25	250	580	60	25	445	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1727	1417	1615	1727	1446	1641	3227		1641	3150	
Flt Permitted	0.95	1.00	1.00	0.59	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1727	1417	1002	1727	1446	1641	3227		1641	3150	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	277	255	158	386	27	272	630	65	27	484	147
RTOR Reduction (vph)	0	0	142	0	0	21	0	8	0	0	32	0
Lane Group Flow (vph)	190	277	113	158	386	6	272	687	0	27	599	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)	13.8	39.1	39.1	21.3	21.3	21.3	18.4	34.9		2.5	19.0	
Effective Green, g (s)	13.8	39.1	39.1	21.3	21.3	21.3	18.4	34.9		2.5	19.0	
Actuated g/C Ratio	0.16	0.44	0.44	0.24	0.24	0.24	0.21	0.39		0.03	0.21	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	763	626	241	415	348	341	1272		46	676	
v/s Ratio Prot	c0.12	0.16			c0.22		c0.17	0.21		0.02	c0.19	
v/s Ratio Perm			0.08	0.16		0.00						
v/c Ratio	0.75	0.36	0.18	0.66	0.93	0.02	0.80	0.54		0.59	0.89	
Uniform Delay, d1	35.7	16.4	15.0	30.3	32.9	25.6	33.3	20.6		42.5	33.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.2	0.3	0.1	6.3	27.4	0.0	12.2	0.5		17.7	13.3	
Delay (s)	46.9	16.7	15.1	36.6	60.3	25.7	45.5	21.1		60.2	47.0	
Level of Service	D	B	B	D	E	C	D	C		E	D	
Approach Delay (s)		24.1			52.1			28.0			47.5	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

INTERSECTION SUMMARY

Site: YR 2030 Intersection 5 (AM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	36.6 mph	36.6 mph
Travel Distance (Total)	833.0 veh-mi/h	999.6 pers-mi/h
Travel Time (Total)	22.7 veh-h/h	27.3 pers-h/h
Demand Flows (Total)	1315 veh/h	1578 pers/h
Percent Heavy Vehicles (Demand)	5.0 %	
Degree of Saturation	0.621	
Practical Spare Capacity	37.0 %	
Effective Intersection Capacity	2119 veh/h	
Control Delay (Total)	1.88 veh-h/h	2.26 pers-h/h
Control Delay (Average)	5.2 sec	5.2 sec
Control Delay (Worst Lane)	12.2 sec	
Control Delay (Worst Movement)	12.9 sec	12.9 sec
Geometric Delay (Average)	4.5 sec	
Stop-Line Delay (Average)	0.6 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	5.9 veh	
95% Back of Queue - Distance (Worst Lane)	152.9 ft	
Queue Storage Ratio (Worst Lane)	0.13	
Total Effective Stops	574 veh/h	689 pers/h
Effective Stop Rate	0.44 per veh	0.44 per pers
Proportion Queued	0.28	0.28
Performance Index	41.3	41.3
Cost (Total)	372.59 $/h	372.59 $/h
Fuel Consumption (Total)	35.3 gal/h	
Carbon Dioxide (Total)	317.6 kg/h	
Hydrocarbons (Total)	0.026 kg/h	
Carbon Monoxide (Total)	0.376 kg/h	
NOx (Total)	0.693 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	631,304 veh/y	757,565 pers/y
Delay	904 veh-h/y	1,084 pers-h/y
Effective Stops	275,569 veh/y	330,682 pers/y
Travel Distance	399,857 veh-mi/y	479,829 pers-mi/y
Travel Time	10,912 veh-h/y	13,094 pers-h/y
Cost	178,843 $/y	178,843 $/y
Fuel Consumption	16,931 gal/y	
Carbon Dioxide	152,463 kg/y	
Hydrocarbons	13 kg/y	
Carbon Monoxide	181 kg/y	
NOx	333 kg/y	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	160	30	285	325	270	10	450	150	60	440	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	174	33	310	353	293	11	489	163	65	478	152
RTOR Reduction (vph)	0	0	28	0	0	233	0	0	121	0	0	97
Lane Group Flow (vph)	217	174	5	310	353	60	11	489	42	65	478	55
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.8	11.2	11.2	15.5	13.9	13.9	0.7	17.6	17.6	8.0	24.9	24.9
Effective Green, g (s)	12.8	11.2	11.2	15.5	13.9	13.9	0.7	17.6	17.6	8.0	24.9	24.9
Actuated g/C Ratio	0.19	0.16	0.16	0.23	0.20	0.20	0.01	0.26	0.26	0.12	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	322	563	252	390	699	313	17	885	396	201	1253	560
v/s Ratio Prot	0.13	0.05		c0.18	c0.10		0.01	c0.14		c0.04	0.14	
v/s Ratio Perm			0.00			0.04			0.03			0.04
v/c Ratio	0.67	0.31	0.02	0.79	0.51	0.19	0.65	0.55	0.11	0.32	0.38	0.10
Uniform Delay, d1	25.8	25.1	24.0	24.9	24.1	22.5	33.7	21.9	19.3	27.7	16.0	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.3	0.0	10.7	0.6	0.3	62.0	0.8	0.1	0.9	0.2	0.1
Delay (s)	31.3	25.5	24.0	35.6	24.7	22.8	95.7	22.7	19.5	28.6	16.2	14.4
Level of Service	C	C	C	D	C	C	F	C	B	C	B	B
Approach Delay (s)		28.3			27.7			23.1			17.0	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	55	875	600	15	20	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	3438	3438	1538	1719	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1719	3438	3438	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	951	652	16	22	38
RTOR Reduction (vph)	0	0	0	7	0	21
Lane Group Flow (vph)	60	951	652	9	22	17
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	NA	Perm	NA	custom
Protected Phases	7	4	8			
Permitted Phases				8	6	6
Actuated Green, G (s)	5.8	35.5	25.7	25.7	36.5	36.5
Effective Green, g (s)	5.8	35.5	25.7	25.7	36.5	36.5
Actuated g/C Ratio	0.07	0.44	0.32	0.32	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	1525	1104	494	784	701
v/s Ratio Prot	0.03	c0.28	0.19			
v/s Ratio Perm				0.01	c0.01	0.01
v/c Ratio	0.48	0.62	0.59	0.02	0.03	0.02
Uniform Delay, d1	35.7	17.1	22.7	18.5	12.0	12.0
Progression Factor	1.00	1.00	0.65	0.91	1.00	1.00
Incremental Delay, d2	3.0	0.8	0.7	0.0	0.1	0.1
Delay (s)	38.6	17.9	15.5	16.9	12.0	12.0
Level of Service	D	B	B	B	B	B
Approach Delay (s)		19.1	15.5		12.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	325	440	170	50	450	25	20	510	35	20	320	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	353	478	185	54	489	27	22	554	38	22	348	217
RTOR Reduction (vph)	0	0	108	0	0	21	0	0	26	0	0	151
Lane Group Flow (vph)	353	478	77	54	489	6	22	554	12	22	348	66
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	20.4	33.3	33.3	4.0	16.9	16.9	2.4	25.1	25.1	1.6	24.3	24.3
Effective Green, g (s)	20.4	33.3	33.3	4.0	16.9	16.9	2.4	25.1	25.1	1.6	24.3	24.3
Actuated g/C Ratio	0.25	0.42	0.42	0.05	0.21	0.21	0.03	0.31	0.31	0.02	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	438	1431	640	85	726	324	51	1078	482	34	1044	467
v/s Ratio Prot	c0.21	0.14		0.03	c0.14		0.01	c0.16		0.01	c0.10	
v/s Ratio Perm			0.05			0.00			0.01			0.04
v/c Ratio	0.81	0.33	0.12	0.64	0.67	0.02	0.43	0.51	0.02	0.65	0.33	0.14
Uniform Delay, d1	27.9	15.8	14.3	37.3	29.0	25.0	38.1	22.5	19.0	38.9	21.6	20.3
Progression Factor	1.00	0.24	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.8	0.1	0.1	14.5	2.5	0.0	5.8	1.8	0.1	35.3	0.9	0.6
Delay (s)	37.6	4.0	1.4	51.8	31.5	25.0	43.9	24.2	19.1	74.2	22.4	20.9
Level of Service	D	A	A	D	C	C	D	C	B	E	C	C
Approach Delay (s)		15.2			33.1			24.6			23.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

INTERSECTION SUMMARY

Site: YR 2030 Intersection 9 (AM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values

Performance Measure	Vehicles		Persons	
Travel Speed (Average)	34.8	mph	34.8	mph
Travel Distance (Total)	493.5	veh-mi/h	592.2	pers-mi/h
Travel Time (Total)	14.2	veh-h/h	17.0	pers-h/h
Demand Flows (Total)	788	veh/h	946	pers/h
Percent Heavy Vehicles (Demand)	3.7	%		
Degree of Saturation	0.277			
Practical Spare Capacity	207.2	%		
Effective Intersection Capacity	2848	veh/h		
Control Delay (Total)	1.56	veh-h/h	1.87	pers-h/h
Control Delay (Average)	7.1	sec	7.1	sec
Control Delay (Worst Lane)	9.1	sec		
Control Delay (Worst Movement)	10.6	sec	10.6	sec
Geometric Delay (Average)	6.2	sec		
Stop-Line Delay (Average)	0.9	sec		
Idling Time (Average)	0.0	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	1.7	veh		
95% Back of Queue - Distance (Worst Lane)	43.1	ft		
Queue Storage Ratio (Worst Lane)	0.04			
Total Effective Stops	444	veh/h	533	pers/h
Effective Stop Rate	0.56	per veh	0.56	per pers
Proportion Queued	0.36		0.36	
Performance Index	23.2		23.2	
Cost (Total)	232.65	$/h	232.65	$/h
Fuel Consumption (Total)	21.1	gal/h		
Carbon Dioxide (Total)	189.4	kg/h		
Hydrocarbons (Total)	0.016	kg/h		
Carbon Monoxide (Total)	0.230	kg/h		
NOx (Total)	0.344	kg/h		

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values

Performance Measure	Vehicles		Persons	
Demand Flows (Total)	378,261	veh/y	453,913	pers/y
Delay	747	veh-h/y	896	pers-h/y
Effective Stops	213,129	veh/y	255,755	pers/y
Travel Distance	236,884	veh-mi/y	284,261	pers-mi/y
Travel Time	6,806	veh-h/y	8,167	pers-h/y
Cost	111,674	$/y	111,674	$/y
Fuel Consumption	10,126	gal/y		
Carbon Dioxide	90,910	kg/y		
Hydrocarbons	8	kg/y		
Carbon Monoxide	110	kg/y		
NOx	165	kg/y		

SIDRA INTERSECTION 6

INTERSECTION SUMMARY

Site: YR 2030 Intersection 10 (AM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	35.9 mph	35.9 mph
Travel Distance (Total)	846.3 veh-mi/h	1015.6 pers-mi/h
Travel Time (Total)	23.5 veh-h/h	28.3 pers-h/h
Demand Flows (Total)	1337 veh/h	1604 pers/h
Percent Heavy Vehicles (Demand)	5.0 %	
Degree of Saturation	0.511	
Practical Spare Capacity	66.5 %	
Effective Intersection Capacity	2619 veh/h	
Control Delay (Total)	2.43 veh-h/h	2.92 pers-h/h
Control Delay (Average)	6.6 sec	6.6 sec
Control Delay (Worst Lane)	9.9 sec	
Control Delay (Worst Movement)	14.0 sec	14.0 sec
Geometric Delay (Average)	4.9 sec	
Stop-Line Delay (Average)	1.7 sec	
Idling Time (Average)	0.1 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	3.2 veh	
95% Back of Queue - Distance (Worst Lane)	83.0 ft	
Queue Storage Ratio (Worst Lane)	0.07	
Total Effective Stops	773 veh/h	927 pers/h
Effective Stop Rate	0.58 per veh	0.58 per pers
Proportion Queued	0.39	0.39
Performance Index	39.3	39.3
Cost (Total)	389.04 $/h	389.04 $/h
Fuel Consumption (Total)	36.5 gal/h	
Carbon Dioxide (Total)	328.6 kg/h	
Hydrocarbons (Total)	0.027 kg/h	
Carbon Monoxide (Total)	0.388 kg/h	
NOx (Total)	0.725 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	641,739 veh/y	770,087 pers/y
Delay	1,168 veh-h/y	1,402 pers-h/y
Effective Stops	370,883 veh/y	445,060 pers/y
Travel Distance	406,233 veh-mi/y	487,480 pers-mi/y
Travel Time	11,304 veh-h/y	13,564 pers-h/y
Cost	186,741 $/y	186,741 $/y
Fuel Consumption	17,519 gal/y	
Carbon Dioxide	157,742 kg/y	
Hydrocarbons	13 kg/y	
Carbon Monoxide	186 kg/y	
NOx	348 kg/y	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	720	5	200	0	0	0	0	825	60	165	690	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		0.97	1.00	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1646	1468					3249		3183	1727	
Flt Permitted		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1646	1468					3249		3183	1727	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	783	5	217	0	0	0	0	897	65	179	750	0
RTOR Reduction (vph)	0	0	59	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	788	158	0	0	0	0	957	0	179	750	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm					NA		Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		48.0	48.0					33.0		7.0	44.0	
Effective Green, g (s)		48.0	48.0					33.0		7.0	44.0	
Actuated g/C Ratio		0.48	0.48					0.33		0.07	0.44	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		790	704					1072		222	759	
v/s Ratio Prot		c0.48						0.29		0.06	c0.43	
v/s Ratio Perm			0.11									
v/c Ratio		1.00	0.22					0.89		0.81	0.99	
Uniform Delay, d1		25.9	15.1					31.8		45.8	27.7	
Progression Factor		1.00	1.00					1.00		1.25	0.68	
Incremental Delay, d2		31.2	0.2					11.3		13.2	23.9	
Delay (s)		57.1	15.3					43.1		70.5	42.7	
Level of Service		E	B					D		E	D	
Approach Delay (s)		48.1			0.0			43.1			48.1	
Approach LOS		D			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	65	5	160	245	1300	0	0	790	550
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor					1.00	1.00	0.97	0.95			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1650	1468	3183	3282			1727	1468
Flt Permitted					0.96	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1650	1468	3183	3282			1727	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	71	5	174	266	1413	0	0	859	598
RTOR Reduction (vph)	0	0	0	0	0	82	0	0	0	0	0	210
Lane Group Flow (vph)	0	0	0	0	76	92	266	1413	0	0	859	388
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)					11.2	11.2	12.0	80.8			64.8	64.8
Effective Green, g (s)					11.2	11.2	12.0	80.8			64.8	64.8
Actuated g/C Ratio					0.11	0.11	0.12	0.81			0.65	0.65
Clearance Time (s)					4.0	4.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					184	164	381	2651			1119	951
v/s Ratio Prot					0.05		c0.08	0.43			c0.50	
v/s Ratio Perm						c0.06						0.26
v/c Ratio					0.41	0.56	0.70	0.53			0.77	0.41
Uniform Delay, d1					41.3	42.1	42.3	3.2			12.3	8.4
Progression Factor					1.00	1.00	0.94	0.81			0.39	0.09
Incremental Delay, d2					1.5	4.4	1.9	0.3			4.3	1.1
Delay (s)					42.8	46.4	41.6	2.9			9.1	1.8
Level of Service					D	D	D	A			A	A
Approach Delay (s)		0.0			45.4			9.0			6.1	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	20	150	330	15	180	35	925	500	290	860	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1665	1468	1559	1569	1468	1641	3282	1468	1641	3271	
Flt Permitted		0.96	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1665	1468	1559	1569	1468	1641	3282	1468	1641	3271	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	22	163	359	16	196	38	1005	543	315	935	22
RTOR Reduction (vph)	0	0	146	0	0	157	0	0	246	0	1	0
Lane Group Flow (vph)	0	87	17	187	188	39	38	1005	297	315	956	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)		10.5	10.5	16.4	16.4	16.4	3.6	35.2	35.2	21.9	53.5	
Effective Green, g (s)		10.5	10.5	16.4	16.4	16.4	3.6	35.2	35.2	21.9	53.5	
Actuated g/C Ratio		0.10	0.10	0.16	0.16	0.16	0.04	0.35	0.35	0.22	0.54	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		174	154	255	257	240	59	1155	516	359	1749	
v/s Ratio Prot		c0.05		c0.12	0.12		0.02	c0.31		c0.19	0.29	
v/s Ratio Perm			0.01			0.03			0.20			
v/c Ratio		0.50	0.11	0.73	0.73	0.16	0.64	0.87	0.58	0.88	0.55	
Uniform Delay, d1		42.3	40.5	39.7	39.7	35.9	47.6	30.3	26.3	37.8	15.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	0.89	0.83	1.04	1.00	1.00	
Incremental Delay, d2		2.3	0.3	10.4	10.2	0.3	18.7	7.9	4.0	20.7	1.2	
Delay (s)		44.5	40.8	50.1	49.9	36.2	61.2	33.0	31.3	58.4	16.5	
Level of Service		D	D	D	D	D	E	C	C	E	B	
Approach Delay (s)		42.1			45.3			33.1			26.9	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	360	340	135	200	35	220	565	175	40	710	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1641	1727	1416	1618	1727	1446	1641	3144		1641	3178	
Flt Permitted	0.95	1.00	1.00	0.53	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1641	1727	1416	904	1727	1446	1641	3144		1641	3178	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	391	370	147	217	38	239	614	190	43	772	174
RTOR Reduction (vph)	0	0	192	0	0	31	0	32	0	0	22	0
Lane Group Flow (vph)	266	391	178	147	217	7	239	773	0	43	924	0
Confl. Peds. (#/hr)	2		14	14		2	1		3	3		1
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8		8						
Actuated Green, G (s)	15.9	35.7	35.7	15.8	15.8	15.8	15.6	38.0		5.5	27.9	
Effective Green, g (s)	15.9	35.7	35.7	15.8	15.8	15.8	15.6	38.0		5.5	27.9	
Actuated g/C Ratio	0.17	0.39	0.39	0.17	0.17	0.17	0.17	0.42		0.06	0.31	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	286	676	554	156	299	250	280	1310		98	972	
v/s Ratio Prot	c0.16	0.23			0.13		c0.15	0.25		0.03	c0.29	
v/s Ratio Perm			0.13	c0.16		0.00						
v/c Ratio	0.93	0.58	0.32	0.94	0.73	0.03	0.85	0.59		0.44	0.95	
Uniform Delay, d1	37.1	21.8	19.3	37.2	35.7	31.3	36.7	20.6		41.4	31.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	35.1	1.2	0.3	54.8	8.5	0.0	21.5	0.7		3.1	18.2	
Delay (s)	72.2	23.0	19.7	92.0	44.1	31.4	58.2	21.3		44.5	49.1	
Level of Service	E	C	B	F	D	C	E	C		D	D	
Approach Delay (s)		34.6			60.4			29.7			48.9	
Approach LOS		C			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	91.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

INTERSECTION SUMMARY

Site: YR 2030 Intersection 5 (PM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	36.4 mph	36.4 mph
Travel Distance (Total)	831.8 veh-mi/h	998.2 pers-mi/h
Travel Time (Total)	22.8 veh-h/h	27.4 pers-h/h
Demand Flows (Total)	1321 veh/h	1585 pers/h
Percent Heavy Vehicles (Demand)	3.8 %	
Degree of Saturation	0.520	
Practical Spare Capacity	63.3 %	
Effective Intersection Capacity	2537 veh/h	
Control Delay (Total)	1.94 veh-h/h	2.33 pers-h/h
Control Delay (Average)	5.3 sec	5.3 sec
Control Delay (Worst Lane)	9.6 sec	
Control Delay (Worst Movement)	11.2 sec	11.2 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	0.6 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	4.2 veh	
95% Back of Queue - Distance (Worst Lane)	107.3 ft	
Queue Storage Ratio (Worst Lane)	0.09	
Total Effective Stops	631 veh/h	758 pers/h
Effective Stop Rate	0.48 per veh	0.48 per pers
Proportion Queued	0.25	0.25
Performance Index	39.4	39.4
Cost (Total)	363.00 $/h	363.00 $/h
Fuel Consumption (Total)	33.7 gal/h	
Carbon Dioxide (Total)	302.9 kg/h	
Hydrocarbons (Total)	0.026 kg/h	
Carbon Monoxide (Total)	0.370 kg/h	
NOx (Total)	0.552 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	633,913 veh/y	760,696 pers/y
Delay	930 veh-h/y	1,116 pers-h/y
Effective Stops	303,028 veh/y	363,634 pers/y
Travel Distance	399,265 veh-mi/y	479,118 pers-mi/y
Travel Time	10,967 veh-h/y	13,161 pers-h/y
Cost	174,239 $/y	174,239 $/y
Fuel Consumption	16,190 gal/y	
Carbon Dioxide	145,414 kg/y	
Hydrocarbons	12 kg/y	
Carbon Monoxide	178 kg/y	
NOx	265 kg/y	

SIDRA INTERSECTION 6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	260	385	10	180	240	165	20	310	260	175	395	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	418	11	196	261	179	22	337	283	190	429	174
RTOR Reduction (vph)	0	0	9	0	0	149	0	0	221	0	0	108
Lane Group Flow (vph)	283	418	2	196	261	30	22	337	62	190	429	66
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.8	13.9	13.9	12.5	11.6	11.6	1.4	15.5	15.5	12.4	26.5	26.5
Effective Green, g (s)	14.8	13.9	13.9	12.5	11.6	11.6	1.4	15.5	15.5	12.4	26.5	26.5
Actuated g/C Ratio	0.21	0.20	0.20	0.18	0.17	0.17	0.02	0.22	0.22	0.18	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	361	679	304	305	567	253	34	758	339	303	1295	579
v/s Ratio Prot	c0.16	c0.12		0.11	0.08		0.01	c0.10		c0.11	0.12	
v/s Ratio Perm			0.00			0.02			0.04			0.04
v/c Ratio	0.78	0.62	0.01	0.64	0.46	0.12	0.65	0.44	0.18	0.63	0.33	0.11
Uniform Delay, d1	26.2	25.8	22.7	26.8	26.5	25.0	34.2	23.7	22.3	26.8	15.6	14.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	1.7	0.0	4.6	0.6	0.2	35.3	0.4	0.3	4.0	0.2	0.1
Delay (s)	36.9	27.4	22.7	31.4	27.1	25.2	69.5	24.1	22.5	30.8	15.7	14.3
Level of Service	D	C	C	C	C	C	E	C	C	C	B	B
Approach Delay (s)		31.1			27.9			25.0			19.0	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	70.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	45	715	670	60	90	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	3438	3438	1538	1719	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1719	3438	3438	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	777	728	65	98	76
RTOR Reduction (vph)	0	0	0	25	0	40
Lane Group Flow (vph)	49	777	728	40	98	36
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	NA	Perm	NA	custom
Protected Phases	7	4	8			
Permitted Phases				8	6	6
Actuated Green, G (s)	5.4	34.4	25.0	25.0	37.6	37.6
Effective Green, g (s)	5.4	34.4	25.0	25.0	37.6	37.6
Actuated g/C Ratio	0.07	0.43	0.31	0.31	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	116	1478	1074	480	807	722
v/s Ratio Prot	0.03	c0.23	c0.21			
v/s Ratio Perm				0.03	c0.06	0.02
v/c Ratio	0.42	0.53	0.68	0.08	0.12	0.05
Uniform Delay, d1	35.8	16.8	24.0	19.4	11.9	11.5
Progression Factor	1.00	1.00	0.68	0.86	1.00	1.00
Incremental Delay, d2	2.5	0.3	1.5	0.1	0.3	0.1
Delay (s)	38.3	17.1	17.9	16.8	12.2	11.6
Level of Service	D	B	B	B	B	B
Approach Delay (s)		18.4	17.8		12.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	235	430	120	45	380	40	25	430	75	5	515	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	3438	1538	1719	3438	1538	1719	3438	1538	1719	3438	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	467	130	49	413	43	27	467	82	5	560	424
RTOR Reduction (vph)	0	0	84	0	0	34	0	0	51	0	0	275
Lane Group Flow (vph)	255	467	46	49	413	9	27	467	31	5	560	149
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.1	28.2	28.2	4.3	16.4	16.4	3.3	30.7	30.7	0.8	28.2	28.2
Effective Green, g (s)	16.1	28.2	28.2	4.3	16.4	16.4	3.3	30.7	30.7	0.8	28.2	28.2
Actuated g/C Ratio	0.20	0.35	0.35	0.05	0.20	0.20	0.04	0.38	0.38	0.01	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	345	1211	542	92	704	315	70	1319	590	17	1211	542
v/s Ratio Prot	c0.15	0.14		0.03	c0.12		0.02	c0.14		0.00	c0.16	
v/s Ratio Perm			0.03			0.01			0.02			0.10
v/c Ratio	0.74	0.39	0.08	0.53	0.59	0.03	0.39	0.35	0.05	0.29	0.46	0.28
Uniform Delay, d1	30.0	19.4	17.3	36.9	28.7	25.4	37.4	17.6	15.5	39.3	20.0	18.6
Progression Factor	1.45	0.70	0.35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.8	0.2	0.1	5.8	1.3	0.0	3.5	0.7	0.2	9.4	1.3	1.3
Delay (s)	51.2	13.8	6.1	42.7	30.0	25.5	40.9	18.3	15.7	48.7	21.3	19.8
Level of Service	D	B	A	D	C	C	D	B	B	D	C	B
Approach Delay (s)		23.9			30.8			19.0			20.8	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

INTERSECTION SUMMARY

Site: YR 2030 Intersection 9 (PM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	34.9 mph	34.9 mph
Travel Distance (Total)	716.1 veh-mi/h	859.4 pers-mi/h
Travel Time (Total)	20.5 veh-h/h	24.7 pers-h/h
Demand Flows (Total)	1147 veh/h	1376 pers/h
Percent Heavy Vehicles (Demand)	3.5 %	
Degree of Saturation	0.451	
Practical Spare Capacity	88.3 %	
Effective Intersection Capacity	2540 veh/h	
Control Delay (Total)	2.20 veh-h/h	2.65 pers-h/h
Control Delay (Average)	6.9 sec	6.9 sec
Control Delay (Worst Lane)	9.9 sec	
Control Delay (Worst Movement)	11.1 sec	11.1 sec
Geometric Delay (Average)	5.7 sec	
Stop-Line Delay (Average)	1.2 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	3.7 veh	
95% Back of Queue - Distance (Worst Lane)	95.7 ft	
Queue Storage Ratio (Worst Lane)	0.08	
Total Effective Stops	649 veh/h	779 pers/h
Effective Stop Rate	0.57 per veh	0.57 per pers
Proportion Queued	0.42	0.42
Performance Index	35.9	35.9
Cost (Total)	335.33 $/h	335.33 $/h
Fuel Consumption (Total)	30.4 gal/h	
Carbon Dioxide (Total)	272.4 kg/h	
Hydrocarbons (Total)	0.023 kg/h	
Carbon Monoxide (Total)	0.333 kg/h	
NOx (Total)	0.475 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	550,435 veh/y	660,522 pers/y
Delay	1,058 veh-h/y	1,270 pers-h/y
Effective Stops	311,422 veh/y	373,707 pers/y
Travel Distance	343,746 veh-mi/y	412,495 pers-mi/y
Travel Time	9,862 veh-h/y	11,835 pers-h/y
Cost	160,956 $/y	160,956 $/y
Fuel Consumption	14,571 gal/y	
Carbon Dioxide	130,757 kg/y	
Hydrocarbons	11 kg/y	
Carbon Monoxide	160 kg/y	
NOx	228 kg/y	

SIDRA INTERSECTION 6

INTERSECTION SUMMARY

Site: YR 2030 Intersection 10 (PM Peak Hour)

New Site
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	36.1 mph	36.1 mph
Travel Distance (Total)	1157.0 veh-mi/h	1388.4 pers-mi/h
Travel Time (Total)	32.1 veh-h/h	38.5 pers-h/h
Demand Flows (Total)	1821 veh/h	2185 pers/h
Percent Heavy Vehicles (Demand)	5.0 %	
Degree of Saturation	0.556	
Practical Spare Capacity	52.9 %	
Effective Intersection Capacity	3275 veh/h	
Control Delay (Total)	3.44 veh-h/h	4.13 pers-h/h
Control Delay (Average)	6.8 sec	6.8 sec
Control Delay (Worst Lane)	10.0 sec	
Control Delay (Worst Movement)	13.3 sec	13.3 sec
Geometric Delay (Average)	5.2 sec	
Stop-Line Delay (Average)	1.6 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	LOS A	
95% Back of Queue - Vehicles (Worst Lane)	4.2 veh	
95% Back of Queue - Distance (Worst Lane)	110.3 ft	
Queue Storage Ratio (Worst Lane)	0.09	
Total Effective Stops	1052 veh/h	1263 pers/h
Effective Stop Rate	0.58 per veh	0.58 per pers
Proportion Queued	0.35	0.35
Performance Index	53.3	53.3
Cost (Total)	530.70 $/h	530.70 $/h
Fuel Consumption (Total)	49.7 gal/h	
Carbon Dioxide (Total)	447.7 kg/h	
Hydrocarbons (Total)	0.037 kg/h	
Carbon Monoxide (Total)	0.528 kg/h	
NOx (Total)	0.985 kg/h	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	873,913 veh/y	1,048,696 pers/y
Delay	1,650 veh-h/y	1,981 pers-h/y
Effective Stops	505,170 veh/y	606,204 pers/y
Travel Distance	555,369 veh-mi/y	666,443 pers-mi/y
Travel Time	15,396 veh-h/y	18,475 pers-h/y
Cost	254,734 $/y	254,734 $/y
Fuel Consumption	23,866 gal/y	
Carbon Dioxide	214,896 kg/y	
Hydrocarbons	18 kg/y	
Carbon Monoxide	254 kg/y	
NOx	473 kg/y	

Existing Plus Project Mitigated

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	198	16	19	485	327	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.99			1.00	0.97	
Flt Protected	0.96			1.00	1.00	
Satd. Flow (prot)	1712			1806	1747	
Flt Permitted	0.96			0.98	1.00	
Satd. Flow (perm)	1712			1768	1747	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	17	21	527	355	123
RTOR Reduction (vph)	3	0	0	0	9	0
Lane Group Flow (vph)	229	0	0	548	469	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	17.3			66.5	66.5	
Effective Green, g (s)	17.3			66.5	66.5	
Actuated g/C Ratio	0.19			0.72	0.72	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	323			1281	1266	
v/s Ratio Prot					0.27	
v/s Ratio Perm	c0.13			c0.31		
v/c Ratio	0.71			0.43	0.37	
Uniform Delay, d1	34.9			5.1	4.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	6.9			1.0	0.8	
Delay (s)	41.8			6.1	5.6	
Level of Service	D			A	A	
Approach Delay (s)	41.8			6.1	5.6	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	414	24	30	665	20	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		1.00			1.00
Frt	0.99		0.87			1.00
Flt Protected	0.95		1.00			0.98
Satd. Flow (prot)	1715		1576			1772
Flt Permitted	0.95		1.00			0.75
Satd. Flow (perm)	1715		1576			1349
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	26	33	723	22	30
RTOR Reduction (vph)	2	0	283	0	0	0
Lane Group Flow (vph)	474	0	473	0	0	52
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	39.0		73.0			73.0
Effective Green, g (s)	39.0		73.0			73.0
Actuated g/C Ratio	0.32		0.61			0.61
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	557		959			821
v/s Ratio Prot	c0.28		c0.30			
v/s Ratio Perm						0.04
v/c Ratio	0.85		0.49			0.06
Uniform Delay, d1	37.8		13.1			9.6
Progression Factor	0.50		1.00			1.00
Incremental Delay, d2	10.6		1.8			0.1
Delay (s)	29.5		15.0			9.7
Level of Service	C		B			A
Approach Delay (s)	29.5		15.0			9.7
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	371	150	70	285	40	56	392	138	24	218	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	1.00
Satd. Flow (prot)	1719	1810	1538	1719	1810	1538		3417	1538		3421	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	1.00
Satd. Flow (perm)	1719	1810	1538	1719	1810	1538		3417	1538		3421	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	403	163	76	310	43	61	426	150	26	237	105
RTOR Reduction (vph)	0	0	115	0	0	14	0	0	75	0	0	90
Lane Group Flow (vph)	179	403	48	76	310	29	0	487	75	0	263	15
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.5	35.0	35.0	9.4	26.9	26.9		42.6	42.6		17.0	17.0
Effective Green, g (s)	17.5	35.0	35.0	9.4	26.9	26.9		42.6	42.6		17.0	17.0
Actuated g/C Ratio	0.15	0.29	0.29	0.08	0.22	0.22		0.36	0.36		0.14	0.14
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	251	528	449	135	406	345		1213	546		485	218
v/s Ratio Prot	0.10	c0.22		0.04	c0.17			c0.14			c0.08	
v/s Ratio Perm			0.03			0.02			0.05			0.01
v/c Ratio	0.71	0.76	0.11	0.56	0.76	0.08		0.40	0.14		0.54	0.07
Uniform Delay, d1	48.9	38.7	31.1	53.3	43.6	36.8		29.1	26.2		47.9	44.6
Progression Factor	0.96	0.97	0.73	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	7.5	5.3	0.1	5.3	8.3	0.1		1.0	0.5		4.3	0.6
Delay (s)	54.3	42.9	22.8	58.6	51.9	36.9		30.1	26.8		52.2	45.2
Level of Service	D	D	C	E	D	D		C	C		D	D
Approach Delay (s)		41.3			51.6			29.3			50.2	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	41.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	9	75	443	11	244	32	618	577	360	600	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1665	1468		1647	1468	1641	3282	1468	1641	3266	
Flt Permitted		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1665	1468		1647	1468	1641	3282	1468	1641	3266	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	10	82	482	12	265	35	672	627	391	652	21
RTOR Reduction (vph)	0	0	77	0	0	61	0	0	410	0	2	0
Lane Group Flow (vph)	0	40	5	0	494	204	35	672	217	391	671	0
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)		7.2	7.2		42.6	42.6	16.0	26.2	26.2	28.0	38.2	
Effective Green, g (s)		7.2	7.2		42.6	42.6	16.0	26.2	26.2	28.0	38.2	
Actuated g/C Ratio		0.06	0.06		0.36	0.36	0.13	0.22	0.22	0.23	0.32	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		100	88		585	521	219	717	321	383	1040	
v/s Ratio Prot		c0.02			c0.30		0.02	c0.20		c0.24	0.21	
v/s Ratio Perm			0.00			0.14			0.15			
v/c Ratio		0.40	0.06		0.84	0.39	0.16	0.94	0.68	1.02	0.65	
Uniform Delay, d1		54.3	53.2		35.6	29.0	46.0	46.1	43.0	46.0	35.1	
Progression Factor		1.00	1.00		1.00	1.00	0.82	0.84	0.80	1.00	1.00	
Incremental Delay, d2		2.6	0.3		10.8	0.5	1.3	19.2	9.5	51.4	3.1	
Delay (s)		56.9	53.5		46.4	29.5	39.2	57.8	44.1	97.4	38.2	
Level of Service		E	D		D	C	D	E	D	F	D	
Approach Delay (s)		54.6			40.5			50.8			59.9	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	236	18	26	402	559	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.99			1.00	0.97	
Flt Protected	0.96			1.00	1.00	
Satd. Flow (prot)	1712			1804	1756	
Flt Permitted	0.96			0.94	1.00	
Satd. Flow (perm)	1712			1698	1756	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	257	20	28	437	608	170
RTOR Reduction (vph)	3	0	0	0	9	0
Lane Group Flow (vph)	274	0	0	465	769	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	19.8			67.8	67.8	
Effective Green, g (s)	19.8			67.8	67.8	
Actuated g/C Ratio	0.21			0.71	0.71	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	355			1204	1245	
v/s Ratio Prot					c0.44	
v/s Ratio Perm	c0.16			0.27		
v/c Ratio	0.77			0.39	0.62	
Uniform Delay, d1	35.8			5.6	7.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	10.0			0.9	2.3	
Delay (s)	45.7			6.5	9.5	
Level of Service	D			A	A	
Approach Delay (s)	45.7			6.5	9.5	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	95.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	689	31	30	630	52	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		1.00			1.00
Frt	0.99		0.87			1.00
Flt Protected	0.95		1.00			0.97
Satd. Flow (prot)	1717		1576			1759
Flt Permitted	0.95		1.00			0.30
Satd. Flow (perm)	1717		1576			538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	749	34	33	685	57	43
RTOR Reduction (vph)	2	0	401	0	0	0
Lane Group Flow (vph)	781	0	317	0	0	100
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type	NA		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	50.6		41.4			41.4
Effective Green, g (s)	50.6		41.4			41.4
Actuated g/C Ratio	0.51		0.41			0.41
Clearance Time (s)	4.0		4.0			4.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	869		652			223
v/s Ratio Prot	c0.45		c0.20			
v/s Ratio Perm						0.19
v/c Ratio	0.90		0.49			0.45
Uniform Delay, d1	22.4		21.5			21.1
Progression Factor	0.61		1.00			1.00
Incremental Delay, d2	9.9		2.6			6.4
Delay (s)	23.5		24.1			27.5
Level of Service	C		C			C
Approach Delay (s)	23.5		24.1			27.5
Approach LOS	C		C			C

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	356	164	76	311	48	152	338	102	16	389	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95	1.00		0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	1.00
Satd. Flow (prot)	1719	1810	1538	1719	1810	1538		3386	1538		3431	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	1.00
Satd. Flow (perm)	1719	1810	1538	1719	1810	1538		3386	1538		3431	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	175	387	178	83	338	52	165	367	111	17	423	279
RTOR Reduction (vph)	0	0	129	0	0	17	0	0	65	0	0	217
Lane Group Flow (vph)	175	387	49	83	338	35	0	532	46	0	440	62
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.4	27.7	27.7	10.8	24.1	24.1		28.5	28.5		17.0	17.0
Effective Green, g (s)	14.4	27.7	27.7	10.8	24.1	24.1		28.5	28.5		17.0	17.0
Actuated g/C Ratio	0.14	0.28	0.28	0.11	0.24	0.24		0.28	0.28		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	248	501	426	186	436	371		965	438		583	261
v/s Ratio Prot	0.10	c0.21		0.05	c0.19			c0.16			c0.13	
v/s Ratio Perm			0.03			0.02			0.03			0.04
v/c Ratio	0.71	0.77	0.12	0.45	0.78	0.09		0.55	0.10		0.75	0.24
Uniform Delay, d1	40.8	33.3	27.0	41.8	35.4	29.5		30.3	26.3		39.5	35.9
Progression Factor	0.89	0.90	0.27	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	5.5	0.1	1.7	8.4	0.1		2.3	0.5		8.8	2.2
Delay (s)	43.0	35.3	7.4	43.5	43.8	29.6		32.6	26.8		48.3	38.1
Level of Service	D	D	A	D	D	C		C	C		D	D
Approach Delay (s)		30.4			42.2			31.6			44.3	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

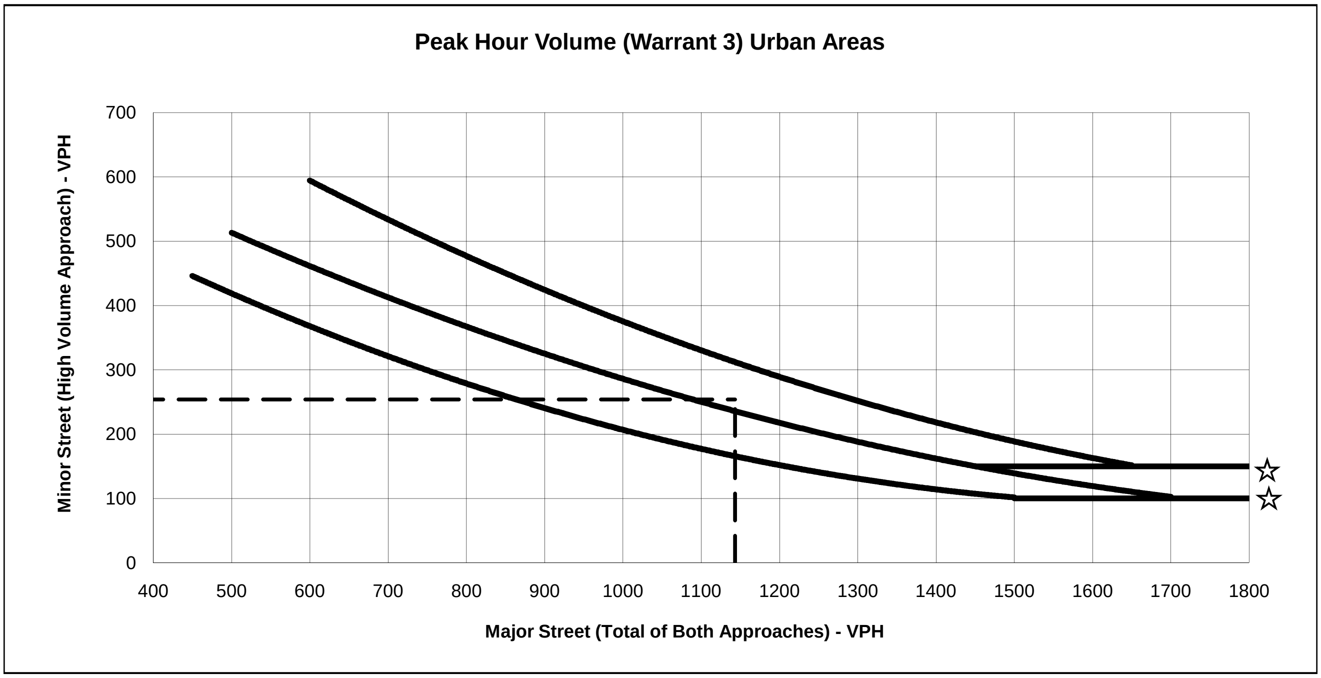
c Critical Lane Group

APPENDIX C:

Signal Warrant Worksheets

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
500	420	500	505	500	N/A
600	360	600	460	600	590
700	325	700	420	700	540
800	285	800	360	800	475
900	245	900	325	900	425
1000	200	1000	285	1000	370
1100	175	1100	250	1100	340
1200	150	1200	220	1200	285
1300	130	1300	190	1300	250
1400	120	1400	155	1400	220
1500	100	1500	145	1500	180
1600	100	1600	120	1600	170
1700	100	1700	100	1650	150
1800	100	1800	100	1800	150

** Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation*



☆ NOTE:
150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

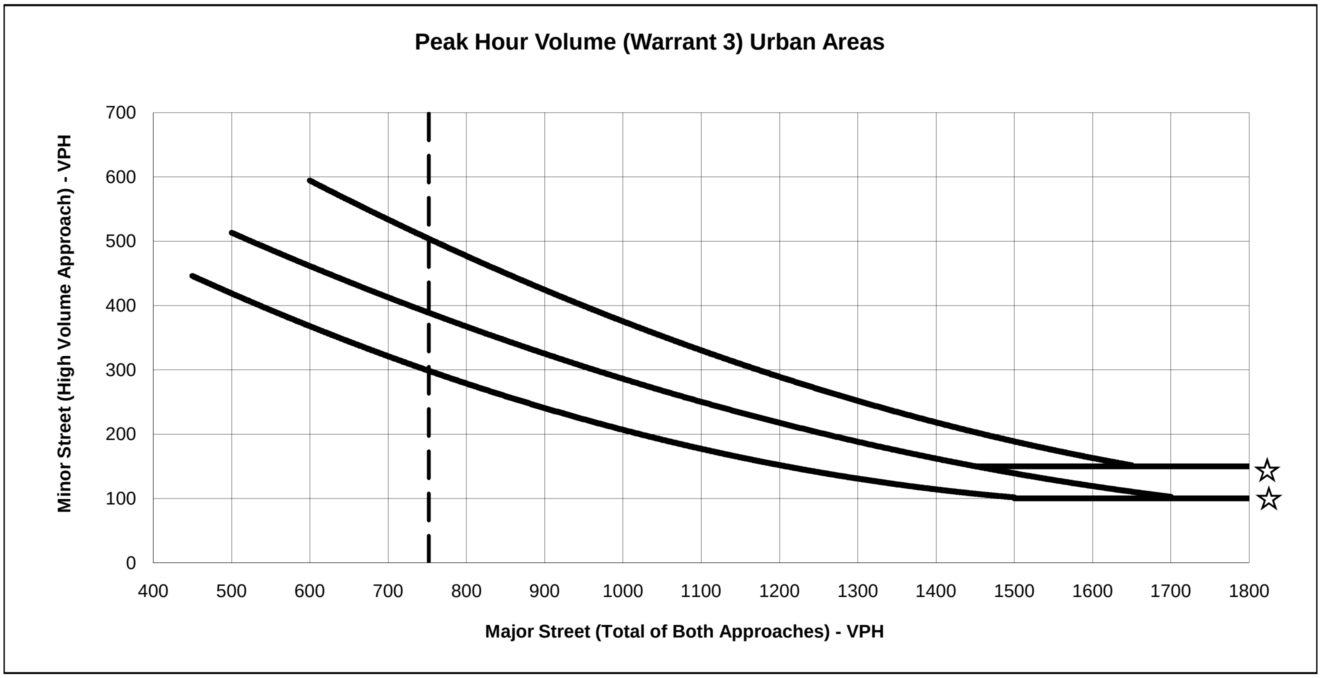
EXISTING PLUS PROJECT SCENARIO (AM/PM)

		Number of Lanes
Major Approach	Golf Road	1
Minor Approach	E. Linwood Avenue	1

Major St. Volume: 1143
Minor St. Volume: 254
Warrant Met?: Yes

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
500	420	500	505	500	N/A
600	360	600	460	600	590
700	325	700	420	700	540
800	285	800	360	800	475
900	245	900	325	900	425
1000	200	1000	285	1000	370
1100	175	1100	250	1100	340
1200	150	1200	220	1200	285
1300	130	1300	190	1300	250
1400	120	1400	155	1400	220
1500	100	1500	145	1500	180
1600	100	1600	120	1600	170
1700	100	1700	100	1650	150
1800	100	1800	100	1800	150

** Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation*



☆ NOTE:
150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

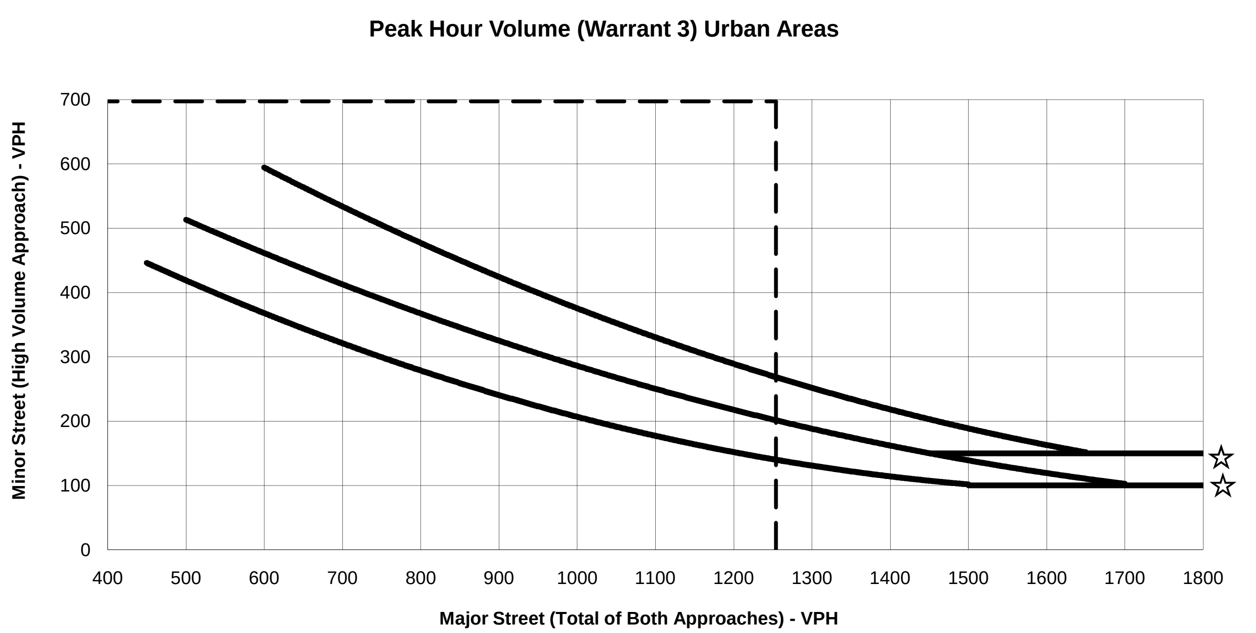
EXISTING PLUS PROJECT SCENARIO (AM/PM)

		Number of Lanes
Major Approach	Berkeley Avenue	1
Minor Approach	1st Street	1

Major St. Volume:	752
Minor St. Volume:	720
Warrant Met?:	Yes

Both 1 Lane Approaches		2 or more Lane and One Lane Approaches		Both 2 or more Lane Approaches	
Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach	Major Street Total of Both Approaches	Minor Street High Volume Approach
500	420	500	505	500	N/A
600	360	600	460	600	590
700	325	700	420	700	540
800	285	800	360	800	475
900	245	900	325	900	425
1000	200	1000	285	1000	370
1100	175	1100	250	1100	340
1200	150	1200	220	1200	285
1300	130	1300	190	1300	250
1400	120	1400	155	1400	220
1500	100	1500	145	1500	180
1600	100	1600	120	1600	170
1700	100	1700	100	1650	150
1800	100	1800	100	1800	150

** Note: Values in Table are approximate, actual curves based upon 2nd order polynomial equation*



☆ NOTE:
150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

EXISTING PLUS PROJECT SCENARIO (AM/PM)

		Number of Lanes
Major Approach	Golden State Blvd	2
Minor Approach	Berkeley Avenue	1

Major St. Volume: 1254
Minor St. Volume: 697
Warrant Met?: Yes