RESOLUTION NO. 2016-019

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ELK GROVE ADOPTING A MITIGATED NEGATIVE DECLARATION AND MITIGATION MONITORING REPORTING PROGRAM (MMRP) FOR THE SHELDON ROAD/ WATERMAN ROAD INTERSECTION IMPROVEMENT PROJECT (PT0138) AND APPROVING THE PROJECT

WHEREAS, the Sheldon Road/Waterman Road Intersection Improvement Project (PT0138) (Project) will construct a single lane roundabout realigned to the east with an additional westbound right turn lane from southbound Waterman Road to westbound Sheldon Road; and including pedestrian accessible crossings at the intersection, drainage improvements, and other incidental features; and

WHEREAS, the City prepared an Initial Study/Mitigated Negative Declaration pursuant to CEQA, attached hereto as Exhibit A and incorporated herein by reference, evaluating the potential environmental effects of the Project; and

WHEREAS, the City determined that the mitigation measures identified in the Initial Study/Mitigated Negative Declaration would reduce environmental impacts to a less than significant level; and

WHEREAS, based on staff's review of the Project, no special circumstances exist that would create a reasonable possibility that this Project will have a significant effect on the environment beyond what was analyzed in the Mitigated Negative Declaration prepared for the Project and disclosed; and

WHEREAS, a Mitigation Monitoring and Reporting Program (MMRP) has been prepared in accordance with CEQA, attached hereto as Exhibit B and incorporated herein by reference, which is designed to ensure compliance with the identified mitigation measures during project implementation and operation; and

WHEREAS, the City distributed the Notice of Intent to Adopt the Mitigated Negative Declaration on November 6, 2015. It was posted at the Sacramento County Clerk's office, distributed through State Clearinghouse and at the City offices, pursuant to Section 15072 of Chapter 3 of Title 14 of the California Code of Regulations (State CEQA Guidelines). A 30-day review and comment period was opened on November 6, 2015 and closed December 8, 2015. The Mitigated Negative Declaration was made available to the public during this review period; and

WHEREAS, the City received written comment letters within the 30-day public review period and responded to those comments in the project staff report; and

WHEREAS, the City has considered the comments received during the public review period, and they do not alter the conclusions in the Initial Study and Mitigated Negative Declaration; and

WHEREAS, the City Council has considered the written and oral comments on the proposed project and the Mitigated Negative Declaration; and

WHEREAS, the City of Elk Grove, Development Services, Planning Department, located 8401 Laguna Palms Way, Elk Grove, California 95758 is the custodian of documents and other materials that constitute the record of proceedings upon which the decision to adopt the Mitigated Negative Declaration is based; and

WHEREAS, the City Council has reviewed the Initial Study, the Mitigated Negative Declaration, and the Mitigation Monitoring and Reporting Program and find that these documents reflect their independent judgment.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Elk Grove hereby adopts the Mitigated Negative Declaration and the Mitigation Monitoring and Reporting Program for the Sheldon Road/Waterman Road Intersection Improvement Project attached hereto and incorporated herein by this reference based on the following findings:

1) On the basis of the whole record, there is no substantial evidence that the Project as designed, mitigated, and revised, will have a significant effect on the environment. A Mitigated Negative Declaration has been prepared and completed in accordance with the California Environmental Quality Act (CEQA). The changes to the project by the removal of the full pedestrian paths does not constitute a "substantial revision" to the Project requiring recirculation of the Mitigated Negative Declaration pursuant to the criteria set forth in CEQA Guidelines Section 15073.5. The Mitigated Negative Declaration reflects the independent judgment and analysis of the City.

2) Pursuant to Public Resources Code, Section 21081 and CEQA Guidelines, Section 15091, all of the proposed mitigation measures described in the Mitigated Negative Declaration are feasible, and therefore shall become binding upon the City.

3) To the extent that these findings conclude that various proposed mitigation measures outlined in the Mitigated Negative Declaration are feasible and have not been modified, superseded or withdrawn, the City Council hereby binds itself and their assigns and successors in interest to implement those measures. These findings are not merely informational, but constitute a binding set of obligations that will come into effect when the City constructs the Project.

<u>Evidence</u>: Pursuant to CEQA and the CEQA guidelines, staff prepared an Initial Environmental Study for the Sheldon Road/Waterman Road Intersection Improvement Project and mitigation measures have been developed that will reduce potential environmental impacts to less than significant levels. The Initial Environmental Study identified potentially significant adverse effects in the areas of aesthetics, biological resources, cultural resources, greenhouse gases, and noise. Mitigation measures that avoid or mitigate the potentially significant effects to a point where no significant effects would occur were identified in the Initial Study and staff prepared a Mitigated Negative Declaration. Preparation of a Mitigation Monitoring and Reporting Program (MMRP) is required in accordance with the City of Elk Grove regulations and is designed to ensure compliance during project implementation. The City distributed the Notice of Intent to

Adopt the Mitigated Negative Declaration on November 6, 2015. It was posted at the Sacramento County Clerk's office, distributed through State Clearinghouse and at the City offices, pursuant to Section 15072 of Chapter 3 of Title 14 of the California Code of Regulations (State CEQA Guidelines).

A 30-day review and comment period was opened on November 6, 2015 and closed December 8, 2015. The Mitigated Negative Declaration was made available to the public during this review period. The City received written comment letters within the 30-day public review period. These comments do not alter the conclusions of the Initial Study/Mitigated Negative Declaration.

On the basis of the Mitigated Negative Declaration, environmental analysis, and the whole record, there is no substantial evidence that the project, as revised with the removal of the full pedestrian paths, will have a significant adverse impact on the environment above those addressed within the adopted Mitigated Negative Declaration. A Mitigation Monitoring and Reporting Program (MMRP), which is incorporated herein by this reference has been prepared to ensure compliance during project implementation. The City of Elk Grove, Development Services Planning Department, located at 8401 Laguna Palms Way, Elk Grove, California 95758 is the custodian of documents and other materials that constitute the record of proceedings upon which the decision to adopt the Mitigated Negative Declaration is based.

BE IT FURTHER RESOLVED that the City Council hereby approves the Project.

PASSED AND ADOPTED by the City Council of the City of Elk Grove this 10th day of February 2016.

GARY DAVIS, MAYOR of the
CITY OF ELK GROVE

ATTEST:

JASON LINDGREN, CITY CLERK

APPROVED AS TO FORM:

JONATHAN P. HOBBS,
CITY ATTORNEY

EXHIBIT A

Sheldon Road/Waterman Road Intersection Improvement Project

Initial Study/Mitigated Negative Declaration

City of

Elk Grove

— Proud Heritage. Bright Future. —

Prepared By

City of Elk Grove
Development Services-Planning
8401 Laguna Palms Way
Elk Grove, CA 95758

November 2015

Sheldon Road/Waterman Road Intersection Improvement Project

Initial Study/Mitigated Negative Declaration

Prepared by:

City of Elk Grove
Development Services - Planning
8401 Laguna Palms Way
Elk Grove, CA 95758

November 2015

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

1.1 INTRODUCTION AND REGULATORY GUIDANCE

This document is an Initial Study (IS) with supporting environmental studies, which provides justification for a Mitigated Negative Declaration (MND) pursuant to the California Environmental Quality Act (CEQA) for the Sheldon Road/Waterman Road Intersection Improvement Project (Project).

The IS/MND is a public document to be used by the City of Elk Grove (City), acting as the CEQA lead agency, to determine whether the Project may have a significant effect on the environment pursuant to CEQA. If the lead agency finds substantial evidence that any aspect of the Project, either individually or cumulatively, may have a significant effect on the environment that cannot be mitigated, regardless of whether the overall effect of the Project is adverse or beneficial, the lead agency is required to prepare an environmental impact report (EIR), use a previously prepared EIR and supplement that EIR, or prepare a subsequent EIR to analyze the Project at hand (Public Resources Code Sections 21080(d), 21082.2(d)).

If the agency finds no substantial evidence that the Project or any of its aspects may cause a significant impact on the environment with mitigation, an MND shall be prepared with a written statement describing the reasons why the proposed Project, which is not exempt from CEQA, would not have a significant effect on the environment and therefore why it does not require the preparation of an EIR (State CEQA Guidelines Section 15371).

According to State CEQA Guidelines Section 15070, a Negative Declaration (ND) shall be prepared for a project subject to CEQA when either:

1) *The IS shows there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or*

2) *The initial study identifies potentially significant effects, but:*

    a) *Revisions in the project plans or proposals made by, or agreed to by the applicant before the proposed MND and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur, and*

    b) *There is no substantial evidence, in light of the whole record before the agency, that the proposed project as revised may have a significant effect on the environment.*

This IS/MND has been prepared in accordance with CEQA, Public Resources Code Section 21000 et seq., and the State CEQA Guidelines Title 14 California Code of Regulations (CCR) Section 15000 et seq.

1.2 LEAD AGENCY

The lead agency is the public agency with primary responsibility over a proposed project. Where two or more public agencies will be involved with a project, CEQA Guidelines Section 15051 provides criteria for identifying the lead agency. In accordance with CEQA Guidelines Section 15051(b)(1), "The lead agency will normally be the agency with general governmental powers." The City of Elk Grove Public Works Department has initiated preliminary design of the Project and it requires approval from the Elk Grove City Council. Therefore, based on the criteria described above, the lead agency for the proposed Project is the City.

1.3 PURPOSE AND DOCUMENT ORGANIZATION

The purpose of this IS/MND is to evaluate the potential environmental impacts of the proposed Sheldon Road/Waterman Road Intersection Improvement Project. Mitigation measures have also been established that reduce or eliminate any identified significant and/or potentially significant impacts. This document is divided into the following sections:

1.0 INTRODUCTION

This section provides an introduction and describes the purpose and organization of this document.

2.0 PROJECT DESCRIPTION

This section provides a Project background and a detailed description of the proposed Project, and describes the process used for notifying and involving the public during Project planning and for coordination with relevant agencies and organizations.

3.0 INITIAL STUDY CHECKLIST

This section describes the environmental setting for each of the environmental subject areas; evaluates a range of impacts classified as "no impact," "less than significant impact," "less than significant impact with mitigation incorporated," or "potentially significant impact" in response to the environmental checklist, and provides mitigation measures, where appropriate, to mitigate potentially significant impacts to a less than significant level; and provides an environmental determination of the Project.

4.0 SUMMARY OF MITIGATION MEASURES

This section provides a summary of mitigation measures for the proposed Project.

5.0 LIST OF PREPARERS

This section identifies staff and consultants responsible for preparation of this document.

6.0 LIST OF ABBREVIATIONS

This section provides a list of abbreviations used throughout the document.

7.0 REFERENCES

This section identifies resources used in the preparation of this document.

2.0 Project Description

2.1 PROJECT LOCATION

The proposed Project is located at the intersection of Sheldon Road and Waterman Road in the Rural Sheldon Area of the City of Elk Grove, Sacramento County, California (**Figure 2.1-1**). The Sheldon Road/Waterman Road intersection is located in a northeastern area of the City and is surrounded by agricultural-residential and agricultural land uses. The proposed Project will replace the existing stop sign–controlled intersection with a roundabout configuration and realign the intersection to the east. **Figure 2.1-2** displays the Project location.

2.2 PROJECT DESCRIPTION

EXISTING SETTING

The proposed Project is located in the Rural Sheldon Area of the City. Existing land uses surrounding the Project site include agricultural-residential and agricultural. The City of Elk Grove General Plan Land Use Map identifies Rural Residential land use surrounding the Project site. Planned development in the vicinity of the proposed Project includes the Sheldon Park Estates subdivision located northeast of the Sheldon Road/Waterman Road intersection and the Sheldon and Waterman housing project located southeast of the Sheldon Road/Waterman Road intersection (see **Figure 2.1-3**). Development of these subdivisions will involve zoning changes to higher-density agricultural-residential zones. Sheldon Road is a two-lane rural roadway that runs east to west and connects Center Parkway with Grant Line Road while providing access for residential areas to State Route (SR) 99 at the SR 99/Sheldon Road interchange. Sheldon Road is ultimately planned as a four-lane arterial within the City of Elk Grove Planning Area boundaries in the City of Elk Grove General Plan Circulation Element. Waterman Road is a two-lane rural roadway that runs north to south and provides local access to industrial businesses, residential neighborhoods, and agricultural land uses. Waterman Road is also ultimately planned as a four-lane arterial in the City of Elk Grove General Plan Circulation Element.

PROPOSED PROJECT

The City proposes to realign and improve the existing stop sign–controlled intersection at Sheldon Road and Waterman Road (see **Figures 2.1-1** and **2.1-2**). The Sheldon Road/Waterman Road intersection will be realigned to the east and replaced with a roundabout configuration.

The increasing population and resulting increases in traffic congestion in the City and south Sacramento County has precipitated the need for improvements to the Sheldon Road/Waterman Road intersection. The City of Elk Grove Planning Department Active Project Report includes two subdivision developments within one-quarter mile of the proposed Project on Sheldon Road and Waterman Road: the Sheldon Park Estates subdivision and the Sheldon and Waterman housing project. The Sheldon-Waterman Intersection Improvement Project is consistent with the City of Elk Grove General Plan. The average daily traffic at the intersection is 17,600 vehicle trips.

The City's Rural Road Improvement Policy, applicable to the Rural Sheldon Area in which the Project is located, sets forth a value-based approach for incremental, rather than ultimate, road improvements that solve specific traffic issues. The City's Rural Road Improvement Standards, in conjunction with the Rural Road Improvement Policy, establish rural road improvement design standards for roadway improvement projects located in the Rural Residential areas of Elk Grove.

The Sheldon Road/Waterman Road Intersection Improvement Project is required to comply with the Rural Road Improvement Policy and the Rural Road Improvement Standards established and adopted by the City.

The Sheldon Road/Waterman Road Intersection Improvement project would include a single-lane roundabout realigned to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road. Other improvements will include pedestrian accessible crossings at the intersection (roundabout), drainage improvements, and other incidental features. Realigned portions of Waterman Road may extend about 700 feet north and south of Sheldon Road. Sheldon Road will also be reconfigured from Briskin Drive to Waterman Road. Sheldon Road improvements, including new roundabout, will extend about 900 feet east of the existing intersection. Realigned driveway access will be provided to adjacent properties on the west side of Waterman Road. Refer to **Figure 2.1-4** for the Project design.

RIGHT-OF-WAY

The Project would require acquisition of right-of-way from the following properties:

1. Parcel at northeast quadrant of intersection, Assessor's Parcel No. 121-0180-012
2. Parcel at southeast quadrant of intersection, Assessor's Parcel No. 127-0010-077

Additional right-of-way would be acquired for ultimate improvements to the intersection. Existing drainage patterns in the Project area will be maintained, although ditches may be improved. All work on Sheldon Road from Briskin Drive to Waterman Road will be performed within the existing right-of-way.

TRAFFIC HANDLING

During construction, the proposed Project may require temporary traffic detours and partial or full lane closures for periods of time.

2.3 FUNDING

The City will use local funds for this Project.

2.4 PROJECT CONSTRUCTION

Analysis contained in this IS/MND has taken into consideration activities within the entire Project area, including proposed contractor staging areas, and all mitigation measures included as part of the Project would be implemented throughout these areas.

2.5 REQUIRED PROJECT APPROVALS

In order for the Project to be implemented, a series of actions and approvals would be required from agencies. Anticipated Project approvals/actions would include but are not limited to the following:

- Elk Grove City Council – Adoption of the MND, Mitigation Monitoring and Reporting Program (MMRP), and other actions associated with Project approval
- Central Valley Regional Water Quality Control Board – 401 Water Quality Certification
- US Army Corps of Engineers (USACE) – Section 404 Permit

City of Elk Grove
Development Services

Figure 2.1-1

Regional Vicinity

City of Elk Grove
Development Services

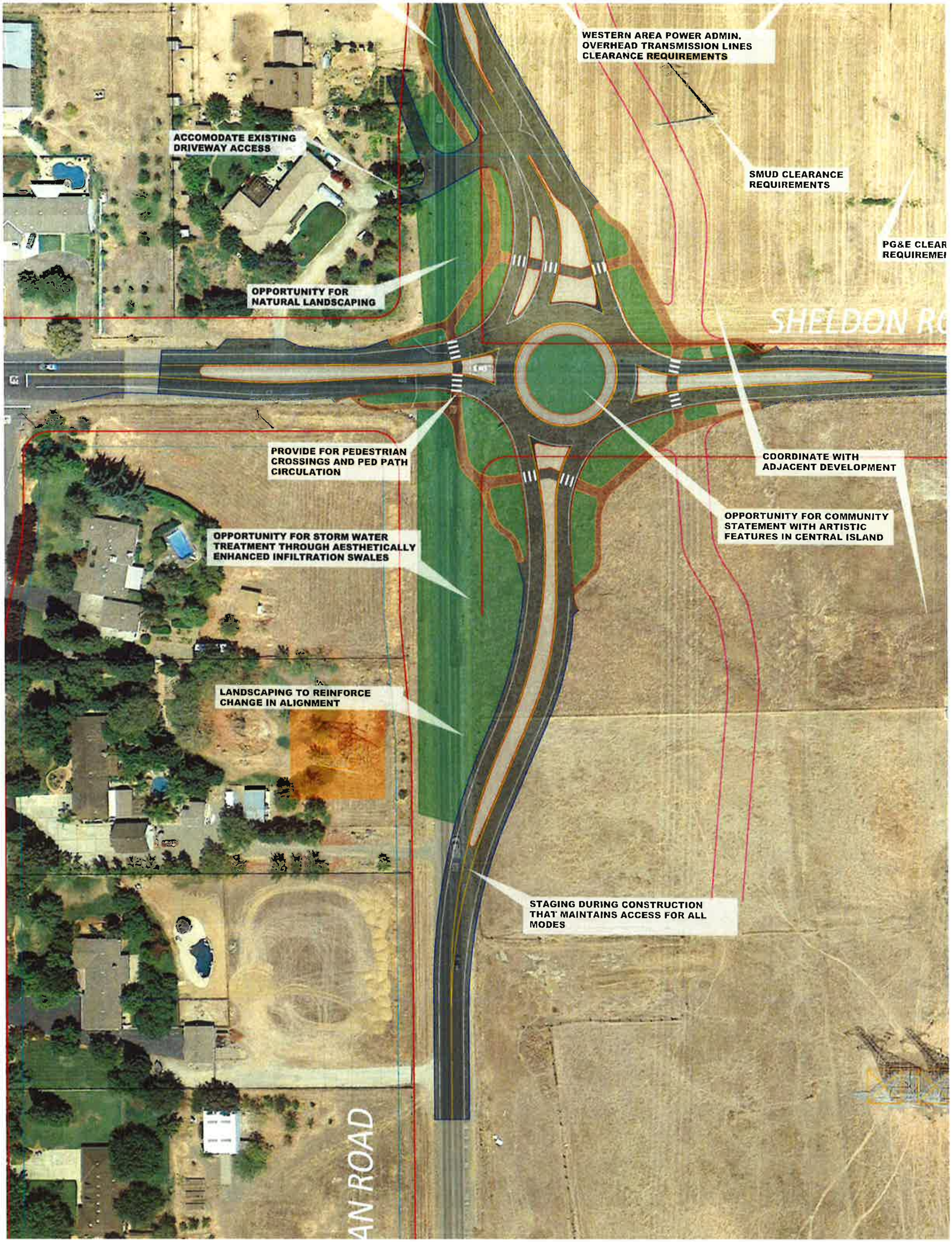
Figure 2.1-2

Project Location

City of Elk Grove
Development Services

Figure 2.1-3

Project Area Development



WESTERN AREA POWER ADMIN. OVERHEAD TRANSMISSION LINES CLEARANCE REQUIREMENTS
ACCOMODATE EXISTING DRIVEWAY ACCESS
SMUD CLEARANCE REQUIREMENTS
PG&E CLEAR REQUIREME
OPPORTUNITY FOR NATURAL LANDSCAPING
SHELDON RO
PROVIDE FOR PEDESTRIAN CROSSINGS AND PED PATH CIRCULATION
COORDINATE WITH ADJACENT DEVELOPMENT
OPPORTUNITY FOR COMMUNITY STATEMENT WITH ARTISTIC FEATURES IN CENTRAL ISLAND
OPPORTUNITY FOR STORM WATER TREATMENT THROUGH AESTHETICALLY ENHANCED INFILTRATION SWALES
LANDSCAPING TO REINFORCE CHANGE IN ALIGNMENT
STAGING DURING CONSTRUCTION THAT MAINTAINS ACCESS FOR ALL MODES
AN ROAD

2.6 OTHER PROJECT ASSUMPTIONS

This IS/MND assumes compliance with all applicable state, federal, and local codes and regulations including but not limited to the City of Elk Grove Improvement Standards, the Sacramento County Water Agency Code, the Guidance Manual for On-Site Storm Water Quality Control Measures, the California Health and Safety Code, and the California Public Resources Code.

2.7 TECHNICAL STUDIES

The following technical studies were conducted as part of this IS/MND:

- Biological Resources Assessment, PMC, October 2014
- Wetland Delineation Report, PMC, December 2014
- Archaeological Assessment, Cogstone, January 2015
- Traffic Study Memorandum, Kittelson & Associates, Inc., July 2014

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3.0 Initial Study Checklist

The environmental factors checked below would be potentially affected by this Project as indicated by the checklist on the following pages.

☒	Aesthetics	☒	Greenhouse Gas Emissions	☐	Population and Housing
☐	Agriculture and Forest Resources	☐	Hazards and Hazardous Materials	☐	Public Services
☐	Air Quality	☐	Hydrology and Water Quality	☐	Recreation
☒	Biological Resources	☐	Land Use and Planning	☐	Transportation/Traffic
☒	Cultural Resources	☐	Mineral Resources	☐	Utilities and Service Systems
☐	Geology and Soils	☒	Noise	☒	Mandatory Findings of Significance

DETERMINATION

On behalf of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to the earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	Date
Christopher Jordan, Environmental Project Manager	City of Elk Grove Planning Department
Printed Name	For

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.1. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☒	☐	☐
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☒	☐	☐

ENVIRONMENTAL SETTING

The proposed Project is located in the Rural Sheldon Area of the City at the intersection of Sheldon Road and Waterman Road. Existing land uses in the surrounding area include agricultural-residential and agricultural. Sheldon Road is a two-lane roadway that runs east to west and Waterman Road is a two-lane roadway that runs north to south. The surrounding landscape is relatively flat and consists of residential properties, undeveloped land, grasses, various types of trees, and overhead utilities. There are no designated state scenic highways in or adjacent to the Project site.

DISCUSSION OF IMPACTS

a) Would the project have a substantial adverse effect on a scenic vista?

No Impact. The City of Elk Grove General Plan EIR (2003b) does not identify any scenic resources or scenic vistas in the vicinity of the Project site. The proposed Project is located in a rural setting and is surrounded by agricultural-residential and agricultural land uses. Views from the Project site are primarily of undeveloped parcels of land, residences, various types of trees, and overhead utilities. The overall visual character of the area is not considered scenic. Therefore, the proposed Project would have no impact on a scenic vista.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The nearest state highway is SR 99, which is located approximately 2.5 miles west of the Project site and does not have a scenic designation in Sacramento County; therefore, the Project would not damage any scenic resources within a state scenic highway. No trees will be removed as a result of the proposed Project, and no rock outcroppings are present at the Project site. According to the archaeological assessment prepared for the proposed Project (Cogstone 2015), there is one historical architectural building within a half-mile of the Project area; however, there are no historic buildings within the Project area and no historic buildings will be impacted by the proposed Project. Therefore, no impact would occur.

c) *Would the project substantially degrade the existing visual character or quality of the site and its surroundings?*

Less Than Significant Impact with Mitigation Incorporated. The proposed Project would realign the existing stop sign–controlled Sheldon Road/Waterman Road intersection to the east and replace it with a roundabout configuration. The proposed improvements will conform to the existing visual character of the Project site and its surroundings and will comply with the City's Rural Road Improvement Policy and Rural Road Improvement Standards. Construction activities and vegetation removal may result in temporary and permanent changes to the visual character of the Project site. However, implementation of mitigation measures **MM 3.1.1** through **MM 3.1.4** will reduce impacts to less than significant.

d) *Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?*

Less Than Significant Impact with Mitigation Incorporated. Under existing conditions, the primary source of day and nighttime lighting and glare in the Project area is from vehicle headlights, as there are no streetlights or traffic lights at the Project site. The proposed Project includes the addition of streetlights at the roundabout. Implementation of mitigation measure **MM 3.1.5** will reduce impacts to less than significant.

Mitigation Measures

MM 3.1.1 All areas disturbed or used for staging of vehicles and equipment shall be restored to their preconstruction condition upon completion of the Project. This is essential in order to provide sediment control and soil stabilization, which can best be accomplished by replanting the disturbed areas with native plants to cover bare soil to help prevent soil erosion. Some areas may also need a seed mix added to the erosion control measure.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.2 The removal of established vegetation shall be minimized and avoided where feasible. Environmentally sensitive area fencing shall be installed to demonstrate areas where vegetation is being preserved.

Timing/Implementation: *Prior to and during construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.3 The Project shall comply with the City's Land Grading and Erosion Control ordinance outlined in Chapter 16.44 of the Elk Grove Municipal Code, which may include seeding, mulching, vegetative buffer strips, sod, plastic covering, burlap covering, watering, and other measures for temporary erosion control of disturbed areas during construction.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.4 Contour grading and slope rounding shall be utilized on all cut and fill slopes in order to help restore the environment in a manner that will blend with the surrounding natural landscape.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.5 The Project shall comply with the City's lighting standards provided in the City of Elk Grove Standard Details and Drawings and the City of Elk Grove Design Guidelines for nonresidential development.

Timing/Implementation: *During Project design and construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
3.2. AGRICULTURE AND FOREST RESOURCES. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forestland (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 45260), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forestland or conversion of forestland to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forestland to non-forest use?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

Agriculture has historically been an important part of Elk Grove's land use and economy. However, the majority of existing land zoned for agricultural uses within the City limits is considered fallow (vacant or underutilized). Few crops are grown in the City itself, and no major intensive agricultural operations (though small family farm activities do exist) occur within the City limits. According to the 2012 Farmland Mapping and Monitoring Program Map for Sacramento County (DOC 2014), land surrounding the Project site is designated as Urban and Built-Up Land, Grazing Land, and Other Land. There is no forestland in the vicinity of the Project site.

DISCUSSION OF IMPACTS

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?

No Impact. The Project site and surrounding area are designated as Urban and Built-Up Land, Grazing Land, and Other Land (DOC 2014). The proposed Project would not convert any designated Farmland to nonagricultural use. Therefore, no impact would occur.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. According to the Sacramento County Williamson Act Map for fiscal year 2011/2012 provided by the California Department of Conservation (2013), no parcels in the Project vicinity are enrolled in a Williamson Act contract. Furthermore, there are no parcels designated exclusively for agriculture in the Project area (City of Elk Grove 2010). No impact would occur.

c) *Would the project conflict with existing zoning for, or cause rezoning of, forestland, timberland, or timberland zoned Timberland Production?*

No Impact. There is no forestland, timberland, or timberland zoned Timberland Production in the vicinity of the proposed Project. Therefore, no impact would occur.

d) *Would the project result in the loss of forestland or conversion of forestland to non-forest use?*

No Impact. There is no forestland in the vicinity of the Project site. Therefore, the proposed Project would not result in the loss of forestland or conversion of forestland to non-forest use, and no impact would occur.

e) *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forestland to non-forest use?*

No Impact. The proposed Project does not involve any changes or alterations to the existing environment that could result in the conversion of forestland to non-forest use, as there is no forestland present in the surrounding area. Furthermore, the proposed Project will not result in the conversion of Farmland to nonagricultural use. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.3. AIR QUALITY. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

ENVIRONMENTAL SETTING

The Project area is located in the Sacramento Valley. The Sacramento Valley is located between two mountain ranges to the east and the west and is bordered at its northern end by more mountains. This topography is conducive to trapping air pollutants. The problem is exacerbated by a temperature inversion layer that traps air at lower levels below an overlying layer of warmer air. Prevailing winds in the area are from the south and southwest. Sea breezes flow over the San Francisco Bay Area and into the Sacramento Valley, transporting pollutants from the large urban areas.

Both the US Environmental Protection Agency (USEPA) and the California Air Resources Board (CARB) have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants representing safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents. The six criteria pollutants are ozone, carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and lead. Areas that meet ambient air quality standards are classified as attainment areas, while areas that do not meet these standards are classified as nonattainment areas. The City portion of the Sacramento Valley has been designated a nonattainment area for federal ozone and fine particulate matter ($PM_{2.5}$) air quality standards as well as State ozone and coarse particulate matter (PM_{10}) standards, and has been designated an attainment or unclassified area for all other State ambient air quality standards (CARB 2013b).

REGULATORY SETTING

Air quality in the Sacramento Valley Air Basin (SVAB) is regulated by several jurisdictions including the USEPA, CARB, and the Sacramento Metropolitan Air Quality Management District (SMAQMD). Each of these jurisdictions develops rules, regulations, and policies to attain the goals or directives imposed upon them through legislation. State and local regulations must be as stringent as USEPA regulations and may be more stringent.

Pollutants subject to federal ambient standards are referred to as criteria pollutants because the USEPA publishes criteria documents to justify the choice of standards. One of the most important reasons for air quality standards is the protection of those members of the population who are most sensitive to the adverse health effects of air pollution, known as sensitive receptors. The term "sensitive receptors" refers to specific population groups, as well as the land uses where they would reside for long periods. Commonly identified sensitive population groups are children, the elderly, the acutely ill, and the chronically ill. Commonly identified sensitive land uses are residences, schools, playgrounds, child care centers, retirement homes or convalescent homes, hospitals, and clinics. Criteria air pollutants, common sources, and associated effects are summarized in **Table 3.3-1**. The federal and State standards for the criteria pollutants and other State-regulated air pollutants are shown in **Table 3.3-2**.

Federal Air Quality Regulations

At the federal level, the USEPA has been charged with implementing national air quality programs. The USEPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was signed into law in 1970. Congress substantially amended the CAA in 1977 and again in 1990.

TABLE 3.3-1
CRITERIA AIR POLLUTANTS
SUMMARY OF COMMON SOURCES AND EFFECTS

Pollutant	Description	Sources	Health Effects	Welfare Effects
Carbon Monoxide (CO)	Colorless, odorless gas	Motor vehicle exhaust, indoor sources include kerosene and wood-burning stoves	Headaches, reduced mental alertness, heart attack, cardiovascular diseases, impaired fetal development, death	Contributes to the formation of smog
Sulfur Dioxide (SO_2)	Colorless gas that dissolves in water vapor to form acid, and interacts with other gases and particulates in the air	Coal-fired power plants, petroleum refineries, manufacture of sulfuric acid, and smelting of ores containing sulfur	Eye irritation, wheezing, chest tightness, shortness of breath, lung damage	Contributes to the formation of acid rain, visibility impairment, plant and water damage, aesthetic damage
Nitrogen Dioxide (NO_2)	Reddish brown, highly reactive gas	Motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels	Susceptibility to respiratory infections, irritation of the lung and respiratory symptoms (e.g., cough, chest pain, difficulty breathing)	Contributes to the formation of smog, acid rain, water quality deterioration, global warming, and visibility impairment

Pollutant	Description	Sources	Health Effects	Welfare Effects
Ozone (O_3)	Gaseous pollutant when it is formed in the troposphere	Primarily vehicle exhaust. Formed from the combination of reactive organic gases and oxides of nitrogen in the presences of sunlight	Eye and throat irritation, coughing, respiratory tract problems, asthma, lung damage	Plant and ecosystem damage
Lead	Metallic element	Metal refineries, smelters, battery manufacturers, iron and steel producers, use of leaded fuels by racing and aircraft industries	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ	Affects animals, plants, and aquatic ecosystems
Particulate Matter (PM)	Very small particles of dust, soot, or other matter, including tiny droplets of liquids	Diesel engines, power plants, industries, windblown dust, woodstoves	Eye irritation, asthma, bronchitis, lung damage, cancer, heavy metal poisoning, cardiovascular effects	Visibility impairment, atmospheric deposition, aesthetic damage, impaired plant photosynthesis

TABLE 3.3-2
SUMMARY OF AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	State Standard [9]	Federal Standard [9]	Principal Health and Atmospheric Effects	Typical Sources
Ozone (O_3) [2]	1 hour 8 hours 8 hours (conformity process [5])	0.09 ppm 0.070 ppm —	— [4] 0.075 ppm [6] 0.08 ppm (4th highest in 3 years)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from reactive organic gases (ROG)/VOCs and nitrogen oxides (NOx) in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.
Carbon Monoxide (CO)	1 hour 8 hours 8 hours (Lake Tahoe)	20 ppm 9.0 ppm [1] 6 ppm	35 ppm 9 ppm —	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.

Pollutant	Averaging Time	State Standard [9]	Federal Standard [9]	Principal Health and Atmospheric Effects	Typical Sources
Respirable Particulate Matter (PM_{10}) [2]	24 hours Annual	50 μg/m³ 20 μg/m³	150 μg/m³ — [2]	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources (wind-blown dust, ocean spray).
Fine Particulate Matter ($PM_{2.5}$) [2]	24 hours Annual 24 hours (conformity process [5])	— 12 μg/m³ —	35 μg/m³ 15.0 μg/m³ 65 μg/m³ (4th highest in 3 years)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter—a toxic air contaminant—is in the $PM_{2.5}$ size range. Many aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical (including photochemical) reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG.
Nitrogen Dioxide (NO_2)	1 hour Annual	0.18 ppm 0.030 ppm	0.100 ppm [7] (98th percentile over 3 years) 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain. Part of the NOx group of ozone precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.
Sulfur Dioxide (SO_2)	1 hour 3 hours 24 hours Annual	0.25 ppm — 0.04 ppm —	0.075 ppm [8] (98th percentile over 3 years) 0.5 ppm 0.14 ppm 0.030 ppm	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.
Lead (Pb) [3]	Monthly Quarterly Rolling 3-month average	1.5 μg/m³ — —	— 1.5 μg/m³ 0.15 μg/m³	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from gasoline may exist in soils along major roads.

Pollutant	Averaging Time	State Standard [9]	Federal Standard [9]	Principal Health and Atmospheric Effects	Typical Sources
Sulfate	24 hours	25 µg/m³	—	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm	—	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.
Visibility Reducing Particles (VRP)	8 hours	Visibility of 10 miles or more at relative humidity less than 70%	—	Reduces visibility. Produces haze. NOTE: Not related to the Regional Haze program under the federal Clean Air Act, which is oriented primarily toward visibility issues in national parks and other "Class I" areas.	See particulate matter above.
Vinyl Chloride[3]	24 hours	0.01 ppm	—	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes.

Source CARB 2013a; USEPA 2015b

Notes: ppm = parts per million; µg/m³ = micrograms per cubic meter; ppb=parts per billion (thousand million)

1. *Rounding to an integer value is not allowed for the State 8-hour CO standard. Violation occurs at or above 9.05 ppm. Violation of the federal standard occurs at 9.5 ppm due to integer rounding.*
2. *Annual PM_{10} NAAQS revoked October 2006; was 50 µg/m³. 24-hr. $PM_{2.5}$ NAAQS tightened October 2006; was 65 µg/m³. In September 2009, the USEPA began reconsidering the $PM_{2.5}$ NAAQS; the 2006 action was partially vacated by a court decision.*
3. *CARB has identified vinyl chloride and the particulate matter fraction of diesel exhaust as toxic air contaminants. Diesel exhaust particulate matter is part of PM_{10} and, in larger proportion, $PM_{2.5}$. Both CARB and the USEPA have identified lead and various organic compounds that are precursors to ozone and $PM_{2.5}$ as toxic air contaminants. There are no exposure criteria for adverse health effects due to toxic air contaminants, and control requirements may apply at ambient concentrations below any criteria levels specified above for these pollutants or the general categories of pollutants to which they belong. Lead NAAQS are not required to be considered in Transportation Conformity analysis.*
4. *Prior to June 2005, the 1-hour NAAQS was 0.12 ppm. The 1-hour NAAQS is still used only in 8-hour ozone early action compact areas, of which there are none in California. However, emission budgets for 1-hour ozone may still be in use in some areas where 8-hour ozone emission budgets have not been developed.*
5. *The 65 µg/m³ $PM_{2.5}$ (24-hr) NAAQS was not revoked when the 35 µg/m³ NAAQS was promulgated in 2006. Conformity requirements apply for all NAAQS, including revoked NAAQS, until emission budgets for the newer NAAQS are found adequate or State Implementation Plan amendments for the newer NAAQS are completed.*
6. *As of September 16, 2009, the USEPA is reconsidering the 2008 8-hour ozone NAAQS (0.075 ppm). On December 17, 2014, the USEPA proposed a revision to the primary and secondary ozone standards to a level within a range of 0.065 to 0.070 ppm.*
7. *Final 1-hour NO_2 NAAQS published in the Federal Register on February 9, 2010, effective March 9, 2010. Project-level hot-spot analysis requirements, while not yet required for conformity purposes, are expected.*
8. *The USEPA finalized a 1-hour SO_2 standard of 75 ppb in June 2010.*
9. *State standards are "not to exceed" unless stated otherwise. Federal standards are "not to exceed more than once a year" or as noted above.*

The federal and State ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the federal and State standards differ in some cases. In general, the California standards are more stringent. This is particularly true for ozone, $PM_{2.5}$, and PM_{10}.

The CAA required the USEPA to establish national ambient air quality standards (NAAQS) and also set deadlines for their attainment. Two types of NAAQS have been established: primary standards, which protect public health, and secondary standards, which protect public welfare from non-health-related adverse effects, such as visibility restrictions.

California Air Quality Regulations

The California Clean Air Act (CCAA), 1988, requires that all air districts in the State endeavor to achieve and maintain California ambient air quality standards (CAAQS) for ozone, CO, SO_2, and NO_2 by the earliest practical date. Plans for attaining CAAQS were to be submitted to CARB by June 30, 1991. The CCAA specifies that districts focus particular attention on reducing the emissions from transportation and area-wide emission sources, and the act provides districts with authority to regulate indirect sources. Each district plan is required to either (1) achieve a 5 percent annual reduction, averaged over consecutive three-year periods, in district-wide emissions of each nonattainment pollutant or its precursors, or (2) to provide for implementation of all feasible measures to reduce emissions. Any planning effort for air quality attainment would thus need to consider both State and federal planning requirements. Any additional development within the region would impede the reduction goals of the CCAA.

CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA. Other CARB duties include monitoring air quality (in conjunction with air quality monitoring networks maintained by air pollution control districts and air quality management districts), establishing CAAQS (which in many cases are more stringent than the NAAQS), and setting emissions standards for new motor vehicles. The emissions standards established for motor vehicles differ depending on various factors including the model year and the type of vehicle, fuel, and engine used.

Sacramento Metropolitan Air Quality Management District

The SMAQMD, in coordination with the air quality management districts and air pollution control districts of El Dorado, Placer, Solano, Sutter, and Yolo counties, prepared and submitted the 1991 Air Quality Attainment Plan (AQAP) in compliance with the requirements set forth in the CCAA, which specifically addressed the nonattainment status for ozone and, to a lesser extent, CO and PM_{10}. The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plan must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. The requirement of the CCAA for a first triennial progress report and revision of the 1991 AQAP was fulfilled with the preparation and adoption of the 1994 Ozone Attainment Plan.

The Ozone Attainment Plan stresses attainment of ozone standards and focuses on strategies for reducing ozone precursor emissions of reactive organic compounds (ROG) and NO_X. It promotes active public involvement, enforcement of compliance with SMAQMD rules and regulations, public education in both the public and private sectors, development and promotion of transportation and land use programs designed to reduce vehicle miles traveled (VMT) within the region, and implementation of stationary and mobile-source control measures. The Ozone Attainment Plan became part of the State Implementation Plan in accordance with the requirements of the CCAA and amended the 1991 AQAP. However, at that time, the region could not show that the national ozone (1-hour) standard would be met by 1999. In exchange for moving the deadline to 2005, the region accepted a designation of "severe nonattainment" coupled with additional emissions requirements on stationary sources. Additional triennial reports were also prepared in 1997, 2000, and 2003 in compliance with the CCAA that acted as incremental updates.

As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CCAA. Milestone reports were prepared for 1996, 1999, and 2002. These milestone reports include compliance demonstrations that the requirements have been met for the Sacramento nonattainment area. The air quality attainment plans and reports present comprehensive strategies to reduce ROG, NO_x, and PM_{10} emissions from stationary, area, mobile, and indirect sources. Such strategies include the adoption of rules and regulations; enhancement of CEQA participation; implementation of a new and modified indirect source review program; adoption of local air quality plans; and stationary, mobile, and indirect source control measures.

In July 1997, the USEPA promulgated a new 8-hour ozone standard. This change lowered the standard for ambient ozone from 0.12 ppm (parts per million) averaged over 1 hour to 0.08 ppm averaged over 8 hours. In general, the 8-hour standard is more protective of public health and more stringent than the 1-hour standard. The promulgation of this standard prompted new designations and nonattainment classifications in June 2004 and resulted in the revocation of the 1-hour standard in June 2005. The region was designated as a nonattainment (serious) area for the national (8-hour) ozone standard with an attainment deadline of June 2013; however, the USEPA reclassified the region from a "serious" to a "severe" 8-hour ozone nonattainment area with an extended attainment deadline of June 15, 2019 (USEPA 2015a). On January 9, 2015, the USEPA approved CARB's plan for the region to attain the 1997 8-hour ozone NAAQS by June 15, 2019 (USEPA 2015a).

The SMAQMD has also adopted various rules and regulations pertaining to the control of emissions from area and stationary sources. Some of the more pertinent regulatory requirements applicable to the proposed Project are identified as follows:

Rule 402. Nuisance. The purpose of this rule is to limit emissions which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause or have natural tendency to cause injury or damage to business or property.

Rule 403. Fugitive Dust. The purpose of this rule is to require that reasonable precautions be taken so as not to cause or allow the emissions of fugitive dust from noncombustion sources from being airborne beyond the property line from which the emissions originates.

Rule 442: Architectural Coatings. The developer or contractor is required to use coatings that comply with the volatile organic compound (VOC) content limits specified in the rule.

Ambient Air Quality

Attainment Status for Criteria Air Pollutants

The attainment status of Sacramento County is summarized in **Table 3.3-3**. An attainment designation for an area signifies that pollutant concentrations did not violate the standard for that pollutant in that area. A nonattainment designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation(s) was caused by an exceptional event, as defined in the criteria.

As depicted in **Table 3.3-3**, Sacramento County is currently designated nonattainment for the State and federal ozone and PM_{10} standards, as well as the State $PM_{2.5}$ standard. Sacramento County is designated either attainment or unclassified for the remaining federal and State ambient air quality standards.

TABLE 3.3-3
ATTAINMENT STATUS DESIGNATIONS

Pollutant	California Standard	Federal Standard
Ozone	1-hour – Nonattainment (Serious) 8-hour – Nonattainment	1-hour – Attainment 8-hour – Nonattainment (Severe –15)
PM_{10}	24-hour – Nonattainment Annual – Nonattainment	24-hour – Attainment
$PM_{2.5}$	Annual – Nonattainment (No State Standard for 24-hour)	24-hour – Nonattainment Annual – Unclassified/Attainment
Carbon Monoxide	1-hour – Attainment 8-hour – Attainment	1-hour – Attainment 8-hour – Attainment
Nitrogen Dioxide	1-hour – Attainment Annual – Attainment	1-hour – Unclassified/Attainment Annual – Unclassified/Attainment
Sulfur Dioxide	1-hour –Attainment 24-hour – Attainment	1-hour – Attainment Pending
Lead	30 day average – Attainment	3-month rolling average – Unclassified/Attainment
Visibility Reducing Particles	8-hour – Unclassified	No Federal Standard
Sulfates	24-hour – Attainment	No Federal Standard
Hydrogen Sulfide	1-hour – Unclassified	No Federal Standard

Source: SMAQMD 2013
Note: Air quality meets federal PM_{10} standards. The SMAQMD must request redesignation to attainment and submit a maintenance plan to be formally designated attainment.

Odors

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from the psychological (e.g., irritation, anger, or anxiety) to the physiological, including circulatory and respiratory effects, nausea, vomiting, and headache.

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor. In fact, an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast-food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Neither the State nor the federal government has adopted any rules or regulations for the control of odor sources. The SMAQMD does not have an individual rule or regulation that specifically addresses odors; however, odors would be applicable to SMAQMD's Rule 402, Nuisance. Any actions related to odors would be based on citizen complaints to local governments and the SMAQMD. No major stationary sources of odors have been identified in the vicinity of the Project site.

Toxic Air Contaminants

Toxic air contaminants (TACs) are not considered criteria pollutants in that the federal Clean Air Act and the California Clean Air Act do not address them specifically through the setting of national or California ambient air quality standards. Instead, the USEPA and CARB regulate hazardous air pollutants and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology to limit emissions. In conjunction with SMAQMD rules, they establish the regulatory framework for TACs. At the national levels, the USEPA has established National Emission Standards for Hazardous Air Pollutants, as required by the CAA Amendments. These are technology-based source-specific regulations that limit allowable emissions of hazardous air pollutants.

At the State level, CARB has authority for the regulation of emissions, including TACs, from motor vehicles, fuels, and consumer products. In California, TACs are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 sets forth a formal procedure for CARB to designate substances as TACs including research, public participation, and scientific peer review. When looking at all controlled TACs, emissions of diesel-exhaust PM are estimated to be responsible for about 70 percent of the total ambient TAC risk. As a result, CARB has made the reduction of the public's exposure to diesel-exhaust PM one of its highest priorities, with an aggressive plan to require cleaner diesel fuel and cleaner diesel engines and vehicles (CARB 2005).

At the local level, air districts have authority over stationary or industrial sources. All projects that require air quality permits from the SMAQMD are evaluated for TAC emissions. The SMAQMD limits emissions and public exposure to TACs through a number of programs. The SMAQMD prioritizes TAC-emitting stationary sources, based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors. The SMAQMD requires a comprehensive health risk assessment for facilities that are classified in the significant risk category, pursuant to AB 2588.

DISCUSSION OF IMPACTS

a) *Would the project conflict with or obstruct implementation of the applicable air quality plan?*

No Impact. The SMAQMD coordinates the work of government agencies, businesses, and private citizens to achieve and maintain healthy air quality for the Sacramento area. The SMAQMD develops market-based programs to reduce emissions associated with mobile sources, processes permits, ensures compliance with permit conditions and with SMAQMD rules and regulations, and conducts long-term planning related to air quality.

As previously stated, the Elk Grove portion of the Sacramento Valley has been designated a nonattainment area for federal ozone and $PM_{2.5}$ air quality standards (CARB 2013b). Since Sacramento County is classified as a nonattainment area for federal air quality standards, the SMAQMD is required to submit air quality plans and rate-of-progress milestone evaluations in accordance with the CAA. The SMAQMD air quality attainment plans and reports, which include the Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (2008), the $PM_{2.5}$ State Implementation Plan, and the PM_{10} Implementation/Maintenance Plan and Re-Designation Request for Sacramento County (2010), present comprehensive strategies to reduce the ozone precursor pollutants (reactive organic gases [ROG] and nitrous oxides [NO_x]) as well as PM emissions from stationary, area, mobile, and indirect sources. The Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan includes the information and analyses to fulfill CAA requirements for demonstrating reasonable further progress toward attaining the 8-hour ozone NAAQS for the Sacramento region. In addition, this plan establishes an updated emissions inventory and maintains existing motor vehicle emission budgets for transportation conformity purposes. The $PM_{2.5}$ State Implementation Plan attempts to fulfill the requirements of the USEPA to redesignate Sacramento County from nonattainment to attainment of the $PM_{2.5}$ NAAQS, and the PM_{10} Implementation/Maintenance Plan and Re-Designation Request for Sacramento County attempts to maintain PM_{10} attainment status.

According to SMAQMD guidance (2011), if the Project results in a change in a designated land use and corresponding substantial increases in VMT, the resultant increase in vehicle miles traveled may be unaccounted for in regional emissions inventories contained in the regional air quality control plans described above, which are based on local planning documents and general plans. Substantial increases in VMT that are not accounted for in the emissions inventory of these air quality plans may conflict with these air quality plans and therefore result in a contribution to the region's existing air quality nonattainment and/or maintenance status.

Roadway improvements do not directly generate vehicle trips. Rather, vehicle trips are generated by land use changes that may be indirectly influenced by transportation improvements. The proposed Project would not result in increases in the rate of trips or VMT. Rather, the proposed traffic facility improvements would provide improved access to an area with existing and anticipated congestion. The Project is considered necessary in order to reduce future congestion anticipated as approved development builds out. Therefore, it can be argued that the Project mitigates the potential adverse impacts associated with planned growth on the existing system by improving system efficiency and reducing forecast congestion levels. As a result, implementation of the Project would not result in an increase in VMT beyond levels assumed in the City General Plan. Therefore, the proposed Project would have no impact.

b) *Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?*

Less Than Significant Impact. Implementation of the proposed Project would result in short-term emissions from construction as well as demolition activities associated with the removal of existing pavement. For purposes of this analysis, emissions from both construction and demolition of the proposed Project will be collectively referred to as construction emissions from this point forward.

The proposed Project will not include the provision of new permanent stationary or mobile sources of emissions, and therefore, by its very nature, it will not generate quantifiable criteria emissions from Project operations. The Project does not propose any buildings and therefore no permanent source or stationary source emissions. In addition, roadway improvements do not directly generate vehicle trips, a predominant source of air pollutant emissions. Rather, vehicle trips are generated by land use changes that may be indirectly influenced by transportation improvements. The proposed Project would not result in increases in the rate of vehicle trips. Rather, the proposed traffic facility improvements provide improved access to an area with existing and anticipated congestion. The Project is considered necessary in order to reduce future congestion anticipated as approved development builds out. Once the proposed traffic facility improvements are implemented, there will be no resultant increase in automobile trips to the area because the improved facilities will not require daily visits. Therefore, new permanent stationary or mobile sources of emissions will not be quantified, as the Project would not result in such emissions.

Construction-generated emissions are short term and of temporary duration, lasting only as long as construction activities occur, but have the potential to represent a significant air quality impact. Implementation of the proposed Project would result in the temporary generation of emissions resulting from site grading and paving, motor vehicle exhaust associated with construction equipment and worker trips, and the movement of construction equipment. Emissions commonly associated with construction activities include fugitive dust from soil disturbance, fuel combustion from mobile heavy-duty diesel- and gasoline-powered equipment, portable auxiliary equipment, and worker commute trips. During construction, fugitive dust, the dominant source of PM_{10} and $PM_{2.5}$ (particulate matter smaller than 2.5 microns) emissions, is generated when wheels or blades disturb surface materials. Uncontrolled dust from construction can become a nuisance and potential health hazard to those living and working nearby. Emissions of airborne PM are largely dependent on the amount of ground disturbance associated with site preparation activities. Demolition and renovation of pavement can also generate PM_{10} and $PM_{2.5}$ emissions. Construction equipment is often diesel-powered and can be a substantial source of NO_X emissions, in addition to PM_{10} and $PM_{2.5}$ emissions. Worker commute trips and architectural coatings are dominant sources of ROG emissions.

The predicted maximum daily construction-generated emissions of ROG, NO_x, PM_{10}, and $PM_{2.5}$ associated with Project construction are summarized in **Table 3.3-4**. The projected criteria pollutant emissions resulting from construction activities were estimated by Michael Baker International (formerly PMC) using the California Emissions Estimator Model (CalEEMod). CalEEMod contains default values for much of the information needed to calculate emissions. However, project-specific, user-supplied information can also be used when it is available. Results of the modeling conducted by Michael Baker International are included in **Appendix A**.

TABLE 3.3-4
PROJECT CONSTRUCTION EMISSIONS (MAXIMUM) POUNDS PER DAY

Construction Phase	ROG	NOx	PM_{10}	$PM_{2.5}$	CO
Demolition[1]	3.34	32.07	3.99	2.12	25.65
Grading & Earthwork[2]	5.85	63.79	11.61	6.64	39.83
Traffic Facility Paving	2.03	19.81	1.35	1.17	13.06
SMAQMD Potentially Significant Impact Threshold	—	85 pounds/day	—	—	—
Exceed SMAQMD Threshold?	—	**No**	—	—	—

*Source: Emissions modeled by Michael Baker International using the CalEEMod computer program. See **Appendix A** for modeling outputs.*

1. *Emissions projected from demolition account for demolition of existing pavement. For the purposes of this analysis, 1,400 feet of Waterman Road, 900 feet of Sheldon Road, and all driveway entrances between Country Hill Road and the Waterman/Sheldon intersection are assumed to be demolished.*
2. *Emissions projected from site preparation, grading, and earthwork include 2.6 acres to account for the Project area.*

It is important to note that actual daily emissions would vary from day to day and would be dependent on the activities occurring. Based on the modeling conducted, estimated short-term daily emissions of ROG, NO_x, PM_{10}, and $PM_{2.5}$ associated with construction activities would not exceed SMAQMD significance thresholds.

The Project would not result in new permanent stationary or mobile sources of emissions and as shown, construction activities would not exceed SMAQMD significance thresholds. As a result, this impact would be considered less than significant.

c) *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?*

Less Than Significant Impact. Due to the region's nonattainment status for ozone and PM, the SMAQMD considers projects that are consistent with all applicable air quality plans intended to bring the basin into attainment for all criteria pollutants, and below SMAQMD significance thresholds of the ozone precursor pollutants (i.e., ROG and NO_x), to have less than significant cumulative impacts. As discussed in issue a), the proposed Project would not conflict with the Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan, the $PM_{2.5}$ State Implementation Plan, or the PM_{10} Implementation/Maintenance Plan and Re-Designation Request for Sacramento County since the Project would not result in an increase in VMT. As discussed in issue b), predicted emissions attributable to the proposed Project would not exceed SMAQMD significance thresholds. Therefore, cumulative impacts would be less than significant per the SMAQMD significance threshold, since the Project would not conflict with applicable air quality plans or exceed SMAQMD significance thresholds. The Project's contribution would not be cumulatively considerable, and the impact would be considered less than significant.

d) *Would the project expose sensitive receptors to substantial pollutant concentrations?*

Less Than Significant Impact. Sensitive land uses are generally defined as locations where people reside or where the presence of air emissions could adversely affect the use of the land. Typical sensitive receptors include residents, schoolchildren, hospital patients, and the elderly. The Elk Grove General Plan considers residences to be "sensitive receptors" in relation to air quality issues. The proposed traffic facility improvements would occur within a residential neighborhood.

Construction activities would involve the use of a variety of gasoline- and diesel-powered equipment that emits exhaust fumes. Sensitive receptors in the Project vicinity could be exposed to nuisance dust and heavy equipment emissions (i.e., diesel exhaust) during construction. The amount to which the receptors are exposed (a function of concentration and duration of exposure) is the primary factor used to determine health risk (i.e., potential exposure to toxic air contaminant emission levels that exceed applicable standards). Construction activities would be subject to SMAQMD Rule 403, which requires taking reasonable precautions, such as using water or chemicals for control of dust during construction operations to prevent the emissions of the air toxic fine particulate matter. Implementation of Rule 403 would ensure the Project would result in less than significant dust-related impacts during construction. Health-related risks associated with diesel exhaust emissions are primarily linked to long-term exposure and the associated risk of contracting cancer. Concentrations of mobile-source diesel exhaust emissions are typically reduced by 70 percent at a distance of approximately 500 feet (CARB 2005). In addition, current models and methodologies for conducting health risk assessments are associated with longer-term exposure periods of 9, 40, and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities. Due to the short, temporary nature of constructing the proposed Project traffic facility improvements, potential health risk impacts from diesel exhaust would be less than significant.

Once the Project is constructed, there would be no greater potential for substantial pollutant concentrations than currently exist. This is because the Project would not result in new permanent stationary or mobile sources of emissions. The Project does not propose any buildings and therefore no permanent source of stationary source emissions. In addition, roadway improvements do not directly generate vehicle trips. Rather, vehicle trips are generated by land use changes that may be indirectly influenced by transportation improvements. The proposed Project would not result in increases in the rate of trips or VMT, and thus would not result in increases in mobile-source air toxics. This impact is less than significant.

e) *Would the project create objectionable odors affecting a substantial number of people?*

Less Than Significant Impact. The occurrence and severity of odor impacts depends on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of the receptors. While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and regulatory agencies. Projects with the potential to frequently expose members of the public to objectionable odors would be deemed to have a significant impact.

Construction of the proposed Project would involve the use of a variety of gasoline- or diesel-powered equipment that would emit exhaust fumes. Exhaust fumes, particularly diesel exhaust, may be considered objectionable by some people. However, construction-generated emissions would occur intermittently throughout the workday and would dissipate rapidly within increasing distance from the source. Additionally, SMAQMD Rule 402 addresses the exposure of emissions that may cause nuisance to any substantial number of people. The proposed Project would be subject to Rule 402, and any objectionable odors resulting from the proposed Project would be short term and limited to the construction period.

Furthermore, idling times of construction equipment would be minimized as required by the state airborne toxics control measure (Title 13, Section 2485 of the California Code of Regulations). As a result, short-term construction activities would not expose a substantial number of people to frequent odorous emissions. In addition, the proposed Project would not result in the installation of any equipment that would be considered major odor-emission sources. As a result, potential exposure of sensitive receptors to odorous emissions would be considered less than significant.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.4 BIOLOGICAL RESOURCES. Would the project:				
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 Wildlife or US 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, or regulations, or by the California Department of Fish and Wildlife or US 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 wetlands, 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?	☐	☐	☐	☒

A Biological Resources Assessment (included in **Appendix B**) was prepared for the Project in November 2014, and a Wetland Delineation Report (included in **Appendix C**) was prepared for the Project in October 2015. The analysis and conclusions below are based on the Biological Resources Assessment and Wetland Delineation Report prepared for the Project.

The biological study area (BSA) is larger than the Project footprint to cover the biological resources that may be affected with implementation of the proposed Project. The BSA for this Project encompasses ±27.2 acres and is defined by the Project footprint and temporary construction zone (TCZ) plus a 250-foot buffer off the TCZ east of Waterman Road (**Figure 3.4-1**). This boundary was chosen due to the presence of vernal pool features to the east of the Project footprint and the fact that the US Fish and Wildlife Service (USFWS) typically considers all vernal pool features within 250 feet of proposed development indirectly affected (USFWS 1996). The remainder of the Project is characterized as urban cover with no potential for vernal pools or special-status species to occur.

ENVIRONMENTAL SETTING

A Michael Baker International biologist conducted an evaluation of the Project site to characterize the biological baseline on and adjacent to the site. The evaluation involved a reconnaissance-level survey and a delineation of potentially jurisdictional features, as well as a query of available data and literature from local, State, federal, and nongovernmental agencies.

Database queries were performed on the following websites:

- USFWS's Sacramento Office's Species List (2014a)
- USFWS's Critical Habitat Portal (2014b)
- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (2014)
- California Native Plant Society's (CNPS) Inventory of Rare, Threatened, and Endangered Plants of California (2014)

A search of the USFWS Sacramento Office's Species List was performed for the Elk Grove, California, US Geological Survey (USGS) 7.5-minute quadrangle and all adjacent quadrangles (Florin, Bruceville, Sloughhouse, Clay, Galt, Buffalo Creek, Sacramento East, and Carmichael) to identify special-status species under their jurisdiction that may be affected by the proposed Project. In addition, a query of the USFWS Critical Habitat Portal was conducted to identify any designated critical habitat on or in the vicinity of the BSA. The CNDDB provided a list of mapped and unprocessed occurrences for special-status species within the quadrangles mentioned above. Lastly, the CNPS database was queried to identify special-status plant species with the potential to occur within the aforementioned USGS quadrangles. Please see **Appendix B** for the raw data returned from the database queries.

A reconnaissance-level survey occurred on October 22, 2014. The objective of the visit was to characterize the existing biological resources conditions on the site and evaluate potential presence of special-status species, wetlands, or other sensitive resources. The Project site has relatively flat topography and ranges in elevation from 50 to 76 feet above mean sea level. The elevation east of Waterman Road slopes gently from the northwest to Laguna Creek in the southeast of the Project site. The elevation along Sheldon Road west of Waterman Road is relatively flat, with a slight slope toward Briskin Drive at the far western end of the BSA. The site is in a rural area of Elk Grove and is surrounded on all sides by a mix of agricultural and residential uses.

The Project site consists of three vegetative communities: urban, annual grassland, and jurisdictional features (**Figure 3.4-2**). Urban cover in the BSA is associated with areas that have been heavily modified by humans, including roadways, existing buildings, and structures, as well as lawns and landscaped vegetation found in residential yards.

Annual grasslands are associated with undeveloped areas east of Waterman Road. In the BSA, this community is composed of primarily introduced species and includes Italian ryegrass (*Festuca perennis*), medusa head (*Taeniatherum caput-medusae*), tarweed (*Holocarpha virgata*), Bermuda grass (*Cynodon dactylon*), soft brome (*Bromus hordeaceus*), rat-tail fescue (*Vulpia myuros*), ripgut brome (*Bromus diandrus*), barleys (*Hordeum* spp.), filarees (*Erodium* spp.), yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), black mustard (*Brassica nigra*), chicory (*Cichorium intybus*), wild oat (*Avena fatua*), and native dove weed (*Croton setigerus*).

City of Elk Grove
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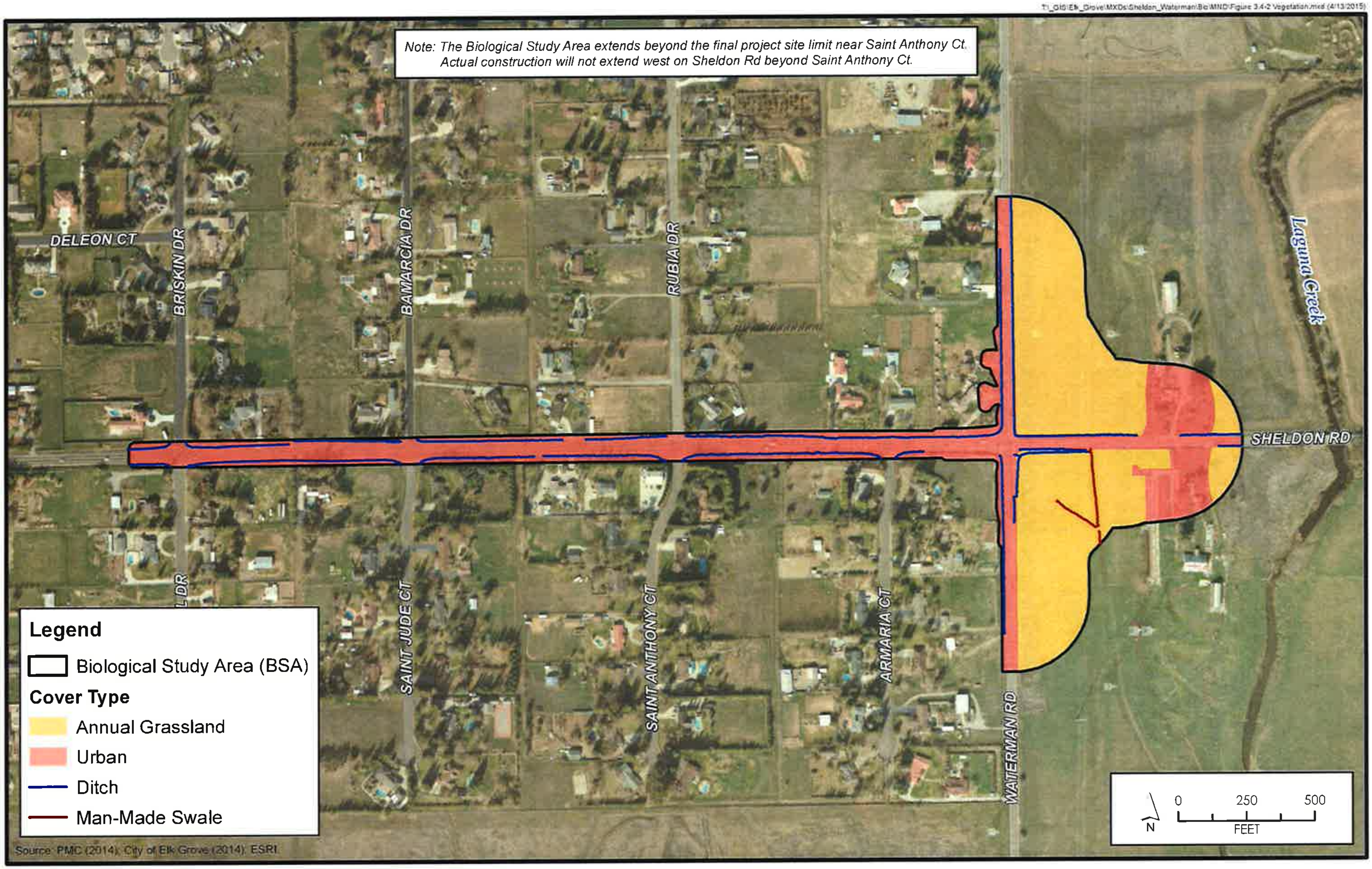
ELK GROVE

Figure 3.4-1

Biological Study Area



City of Elk Grove
Development Services

Figure 3.4-2

Vegetation and Aquatic Features

Two aquatic classifications occur in the BSA: drainage ditches and a jurisdictional man-made swale. Ditch features are characterized by flashy, ephemeral flows of stormwater runoff from roads and adjacent uplands. These waters drain into the man-made swales and eventually into Laguna Creek. Vegetation in the swales in the BSA is different from the surrounding uplands. Dominant species include Mediterranean barley (*Hordeum marinum*), Italian ryegrass, loosestrife (*Lythrum hyssopifolia*), and prostrate knotweed (*Polygonum aviculare*). Vegetation in the ditches is characterized by a mix of upland plants and hydrophytic species similar to those found in swales. Species composition in the ditches is dependent upon hydroperiod.

SENSITIVE NATURAL COMMUNITIES

Sensitive habitats include areas of special concern to resource agencies, areas protected under CEQA, areas designated as sensitive natural communities by the CDFW, areas outlined in Section 1600 of the Fish and Game Code (FGC), areas regulated under Section 404 of the federal Clean Water Act, and areas protected under local regulations and policies. Annual grassland is considered a special-status community in the sense that it provides foraging habitat for the State-threatened Swainson's hawk (*Buteo swainsoni*) and is protected under Chapter 16.130 of the Elk Grove Municipal Code. No other sensitive natural communities were identified in the BSA.

WETLANDS AND OTHER WATERS OF THE UNITED STATES

Jurisdictional waters of the United States provide a variety of functions for plants and wildlife. Wetlands and other water features provide habitat, foraging, cover, migration, and movement corridors for both special-status and common species. In addition to habitat functions, these features provide physical conveyance of surface water flows capable of handling large stormwater events. Large storms can produce extreme flows that cause bank cutting and sedimentation of open waters and streams. Jurisdictional waters can slow these flows and lessen the effects of these large storm events, protecting habitat and other resources. The jurisdictional delineation identified 0.13 acre of potential jurisdictional waters, in the form of a man-made swale, in the BSA. This boundary will require verification by the U.S. Army Corps of Engineers.

SPECIAL-STATUS SPECIES

Candidate, sensitive, or special-status species are commonly characterized as species that are at potential risk or actual risk to their persistence in a given area or across their range. These species have been identified and assigned a status ranking by governmental agencies such as the CDFW, the USFWS, and nongovernmental organizations such as the CNPS. The degree to which a species is at risk of extinction is the determining factor in the assignment of a status ranking. Some common threats to a species's or population's persistence include habitat loss, degradation, and fragmentation, as well as human conflict and intrusion. For the purposes of this biological review, special-status species are defined by the following codes:

- Listed, proposed, or candidates for listing under the federal Endangered Species Act (50 Code of Federal Regulations 17.11 – listed; 61 Federal Register 7591, February 28, 1996, candidates)
- Listed or proposed for listing under the California Endangered Species Act (FGC 1992 Section 2050 et seq.; 14 California Code of Regulations [CCR] Section 670.1 et seq.)
- Designated as Species of Special Concern by the CDFW

- Designated as Fully Protected by the CDFW (FGC Sections 3511, 4700, 5050, and 5515)
- Species that meet the definition of rare or endangered under CEQA (14 CCR Section 15380) including CNPS List Rank 1B and 2

The query of the USFWS, CNPS, and CNDDB databases revealed several special-status species with the potential to occur in the Project vicinity. **Appendix D** summarizes each species identified in the database results, a description of the habitat requirements for each species, and conclusions regarding the potential for each species to be impacted by the proposed Project. **Figure 3.4-3** depicts the locations of special-status species recorded within a 1-mile radius of the Project site.

DISCUSSION OF IMPACTS

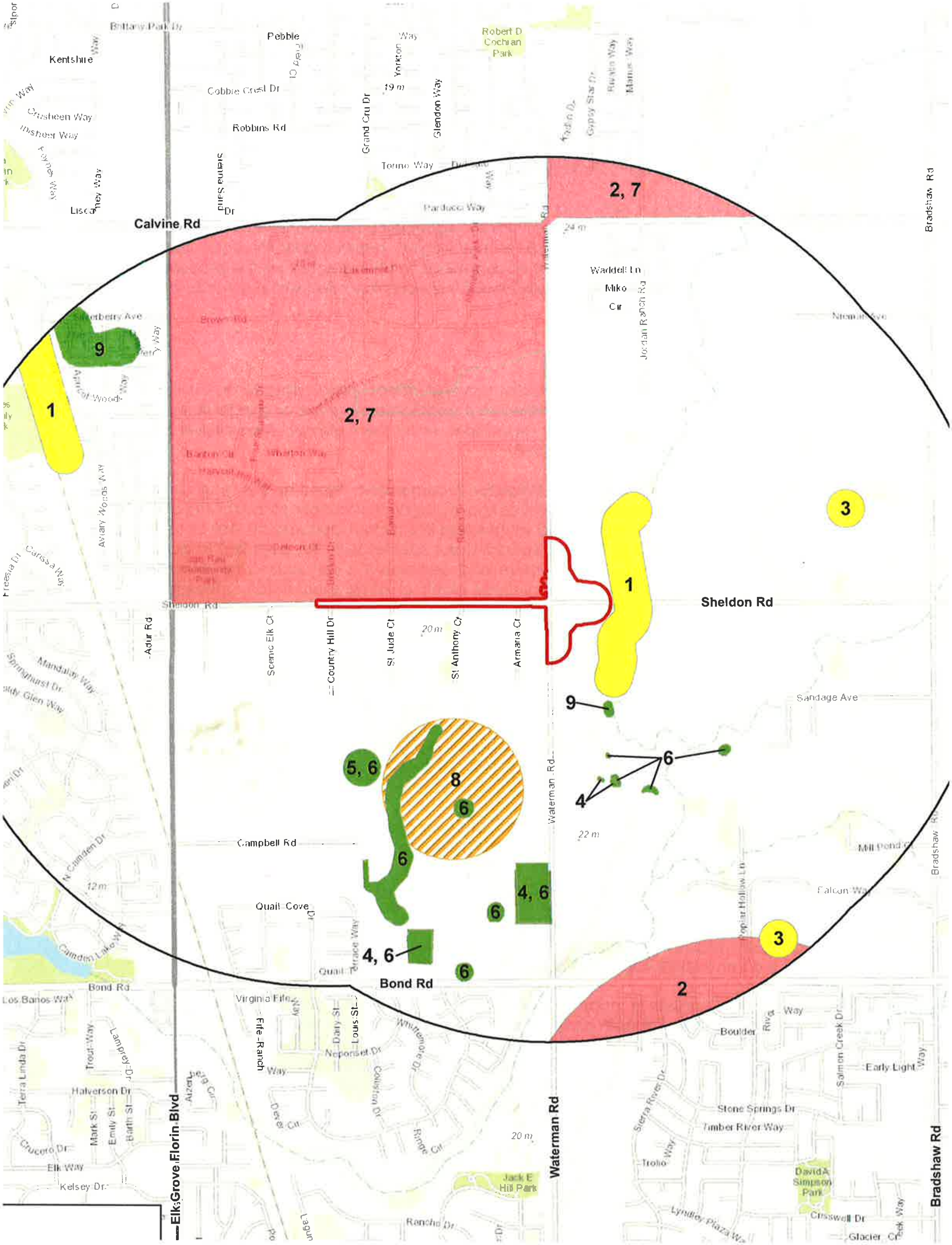
a) *Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?*

Less Than Significant Impact with Mitigation Incorporated. Based on the results of database searches and historic records, as well as known regional occurrences, burrowing owl (*Athene cunicularia*), Swainson's hawk, and white-tailed kite (*Elanus leucurus*), as well as other raptors and migratory birds, are the only special-status species with the potential to occur on the Project site. Given its disturbed nature and because it is surrounded by agricultural and urban land use barriers, no special-status plants or other special-status animals have the potential to occur on the Project site. No signs of special-status species were encountered during the reconnaissance-level survey on October 22, 2014.

Though no sign of burrowing owls or suitable burrows were found during the site visit, Project implementation may result in the loss of this species through destruction of active nesting sites and/or incidental burial of adults, young, and eggs, should they become established on-site. Potential nest abandonment and mortality to burrowing owl individuals would be considered a potentially significant impact to protected species; however, implementation of mitigation measures **MM 3.4.1** and **MM 3.4.2** will reduce those impacts to a less than significant level.

Habitats on and adjacent to the Project site may provide suitable nesting habitat for white-tailed kite and other raptors and migratory birds protected under the Migratory Bird Treaty Act and Section 3503.5 of the California Fish and Game Code. The removal of trees/vegetation during construction activities could result in noise, dust, human disturbance, and other direct/indirect impacts to nesting birds on or in the vicinity of the Project site. Potential nest abandonment and mortality to individuals would be considered a potentially significant impact to protected species; however, implementation of mitigation measures **MM 3.4.1** and **MM 3.4.3** will reduce those impacts to a less than significant level.

The annual grassland communities in the BSA represent suitable foraging habitat for Swainson's hawk. Approximately 1.6 acres of foraging habitat will be permanently impacted by Project-related activities (**Figure 3.4-4**). Permanent loss of foraging habitat would be considered a potentially significant impact to protected species; however, implementation of mitigation measure **MM 3.4.4** will reduce those impacts to a less than significant level.


Calvine Rd
Sheldon Rd
Bond Rd
Waterman Rd
Bradshaw Rd
Elk Grove Florin Blvd
Campbell Rd
Quail Cove
Sandage Ave
Falcon Way
Waddell Ln
Jordan Ranch Rd
Scenic Elk Ct
Country Hill Dr
St Jude Ct
St Anthony Ct
Armaria Ct
Robert D Cochran Park
Jack E Hill Park
David A Simpson Park
Kentshire
Pebble
Cobble Crest Dr
Robbins Rd
Grand Cru Dr
Glendon Way
Torino Way
Parducci Way
Aviary Woods Way
Adur Rd
Mandalay Way
Springhurst Dr
N Camden Dr
Camden Lake Way
Los Banos Way
Virginia Fife Way
Fife Ranch Way
Neponset Dr
Trout Way
Lamprey Dr
Halverson Dr
Terra Linda Dr
Elk Way
Kelsey Dr
Boulder
Early Light Way
Salmon Creek Dr
Stone Springs Dr
Timber River Way
Sierra River Dr
Poplar Hollow Ln
Mill Pond Ct
Crisswell Dr
Glacier Ct
Lyndley Plaza Way
Rancho Dr
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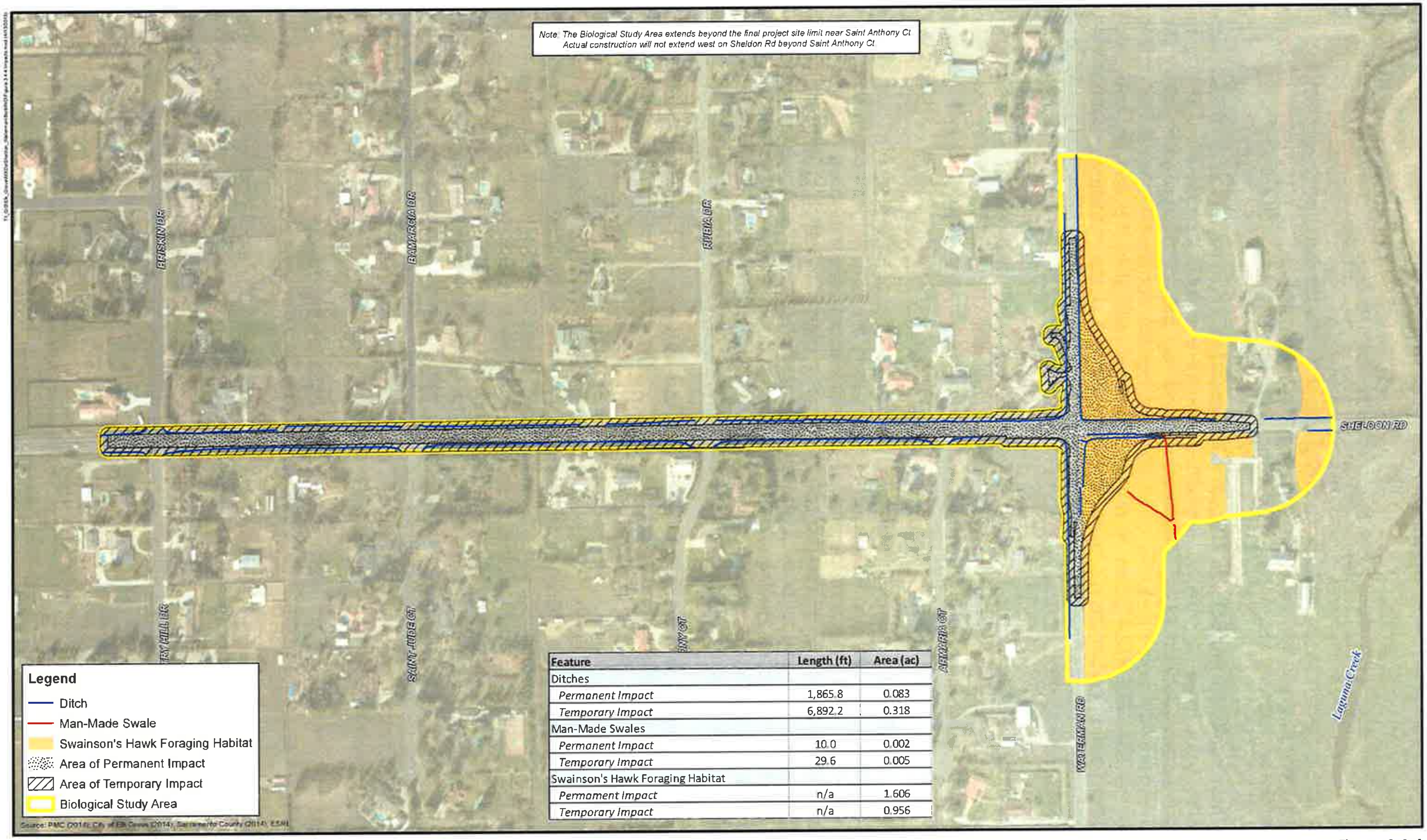
6
8
9
20 m
22 m
24 m
12 m



Feature	Length (ft)	Area (ac)
Ditches		
Permanent Impact	1,865.8	0.083
Temporary Impact	6,892.2	0.318
Man-Made Swales		
Permanent Impact	10.0	0.002
Temporary Impact	29.6	0.005
Swainson's Hawk Foraging Habitat		
Permament Impact	n/a	1.606
Temporary Impact	n/a	0.956

Figure 3.4-4
Project Impact Map
PMC

b) *Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?*

Less Than Significant Impact with Mitigation Incorporated. Implementation of Project-related activities may result in adverse impacts to sensitive natural communities. The annual grassland community could be considered sensitive as it provides foraging habitat for State-threatened Swainson's hawk. No other sensitive natural communities were documented within the BSA. The ±13.4 acres of annual grassland habitat in the BSA provide suitable foraging habitat for Swainson's hawk. Approximately 1.6 acres of foraging habitat will be permanently impacted by Project-related activities (**Figure 3.4-4**). Mitigation measure **MM 3.4.4** will ensure that impacts to Swainson's hawk foraging habitat will be less than significant.

c) *Would the project 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 wetlands, etc.), through direct removal, filling, hydrological interruption, or other means?*

Less Than Significant Impact with Mitigation Incorporated. Approximately 0.13 acre of man-made swales (potential jurisdictional waters) occurs in the BSA. Approximately 0.002 ac of permanent impacts and 0.005 acre of temporary impacts are expected to occur to the swale as a result of the proposed project. Therefore, implementation of Project activities may result in adverse impacts to federally protected waters. In order to reduce potential impacts to a less than significant level, implementation of mitigation measure **MM 3.4.5** will reduce the impacts to less than significant. If the U.S. Army Corps of Engineers identify that the swale is not jurisdictional, no mitigation will be required.

d) *Would the project 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?*

No Impact. Available data on movement corridors and linkages was accessed via the CDFW (2014) BIOS Viewer. Data reviewed included the Essential Connectivity Areas [ds623] layer and the Missing Linkages in California [ds420] layer. The BSA is not located within an identified corridor. In addition, the majority of the BSA is either developed or has been disturbed by previous and ongoing tilling, grazing, or some other form of disturbance, and while it could occasionally provide opportunity for local wildlife movement, adjacent lands such as Laguna Creek are farther removed from anthropogenic activities and therefore offer more optimal movement opportunities. Furthermore, the BSA is abutted by urban uses to the west, which further impair any corridor function. As such, no impact is anticipated, and no additional avoidance and minimization measures are proposed.

e) *Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

No Impact. The proposed Project would not conflict with any local policies or ordinances protecting biological resources. No trees will be removed as a result of Project-related activities; thus, there will be no conflict with the Elk Grove Tree Preservation and Protection Codes found in Chapter 19.12 of the City Municipal Code. In addition, implementation of mitigation measure **MM 3.4.4** will ensure the Project's compliance with the Elk Grove Swainson's Hawk Impact Mitigation Fees ordinance found in Chapter 16.130 of the City

Municipal Code. As such, no impact is anticipated, and no additional avoidance and minimization measures are proposed.

f) *Would the project conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or State habitat conservation plan?*

No Impact. The proposed Project would not 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 BSA is located within the South Sacramento County Habitat Conservation Plan planning area; however, this plan has not been adopted to date. As a result, the proposed Project would not conflict with the plan, and no impact is anticipated. No avoidance and minimization measures are proposed.

Mitigation Measures

MM 3.4.1 A qualified biologist(s) shall monitor construction activities that could potentially cause significant impacts to sensitive biological resources. In addition, the applicant shall retain a qualified biologist to conduct mandatory contractor/worker awareness training for construction personnel. The awareness training will be provided to all construction personnel to brief them on the identified location of sensitive biological resources, including how to identify species (visual and auditory) most likely to be present, the need to avoid impacts to biological resources (e.g., plants, wildlife, and jurisdictional waters), and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the Project, the contractor shall ensure that they receive the mandatory training before starting work.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.2 If clearing and construction activities would occur during the nesting period for burrowing owls (February 1–August 31), the City shall retain a qualified biologist to conduct preconstruction surveys in accordance with the CDFW's *Staff Report on Burrowing Owl Mitigation*, published March 7, 2012. Surveys shall be conducted within 14 days prior to ground-breaking activities and shall be repeated if Project activities are suspended or delayed for more than 15 days during nesting season.

If no burrowing owls are detected, no further mitigation is required. If active burrowing owl nest sites are detected, the applicant shall implement the avoidance, minimization, and mitigation methodologies outlined in the CDFW's *Staff Report on Burrowing Owl Mitigation* prior to initiating Project-related activities that may impact burrowing owls.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.3 If clearing and/or construction activities would occur during the bird nesting season (January 15–August 15), preconstruction surveys to identify active migratory bird and raptor nests shall be conducted by a qualified biologist within 14 days of construction initiation. Preconstruction surveys must be performed by a qualified biologist for the purposes of determining the presence/absence of active nest sites in the Project area and a 200-foot (500-foot for raptors) buffer. If no active nests are found, no further mitigation is required. Surveys shall be repeated if construction activities are delayed or postponed for more than 30 days.

If active nest sites are identified within 200 feet (500 feet for raptors) of Project activities, the applicant shall impose an exclusionary buffer for all active nest sites prior to commencement of any Project-related activities to avoid construction- or access-related disturbances to nesting raptors. An exclusionary buffer constitutes an area where Project-related activities (i.e., vegetation removal, earth moving, and construction) will not occur, and shall be imposed within 100 feet (250 feet for raptors) of any active nest sites until the nest is deemed inactive by a qualified biologist. Activities permitted within the exclusionary buffer and the size (i.e., 250 feet) of exclusionary buffers may be adjusted through consultation with the City of Elk Grove Planning Department.

Timing/Implementation: *Prior to the start of Project grading and throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.4 The City shall mitigate for the loss of Swainson's hawk foraging habitat at a 1:1 ratio. Mitigation can be accomplished through the City of Elk Grove Swainson's Hawk Impact Mitigation Fees (Chapter 16.130 of the Elk Grove Municipal Code) or other method determined acceptable to the CDFW.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.5 For every acre of jurisdictional waters (man-made swale) permanently or temporarily affected by the proposed Project, the City shall replace the affected acreage at a minimum 1:1 ratio, or another approved ratio as determined by the US Army Corps of Engineers (USACE). Impacts shall be offset through the restoration and relocation of roadside ditches and/or swales within the Project area or through purchase of credits or payment of an in-lieu fee.

Timing/Implementation: *Prior to the start of Project grading and throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☒	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geological feature?	☐	☐	☒	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

ENVIRONMENTAL SETTING

An archaeological assessment for the proposed Project was prepared in January 2015 and is included in **Appendix E**. Areas along rivers and creeks within Sacramento County are known to contain cultural resources because of the villages built by Native Americans over periods of hundreds of years (City of Elk Grove 2003b). Approximately eight Plains Miwok tribelets existed along the Cosumnes River drainage and Sacramento River in the Elk Grove Planning Area. The majority of the prehistoric and historic Native American archaeological sites in Elk Grove are village mounds (City of Elk Grove 2003b). The proposed Project is located within one-quarter mile west of Laguna Creek. The City of Elk Grove General Plan EIR (2003) Cultural Resources Sensitivity Map designates areas surrounding Laguna Creek as sensitive for cultural resources. The California Office of Historic Preservation does not identify any historic sites within the surrounding area of the Project site.

BACKGROUND

A record and information search of the Project area was completed by the North Central Information Center of the California Historical Resources Information System. Additional sources consulted for the proposed Project include:

- The National Register of Historic Places (1979–2002 and supplements)
- Historic USGS topographic maps
- Historic US Department of Agriculture (USDA) aerial photographs
- The California Register of Historic Resources (1992–2014)
- The California Inventory of Historic Resources (1976–2014)
- The California Historical Landmarks (1995 and supplements to 2014)
- The California Points of Historical Interest (1992–2014)
- The Local Historical Register Listings
- The Bureau of Land Management General Land Office Records
- Ab52 Consultation Letter was sent out to interested tribes October 8, 2015

The record search and literature review indicated that one historical architectural resource is present within the Project area and seven cultural resources have been previously documented outside the Project area within a half-mile radius, including three prehistoric sites, two prehistoric isolates, and two historical architectural resources. According to the Native American Heritage Commission, there are no known sacred lands within one half-mile of the Project area (Cogstone 2015). A cultural resources survey of the Project area was conducted in December 2014. No new cultural resources were observed within or immediately adjacent to the Project area during the survey.

DISCUSSION OF IMPACTS

a) *Would the project cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?*

Less Than Significant Impact. The archaeological and historical investigations for the proposed Project determined that one historical architectural resource (a historic transmission line) is located along the eastern boundary of the Project area. The transmission line is overhead and above the Project area and will not be impacted by the Project. Furthermore, the transmission towers for this transmission line are not located within the Project area and therefore no adverse impacts are anticipated for this resource. Other historic resources identified within a one-half mile radius are not located within the Project area and would not be adversely affected by the proposed Project (Cogstone 2015). Therefore, impacts are considered less than significant.

b) *Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?*

Less Than Significant Impact. *See above (a) for discussion of archaeological resources.*

c) *Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?*

Less Than Significant Impact. The proposed Project would realign and improve the existing stop sign–controlled intersection at Sheldon Road and Waterman Road. According to the archaeological assessment prepared for the proposed Project, the potential for discovery of archaeological resources is low based on the results of the literature search, local ethnographic settlement patterns, and the prehistory and history of the area (Cogstone 2015). The record search and literature review performed for the proposed Project identified three prehistoric sites, two prehistoric isolates, and three historical architectural resources within a half-mile radius of the Project area. According to the City of Elk Grove General Plan EIR, no paleontological resources have been officially reported in the City's Planning Area. No known prehistoric or archaeological resources are located within the Project area; therefore, the proposed Project would not be expected to impact any archaeological resources (Cogstone 2015).

Per Policy HR-6 Action 2 of the City of Elk Grove General Plan, requirements would be included in the construction contract requiring immediate notification of the Planning Department if any archaeological or paleontological resource is uncovered during construction. In the event of this type of discovery, construction would stop and an archaeologist that meets the Secretary of the Interior's Professional Qualifications Standards in prehistoric or historical archaeology would be retained to evaluate the finds and recommend appropriate action. Furthermore, incorporation of mitigation measure **MM 3.5.1** would further reduce impacts to a less than significant level. With adherence to the City policy and incorporation of mitigation measure **MM 3.5.1**, impacts to archaeological and paleontological resources would be less than significant.

d) *Would the project disturb any human remains, including those interred outside of formal cemeteries?*

Less Than Significant Impact. Based on the nature of the proposed Project and the findings of the archaeological assessment, it is not anticipated that any human remains would be discovered during construction activities. With implementation of mitigation measure **MM 3.5.2**, impacts will be further reduced to less than significant.

Mitigation Measures

MM 3.5.1 In accordance with California Public Resources Code Section 5097.5, which prohibits knowing and willful excavation of undiscovered cultural resources without permission from the appropriate public agency with jurisdiction over the lands, and in order to mitigate for the potential discovery of an archaeological or paleontological resources, the following measure will be implemented during construction and included in the construction contract:

If buried archaeological and/or paleontological resources, such as chipped or ground stone, historic debris, building foundations, human bone, or fossils, are inadvertently discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the find until a qualified archaeologist can access the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the City and all other appropriate agencies.

Timing/Implementation: *Throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.5.2 In order to mitigate for the potential discovery or disturbance of any human remains, the protocol of California Health and Safety Code Section 7050.5(b) will be adhered to as follows:

In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Section 27460 et seq. of the Government Code, that the remains are not subject to the provisions of Section 27491 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code.

If the remains are determined to be Native American, City policy would dictate that the procedures outlined in CEQA Section 15064.5(d) and (e) shall be followed.

Timing/Implementation: *Throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.6. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

Regional Geology

Elk Grove is located within the Great Valley geomorphic province, which is primarily described as a relatively flat alluvial plain, about 50 miles wide and 400 miles long, with thick sequences of sedimentary deposits of Jurassic through Holocene age. The Great Valley geomorphic province is bounded on the north by the Klamath and Cascade mountain ranges, on the east by the Sierra Nevada, and on the west by the California Coast Mountain Range.

Topography

The Project area is located in the Sacramento Valley, which is primarily flat land with no hills or valleys. The Project site is located in an area of relatively level terrain at approximately 50 to 76 feet above mean sea level (USGS 2014).

Faults and Seismicity

No known active faults or Alquist-Priolo earthquake hazard zones occur in the City, although several inactive subsurface faults are identified in the Delta. According to the Fault Activity Map of California, the nearest faults to the City with activity within the last 200 years are the Concord, Hayward, and Cleveland Hill faults. The closest known fault to the City is the Willows fault zone, located approximately 10 miles north of Elk Grove. The Safety Element of the Sacramento County General Plan (2011) identified two major subsurface fault zones on the eastern and western sides of the City. The Midland Fault Zone is located approximately 20 miles west, while the Bear Mountain Fault Zone is located approximately 20 miles east. The closest known active subsurface fault is the Dunnigan Hills fault, located approximately 25 miles northwest of the City.

Ground Shaking

In populated areas, the greatest potential for loss of life and property damage is a result of ground shaking from a nearby earthquake. Because the Project site is not located in an area near any active faults or fault zones, the potential for ground shaking in the immediate area is diminished. However, major seismic events occurring in adjacent areas, especially in the San Francisco Bay Area, could cause the Project site to experience ground shaking activity.

Liquefaction

Liquefaction is the loss of soil strength due to seismic forces generating various types of ground failure. The potential for liquefaction must account for soil types and density, the groundwater table, and the duration and intensity of ground shaking.

Soils

According to the Web Soil Survey provided by the Natural Resources Conservation Service (NRCS), the Project area is underlain by Redding gravelly loam soils (USDA 2006). The Redding soil series consists of moderately deep, moderately well drained soils. Typically, Redding gravelly loam soils occur over 0 to 8 percent slopes.

DISCUSSION OF IMPACTS

a) *Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving:*

   i) *Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?*

   No Impact. No known active faults or Alquist-Priolo earthquake hazard zones occur in the vicinity of the Project site. Therefore, the Project would have no impact concerning fault rupture hazards.

   ii) *Strong seismic ground shaking?*

   Less Than Significant Impact. The Project site is not located within an Alquist-Priolo earthquake hazard zone; however, major seismic events occurring in adjacent areas, especially in the San Francisco Bay Area, could cause the Project area to experience ground-shaking activity. The proposed Project would replace the existing stop sign–

controlled Sheldon Road/Waterman Road intersection with a roundabout configuration, would realign the Sheldon Road/Waterman Road intersection to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road, and would include pedestrian accessible crossings at the intersection. The proposed Project will not result in the development of habitable structures or other development that would typically cause an increase in population that could be adversely affected by seismic ground shaking. The improvements would be designed in accordance with the Uniform Building Code and the City of Elk Grove Design Guidelines and Standard Construction Specifications. Therefore, the impact is considered to be less than significant.

iii) Seismic-related ground failure, including liquefaction?

No Impact. Liquefaction is most likely to occur in deposits of water-saturated alluvium or similar deposits of artificial fill. The proposed Project is located on soils included in the Redding soil series (USDA 2006). Soils in the Redding soil series are known to be moderately well drained. Additionally, Elk Grove is not within an area of Sacramento County known to be susceptible to liquefaction. No impact would occur.

iv) Landslides?

No Impact. The Project site and the surrounding area are relatively flat; therefore, the occurrence of a landslide is unlikely. No impact would occur.

b) *Would the project result in substantial soil erosion or the loss of topsoil?*

Less Than Significant Impact. Construction of the proposed Project would involve minimal grading for the intersection and roadway improvements. This activity may result in short-term wind-driven erosion of soils. Chapter 16.44, Land Grading and Erosion Control, of the City Municipal Code establishes procedures to minimize erosion and sedimentation during construction activities. The Regional Water Quality Control Board (RWQCB) requires that a National Pollutant Discharge Elimination System (NPDES) construction activity permit be issued prior to construction. The permit requires that the City impose water quality and watershed protection measures for all development projects, including erosion control. Compliance with Municipal Code Chapter 16.44 would reduce impacts associated with soil erosion to a less than significant level.

c) *Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?*

Less Than Significant Impact. The Project area is relatively flat and therefore landslides are not anticipated. The Project site is located in an area in which soils of the Redding soil series are found. The NRCS classifies these soil types as moderately well drained and as moderately deep over a duripan. The potential for soil liquefaction with earthquake shaking is considered minimal due to the depth of the groundwater beneath the seat at approximately 20 to 30 feet below mean sea level and therefore approximately 85 to 105 feet below ground surface at the Project site (City of Elk Grove 2003b). Furthermore, the potential for differential settlement or lateral spreading occurring during or after seismic events on the Project site is considered to be low. This is because the potential for earthquake hazard in the Project area is considered low. Therefore, the proposed Project would have a less than significant impact related to landslide, lateral spreading, subsidence, liquefaction, or collapse.

d) *Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?*

Less Than Significant Impact. According to soil data for the City of Elk Grove provided by the NRCS, the Project site is underlain by Redding gravelly loam soil. Soils with high clay content are usually expansive. Minerals in certain clays swell with increased moisture content and then contract during dry periods. The Project site contains soils with low to moderate clay content. According to the City of Elk Grove General Plan EIR (2003b), soils found in the City, including Redding gravelly loam, have a high shrink-swell potential; however, since these soils are located at shallow depths, they are conducive to urban development. Properly designed roads can help prevent potential damage caused by the high shrink-swell potential. The proposed Project would be designed so that grades are constructed in such a way as to prevent water from collecting on or adjacent to pavements, thereby discouraging soil saturation along the roadway and adjacent to existing and planned structures. Therefore, this impact is considered less than significant.

e) *Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?*

No Impact. The Project does not propose the use or construction of septic tanks or alternative wastewater disposal systems; therefore, there would be no impact.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.7. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☒	☐	☐
b) Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☒	☐	☐

ENVIRONMENTAL SETTING

Since the early 1990s, scientific consensus holds that the world's population is releasing greenhouse gases (GHG) faster than the earth's natural systems can absorb them. These gases are released as byproducts of fossil fuel combustion, waste disposal, energy use, land use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons, creates a blanket around the earth that allows light to pass through but traps heat at the surface preventing its escape into space. While this is a naturally occurring process known as the greenhouse effect, human activities have accelerated the generation of GHGs beyond natural levels. The overabundance of GHGs in the atmosphere has led to an unexpected warming of the earth and has the potential to severely impact the earth's climate system.

Table 3.7-1 provides descriptions of the primary GHGs attributed to global climate change, including a description of their physical properties, primary sources, and contribution to the greenhouse effect.

TABLE 3.7-1
GREENHOUSE GASES

Greenhouse Gas	Description
Carbon dioxide (CO_2)	CO_2 is a colorless, odorless gas and is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere.[1]
Methane (CH_4)	CH_4 is a colorless, odorless gas and is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. CH_4 is emitted from both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (livestock intestinal fermentation and manure management), biomass burning, and waste management. These activities release significant quantities of CH_4 to the atmosphere. Natural sources of CH_4 include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. Methane's atmospheric lifetime is about 12 years.[2]

Greenhouse Gas	Description
Nitrous oxide (N_2O)	N_2O is a clear, colorless gas with a slightly sweet odor. N_2O is produced by natural and human-related sources. Primary human-related sources are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 120 years.[3]

Sources: [1] USEPA 2011a, [2] USEPA 2011b, [3] USEPA 2010

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. CH_4 traps over 21 times more heat per molecule than CO_2, and N_2O absorbs 310 times more heat per molecule than CO_2. Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e), which weight each gas by its global warming potential. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

REGULATORY SETTING

The State of California has been studying the impacts of climate change since 1988, when AB 4420 was approved. This legislation directed the California Energy Commission, in consultation with CARB and other agencies, to study the implications of global warming on California's environment, economy, and water supply. The California Energy Commission was also directed to prepare and maintain the State's inventory of GHG emissions. AB 4420 directed CARB to adopt regulations to achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles. The CARB proposal implementing these regulations was approved in September 2004. Implementation of these regulations estimates GHG emissions from new California cars and light trucks to be reduced by approximately 30 percent by 2016 (CARB 2005).

In 2006, California adopted AB 32, the Global Warming Solutions Act. AB 32 codifies the State's goal by requiring that the State's global warming emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that has been phased in starting in 2012. In order to effectively implement the cap, AB 32 directs CARB to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels. In adopting AB 32, the legislature determined the necessary GHG reductions for the State to make in order to sufficiently offset its contribution to the cumulative climate change problem to reach 1990 levels. AB 32 is the only legally mandated requirement for the reduction of greenhouse gas emissions. As such, compliance with AB 32 is the adopted basis upon which an agency can base its significance threshold for evaluating a project's GHG impacts.

At the present time, there are no adopted or recommended thresholds of significance established by federal, State, or local agencies/jurisdictions for the evaluation of GHG emissions and resultant impacts attributable to proposed development projects. Preliminary guidance from the Office of Planning and Research and recent letters from the Attorney General critical of CEQA documents that have taken different approaches indicate that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water conveyance and treatment, waste generation, and construction activities.

Addressing GHG generation impacts requires an agency to make a determination as to what constitutes a significant impact. The amendments to the CEQA Guidelines specifically allow lead agencies to determine thresholds of significance that illustrate the extent of an impact and are a basis from which to apply mitigation measures. This means that each agency is left to determine if a project's GHG emissions will have a "significant" impact on the environment. The guidelines direct that agencies are to use "careful judgment" and "make good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate" the project's GHG emissions (14 CCR Section 1564.4(a)).

In its Final Statement of Reasons for Regulatory Action (FSOR) accompanying the CEQA Amendments, the California Natural Resources Agency (2009) explains that quantification of GHG emissions "is reasonably necessary to ensure an adequate analysis of GHG emissions using available data and tools" and that "quantification will, in many cases, assist in the determination of significance." However, as explained in the FSOR, the revised Section 15064.4(b) assigns lead agencies the discretion to determine the methodology to quantify GHG emissions. The FSOR also notes that CEQA case law has long stated that "there is no iron-clad definition of 'significance.' Accordingly, lead agencies must use their best efforts to investigate and disclose all that they reasonably can determine methodology concerning a project's potential adverse impacts."

Determining a threshold of significance for a project's climate change impacts poses a special difficulty for lead agencies. Much of the science in this area is new and is evolving constantly. At the same time, neither the State nor local agencies are specialized in this area, nor are there currently any local, regional, or State thresholds for determining whether the proposed project would have a significant impact on climate change. The CEQA Amendments do not prescribe specific significance thresholds but instead leave considerable discretion to lead agencies to develop appropriate thresholds to apply to projects within their jurisdictions.

The SMAQMD adopted significance thresholds for GHG emissions on October 23, 2014. The SMAQMD greenhouse gas significance thresholds are 1,100 metric tons of CO_2e per year for the construction and operational phases of projects and 10,000 direct metric tons of CO_2e per year for stationary source projects. The Sacramento County Climate Action Plan, adopted November 9, 2011, and the City of Elk Grove Climate Action Plan, adopted March 27, 2013, do not identify thresholds of significance for GHG emissions.

DISCUSSION OF IMPACTS

a) *Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

Less Than Significant Impact with Mitigation Incorporated. See below (b) for discussion of project generated greenhouse gas emissions.

b) *Would the project conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?*

Less Than Significant Impact with Mitigation Incorporated. Implementation of the proposed Project would result in short-term emissions from construction as well as demolition activities associated with the removal of existing pavement. Emissions resulting from construction of the proposed Project are presented in **Table 3.7-2**.

The proposed Project will not include the provision of new permanent stationary or mobile sources of emissions; therefore, by its very nature, it will not generate quantifiable GHG emissions from Project operations. The Project does not propose any buildings and therefore no permanent source of stationary source and/or indirect source (electricity generation) emissions. In addition, roadway improvements do not directly generate vehicle trips, a predominant source of GHG emissions. Rather, vehicle trips are generated by land use changes that may be indirectly influenced by transportation improvements. The proposed Project would not result in increases in the rate of vehicle trips. Rather, the proposed traffic facility improvements provide improved access to an area with existing and anticipated congestion. The Project is considered necessary in order to reduce future congestion anticipated as approved development builds out. Once the proposed traffic facility improvements are implemented, there will be no resultant increase in automobile trips to the area because the improved facilities will not require daily visits. Therefore, new permanent stationary, indirect, or mobile sources of emissions will not be quantified as the Project would not result in such emissions.

As shown in **Table 3.7-2**, the construction of the proposed Project could produce an additional 233 metric tons of CO_2e. The SMAQMD significance threshold for CO_2e is 1,100 metric tons per year; thus, the proposed Project would not exceed the SMAQMD significance threshold for GHG emissions. Once construction of the proposed traffic facility improvements is completed, the generation of GHG emissions would cease.

TABLE 3.7-2
CONSTRUCTION GHG EMISSIONS – METRIC TONS PER YEAR

Source	CO_2	CH_4	N_2O	CO_2e
Demolition and Construction	233	0	0	233
SMAQMD Potentially Significant Impact Threshold	—	—	—	1,100
Exceeds SMAQMD Threshold?	—	—	—	**No**

*Source: CalEEMod version 2013.2. Refer to **Appendix A** for model data outputs.*

The Elk Grove Climate Action Plan (CAP) is a strategic planning document that identifies sources of GHG emissions from within Elk Grove's boundary and reduces emissions through energy use, transportation, land use, water use, and solid waste strategies (referred to as "measures" in the CAP). The policy provisions contained in the CAP were prepared with the purpose of complying with the requirements of AB 32 and achieving the goals of the AB 32 Scoping Plan. The City considers a specific project proposal consistent with the Elk Grove CAP if it complies with the GHG reduction measures contained in the adopted CAP.

There is only one mandatory GHG reduction measure in the Elk Grove CAP that applies to the proposed Project, RC-1 – Waste Reduction, which requires construction and demolition activities in the City to divert 65 percent of the waste generated from such activities. Mitigation measure **MM 3.7.1** is required to ensure consistency with CAP reduction measure RC-1. In addition, the proposed Project is consistent with CAP reduction measure TACM-12, which seeks to encourage traffic circles over four- or two-way stop signs at residential intersections where feasible.

The proposed Project would comply with the applicable GHG reduction measure included in the Elk Grove CAP with implementation of mitigation measure **MM 3.7.1**. Furthermore, the Project is considered necessary in order to reduce future congestion anticipated as approved development builds out. Once the proposed traffic facility improvements are implemented, there will be no resultant increase in automobile trips to the area because the improved facilities will not require daily visits. As a result, the Project would be consistent with the AB 32 strategies to help California reach the emissions reduction targets. Therefore, this impact is less than significant.

Mitigation Measures

MM 3.7.1 The City of Elk Grove Planning Department shall require that the Project divert 65 percent of the waste generated during the demolition of existing pavement and construction of new traffic improvement facilities, consistent with CAP measure RC-1.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.8. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

ENVIRONMENTAL SETTING

The proposed Project is located in the northeastern portion of the City. According to the EnviroStor database provided by the California Department of Toxic Substances Control (CDTSC) (2014), no known hazardous material or hazardous waste sites exist in the vicinity of the proposed Project. A record search of the Cortese List, a list of hazardous substances sites compiled by the CDTSC pursuant to Government Code Section 65962.5, did not return any hazardous materials sites in the Project vicinity (CDTSC 2014). The nearest airport to the Project site that is currently in operation is Mather Airport, located approximately 7.5 miles northeast of the Project site. Mather Airport is a public-use airport facility. There are no private airstrips in the vicinity of the proposed Project.

REGULATORY SETTING

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, State, or local agency, or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined in Title 22, Section 66260.10 of the CCR as follows:

> *A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed.*

Chemical and physical properties that cause a substance to be considered hazardous, including the properties of toxicity, ignitability, corrosivity, and reactivity, are defined in the CCR, Title 22, Sections 66261.20–66261.24. Factors that influence the health effects of exposure to hazardous material include the dose to which the person is exposed, the frequency of exposure, the exposure pathway, and individual susceptibility. In addition, the release of hazardous materials into the environment could potentially contaminate soils, surface water, and groundwater supplies.

Under Government Code Section 65962.5, the CDTSC maintains a list of hazardous substance sites. This list, referred to as the Cortese List, includes CALSITE hazardous material sites, sites with leaking underground storage tanks, and landfills with evidence of groundwater contamination. In addition, the Sacramento County Environmental Management Department (SCEMD) maintains records of toxic or hazardous material incidents, and the RWQCB keeps files on hazardous material sites.

Most hazardous materials regulation and enforcement in Sacramento County is managed by the SCEMD. Most hazardous materials regulation and enforcement in Elk Grove is overseen by the SCEMD which refers large cases of hazardous materials contamination or violations to the Central Valley RWQCB and the CDTSC. It is not at all uncommon for other agencies such as the SMAQMD and both the federal and California Occupational Safety and Health Administrations to become involved when issues related to hazardous materials arise.

DISCUSSION OF IMPACTS

a) *Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?*

   Less Than Significant Impact. The proposed Project would not include the routine transport, use, or disposal of hazardous materials that could create a significant hazard to the public. During construction, small amounts of hazardous materials, such as oil, fuel, and solvents, would be used for minor equipment maintenance. All equipment fueling and major maintenance activities will be performed off-site. Any use of hazardous materials would be in compliance with all applicable local, State, and federal standards associated with the handling of hazardous materials. Therefore, this impact would be less than significant.

b) *Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?*

Less Than Significant Impact. Once construction is complete, the proposed Project would not create a significant hazard to the public or the environment. The use and handling of hazardous materials during construction activities would occur in accordance with applicable federal, State, and local laws, including California Occupational Health and Safety Administration requirements. These actions would minimize the potential and extent of any major spill, and impacts would be less than significant.

c) *Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school?*

No Impact. Currently, there are no existing or proposed schools within one-quarter mile of the Project area. The nearest school to the Project site is Pleasant Grove High School located approximately three-quarters of a mile to the southeast. Therefore, there would be no impact related to hazardous emissions, materials, substances, or waste near schools.

d) *Would the project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

No Impact. The provisions in Government Code Section 65962.5 are commonly referred to as the Cortese List. An online search of the Cortese List conducted in September 2014 found no records within or adjacent to the Project site. No impact would occur.

e) *For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area?*

No Impact. The proposed Project is not located within an airport land use plan area or within 2 miles of a public airport or public use airport (see (f) discussion below).

f) *For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?*

No Impact. The proposed Project is not located within 2 miles of a public airport, public use airport, or private airstrip or within an airport land use plan, nor does it include any structures or equipment that would obstruct navigable airspace. The nearest airport/airstrip to the Project site is Mather Airport, located approximately 7.5 miles northeast of the Project site. For these reasons, no impact would occur.

g) *Would the project impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?*

Less Than Significant Impact. Upon incorporation, the City adopted the Sacramento County Multi-Hazard Disaster Plan (SCMDP), which was established to address planned response to extraordinary emergency situations associated with natural disasters and technological incidents. The SCMDP focuses on operational concepts relative to large-scale disasters, which can pose major threats to life and property requiring unusual emergency responses. Additionally, the City adopted the Sacramento County Area Plan, which is used as a guideline for hazardous material related accidents or occurrences. The purpose of the Sacramento County Area Plan is "to delineate responsibilities and actions by various agencies in Sacramento County required to meet the obligation to protect the health and welfare of the populace, natural resource (environment), and the public and private properties involving hazardous materials." The City will require the contractor to coordinate with the fire and police departments before any lane closures and/or detours ahead of time. Emergency access will be maintained throughout construction. Therefore, impacts would be less than significant.

h) *Would the project expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?*

Less Than Significant Impact. The Project site is located in a rural area of the City, surrounded by residential, agricultural, and vacant/undeveloped parcels. The City is not located within a designated Fire Hazard Severity Zone (California Department of Forestry and Fire Protection 2008). Furthermore, the proposed Project consists of the realignment of the Sheldon Road/Waterman Road intersection to the east and replacement of the intersection with a roundabout configuration. It would not result in new development that would induce population growth in the area beyond what is already planned. Emergency access would be maintained throughout construction. In the event of a fire, the Cosumnes Fire Department would provide fire and emergency services to the Project area. Therefore, impacts are considered less than significant.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.9. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of a failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

Surface Water

The City is part of the Sacramento River watershed—a 27,000-square-mile watershed including portions of the Sacramento River and Cosumnes River. Laguna Creek is located within one-quarter mile east of the Project site and runs perpendicular to Sheldon Road, crossing underneath Sheldon Road east of the Project site. Laguna Creek is part of the Morrison Creek stream group and is one of the main hydrologic features within the City Planning Area and the main creek that flows through the City. Portions of the creek have been altered by development.

Groundwater

The depth to groundwater at the Project site is estimated at approximately 20 to 30 feet below mean sea level (approximately 85 to 105 feet below ground surface at the Project site). General groundwater depth may be influenced by local pumping, rainfall, and irrigation patterns. The Project site is underlain by the Sacramento Valley Groundwater Basin, and more specifically, the South American Subbasin (Department of Water Resources 2004). This groundwater subbasin is defined by the American River to the north, the Cosumnes and Mokelumne rivers to the south, the Sierra Nevada mountains to the east, and the Sacramento River to the west.

Floodplain

According to the Federal Insurance Rate Map provided by the Federal Emergency Management Agency (2012), the Project site is not within a 100-year floodplain or a 500-year floodplain.

REGULATORY SETTING

The State Water Resources Control Board and the RWQCB enforce State of California statutes, which are equivalent to or more stringent than the federal statutes. The RWQCBs are responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters. In the proposed Project area, the Central Valley RWQCB is responsible for protecting surface waters and groundwater from both point sources of pollution (i.e., discharge from a pipe, ditch, or other well-defined source) and nonpoint sources (i.e., diffuse sources with no discernible distinct point of source, often referred to as runoff or polluted runoff from agriculture, urban areas, mining, construction sites, and other sites). The City has a current NPDES General Permit, renewed by the Central Valley RWQCB in June 2015, which regulates stormwater discharges associated with construction activities. Preparation of a stormwater pollution prevention plan (SWPPP) would be required for this Project to minimize polluted runoff during construction.

DISCUSSION OF IMPACTS

a) Would the project violate any water quality standards or waste discharge requirements?

Less Than Significant Impact.

Construction Water Quality Impacts

The proposed Project involves realignment of the Sheldon Road/Waterman Road intersection to the east and replacement of the intersection with a roundabout configuration. The State Water Resources Control Board requires dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit 99-08-DWQ). The Project footprint is approximately 4.6 acres, and approximately 1.3 acres of new pavement will be added at the Project site. Therefore, the Project will need to obtain coverage under the Construction

General Permit. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation.

The Construction General Permit requires the development and implementation of a stormwater pollution prevention plan. The SWPPP should contain a site map that shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the Project site. The SWPPP must list best management practices (BMPs) that the discharger will use to protect stormwater runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program—a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of the BMPs.

In addition, measures would be included in the grading plans to minimize erosion potential and water quality degradation of the Project area in accordance with Elk Grove Municipal Code Title 16, Chapter 16.44, Land Grading and Erosion Control. Chapter 16.44 establishes administrative procedures, minimum standards for review, and implementation and enforcement procedures for controlling erosion, sedimentation, disruption of existing drainage, and related environmental damage caused by land clearing activities, grading, filling, and land excavation. Additionally, the State has published a set of BMPs for both pre- and post-construction periods, which would be applied to the Project. The City would identify the appropriate BMPs for the proposed Project. Compliance with the provisions of the BMPs and with Municipal Code Chapter 16.44 would reduce impacts associated with water quality standards and discharge requirements to a less than significant level.

<u>Operational Water Quality Impacts</u>

The proposed Project consists of realignment of the Sheldon Road/Waterman Road intersection to the east and replacement of the intersection with a roundabout configuration. The Project will result in an increase in impervious surfaces due to the realignment of the Sheldon Road/Waterman Road intersection. Thus, the types, quantities, and timing of contaminant discharges in stormwater runoff would be slightly altered relative to existing conditions. The amount of contaminants discharged in stormwater drainage varies based on a variety of factors, including pollutants on trail surfaces and the amount of rainfall. Development of the Project would be subject to the requirements of NPDES Stormwater Permit No. CAS617002, which requires that the City impose water quality and watershed protection measures for all development projects and prohibits discharges from causing violations of applicable water quality standards or from resulting in conditions that create a nuisance or water quality impairment in receiving waters. The NPDES permit requires a SWPPP to be developed and implemented and the SWPPP to identify best management practices for construction and operation in project design for new development. Implementation of the City's NPDES permit would reduce water quality impacts to a less than significant level.

b) *Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?*

Less Than Significant Impact. The proposed Project will realign the Sheldon Road/Waterman Road intersection to the east and replace the intersection with a roundabout configuration.

The Project will result in an increase in impervious surfaces, which will alter the rate of infiltration at the Project site. However, impacts to groundwater resources would be minimal, as the proposed Project does not contain elements that would add to or draw from groundwater supplies. Additionally, the proposed Project would not be constructed immediately above any preexisting wells, nor would areas known to contain wells be disturbed by Project construction. Therefore, impacts to groundwater supplies would be less than significant.

c) *Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*

Less Than Significant Impact. The proposed Project would not result in the alteration of the course of a stream or river. Realignment and replacement of the Sheldon Road/Waterman Road intersection will result in an increase in impervious surfaces, which will alter the existing drainage pattern on the Project site. The proposed Project would be required to meet the existing NPDES permit requirements, requiring the City to prepare a stormwater pollution prevention plan for the proposed Project and submit it to the Central Valley RWQCB in support of NPDES regulations. The proposed Project would be required to implement appropriate BMPs to prevent erosion and provide sedimentation control during construction. Additionally, the Project would be subject to Chapter 16.44 of the City's Municipal Code. Chapter 16.44 establishes administrative procedures, minimum standards for review, and implementation and enforcement procedures for controlling erosion, sedimentation, disruption of existing drainage and related environmental damage caused by land clearing activities, grading, filling, and land excavation. Compliance with the provisions of the NPDES, SWPPP, BMPs, and Chapter 16.44 of the Municipal Code would reduce impacts associated with erosion and siltation to a less than significant level.

d) *Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?*

Less Than Significant Impact. The proposed Project consists of the realignment of the Sheldon Road/Waterman Road intersection to the east, replacement of the intersection with a roundabout configuration, and construction of pedestrian-accessible crossings at the intersection, which will result in minimal alteration of the existing drainage pattern of the site due to an increase in impervious surfaces. The increase in impervious surfaces may result in an increase in the rate or amount of surface runoff from the Project site. However, this increase will not result in flooding on- or off-site because the Project would not result in a substantial alteration of the existing drainage pattern of the site or area because it would not substantially increase the rate or amount of surface runoff, as the Project involves improvements to an existing intersection and existing roadways. No streams or rivers would be altered by the proposed Project. This impact is considered less than significant.

e) *Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?*

Less Than Significant Impact. The proposed Project will result in a minimal increase in impervious surfaces at the Project site, which would result in an increase in the quantity of runoff generated in a storm event. The proposed Project includes new underground drainage facilities, and the Project is not expected to contribute to runoff water that would exceed the capacity of existing or planned stormwater drainage systems in the Project vicinity. Furthermore, compliance with the provisions of the NPDES, SWPPP, BMPs, and Chapter 16.44 of the Municipal Code would reduce impacts associated with runoff to a less than significant level. Impacts are considered less than significant.

f) *Would the project otherwise substantially degrade water quality?*

Less Than Significant Impact. Refer to discussion of issue a) of this subsection. The proposed Project is not anticipated to substantially degrade water quality once completed and once implementation of the City's NPDES permit occurs. Compliance with the provisions of the NPDES, SWPPP, BMPs, and Chapter 16.44 of the Municipal Code would reduce impacts associated with water quality to a less than significant level.

g) *Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?*

No Impact. The proposed Project is not located within the 100-year floodplain, nor does it include any new development of housing. No impact would occur.

h) *Would the project place structures within a 100-year flood hazard area that would impede or redirect flood flows?*

No Impact. The proposed Project is not located within the 100-year floodplain and does not involve placement of structures within a 100-year floodplain that would impede or redirect flood flows. No impact would occur.

i) *Would the project expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of a failure of a levee or dam?*

No Impact. According to the Sacramento County General Plan Background Report (2011), the Project site is not located within a levee protection area, nor is it located in the Folsom Dam Failure Flood Area. Therefore, the Project would not expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of a failure of a levee or dam. No impact would occur.

j) *Would the project be subject to inundation by seiche, tsunami, or mudflow?*

No Impact. The proposed Project area is not located near any ocean coast or seiche hazard areas and would not involve the development of residential or other sensitive land uses in or near these areas. Therefore, the Project would not expose people to potential impacts involving seiche or tsunami. No potential for mudflows is anticipated. Therefore, there is no impact associated with the proposed Project.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.10 LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

The proposed Project is located in the Rural Sheldon Area in Elk Grove. The Project site is surrounded by agricultural-residential and agricultural land uses (see **Figure 3.10-1**). According to the City of Elk Grove Zoning Map (2010), land surrounding the Project site is designated as Agricultural Residential zones AR-2, AR-5, and AR-80. Planned development in the vicinity of the proposed Project includes the Sheldon Park Estates subdivision northeast of the Project site and the Sheldon and Waterman housing project southeast of the Project site, as shown on **Figure 2.1-3**. Development of the subdivisions would rezone an area of land northeast of the Project site from AR-5 to AR-2 and land zoned AR-80 southeast of the Project site to AR-2. The City of Elk Grove General Plan Land Use Map identifies the Project site and surrounding area as Rural Residential (see **Figure 3.10-2**).

REGULATORY SETTING

City of Elk Grove General Plan

The City of Elk Grove General Plan (adopted November 2003 and reflecting amendments through July 2009) is a broad framework for planning the future of the City. It is the official policy statement of the City Council to guide the private and public development of Elk Grove in a manner to gain the maximum social and economic benefit to the citizens. All other City codes and standards, including Specific Plans and the Development Code, must be consistent with the General Plan. The General Plan includes policies that relate to the proposed Project. **Table 3.10-1** summarizes applicable policies and the Project's consistency with these policies.

TABLE 3.10-1
ELK GROVE GENERAL PLAN LAND USE CONSISTENCY WITH THE SHELDON ROAD/WATERMAN ROAD INTERSECTION IMPROVEMENT PROJECT

General Plan Policy (as adopted)	Consistency with Project	Analysis
Policy LU-18: Land uses within the "Sheldon" area (generally encompassing the area designated for Rural Residential uses in the eastern part of Elk Grove) shall be consistent with the community's rural character, emphasizing lot sizes of at least two gross acres, roadways which preserve the area's mature trees, and limited commercial services.	Yes	The proposed Project will comply with the Rural Road Improvement Policy and the Rural Road Improvement Standards established by the City, applicable to the Rural Sheldon Area of Elk Grove.
Policy CI-1: Circulation planning for all modes of travel (vehicle, transit, bicycle, pedestrian, etc.) shall be coordinated with efforts to reduce air pollution.	Yes	The proposed Project includes pedestrian-accessible crossings at the Sheldon Road/Waterman Road intersection (roundabout). In addition, the proposed project will reduce congestion and idling at the intersection, which may reduce air pollution.
Policy CI-5-Action 3: The City will support positive incentives such as carpool and vanpool parking, bus turnouts, and pedestrian-friendly project designs to promote the use of transportation alternatives.	Yes	The proposed Project includes pedestrian-accessible crossings at the intersection of Sheldon Road and Waterman Road.
Policy CI-13: The City shall require that all roadways and intersections in Elk Grove operate at a minimum level of service "D" at all times.	Yes	The Sheldon Road/Waterman Road intersection is currently operating at level of service F during AM and PM peak traffic hours. The proposed Project is projected to maintain an acceptable level of service at the Sheldon Road/Waterman Road intersection through the year 2024, consistent with the City's Rural Road Improvement Policy.

DISCUSSION OF IMPACTS

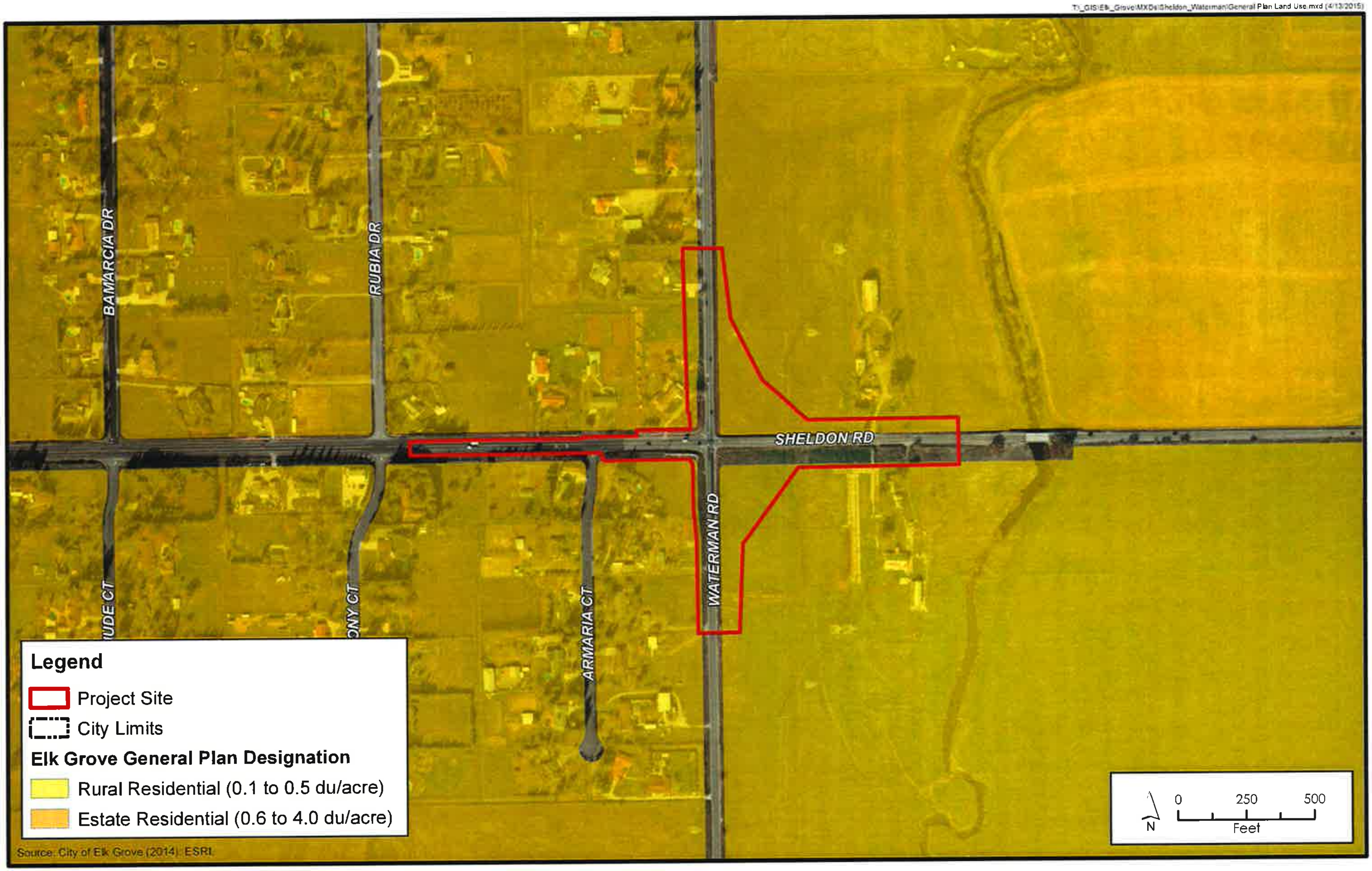
a) Would the project physically divide an established community?

No Impact. The proposed Project is located at the intersection of Sheldon Road and Waterman Road and on Sheldon Road and Waterman Road approaching the intersection. No barriers to movement through the existing and planned communities in the surrounding areas would be installed. Rather, the proposed Project would provide pedestrian facilities that do not currently exist at the intersection, which would improve community continuity. Additionally, the proposed Project is anticipated to improve local traffic circulation in the area. Therefore, no impact would occur.

City of Elk Grove
Development Services

Figure 3.10-1

Existing Land Use



City of Elk Grove
Development Services

Figure 3.10-2

General Plan Land Use

b) *Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?*

Less Than Significant Impact. The proposed Project would require right-of-way acquisition from properties in the northwest, southwest, and northeast quadrants of the Project area. Existing land uses in the Project area include agricultural residential and agricultural uses. Sheldon Road and Waterman Road are ultimately planned as four-lane arterial roadways in the City of Elk Grove General Plan Circulation Element. The proposed Project will not conflict with any applicable land use plan, policy, or regulation. Therefore, impacts are considered less than significant.

c) *Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?*

No Impact. Currently, no habitat conservation plans or natural community conservation plans are in place in the Project region or applicable to the Project site. The South Sacramento Habitat Conservation Plan is a planned conservation plan that will cover the City, including the Project location. However, no habitat conservation plans or natural community conservation plans applicable to the Project area have been adopted to date. Therefore, no impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.11. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

The Surface Mining and Reclamation Act of 1975 requires the State Geologist to inventory and classify selected mineral resources in California. The proposed Project is located in a rural setting covered by the MRZ-3 classification for mineral resources. The MRZ-3 classification covers areas "containing aggregate deposits, the significance of which cannot be evaluated from available data" (City of Elk Grove 2003b). No mineral extraction activities occur in the vicinity of the Project site. None of the roadways in the vicinity of the Project serve as routes for traffic involved in mineral extraction activities.

DISCUSSION OF IMPACTS

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?

No Impact. The proposed Project would not result in the use or extraction of any mineral or energy resources and would not restrict access to known mineral resource areas. The proposed Project would not conflict with energy conservation plans, use nonrenewable resources in a wasteful manner, or result in the loss of availability of a known mineral resource. Therefore, no impact would occur.

b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact. Refer to issue a) above. The proposed Project would have no impact on mineral resources. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.12. NOISE. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or of applicable standards of other agencies?	☐	☒	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☒	☐	☐
e) For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

Acoustic Fundamentals

Sound is mechanical energy transmitted through a medium (air) in the form of a wave from a disturbance or vibration. Noise, however, is generally defined as sound that is loud, unpleasant, unexpected, or disagreeable.

Amplitude

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. For example, a 10 dB sound is 10 times the pressure difference of a 0 dB sound; a 20 dB sound is 100 times the pressure difference of a 0 dB sound. Another feature of the decibel scale is the way in which sound amplitudes from multiple sources are added together. A 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person (FHWA 1980).

Frequency

Frequency is the number of fluctuations of the pressure wave per second. The unit of frequency is the hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA.

Sound and the Human Ear

Because of the ability of the human ear to detect a wide range of sound pressure fluctuations, sound pressure levels are expressed in logarithmic units called decibels. The sound pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold.

In addition, because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. A dBA scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for purposes of environmental noise regulation. **Table 3.12-1** includes examples of A-weighted noise levels from common indoor and outdoor activities.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual experiences with noise.

Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment, referred to as the "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the hearers. With regard to increases in A-weighted noise level, knowledge of the following relationships will be helpful in understanding this report (USEPA 1971):

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans.
- Outside of the laboratory, a 3 dB change is considered a just-perceivable difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- A 10 dB change is subjectively heard as approximately a doubling in loudness.

TABLE 3.12-1
NOISE ENVIRONMENT

Indoors	A-weighted decibels		Perceived loudness relative to 60 dba	Outdoors
	140	Threshold of Pain	x256	
	130	Deafening	x128	Military Jet Takeoff with Afterburner (at 50 Feet)
	120		x64	
				Jet Takeoff at 200 Feet
Rock Band	110	Uncomfortably Loud	x32	
Inside Subway Train, New York	100		x16	747-100 Takeoff (4 Miles from Start of Roll)
				Power Lawnmower (at 50 Feet) Ambulance Siren (at 100 Feet)
Noisy Cocktail Bar	90	Very Loud	x8	
				727-200 Takeoff (4 Miles from Start of Roll)
Jet Aircraft Cabin, at Cruise Shouting (at 3 Feet)	80		x4	Diesel Truck, 40 mph (at 50 Feet)
Noisy Restaurant		Moderately Loud		Automobile, 65 mph (at 50 Feet)
Vacuum Cleaner at 3 Feet	70		x2	Busy Street (at 50 Feet)
Large Business Office				757-200 Takeoff (4 Miles from Start of Roll)
Normal Conversation (at 3 Feet)	60		x1	Automobile, 30 mph (at 50 Feet)
Quiet Office				Cessna 172 Landing (3,300 Feet from Rwy End)
	50	Moderately Quiet	x1/2	
	40		x1/4	
Quiet Library				
				Quiet Urban Area, Nighttime
	30	Very Quiet	x1/8	Quiet Suburban Area, Nighttime
Concert Hall, Background				
				Quiet Rural Area, Nighttime
	20		x1/16	
Recording Studio				
	10	Barely Audible	x1/32	
				Leaves Rustling
	0	Threshold of Hearing	x1/64	

Sources: Caltrans 2002; Egan and Hill 1972; US Department of Housing and Urban Development 2009

Negative Effects of Noise on Humans

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time, while traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period of time. However, gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases is dependent upon the noise frequency, bandwidth, level, and exposure time (Caltrans 1998).

Characteristics of Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3.0 and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance. Noise generated by stationary sources typically attenuates at a rate between 6.0 and about 7.5 dBA per doubling of distance.

Sound levels can be reduced by placing barriers between the noise source and the receiver. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise, but are less effective than solid barriers.

Noise Descriptors

The selection of a proper noise descriptor for a specific source is dependent upon the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998; Lipscomb and Taylor 1978).

- L_{max} (Maximum Noise Level): The maximum instantaneous noise level during a specific period of time.
- L_{min} (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time.
- L_{eq} (Equivalent Noise Level): The energy mean noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}.

- L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dBA "penalty" for the noise-sensitive hours between 10 p.m. and 6 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" for the noise-sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically approximately 0.5 dBA higher than the L_{dn}.

Existing Noise Environment

Noise-Sensitive Land Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other noise-sensitive land uses include hospitals, convalescent facilities, parks, hotels, churches, libraries, and other uses where low interior noise levels are essential. Noise-sensitive land uses located near the Project site include residential land uses. Residential dwellings are located at various distances from the roadways along Sheldon Road and Waterman Road. Numerous residential dwellings within one-quarter mile of the Project site exist within 100 feet of the roadways.

REGULATORY SETTING

Local Plans, Policies, Regulations, and Ordinances

City of Elk Grove General Plan

The Noise Element of the City's General Plan contains policies designed to protect the community from the harmful and annoying effects of exposure to excessive noise. General Plan policies applicable to the proposed Project are summarized below.

> **NO-3** Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table NO-A as measured immediately within the property line of lands designated for noise-sensitive uses.
>
> > **NO-3-Action 1** Limit construction activity to the hours of 7 a.m. to 7 p.m. whenever such activity is adjacent to residential uses.
> >
> > **NO-3-Action 3** The City shall require that stationary construction equipment and construction staging areas be set back from existing noise-sensitive land uses.

The City's General Plan also includes maximum allowable noise standards for projects affected by non-transportation noise sources. Noise compatibility of proposed development is determined in comparison to these standards. The City's noise standards for projects affected by stationary (i.e., non-transportation) noise sources are as follows:

TABLE 3.12-2
PERFORMANCE STANDARDS FOR STATIONARY (NON-TRANSPORTATION) NOISE SOURCES

Source	Noise Level (Hourly L_{eq}, dBA)	
	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Part 1: Typical Sources[1]	55	45
Part 2: Sources Which Are Tonal, Impulsive, Repetitive, or Consist Primarily of Speech or Music[2]	50	40

Source: Elk Grove 2003a, Table NO-A (amended January 5, 2005)

1. *The standards above will apply generally to noise sources that are not tonal, impulsive, or repetitive in nature. Typical noise sources in this category would include HVAC systems, cooling towers, fans, blowers, etc.*
2. *The standards in Part 2 apply to noises which are tonal in nature, impulsive or repetitive, or which consist primarily of speech or music (e.g., humming sounds, outdoor speaker systems). Typical noise sources in this category include pile drivers, drive-through speaker boxes, punch presses, steam valves, and transformer stations.*

The noise level standards in Parts 1 and 2 do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

The City may impose noise level standards which are more or less restrictive than those specified above based upon determination of existing low or high ambient noise levels.

As depicted in **Table 3.12-2**, the City's maximum acceptable exterior noise standard for residential land uses affected by non-transportation noise sources is 55 dBA L_{eq} during the daytime hours (i.e., 7 a.m. to 10 p.m.) and 45 dBA during the nighttime hours (i.e., 10 p.m. to 7 a.m.). To account for increased annoyance potential, non-transportation sources with tonal, impulsive, or repetitive noise characteristics (i.e., pile driver) are reduced by 5 dBA.

City of Elk Grove Noise Ordinance

Elk Grove Municipal Code Title 6, Chapter 6.32, Noise Control, regulates noise generated by non-transportation sources. Section 6.32.100, Exemptions, of the Code restricts construction activities to occur between the hours of 6 a.m. and 8 p.m., Monday through Friday, and between the hours of 7 a.m. and 8 p.m. on Saturday and Sunday.

DISCUSSION OF IMPACTS

a) *Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or of applicable standards of other agencies?*

Less Than Significant Impact with Mitigation Incorporated. The proposed Project consists of realignment and replacement of the Sheldon Road/Waterman Road intersection. Realignment of the intersection to the east will shift noise traffic closer to some land uses; however, the proposed Project is not anticipated to result in exposure of persons to noise levels in excess of established standards during operation, as the Project involves replacement and realignment of an existing intersection.

Construction noise typically occurs intermittently and varies depending upon the nature or phase (e.g., demolition/land clearing, grading and excavation, etc.) of construction. Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical noise levels for individual pieces of construction equipment are summarized in **Table 3.12-3.**

TABLE 3.12-3
CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Noise Level (dBA L_{max} at 50 feet)
Bulldozers	82
Heavy Trucks	81
Backhoe	78
Pneumatic Tools	85
Concrete Pump	81
Loader	79
Roller	80
Compressor	78
Crane	81
Drill Rig	79
Paver	77
Hoe Ram	90

Source: FHWA 2008

During construction, noise from equipment would cause short-term localized increases in ambient noise levels. The actual noise levels at any particular location would depend on a variety of factors, including the type of construction equipment or activity involved, distance to the source of the noise, obstacles to noise that exist between the receptor and the source, time of day, and similar factors. Construction of the proposed Project would result in a temporary, periodic increase in ambient noise levels that would exceed the City noise standards. However, this increase would be temporary, intermittent, and limited to daytime hours. Further, mitigation is available that would require limits to the hours of construction, appropriate locations for staging areas, noise-reduction intake and exhaust mufflers and engine shrouds for construction equipment, and minimization of construction equipment idling, which would reduce impacts to less than significant. Therefore, impacts are considered less than significant with incorporation of mitigation measures **MM 3.12.1** through **MM 3.12.4**.

b) *Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?*

Less Than Significant Impact with Mitigation Incorporated. Construction activities associated with the proposed Project include the construction of a single-lane roundabout and realignment of the Sheldon Road/Waterman Road intersection. Construction would be temporary and would occur between the hours of 7 a.m. and 7 p.m. in accordance with Chapter 6.32, Noise Control, of the City of Elk Grove Municipal Code, as specified in mitigation measure **MM 3.12.1**. No pile driving or other activities commonly associated with vibration would occur. Therefore, impacts would be less than significant with implementation of mitigation measures **MM 3.12.1** through **MM 3.12.4**.

c) *Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?*

Less Than Significant Impact. The proposed Project includes a single-lane roundabout configuration at the Sheldon Road/Waterman Road intersection and realignment of the intersection to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road. The proposed Project would reduce idling at the intersection and is not expected to result in a substantial permanent increase in ambient noise levels during operation. Impacts are considered less than significant.

d) *Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?*

Less Than Significant Impact with Mitigation Incorporated. The proposed Project would result in temporary increased ambient noise levels in the vicinity of the Project site during construction due to construction vehicles and activities; however, these increases would be temporary, intermittent, and limited to daytime hours. Because sensitive land uses are located adjacent to the Project area, temporary construction noise is considered potentially significant unless mitigation is incorporated. Implementation of mitigation measures **MM 3.12.1** through **MM 3.12.4** will reduce impacts to a less than significant level.

e) *For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

No Impact. The proposed Project is not located within an airport land use plan or within 2 miles of a public airport. No impact would occur.

f) *For a project located within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?*

No Impact. The proposed Project is not located in the vicinity of a private airstrip. No impact would occur.

Mitigation Measures

MM 3.12.1 Construction activities shall be limited to between the hours of 7 a.m. and 7 p.m., Monday through Sunday.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.2 Construction equipment and equipment staging areas shall be located at the farthest distance possible from adjacent sensitive land uses.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.3 Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.4 When not in use, motorized construction equipment shall not be left idling.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.13. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

In the 10 years prior to the incorporation of the City in July 2000, the population increased by 70.5 percent, in part due to annexations. The City began to rapidly develop as a result of an increase in jobs to the Sacramento County region and the availability of land outside the downtown Sacramento area. The 2014 population of the City was approximately 160,688 persons (Department of Finance 2014). Growth in population causes an increased demand for housing. New housing developments are planned in the City of Elk Grove Planning Area, including the Sheldon Park Estates planned northeast of the Project site and the Sheldon and Waterman housing project planned southeast of the Project site.

DISCUSSION OF IMPACTS

a) Would the project induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

No Impact. The proposed Project does not include the construction of new homes or businesses, nor does it include extension or construction of new roadways which could potentially induce growth. Planned development northeast and southeast of the Sheldon Road/Waterman Road intersection will include approximately 71 single-family lots combined (De Novo Planning Group 2014; City of Elk Grove 2009). The proposed Project would relieve congestion at the Sheldon Road/Waterman Road intersection and is not anticipated to induce growth. Therefore, no impact would occur.

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. No residential structures would be displaced as a result of the proposed Project. No impact would occur.

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. As discussed in issue b) above, the proposed Project would not involve the removal or relocation of any housing. The proposed Project would not displace any people or necessitate the construction of any replacement housing. Therefore, no impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.14 PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☐	☒
d) Parks?	☐	☐	☐	☒
e) Other public facilities?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

The proposed Project is located in Elk Grove at the intersection of Sheldon Road and Waterman Road and along Sheldon Road and Waterman Road approaching the intersection. The City receives general public safety and law enforcement from the City of Elk Grove Police Department. The Cosumnes Fire Department provides fire protection and emergency services to the City. The Elk Grove Unified School District provides educational services in the area surrounding the Project site. Additionally, the City provides maintenance of public facilities.

DISCUSSION OF IMPACTS

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

a, b) Fire protection, police protection?

Less Than Significant Impact. The proposed Project involves the replacement of the existing stop sign–controlled Sheldon Road/Waterman Road intersection with a roundabout configuration, realignment of the Sheldon Road/Waterman Road intersection to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road, and construction of pedestrian-accessible crossings at the intersection. Therefore, the proposed Project would not induce population growth and furthermore, does not include any components that would result in an increased demand for fire protection or police protection. Establishment of additional facilities to maintain acceptable service ratios for the public would not be necessary. However, traffic handling during construction may require temporary road closures and detours. The City will coordinate with the local fire and police departments before road closures to ensure the fire department and police department are aware of any temporary road closures and detours ahead of time. Therefore, this impact is considered less than significant.

c–e) Schools, parks, other public facilities?

No Impact. The proposed Project would not induce population growth and does not include any components that would result in an increase in demand for schools, parks, or other public services, as discussed in issues a, b). Establishment of additional facilities to maintain acceptable service ratios for the public would not be necessary. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.15. RECREATION.				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities, or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

The City's General Plan (2003a) contains goals and policies established to conserve existing national, State, and regional recreation areas, as well as encouragement for the development of additional recreational opportunities to meet the City's needs. In addition, the City of Elk Grove Bicycle, Pedestrian, and Trails Master Plan (2014) includes goals that encourage an exceptional public parks network throughout the City and public use of all available pedestrian and bicycle trails. No parks or recreational facilities exist in the Project vicinity.

DISCUSSION OF IMPACTS

a) *Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*

No Impact. The proposed Project would realign the existing stop sign-controlled Sheldon Road/Waterman Road intersection to the east and replace it with a roundabout configuration. The Project does not include a residential or commercial component that would increase human presence in the area which could result in increased use of existing parks or recreational facilities. Therefore, no impact would occur in relation to increased use or physical deterioration of existing parks or recreational facilities.

b) *Does the project include recreational facilities, or require the construction or expansion of existing facilities, which might have an adverse physical effect on the environment?*

No Impact. Refer to issue a) above. The proposed Project does not include recreational facilities or require the construction or expansion of existing recreational facilities. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.16 TRANSPORTATION/TRAFFIC. Would the project:				
a) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☒	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

A traffic study was prepared for the proposed Project in October 2014 and is included in **Appendix F**. The Project is located at the Sheldon Road/Waterman Road intersection and on Sheldon Road and Waterman Road approaching the intersection. Sheldon Road is currently a north–south two-lane roadway and Waterman Road is currently an east–west two-lane roadway. According to the traffic study prepared for the Project, the existing stop sign–controlled Sheldon Road/Waterman Road intersection experiences congestion during both AM and PM peak traffic hours (Kittelson & Associates 2014). The proposed Project would improve the Sheldon Road/Waterman Road intersection with replacement of the existing stop sign–controlled intersection with a roundabout configuration, realignment of the intersection to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road, and includes pedestrian-accessible crossings at the intersection. The Project does not involve the construction of new roadways.

DISCUSSION OF IMPACTS

a) *Would the project conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?*

Less Than Significant Impact. The proposed Project will realign and replace the Sheldon Road/Waterman Road intersection with a roundabout configuration. The proposed Project is anticipated to improve circulation and safety through the Project area. According to the traffic study prepared by Kittelson & Associates for the Project, under current conditions, the Sheldon Road/Waterman Road intersection is operating under unacceptable levels of service (LOS) during both the AM and PM peak traffic hours. The proposed Project is projected to maintain acceptable LOS at the Sheldon Road/Waterman Road intersection until the year 2024, consistent with the City's Rural Roads Improvement Policy's value-based approach from incremental, rather than ultimate, road improvements that solve specific traffic issues (Kittelson & Associates 2014). Therefore, impacts would be less than significant.

b) *Would the project conflict with an applicable congestion management program including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?*

Less Than Significant Impact. Under existing conditions, the Sheldon Road/Waterman Road intersection is operating at LOS F during AM and PM peak traffic hours, which is considered an unacceptable LOS for the City. As discussed above in issue a), the proposed Project is projected to maintain acceptable LOS at the Sheldon Road/Waterman Road intersection through the year 2024, consistent with the City's Rural Roads Improvement Policy (Kittelson & Associates 2014). **Table 3.16-1** displays the future plus project LOS conditions at the Sheldon Road/Waterman Road intersection during AM and PM peak traffic hours.

TABLE 3.16-1
FUTURE PLUS PROJECT PEAK HOUR LEVELS OF SERVICE

Study Intersection Approach	Year 2016 (with Project)				Year 2035 (with Project)			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Northbound	13.7	B	9.5	A	79.2	F	22.9	C
Westbound	8.0	A	10.2	B	14.4	B	30.5	D
Southbound	9.4	A	18.7	C	25.1	D	173.1	F
Eastbound	12.9	B	13.6	B	86.8	F	38.8	E

Source: Kittelson & Associates 2014
Note: Delay is measured in average seconds per vehicle

According to the City's Improvement Standards, intersections should operate at LOS D or better at all times. The Sheldon Road/Waterman Road intersection does not meet the LOS D standard under current conditions. The proposed Project would maintain acceptable level of service at the Sheldon Road/Waterman Road intersection in accordance with the City's

General Plan and the City's Rural Roads Improvement Policy. Therefore, impacts would be less than significant.

c) *Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?*

No Impact. Mather Airport is the closest airport in proximity to the Project site, located approximately 7.5 miles northeast of the Project. The proposed Project involves realignment and replacement of the Sheldon Road/Waterman Road intersection and would not result in a change in air traffic patterns. In addition, the Project does not propose any structures that would impede a height limitation in close proximity to an airport. No impact would occur.

d) *Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*

No Impact. The proposed Project involves realignment of the Sheldon Road/Waterman Road intersection and replacement of the intersection with a roundabout configuration. According to the traffic study prepared for the Project, compared to other intersection configurations, roundabouts are considered a safer option, as they experience fewer collisions (Kittelson & Associates 2014). Furthermore, the proposed Project will be designed in accordance with the City's Design and Improvement Standards. Therefore, impacts are considered less than significant.

e) *Would the project result in inadequate emergency access?*

Less Than Significant Impact. Traffic handling during construction of the proposed Project may require temporary partial or full lane closures and/or detours. Emergency access along Sheldon Road and Waterman Road at the Project site will be maintained at all times. The City will require the contractor to coordinate with the local fire and police departments before road closures to ensure emergency service providers are aware of any temporary road closures and/or detours ahead of time. During operation, the Project improvements will improve circulation at the intersection of Sheldon Road and Waterman Road, thus helping to improve emergency vehicle response times. This impact is considered less than significant.

f) *Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?*

No Impact. The proposed Project includes construction of pedestrian-accessible crossings at the intersection of Sheldon Road and Waterman Road. The Project is consistent with adopted policies, plans, and programs supporting alternative transportation including the Elk Grove General Plan and the Elk Grove Bicycle, Pedestrian, and Trails Master Plan. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.17. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, State, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

ENVIRONMENTAL SETTING

Water

Water services within the Elk Grove City limits are supplied by the Sacramento County Water Agency and the Elk Grove Water District. The proposed Project area receives water services from both, as areas north of Sheldon Road are served by the Sacramento County Water Agency and areas south of Sheldon Road are served by the Sacramento County Water Agency and the Elk Grove Water District. Private service areas also exist within the City limits of Elk Grove.

Wastewater Service

Urbanized portions of Sacramento County, such as the City, receive wastewater service from the Sacramento Regional County Sanitation District (SRCSD), which is a publicly owned wastewater agency. Over one million people in the major Sacramento metropolitan area receive wastewater services from the SRCSD. Three agencies—the City of Folsom, the City of Sacramento, and Sacramento County Sanitation District 1—contribute to the wastewater services provided by the SRCSD. The proposed Project area falls within the Sacramento County Sanitation District 1 service area.

Solid Waste Service

Solid waste services in the City are provided by the Sacramento County Public Works Agency, Waste Management and Recycling. The Central Valley Waste Services provide solid waste services to single-family residential customers. Solid waste within the City limits is typically delivered to Sacramento County's Kiefer Landfill, the primary municipal solid waste disposal facility in Sacramento County, located at the intersection of Grant Line Road and Kiefer Boulevard. Waste is accepted from the general public, businesses, and private waste haulers.

At present, the Kiefer Landfill, which comprises approximately 1,084 acres, is the only landfill within the jurisdiction of Sacramento County that is permitted to accept solid waste for disposal. The maximum tons per day (tons/day) allowed at the Kiefer Landfill is 10,815 tons/day, with an average intake of 6,362 tons/day. The landfill has a total capacity of 117 million cubic yards (58 million tons). The Kiefer Landfill is classified as a major landfill, which is defined as a facility that receives more than 50,000 tons of solid waste per year. The Kiefer Landfill has been operating below permitted capacity and is projected to have capacity for about the next 20 to 30 years (City of Elk Grove 2003a).

Electrical, Telephone, and Natural Gas Services

Electrical services within the City limits are provided by the Sacramento Municipal Utility District. Telephone services in Elk Grove are provided by Frontier Communications (formerly Citizens Communications) and Pacific Bell. Natural gas services to customers within the City limits are provided by the Pacific Gas and Electric Company.

Utility Relocations

Utility relocations will not occur as a result of the proposed Project.

DISCUSSION OF IMPACTS

a) *Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?*

   No Impact. The proposed Project consists of realignment of the Sheldon Road/Waterman Road intersection to the east and replacement of the intersection with a roundabout configuration, and does not include any uses that would generate wastewater. Furthermore, the Project does not include any components that would result in an increased demand for wastewater treatment. Therefore, the proposed Project would not exceed wastewater treatment requirements of the RWQCB and no impact would occur.

b) *Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*

   No Impact. The proposed Project does not include any uses that would generate wastewater nor does it include new development for habitation or new businesses. Population growth would not result from the proposed Project that would require or result in the construction or expansion of new water or wastewater treatment facilities. No impact would occur.

c) *Would the project require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*

Less Than Significant Impact. The proposed Project will result in an increase of impervious surfaces at the intersection of Sheldon Road and Waterman Road, which may increase stormwater runoff to drainage facilities. Stormwater runoff at the Project site is collected by roadside ditches along Sheldon Road and Waterman Road. The proposed Project includes the construction of underground drainage facilities and is not anticipated to require the expansion of existing facilities. Therefore, impacts are considered less than significant.

d) *Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?*

Less Than Significant Impact. During construction of the proposed Project, there may be a temporary need for water to control dust. However, the proposed Project would not result in an increase in demand for long-term water supply. This impact would be less than significant.

e) *Would the project result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?*

No Impact. The proposed Project does not include any uses that would generate wastewater and would therefore not affect capacity of the local wastewater treatment provider. No impact would occur.

f) *Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?*

Less Than Significant Impact. Solid waste generated by the proposed Project would be transported to the Kiefer Landfill, which has been operating below permitted capacity and is projected to have capacity for about the next 20 to 30 years (City of Elk Grove 2003a). Operation of the proposed Project would not result in the generation of solid waste. Impacts would be less than significant.

g) *Would the project comply with federal, State, and local statutes and regulations related to solid waste?*

No Impact. The proposed Project would comply with all applicable federal, State, and local solid waste regulations including the California Integrated Waste Management Act of 1989 (AB 939) and the California Solid Waste Re-Use and Recycling Access Act of 1991 (Sections 42900–42911 of the Public Resources Code). The Project does not include any components that would result in an increased demand for solid waste. No impact would occur.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
3.18. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plants or animals, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☒	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

DISCUSSION OF IMPACTS

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plants or animals, or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant Impact with Mitigation Incorporated. As discussed in subsection 3.4, Biological Resources, of this IS/MND, the Project site is not located within an identified corridor as identified in the CDFW BIOS Viewer (2014). The burrowing owl, Swainson's hawk, white-tailed kite, and other raptors and migratory birds have the potential to occur at the Project site. No signs of special-status species were encountered during the reconnaissance-level survey conducted on October 22, 2014. Implementation of mitigation measures **MM 3.4.1** through **MM 3.4.4** (included in subsection 3.4, Biological Resources, of this IS/MND) would reduce impacts to biological resources to a less than significant level. The potential for discovery or disturbance of historical, archaeological, or paleontological resources, or human remains is not anticipated. However, implementation of mitigation measures **MM 3.5.1** and **MM 3.5.2** (included in subsection 3.5, Cultural Resources, of this IS/MND) would reduce impacts to a less than significant level. Impacts are considered less than significant with mitigation incorporated.

b) *Does the project have impacts that are individually limited, but cumulatively considerable?*

Less Than Significant Impact. CEQA Guidelines Section 15064(h) states that a lead agency shall consider whether the cumulative impact of a project is significant and whether the effects of the project are cumulatively considerable. The assessment of the significance of the cumulative effects of a project must therefore be conducted in connection with the effects of past projects, or other current projects, and probable future projects.

The proposed Project would realign and improve the existing stop sign-controlled intersection at Sheldon Road and Waterman Road. Two subdivision developments are listed on the City's Active Project Report (Sheldon Park Estates and Sheldon and Waterman) within one-quarter mile of the Project site. Because the proposed Project would improve traffic circulation and pedestrian access at the intersection of Sheldon Road and Waterman Road, would comply with the City's Rural Road Improvement Policy, and is consistent with the City of Elk Grove General Plan, it would make no significant contribution to cumulatively adverse impacts associated with existing or proposed development projects in the City, as the Project is a roadway improvement project and would not directly generate vehicle trips. Construction of the proposed Project along with other construction in the City and south Sacramento County would contribute to cumulative environmental impacts. However, the proposed Project's contribution would be minimal, and impacts are considered less than cumulatively considerable.

c) *Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?*

Less Than Significant Impact with Mitigation Incorporated. During operation, the proposed Project would not create a significant hazard to the public or the environment, as it would improve traffic circulation and safety at the intersection of Sheldon Road and Waterman Road. Construction of the proposed Project will result in a temporary, periodic increase in ambient noise levels and GHG emissions. Implementation of mitigation measure **MM 3.7.1** (included in subsection 3.7, Greenhouse Gas Emissions, of this IS/MND) and mitigation measures **MM 3.12.1** through **MM 3.12.4** (included in subsection 3.12, Noise, of this IS/MND) would reduce impacts to a less than significant level.

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4.0 LIST OF MITIGATION MEASURES

4.1 SUMMARY OF MITIGATION MEASURES

AESTHETICS (SUBSECTION 3.1)

MM 3.1.1 All areas disturbed or used for staging of vehicles and equipment shall be restored to their pre-construction condition upon completion of the Project. This is essential in order to provide sediment control and soil stabilization, which can best be accomplished by using a tackifying agent or mulch to cover bare soil to help prevent soil erosion. Some areas may also need a seed mix added to the erosion control measure.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.2 The removal of established vegetation shall be minimized and avoided where feasible. Environmentally sensitive area fencing shall be installed to demonstrate areas where vegetation is being preserved.

Timing/Implementation: *Prior to and during construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.3 The Project shall comply with the City's Land Grading and Erosion Control ordinance outlined in Chapter 16.44 of the Elk Grove Municipal Code, which may include seeding, mulching, vegetative buffer strips, sod, plastic covering, burlap covering, watering, and other measures for temporary erosion control of disturbed areas during construction.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.4 Contour grading and slope rounding shall be utilized on all cut and fill slopes in order to help restore the environment in a manner that will blend with the surrounding natural landscape.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.1.5 The Project shall comply with the City's lighting standards provided in the City of Elk Grove Standard Details and Drawings and the City of Elk Grove Design Guidelines for nonresidential development.

Timing/Implementation: *During Project design and construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

BIOLOGICAL RESOURCES (SUBSECTION 3.4)

MM 3.4.1 A qualified biologist(s) shall monitor construction activities that could potentially cause significant impacts to sensitive biological resources. In addition, the applicant shall retain a qualified biologist to conduct mandatory contractor/worker awareness training for construction personnel. The awareness training will be provided to all construction personnel to brief them on the identified location of sensitive biological resources, including how to identify species (visual and auditory) most likely to be present, the need to avoid impacts to biological resources (e.g., plants, wildlife, and jurisdictional waters), and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the Project, the contractor shall ensure that they receive the mandatory training before starting work.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.2 If clearing and construction activities would occur during the nesting period for burrowing owls (February 1–August 31), the City shall retain a qualified biologist to conduct preconstruction surveys in accordance with the CDFW's *Staff Report on Burrowing Owl Mitigation*, published March 7, 2012. Surveys shall be conducted within 14 days prior to ground-breaking activities and shall be repeated if Project activities are suspended or delayed for more than 15 days during nesting season.

If no burrowing owls are detected, no further mitigation is required. If active burrowing owl nest sites are detected, the applicant shall implement the avoidance, minimization, and mitigation methodologies outlined in the CDFW's *Staff Report on Burrowing Owl Mitigation* prior to initiating Project-related activities that may impact burrowing owls.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.3 If clearing and/or construction activities would occur during the bird nesting season (January 15–August 15), preconstruction surveys to identify active migratory bird and raptor nests shall be conducted by a qualified biologist within 14 days of construction initiation. Preconstruction surveys must be performed by a qualified biologist for the purposes of determining presence/absence of active nest sites in the Project area and a 200-foot (500-foot for raptors) buffer. If no active nests are found, no further mitigation is required. Surveys shall be repeated if construction activities are delayed or postponed for more than 30 days.

If active nest sites are identified within 200 feet (500 feet for raptors) of Project activities, the applicant shall impose an exclusionary buffer for all active nest sites prior to commencement of any Project-related activities to avoid construction- or access-related disturbances to nesting raptors. An exclusionary buffer constitutes an area where Project-related activities (i.e., vegetation removal, earth moving, and construction) will not occur, and shall be imposed within 100 feet (250 feet for raptors) of any active nest sites until the nest is deemed inactive by a qualified biologist. Activities permitted within the exclusionary buffer and the size (i.e., 250 feet) of exclusionary buffers may be adjusted through consultation with the City of Elk Grove Planning Department.

Timing/Implementation: *Prior to the start of Project grading and throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.4 The City shall mitigate for the loss of Swainson's hawk foraging habitat at a 1:1 ratio. Mitigation can be accomplished through the City of Elk Grove Swainson's Hawk Impact Mitigation Fees (Chapter 16.130 of the Elk Grove Municipal Code) or other method determined acceptable to the CDFW.

Timing/Implementation: *Prior to the start of Project grading*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.4.5 For every acre of roadside ditch and/or man-made swale permanently or temporarily affected by the proposed Project, the City shall replace the affected acreage at a minimum 1:1 ratio, or another approved ratio as determined by the US Army Corps of Engineers (USACE). Impacts shall be offset through the restoration and relocation of roadside ditches and/or swales within the Project area or through purchase of credits or payment of an in-lieu fee.

Timing/Implementation: *Prior to the start of Project grading and throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

CULTURAL RESOURCES (SUBSECTION 3.5)

MM 3.5.1 In accordance with California Public Resources Code Section 5097.5, which prohibits knowing and willful excavation of undiscovered cultural resources without permission from the appropriate public agency with jurisdiction over the lands, and in order to mitigate for the potential discovery of an archaeological or paleontological resources, the following measure will be implemented during construction and included in the construction contract:

> *If buried archaeological and/or paleontological resources, such as chipped or ground stone, historic debris, building foundations, human bone, or fossils, are inadvertently discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the find until a qualified archaeologist can access the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the City and all other appropriate agencies.*

Timing/Implementation: *Throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.5.2 In order to mitigate for the potential discovery or disturbance of any human remains, the protocol of California Health and Safety Code Section 7050.5(b) will be adhered to as follows:

> *In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Section 27460 et seq. of the Government Code, that the remains are not subject to the provisions of Section 27491 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code.*

If the remains are determined to be Native American, City policy would dictate that the procedures outlined in CEQA Section 15064.5(d) and (e) shall be followed.

Timing/Implementation: *Throughout Project construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

Greenhouse Gas Emissions (Subsection 3.7)

MM 3.7.1 The City of Elk Grove Planning Department shall require that the Project divert 65 percent of the waste generated during the demolition of existing pavement and construction of new traffic improvement facilities, consistent with CAP measure RC-1.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

Noise (Subsection 3.12)

MM 3.12.1 Construction activities shall be limited to between the hours of 7 a.m. and 7 p.m., Monday through Sunday.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.2 Construction equipment and equipment staging areas shall be located at the farthest distance possible from adjacent sensitive land uses.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.3 Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

MM 3.12.4 When not in use, motorized construction equipment shall not be left idling.

Timing/Implementation: *During construction*

Enforcement/Monitoring: *City of Elk Grove Planning Department*

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5.0 LIST OF PREPARERS

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6.0 LIST OF ACRONYMS

AB	Assembly Bill
AQAP	Air Quality Attainment Plan
BMP	best management practice
BSA	biological study area
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDTSC	California Department of Toxic Substances Control
CEQA	California Environmental Quality Act
CH_4	methane
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
dB	decibel
dBA	A-weighted decibels
DOC	Department of Conservation
DWR	Department of Water Resources
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
FGC	Fish and Game Code
FHWA	Federal Highway Administration
FSOR	Final Statement of Reasons for Regulatory Action
GHG	greenhouse gas
IS	Initial Study
L_{dn}	Day-Night Noise Level
L_{eq}	Equivalent Noise Level

L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
LOS	level of service
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
NAAQS	national ambient air quality standards
NO_2	nitrogen dioxide
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O_3	ozone
Pb	lead
PM	particulate matter
ppm	parts per million
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SCEMD	Sacramento County Environmental Management Department
SCMDP	Sacramento County Multi-Hazard Disaster Plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
SR 99	State Route 99
SRCSD	Sacramento Regional County Sanitation District
SVAB	Sacramento Valley Air Basin
SWPPP	stormwater pollution prevention plan
TAC	toxic air contaminant
TCZ	temporary construction zone
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VMT	vehicle miles traveled
VOC	volatile organic compound

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Exhibit A – Sheldon Road/Waterman Road Intersection Improvement Project (PT0138)

Website location for Appendices to Mitigated Negative Declaration:

http://www.elkgrovecity.org/city_hall/departments_divisions/planning/environmental_review/environmental_documents/?portalId=109669&pageId=144965&objectId.15286=145414&contextId.15286=144966&parentId.15286=245226

Embedded Link to webpage:

Environmental Documents

APPENDICES

APPENDIX A – ANNUAL AND DAILY CONSTRUCTION EMISSIONS

Sheldon - Waterman Intersection Improvements

Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	117.25	1000sqft	2.69	117,250.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2016
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	590.31	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Unit amount accounts for improvements to Waterman Road, Sheldon Road, Driveways on Sheldon Road, and intersection based on Figure 3

Construction Phase - Demolition of all existing pavement assumed. No building construction or painting

Demolition -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	220.00
tblProjectCharacteristics	OperationalYear	2014	2016

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

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	lb/day										lb/day					
2015	3.3560	32.5022	25.6626	0.0317	6.6284	1.9044	8.3814	3.3877	1.7830	5.0004	0.0000	3,220.1136	3,220.1136	0.7522	0.0000	3,235.9098
Total	**3.3560**	**32.5022**	**25.6626**	**0.0317**	**6.6284**	**1.9044**	**8.3814**	**3.3877**	**1.7830**	**5.0004**	**0.0000**	**3,220.1136**	**3,220.1136**	**0.7522**	**0.0000**	**3,235.9098**

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	lb/day										lb/day					
2015	3.3560	32.5022	25.6626	0.0317	6.6284	1.9044	8.3814	3.3877	1.7830	5.0004	0.0000	3,220.1136	3,220.1136	0.7522	0.0000	3,235.9098
Total	**3.3560**	**32.5022**	**25.6626**	**0.0317**	**6.6284**	**1.9044**	**8.3814**	**3.3877**	**1.7830**	**5.0004**	**0.0000**	**3,220.1136**	**3,220.1136**	**0.7522**	**0.0000**	**3,235.9098**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	lb/day										lb/day					
Area	2.9570	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**2.9570**	**1.2000e-004**	**0.0123**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**4.0000e-005**		**0.0257**	**0.0257**	**7.0000e-005**	**0.0000**	**0.0272**

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	lb/day										lb/day					
Area	2.9570	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**2.9570**	**1.2000e-004**	**0.0123**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**4.0000e-005**		**0.0257**	**0.0257**	**7.0000e-005**	**0.0000**	**0.0272**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	1/28/2015	5	20	
2	Site Preparation	Site Preparation	1/29/2015	2/2/2015	5	3	
3	Grading	Grading	2/3/2015	2/10/2015	5	6	
4	Paving	Paving	2/11/2015	12/15/2015	5	220	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Paving	Paving Equipment	1	8.00	130	0.36
Site Preparation	Scrapers	1	8.00	361	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	164.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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	lb/day										lb/day					
Fugitive Dust					1.8512	0.0000	1.8512	0.2803	0.0000	0.2803			0.0000			0.0000
Off-Road	3.0666	29.6778	22.0566	0.0245		1.8651	1.8651		1.7469	1.7469		2,509.059 9	2,509.059 9	0.6357		2,522.410 4
Total	**3.0666**	**29.6778**	**22.0566**	**0.0245**	**1.8512**	**1.8651**	**3.7163**	**0.2803**	**1.7469**	**2.0272**		**2,509.059 9**	**2,509.059 9**	**0.6357**		**2,522.410 4**

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	lb/day										lb/day					
Hauling	0.2313	2.3546	2.9052	5.9500e-003	0.1422	0.0385	0.1807	0.0389	0.0354	0.0743		603.1894	603.1894	4.6300e-003		603.2865
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0582	0.0525	0.7008	1.2700e-003	0.0989	7.6000e-004	0.0997	0.0262	7.0000e-004	0.0269		107.8643	107.8643	5.5200e-003		107.9803
Total	**0.2894**	**2.4071**	**3.6059**	**7.2200e-003**	**0.2411**	**0.0393**	**0.2803**	**0.0651**	**0.0361**	**0.1012**		**711.0537**	**711.0537**	**0.0102**		**711.2669**

3.2 Demolition - 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	lb/day										lb/day					
Fugitive Dust					1.8512	0.0000	1.8512	0.2803	0.0000	0.2803			0.0000			0.0000
Off-Road	3.0666	29.6778	22.0566	0.0245		1.8651	1.8651		1.7469	1.7469	0.0000	2,509.059 9	2,509.059 9	0.6357		2,522.410 4
Total	**3.0666**	**29.6778**	**22.0566**	**0.0245**	**1.8512**	**1.8651**	**3.7163**	**0.2803**	**1.7469**	**2.0272**	**0.0000**	**2,509.059 9**	**2,509.059 9**	**0.6357**		**2,522.410 4**

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	lb/day										lb/day					
Hauling	0.2313	2.3546	2.9052	5.9500e-003	0.1422	0.0385	0.1807	0.0389	0.0354	0.0743		603.1894	603.1894	4.6300e-003		603.2865
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0582	0.0525	0.7008	1.2700e-003	0.0989	7.6000e-004	0.0997	0.0262	7.0000e-004	0.0269		107.8643	107.8643	5.5200e-003		107.9803
Total	**0.2894**	**2.4071**	**3.6059**	**7.2200e-003**	**0.2411**	**0.0393**	**0.2803**	**0.0651**	**0.0361**	**0.1012**		**711.0537**	**711.0537**	**0.0102**		**711.2669**

3.3 Site Preparation - 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	lb/day										lb/day					
Fugitive Dust					1.5908	0.0000	1.5908	0.1718	0.0000	0.1718			0.0000			0.0000
Off-Road	2.8203	32.4699	18.6797	0.0239		1.5973	1.5973		1.4695	1.4695		2,508.1983	2,508.1983	0.7488		2,523.9231
Total	**2.8203**	**32.4699**	**18.6797**	**0.0239**	**1.5908**	**1.5973**	**3.1881**	**0.1718**	**1.4695**	**1.6413**		**2,508.1983**	**2,508.1983**	**0.7488**		**2,523.9231**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0358	0.0323	0.4313	7.8000e-004	0.0609	4.7000e-004	0.0613	0.0161	4.3000e-004	0.0166		66.3780	66.3780	3.4000e-003		66.4494
Total	**0.0358**	**0.0323**	**0.4313**	**7.8000e-004**	**0.0609**	**4.7000e-004**	**0.0613**	**0.0161**	**4.3000e-004**	**0.0166**		**66.3780**	**66.3780**	**3.4000e-003**		**66.4494**

3.3 Site Preparation - 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	lb/day										lb/day					
Fugitive Dust					1.5908	0.0000	1.5908	0.1718	0.0000	0.1718			0.0000			0.0000
Off-Road	2.8203	32.4699	18.6797	0.0239		1.5973	1.5973		1.4695	1.4695	0.0000	2,508.198 3	2,508.198 3	0.7488		2,523.923 1
Total	**2.8203**	**32.4699**	**18.6797**	**0.0239**	**1.5908**	**1.5973**	**3.1881**	**0.1718**	**1.4695**	**1.6413**	**0.0000**	**2,508.198 3**	**2,508.198 3**	**0.7488**		**2,523.923 1**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0358	0.0323	0.4313	7.8000e-004	0.0609	4.7000e-004	0.0613	0.0161	4.3000e-004	0.0166		66.3780	66.3780	3.4000e-003		66.4494
Total	**0.0358**	**0.0323**	**0.4313**	**7.8000e-004**	**0.0609**	**4.7000e-004**	**0.0613**	**0.0161**	**4.3000e-004**	**0.0166**		**66.3780**	**66.3780**	**3.4000e-003**		**66.4494**

3.4 Grading - 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	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.9656	31.2611	20.2019	0.0206		1.7524	1.7524		1.6122	1.6122		2,164.101 2	2,164.101 2	0.6461		2,177.668 7
Total	**2.9656**	**31.2611**	**20.2019**	**0.0206**	**6.5523**	**1.7524**	**8.3048**	**3.3675**	**1.6122**	**4.9797**		**2,164.101 2**	**2,164.101 2**	**0.6461**		**2,177.668 7**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0447	0.0404	0.5391	9.7000e-004	0.0761	5.9000e-004	0.0767	0.0202	5.4000e-004	0.0207		82.9726	82.9726	4.2500e-003		83.0618
Total	**0.0447**	**0.0404**	**0.5391**	**9.7000e-004**	**0.0761**	**5.9000e-004**	**0.0767**	**0.0202**	**5.4000e-004**	**0.0207**		**82.9726**	**82.9726**	**4.2500e-003**		**83.0618**

3.4 Grading - 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	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.9656	31.2611	20.2019	0.0206		1.7524	1.7524		1.6122	1.6122	0.0000	2,164.101 2	2,164.101 2	0.6461		2,177.668 7
Total	**2.9656**	**31.2611**	**20.2019**	**0.0206**	**6.5523**	**1.7524**	**8.3048**	**3.3675**	**1.6122**	**4.9797**	**0.0000**	**2,164.101 2**	**2,164.101 2**	**0.6461**		**2,177.668 7**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0447	0.0404	0.5391	9.7000e-004	0.0761	5.9000e-004	0.0767	0.0202	5.4000e-004	0.0207		82.9726	82.9726	4.2500e-003		83.0618
Total	**0.0447**	**0.0404**	**0.5391**	**9.7000e-004**	**0.0761**	**5.9000e-004**	**0.0767**	**0.0202**	**5.4000e-004**	**0.0207**		**82.9726**	**82.9726**	**4.2500e-003**		**83.0618**

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	lb/day										lb/day					
Off-Road	1.9443	19.7532	12.2652	0.0176		1.2418	1.2418		1.1437	1.1437		1,823.2763	1,823.2763	0.5345		1,834.5006
Paving	0.0320					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9763**	**19.7532**	**12.2652**	**0.0176**		**1.2418**	**1.2418**		**1.1437**	**1.1437**		**1,823.2763**	**1,823.2763**	**0.5345**		**1,834.5006**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0671	0.0606	0.8086	1.4600e-003	0.1141	8.8000e-004	0.1150	0.0303	8.1000e-004	0.0311		124.4588	124.4588	6.3700e-003		124.5927
Total	**0.0671**	**0.0606**	**0.8086**	**1.4600e-003**	**0.1141**	**8.8000e-004**	**0.1150**	**0.0303**	**8.1000e-004**	**0.0311**		**124.4588**	**124.4588**	**6.3700e-003**		**124.5927**

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	lb/day										lb/day					
Off-Road	1.9443	19.7532	12.2652	0.0176		1.2418	1.2418		1.1437	1.1437	0.0000	1,823.276 3	1,823.276 3	0.5345		1,834.500 6
Paving	0.0320					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9763**	**19.7532**	**12.2652**	**0.0176**		**1.2418**	**1.2418**		**1.1437**	**1.1437**	**0.0000**	**1,823.276 3**	**1,823.276 3**	**0.5345**		**1,834.500 6**

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	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0671	0.0606	0.8086	1.4600e-003	0.1141	8.8000e-004	0.1150	0.0303	8.1000e-004	0.0311		124.4588	124.4588	6.3700e-003		124.5927
Total	**0.0671**	**0.0606**	**0.8086**	**1.4600e-003**	**0.1141**	**8.8000e-004**	**0.1150**	**0.0303**	**8.1000e-004**	**0.0311**		**124.4588**	**124.4588**	**6.3700e-003**		**124.5927**

4.0 Operational Detail - Mobile

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	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
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	Primary	Diverted	Pass-by
Other Asphalt Surfaces	10.00	5.00	6.50	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.504516	0.068219	0.178179	0.147873	0.044976	0.006346	0.020386	0.015946	0.002304	0.002308	0.006193	0.000574	0.002181

5.0 Energy Detail

Historical Energy Use: N

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	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

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/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	lb/day										lb/day					
Mitigated	2.9570	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272
Unmitigated	2.9570	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272

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	lb/day										lb/day					
Architectural Coating	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5092					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-003	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272
Total	**2.9570**	**1.2000e-004**	**0.0123**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0257**	**0.0257**	**7.0000e-005**		**0.0272**

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	lb/day										lb/day					
Architectural Coating	0.4467					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5092					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-003	1.2000e-004	0.0123	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0257	0.0257	7.0000e-005		0.0272
Total	**2.9570**	**1.2000e-004**	**0.0123**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0257**	**0.0257**	**7.0000e-005**		**0.0272**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Sheldon - Waterman Intersection Improvements

Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	117.25	1000sqft	2.69	117,250.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2016
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	590.31	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Unit amount accounts for improvements to Waterman Road, Sheldon Road, Driveways on Sheldon Road, and intersection based on Figure 3

Construction Phase - Demolition of all existing pavement assumed. No building construction or painting

Demolition -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	220.00
tblProjectCharacteristics	OperationalYear	2014	2016

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					
2015	0.2706	2.6454	1.7755	2.5000e-003	0.0553	0.1634	0.2187	0.0171	0.1508	0.1679	0.0000	231.8731	231.8731	0.0626	0.0000	233.1882
Total	**0.2706**	**2.6454**	**1.7755**	**2.5000e-003**	**0.0553**	**0.1634**	**0.2187**	**0.0171**	**0.1508**	**0.1679**	**0.0000**	**231.8731**	**231.8731**	**0.0626**	**0.0000**	**233.1882**

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					
2015	0.2706	2.6454	1.7755	2.5000e-003	0.0553	0.1634	0.2187	0.0171	0.1508	0.1679	0.0000	231.8728	231.8728	0.0626	0.0000	233.1879
Total	**0.2706**	**2.6454**	**1.7755**	**2.5000e-003**	**0.0553**	**0.1634**	**0.2187**	**0.0171**	**0.1508**	**0.1679**	**0.0000**	**231.8728**	**231.8728**	**0.0626**	**0.0000**	**233.1879**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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	0.5396	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.5396**	**1.0000e-005**	**1.5300e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.9100e-003**	**2.9100e-003**	**1.0000e-005**	**0.0000**	**3.0800e-003**

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	0.5396	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.5396**	**1.0000e-005**	**1.5300e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.9100e-003**	**2.9100e-003**	**1.0000e-005**	**0.0000**	**3.0800e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	1/28/2015	5	20	
2	Site Preparation	Site Preparation	1/29/2015	2/2/2015	5	3	
3	Grading	Grading	2/3/2015	2/10/2015	5	6	
4	Paving	Paving	2/11/2015	12/15/2015	5	220	

Acres of Grading (Site Preparation Phase): 4.5

Acres of Grading (Grading Phase): 3

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Site Preparation	Graders	1	8.00	174	0.41
Paving	Pavers	1	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Paving	Paving Equipment	1	8.00	130	0.36
Site Preparation	Scrapers	1	8.00	361	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	164.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 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					
Fugitive Dust					0.0185	0.0000	0.0185	2.8000e-003	0.0000	2.8000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0307	0.2968	0.2206	2.4000e-004		0.0187	0.0187		0.0175	0.0175	0.0000	22.7618	22.7618	5.7700e-003	0.0000	22.8829
Total	**0.0307**	**0.2968**	**0.2206**	**2.4000e-004**	**0.0185**	**0.0187**	**0.0372**	**2.8000e-003**	**0.0175**	**0.0203**	**0.0000**	**22.7618**	**22.7618**	**5.7700e-003**	**0.0000**	**22.8829**

3.2 Demolition - 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	2.5100e-003	0.0251	0.0315	6.0000e-005	1.3800e-003	3.9000e-004	1.7600e-003	3.8000e-004	3.5000e-004	7.3000e-004	0.0000	5.4665	5.4665	4.0000e-005	0.0000	5.4674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9000e-004	5.8000e-004	6.1100e-003	1.0000e-005	9.5000e-004	1.0000e-005	9.6000e-004	2.5000e-004	1.0000e-005	2.6000e-004	0.0000	0.8845	0.8845	5.0000e-005	0.0000	0.8856
Total	**3.0000e-003**	**0.0257**	**0.0376**	**7.0000e-005**	**2.3300e-003**	**4.0000e-004**	**2.7200e-003**	**6.3000e-004**	**3.6000e-004**	**9.9000e-004**	**0.0000**	**6.3510**	**6.3510**	**9.0000e-005**	**0.0000**	**6.3529**

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					0.0185	0.0000	0.0185	2.8000e-003	0.0000	2.8000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0307	0.2968	0.2206	2.4000e-004		0.0187	0.0187		0.0175	0.0175	0.0000	22.7618	22.7618	5.7700e-003	0.0000	22.8829
Total	**0.0307**	**0.2968**	**0.2206**	**2.4000e-004**	**0.0185**	**0.0187**	**0.0372**	**2.8000e-003**	**0.0175**	**0.0203**	**0.0000**	**22.7618**	**22.7618**	**5.7700e-003**	**0.0000**	**22.8829**

3.2 Demolition - 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	2.5100e-003	0.0251	0.0315	6.0000e-005	1.3800e-003	3.9000e-004	1.7600e-003	3.8000e-004	3.5000e-004	7.3000e-004	0.0000	5.4665	5.4665	4.0000e-005	0.0000	5.4674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9000e-004	5.8000e-004	6.1100e-003	1.0000e-005	9.5000e-004	1.0000e-005	9.6000e-004	2.5000e-004	1.0000e-005	2.6000e-004	0.0000	0.8845	0.8845	5.0000e-005	0.0000	0.8856
Total	**3.0000e-003**	**0.0257**	**0.0376**	**7.0000e-005**	**2.3300e-003**	**4.0000e-004**	**2.7200e-003**	**6.3000e-004**	**3.6000e-004**	**9.9000e-004**	**0.0000**	**6.3510**	**6.3510**	**9.0000e-005**	**0.0000**	**6.3529**

3.3 Site Preparation - 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					
Fugitive Dust					2.3900e-003	0.0000	2.3900e-003	2.6000e-004	0.0000	2.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.2300e-003	0.0487	0.0280	4.0000e-005		2.4000e-003	2.4000e-003		2.2000e-003	2.2000e-003	0.0000	3.4131	3.4131	1.0200e-003	0.0000	3.4345
Total	**4.2300e-003**	**0.0487**	**0.0280**	**4.0000e-005**	**2.3900e-003**	**2.4000e-003**	**4.7900e-003**	**2.6000e-004**	**2.2000e-003**	**2.4600e-003**	**0.0000**	**3.4131**	**3.4131**	**1.0200e-003**	**0.0000**	**3.4345**

3.3 Site Preparation - 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	5.0000e-005	5.6000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0817	0.0817	0.0000	0.0000	0.0817
Total	**5.0000e-005**	**5.0000e-005**	**5.6000e-004**	**0.0000**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0817**	**0.0817**	**0.0000**	**0.0000**	**0.0817**

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					2.3900e-003	0.0000	2.3900e-003	2.6000e-004	0.0000	2.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.2300e-003	0.0487	0.0280	4.0000e-005		2.4000e-003	2.4000e-003		2.2000e-003	2.2000e-003	0.0000	3.4131	3.4131	1.0200e-003	0.0000	3.4345
Total	**4.2300e-003**	**0.0487**	**0.0280**	**4.0000e-005**	**2.3900e-003**	**2.4000e-003**	**4.7900e-003**	**2.6000e-004**	**2.2000e-003**	**2.4600e-003**	**0.0000**	**3.4131**	**3.4131**	**1.0200e-003**	**0.0000**	**3.4345**

3.3 Site Preparation - 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	5.0000e-005	5.6000e-004	0.0000	9.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0817	0.0817	0.0000	0.0000	0.0817
Total	**5.0000e-005**	**5.0000e-005**	**5.6000e-004**	**0.0000**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0817**	**0.0817**	**0.0000**	**0.0000**	**0.0817**

3.4 Grading - 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					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.9000e-003	0.0938	0.0606	6.0000e-005		5.2600e-003	5.2600e-003		4.8400e-003	4.8400e-003	0.0000	5.8897	5.8897	1.7600e-003	0.0000	5.9266
Total	**8.9000e-003**	**0.0938**	**0.0606**	**6.0000e-005**	**0.0197**	**5.2600e-003**	**0.0249**	**0.0101**	**4.8400e-003**	**0.0149**	**0.0000**	**5.8897**	**5.8897**	**1.7600e-003**	**0.0000**	**5.9266**

3.4 Grading - 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-004	1.3000e-004	1.4100e-003	0.0000	2.2000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.2041	0.2041	1.0000e-005	0.0000	0.2044
Total	**1.1000e-004**	**1.3000e-004**	**1.4100e-003**	**0.0000**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.2041**	**0.2041**	**1.0000e-005**	**0.0000**	**0.2044**

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					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.9000e-003	0.0938	0.0606	6.0000e-005		5.2600e-003	5.2600e-003		4.8400e-003	4.8400e-003	0.0000	5.8897	5.8897	1.7600e-003	0.0000	5.9266
Total	**8.9000e-003**	**0.0938**	**0.0606**	**6.0000e-005**	**0.0197**	**5.2600e-003**	**0.0249**	**0.0101**	**4.8400e-003**	**0.0149**	**0.0000**	**5.8897**	**5.8897**	**1.7600e-003**	**0.0000**	**5.9266**

3.4 Grading - 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-004	1.3000e-004	1.4100e-003	0.0000	2.2000e-004	0.0000	2.2000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.2041	0.2041	1.0000e-005	0.0000	0.2044
Total	**1.1000e-004**	**1.3000e-004**	**1.4100e-003**	**0.0000**	**2.2000e-004**	**0.0000**	**2.2000e-004**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**0.0000**	**0.2041**	**0.2041**	**1.0000e-005**	**0.0000**	**0.2044**

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	0.2139	2.1729	1.3492	1.9300e-003		0.1366	0.1366		0.1258	0.1258	0.0000	181.9453	181.9453	0.0533	0.0000	183.0654
Paving	3.5200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.2174**	**2.1729**	**1.3492**	**1.9300e-003**		**0.1366**	**0.1366**		**0.1258**	**0.1258**	**0.0000**	**181.9453**	**181.9453**	**0.0533**	**0.0000**	**183.0654**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.2000e-003	7.4100e-003	0.0775	1.4000e-004	0.0121	1.0000e-004	0.0122	3.2200e-003	9.0000e-005	3.3100e-003	0.0000	11.2264	11.2264	6.4000e-004	0.0000	11.2397
Total	**6.2000e-003**	**7.4100e-003**	**0.0775**	**1.4000e-004**	**0.0121**	**1.0000e-004**	**0.0122**	**3.2200e-003**	**9.0000e-005**	**3.3100e-003**	**0.0000**	**11.2264**	**11.2264**	**6.4000e-004**	**0.0000**	**11.2397**

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	0.2139	2.1728	1.3492	1.9300e-003		0.1366	0.1366		0.1258	0.1258	0.0000	181.9451	181.9451	0.0533	0.0000	183.0652
Paving	3.5200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.2174**	**2.1728**	**1.3492**	**1.9300e-003**		**0.1366**	**0.1366**		**0.1258**	**0.1258**	**0.0000**	**181.9451**	**181.9451**	**0.0533**	**0.0000**	**183.0652**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.2000e-003	7.4100e-003	0.0775	1.4000e-004	0.0121	1.0000e-004	0.0122	3.2200e-003	9.0000e-005	3.3100e-003	0.0000	11.2264	11.2264	6.4000e-004	0.0000	11.2397
Total	**6.2000e-003**	**7.4100e-003**	**0.0775**	**1.4000e-004**	**0.0121**	**1.0000e-004**	**0.0122**	**3.2200e-003**	**9.0000e-005**	**3.3100e-003**	**0.0000**	**11.2264**	**11.2264**	**6.4000e-004**	**0.0000**	**11.2397**

4.0 Operational Detail - Mobile

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
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	Primary	Diverted	Pass-by
Other Asphalt Surfaces	10.00	5.00	6.50	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.504516	0.068219	0.178179	0.147873	0.044976	0.006346	0.020386	0.015946	0.002304	0.002308	0.006193	0.000574	0.002181

5.0 Energy Detail

Historical Energy Use: N

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						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.5396	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003
Unmitigated	0.5396	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003

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	0.0815					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4579					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.5000e-004	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003
Total	**0.5396**	**1.0000e-005**	**1.5300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.9100e-003**	**2.9100e-003**	**1.0000e-005**	**0.0000**	**3.0800e-003**

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	0.0815					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4579					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.5000e-004	1.0000e-005	1.5300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	2.9100e-003	2.9100e-003	1.0000e-005	0.0000	3.0800e-003
Total	**0.5396**	**1.0000e-005**	**1.5300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**2.9100e-003**	**2.9100e-003**	**1.0000e-005**	**0.0000**	**3.0800e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX B – BIOLOGICAL RESOURCES ASSESSMENT

City of Elk Grove
Sheldon-Waterman Intersection Improvement Project
Biological Resources Assessment

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PMC®

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October 2014

Summary of Findings and Conclusions

The City of Elk Grove proposes to realign and improve the existing stop-sign controlled intersection at Sheldon Road and Waterman Road. The Sheldon-Waterman intersection will be realigned to the east and replaced with a roundabout configuration. The increasing population and resulting increases in traffic congestion in the City of Elk Grove and south Sacramento County has precipitated the need for improvements to the Sheldon-Waterman intersection.

The field surveys revealed two man-made swales and thirteen drainage ditch features, as well as suitable habitat for burrowing owls (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), raptors and migratory birds. Impacts to these resources, as a result of project-related activities, would be considered **potentially significant**; however, several mitigation measures are proposed herein, which if implemented would reduce those impacts to a **less than significant** level.

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Chapter 1. Introduction

The purpose of this Biological Resources Assessment (BRA) is to describe the existing biological environment and to review the proposed Sheldon-Waterman Intersection Improvement Project (project) in sufficient detail to determine to what extent the proposed action may affect threatened, endangered, proposed, or candidate species and/or their habitats. This BRA summarizes the effects on biological resources within the biological study area (BSA) for use in the environmental document, and presents technical information upon which later decisions regarding project design may be developed.

1.1. Project Location

The project site is located in the northeast portion of the City of Elk Grove (City), in Sacramento County, California (CA, **Figure 1**). The project is located in Sections 20, 29, 19, and 30 of Township 7 North, Range 6 East, on the Elk Grove, CA US Geological Survey (USGS) 7.5-minute quadrangle (**Figure 2**). More specifically, the BSA is located at the intersection of Sheldon Road and Waterman Road. Along Sheldon Road, the BSA extends from approximately 150 feet west of Briskin Drive to ±800 feet east of the Sheldon-Waterman intersection. Along Waterman Road, the BSA extends approximately 700 feet north and south of its intersection with Sheldon Road.

1.2. Project Description

The City proposes to realign and replace the existing stop-sign controlled intersection at Sheldon Road and Waterman Road (**Figure 3**). The Sheldon-Waterman intersection will be realigned to the east and replaced with a roundabout configuration Existing land uses surrounding the BSA include rural residential and agricultural. Sheldon Road is a two-lane rural roadway that runs east-west, connects Center Parkway with Grant Line Road, and provides access for residential areas. Sheldon Road is ultimately planned as a four-lane arterial in the City's Planning Area boundaries of the General Plan Circulation Element. Waterman Road is a two-lane rural roadway that runs north-south and provides local access to industrial businesses, residential neighborhoods, and agricultural land uses. Waterman Road is also ultimately planned as a four-lane arterial in the City's General Plan Circulation Element. The increasing population and resulting increases in traffic congestion in the City and south Sacramento County has precipitated the need for improvements to the Sheldon-Waterman intersection.

The project would include a single-lane roundabout realigned to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road. Other improvements will include pedestrian-accessible crossings at the intersection (roundabout), drainage improvements, and other incidental features. Realigned portions of Waterman Road may extend about 700 feet north and south of Sheldon Road. Sheldon Road will also be reconfigured from Briskin Drive to Waterman Road. Sheldon Road improvements, including the new roundabout, will extend about 900 feet east of the existing intersection. Realigned driveway access will be provided to adjacent properties on the west side of Waterman Road.

1.3. Biological Study Area

The BSA for this project is defined by the project footprint and temporary construction zone (TCZ) plus a 250-foot buffer off the TCZ east of Waterman Road (**Figure 4**). This boundary was chosen due to the presence of vernal pool features to the east of the project footprint and the fact that the US Fish and Wildlife Service (USFWS) typically considers all vernal pool features within 250 feet of proposed development indirectly affected (USFWS 1996a). The remainder of the project is characterized as urban cover with no potential for vernal pools or special-status species to occur.

1.4. Project Setting

1.4.1. Topography

The ±27.2 acre BSA is located in the Sacramento Valley and is mostly flat with the exception of the area southeast of the intersection, which is characterized by gently rolling topography. The BSA elevation is between 50 and 76 feet above mean sea level (amsl). The elevation east of Waterman Road slopes gently from the northwest to Laguna Creek in the southeast of the project. The elevation along Sheldon Road, west of Waterman Road, is relatively flat, with a slight slope toward Briskin Drive at the far western end of the BSA.

1.4.2. Hydrology

Surface water in the BSA sheetflows into a network of drainage ditches found throughout along the roadways. Most of these ditches flow through culverts into a man-made swale southeast of the intersection (**Figure 5**). This swale flows south, eventually draining into Laguna Creek ±350 feet east of the BSA. From the BSA, Laguna Creek flows south, eventually draining into Morrison Creek ±6.6 linear miles west of the BSA. Morrison Creek flows west, then south, and ultimately connects to the Sacramento River.

1.4.3. Soils

The Natural Resources Conservation Service's (NRCS) Web Soil Survey identifies two soil types in the BSA (**Figure 6**). Each soil type is described below based on the map unit descriptions and hydric soils ratings obtained from the Web Soil Survey. Hydric soils ratings describe the proportion of map units that meet the hydric soils criteria (USDA 2014).

Redding gravelly loam, 0 to 8 percent slopes. This soil type makes up the majority of the BSA. This is a moderately well-drained soil that occurs on the toeslopes of terraces up to elevations of 1,500 feet (457 meters) amsl. The depth to the restrictive feature (duripan) is estimated to be between 28 and 66 inches. This soil type is derived from gravelly alluvium. In addition, over 90 percent of the map units' components meet hydric soil criteria, which results in a **predominantly hydric** rating.

San Joaquin-Durixeralfs complex, 0 to 1 percent slopes. This soil type is associated with the far western end of the project site. This is a well-drained to moderately well-drained soil that occurs on the toeslopes of terraces at elevations ranging from 20 to 500 feet (6 to 152 meters) amsl. The depth to the restrictive feature (duripan) is estimated to be from 20 to more than 80 inches. This soil type is derived from alluvium derived from granite. In addition, roughly 2 percent of the map units' components meet hydric soil criteria, which results in a **predominantly nonhydric** rating.

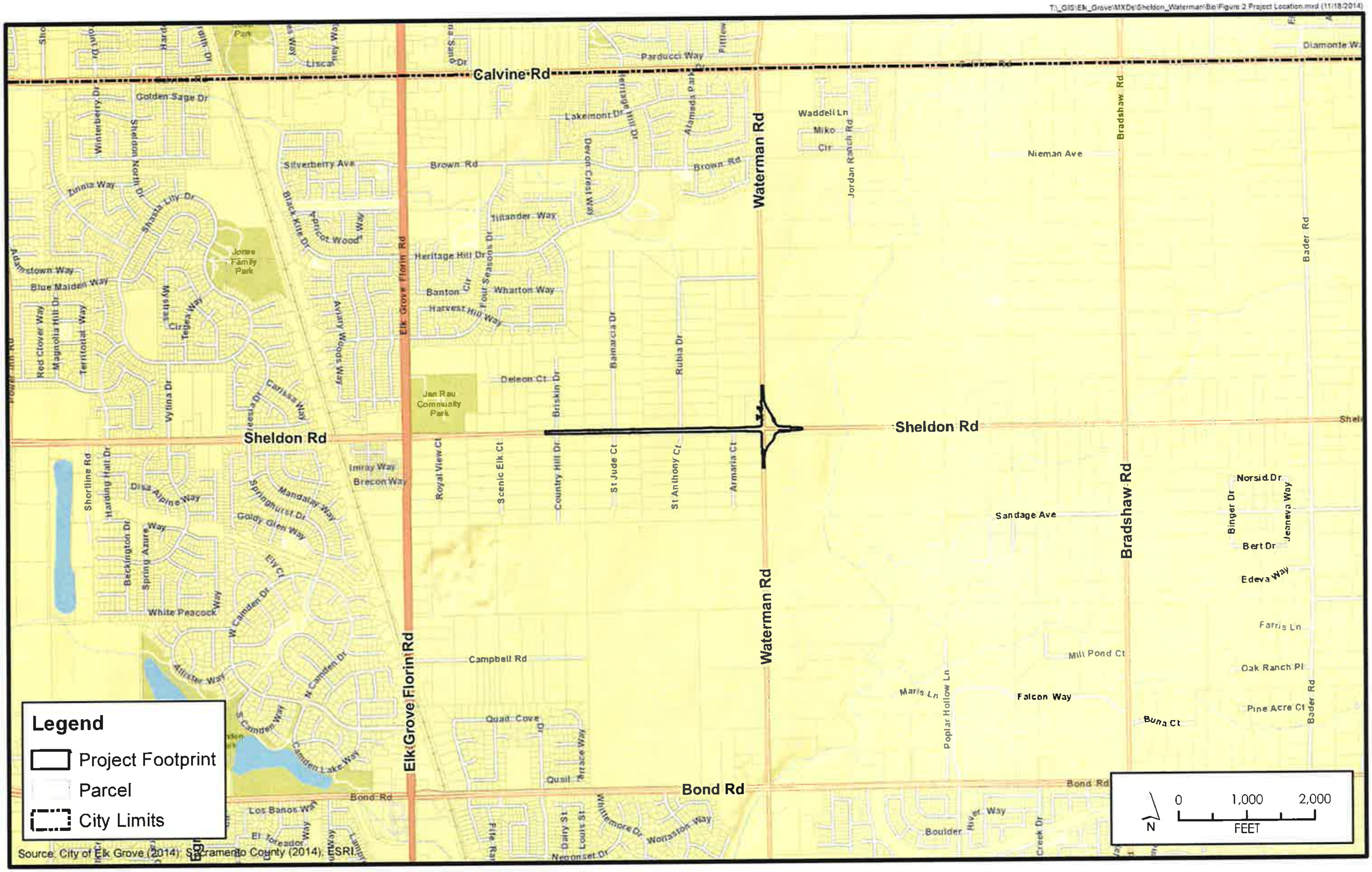
1.4.4. Climate

Local climate data was obtained from the National Oceanic and Atmospheric Administration (NOAA) Online Weather Data (NOAA 2014) for the Clarksburg station. The BSA is characterized by a Mediterranean climate with warm, hot, dry summers and cool, wet, rainy winters. Precipitation that falls as rain ranges from an average high of 3.84 inches in January to a low of 0.01 inches in July, for a total average annual rainfall of 17.37 inches.

City of Elk Grove
Development Services

Figure 1

Regional Vicinity Map



City of Elk Grove
Development Services

Figure 2

Project Location Map

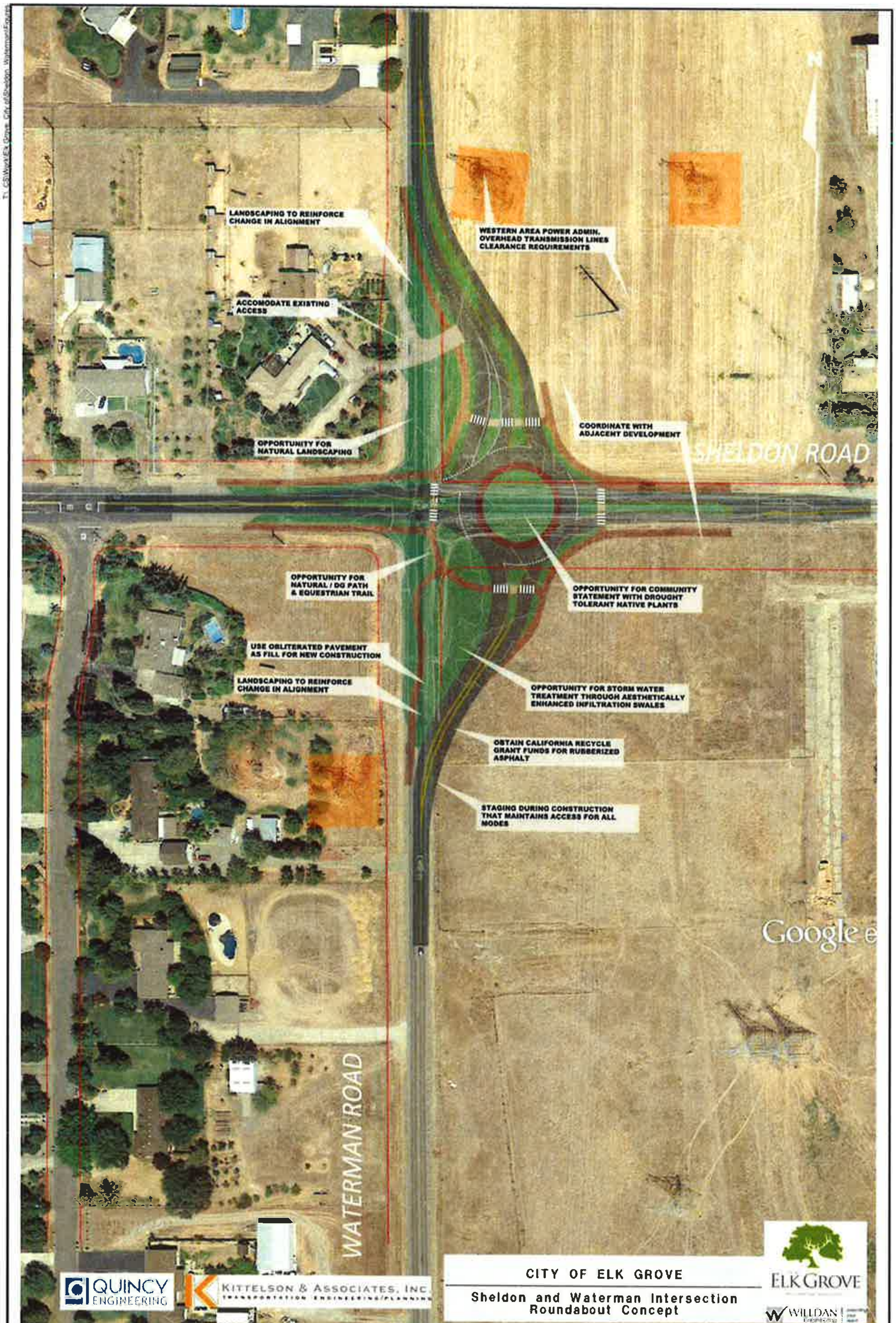


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Figure 3
Project Design

City of Elk Grove
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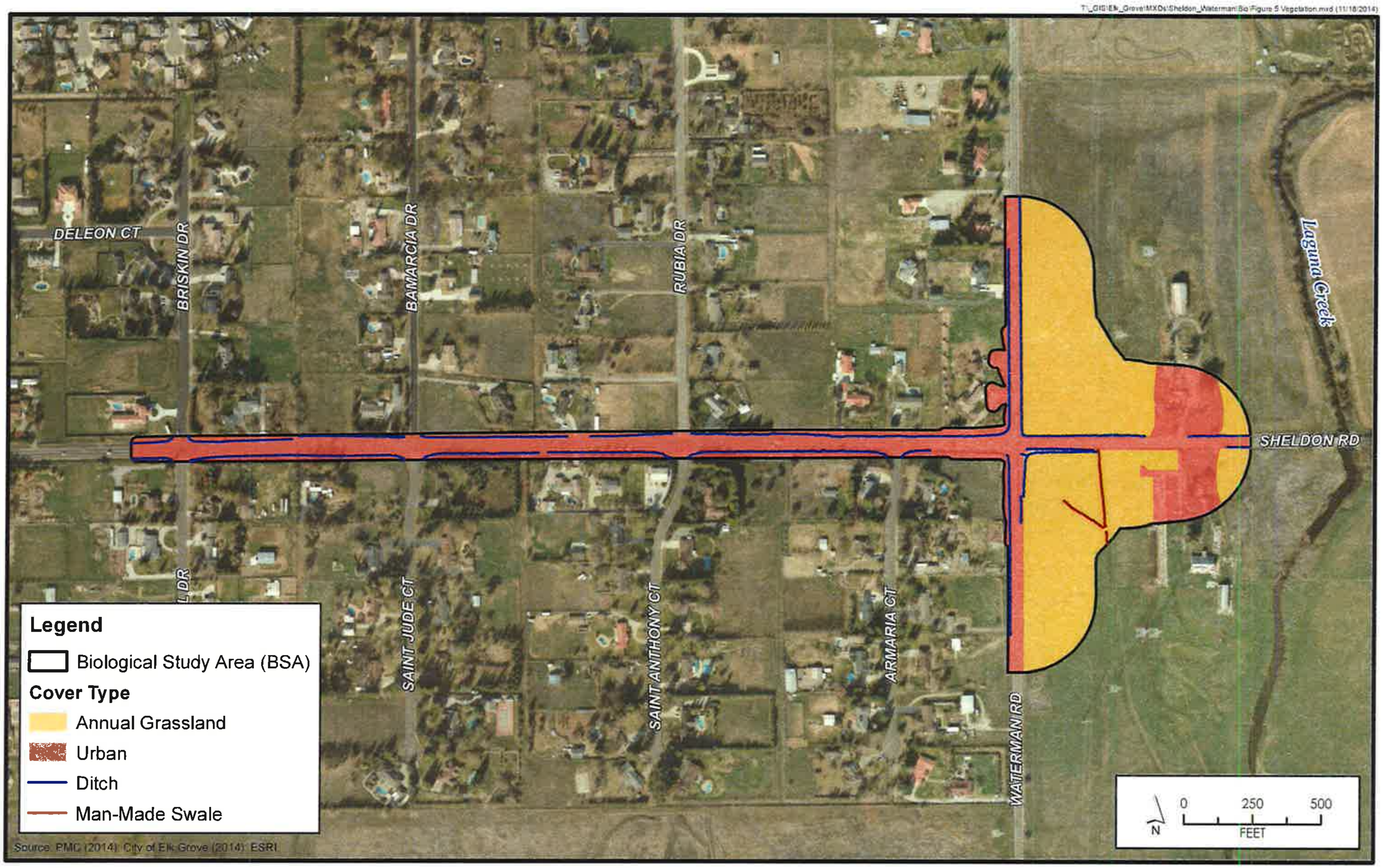
Figure 4

Biological Study Area



City of Elk Grove
Development Services

ELK GROVE

Figure 5

Vegetation and Aquatic Features

T:_GIS\Elk_Grove\MXDs\Sheldon_Waterman\Bio\Figure 6 Soils.mxd (11/18/2014)

City of Elk Grove
Development Services

Figure 6

NRCS Soils Map

Chapter 2. Regulatory Setting

This section identifies the environmental review and consultation requirements, as well as permits and approvals that must be obtained from local, state, and federal agencies before implementation of the proposed project.

2.1. Federal

2.1.1. Endangered Species Act

The Endangered Species Act of 1973 (FESA), as amended, provides protective measures for federally listed threatened and endangered species, including their habitats, from unlawful take (16 United States Code (USC) §1531-1544). FESA defines "take" to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Title 50, Part 222, of the Code of Federal Regulations (50 CFR §222) further defines "harm" to include "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including feeding, spawning, rearing, migrating, feeding, or sheltering."

FESA §7(a)(1) requires federal agencies to utilize their authority to further the conservation of listed species. FESA §7(a)(2) requires consultation with the USFWS and/or the National Marine Fisheries Service (NMFS) if a federal agency undertakes, funds, permits, or authorizes (termed the federal nexus) any action that may affect endangered or threatened species, or designated critical habitat. For projects that may result in the incidental take of threatened or endangered species, or critical habitat, and that lack a federal nexus, a §10(a)(1)(b) incidental take permit can be obtained from the USFWS and/or NMFS.

2.1.2. Clean Water Act

The basis of the Clean Water Act (CWA) was established in 1948; however, it was referred to as the Federal Water Pollution Control Act. The act was reorganized and expanded in 1972 (33 USC §1251), and at this time the CWA became the act's commonly used name. The basis of the CWA is the regulation of pollutant discharges into waters of the US (WoUS), as well as the establishment of surface water quality standards.

2.1.2.1. SECTION 404

CWA §404 (33 USC §1344) established the program to regulate the discharge of dredged or fill material into WoUS, including wetlands. Under this regulation, certain activities proposed within WoUS require the obtainment of a permit prior to initiation. These activities include, but are not limited to, placement of fill for the purposes of development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and bridges), and mining operations.

The primary objective of this program is to ensure that the discharge of dredge or fill material is not permitted if a practicable alternative to the proposed activities exists that results in less impact to WoUS, or the proposed activity would result in significant adverse impacts to WoUS. To comply with these objectives a permittee must document the measures taken to avoid and minimize impacts to WoUS, and provide compensatory mitigation for any unavoidable impacts.

The US Environmental Protection Agency (EPA) and USFWS are assigned roles and responsibilities in the administration of this program; however, the US Army Corps of Engineers (USACE) is the lead agency in the administration of day-to-day activities, including issuance of permits. The agencies will typically assert jurisdiction over the following waters: (1) traditional navigable waters (TNW); (2) wetlands adjacent to TNWs; (3) relatively permanent waters (RPW) that are non-navigable tributaries to TNWs, and have relatively permanent flow or seasonally continuous flow (typically three months); and (4) wetlands that directly abut RPWs. Case-by-case investigations are usually conducted by the agencies to ascertain their jurisdiction over waters that are non-navigable tributaries and do not contain relatively permanent or seasonal flow, wetlands adjacent to the aforementioned features, and wetlands adjacent to but not directly abutting RPWs (USACE 2007). Jurisdiction is not generally asserted over swales or erosional features (e.g., gullies or small washes characterized by low volume/short duration flow events), or ditches constructed wholly within and draining only uplands that do not have relatively permanent flows.

The extent of jurisdiction within WoUS that lack adjacent wetlands is determined by the ordinary high water mark (OHWM). The OHWM is defined in 33 CFR §328.3(e) as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." Wetlands are further defined under 33 CFR §328.3 and 40 CFR §230.3 as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" and typically include "swamps, marshes, bogs, and similar areas." The *1987 Corps Wetland Delineation Manual* (1987 Manual) sets forth a standardized methodology for delineating the extent of wetlands under federal jurisdiction (Environmental Laboratory 1987).

The 1987 Manual outlines three parameters that all wetlands, under normal circumstances, must contain positive indicators for to be considered jurisdictional. These parameters include (1) wetland hydrology, (2) hydrophytic vegetation, and (3) hydric soils (Environmental Laboratory 1987). In 2006 the USACE issued a series of Regional Supplements (Supplement) to address regional differences that are important to the functioning and identification of wetlands. The Supplements present "wetland indicators, delineation guidance, and other information" that is specific to the region. The USACE requires that wetland delineations submitted after June 5, 2007, be conducted in accordance with both the 1987 Manual and applicable Supplement.

2.1.2.2. SECTION 401

Under CWA §401 (33 USC §1341), federal agencies are not authorized to issue a permit and/or license for any activity that may result in discharges to WoUS, unless a state or tribe where the discharge originates either grants or waives CWA §401 certification. CWA §401 provides states or tribes with the ability to grant, grant with conditions, deny, or waive certification. Granting certification, with or without conditions, allows the federal permit/license to be issued and remain consistent with any conditions set forth in the CWA §401 certification. Denial of the certification prohibits the issuance of the federal license or permit, and waiver allows the permit/license to be issued without state or tribal comment. Decisions made by states or tribes are based on the proposed project's compliance with EPA water quality standards as well as applicable effluent limitations guidelines, new source performance standards, toxic pollutant restrictions, and any other appropriate requirements of state or tribal law. In California, the State Water Resources Control Board (SWRCB) is primary regulatory authority for CWA §401 requirements (additional details below).

2.1.3. Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act of 1918 (16 USC §703-711). The Migratory Bird Treaty Act makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR §10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR §21). The majority of birds found in the project vicinity would be protected under the act.

2.2. State

2.2.1. California Endangered Species Act

Under the California Endangered Species Act (CESA), the California Department of Fish and Wildlife (CDFW) has the responsibility for maintaining a list of endangered and threatened species (California Fish and Game Code (FGC) §2070). CDFW also maintains a list of "candidate species," which are species formally noticed as being under review for potential addition to the list of endangered or threatened species, and a list of "species of special concern," which serve as a species "watch lists."

Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present, and determine whether the proposed project will have a potentially significant impact on such species. In addition, CDFW encourages informal consultation on any proposed project that may impact a candidate species.

Project-related impacts to species on the CESA endangered or threatened list would be considered significant. State-listed species are fully protected under the mandates of CESA. Take of protected species incidental to otherwise lawful management activities may be authorized under FGC §206.591. Authorization from CDFW would be in the form of an incidental take permit.

2.2.2. California Fish and Game Code

2.2.2.1. STREAMBED ALTERATION AGREEMENT

State and local public agencies are subject to FGC §1602, which governs construction activities that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated as waters of the state by CDFW. Under FGC §1602, a discretionary Streambed Alteration Agreement must be issued by CDFW to the project proponent prior to the initiation of construction activities within lands under CDFW jurisdiction. As a general rule, this requirement applies to any work undertaken within the 100-year floodplain of a stream or river containing fish or wildlife resources.

2.2.2.2. NATIVE PLANT PROTECTION ACT

The Native Plant Protection Act (FGC §1900-1913) prohibits the taking, possessing, or sale within the state of any plants with a state designation of rare, threatened, or endangered (as defined by CDFW). An exception in the act allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify the CDFW and give that state agency at least 10 days to retrieve the plants before they are plowed under or otherwise destroyed (FGC §1913). Project impacts to these species are not considered significant unless the species are known to have a high potential to occur within the area of disturbance associated with construction of the proposed project.

2.2.2.3. BIRDS OF PREY

Under FGC §3503.5 it is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds of prey), or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.

2.2.2.4. FULLY PROTECTED SPECIES

California statutes also afford "fully protected" status to a number of specifically identified birds, mammals, reptiles, and amphibians. These species cannot be taken, even with an incidental take permit. FGC §3505 makes it unlawful to take "any aigrette or egret, osprey, bird of paradise, goura, numidi, or any part of such a bird." FGC §3511 protects from take the following fully protected birds: (a) American peregrine falcon (*Falco peregrinus anatum*); (b) brown pelican (*Pelecanus occidentalis*); (c) California black rail (*Laterallus jamaicensis coturniculus*); (d) California clapper rail (*Rallus longirostris obsoletus*); (e) California condor (*Gymnogyps californianus*); (f) California least tern (*Sterna albifrons browni*); (g) golden eagle (*Aquila chrysaetos*); (h) greater sandhill crane (*Grus canadensis tabida*); (i) light-footed clapper rail (*Rallus longirostris levipes*); (j) southern bald eagle (*Haliaeetus leucocephalus leucocephalus*); (k) trumpeter swan (*Cygnus buccinator*); (l) white-tailed kite (*Elanus leucurus*); and (m) Yuma clapper rail (*Rallus longirostris yumanensis*).

FGC §4700 identifies the following fully protected mammals that cannot be taken: (a) Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*); (b) bighorn sheep (*Ovis canadensis*), except Nelson bighorn sheep (subspecies *Ovis canadensis nelsoni*); (c) Guadalupe fur seal (*Arctocephalus townsendi*); (d) ring-tailed cat (genus *Bassariscus*); (e) Pacific right whale (*Eubalaena sieboldi*); (f) salt-marsh harvest mouse (*Reithrodontomys raviventris*); (g) southern sea otter (*Enhydra lutris nereis*); and (h) wolverine (*Gulo gulo*).

FGC §5050 protects from take the following fully protected reptiles and amphibians: (a) blunt-nosed leopard lizard (*Crotaphytus wislizenii silus*); (b) San Francisco garter snake (*Thamnophis sirtalis tetrataenia*); (c) Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*); (d) limestone salamander (*Hydromantes brunus*); and (e) black toad (*Bufo boreas exsul*).

FGC §5515 also identifies certain fully protected fish that cannot lawfully be taken even with an incidental take permit: (a) Colorado River squawfish (*Ptychocheilus lucius*); (b) thicktail chub (*Gila crassicauda*); (c) Mohave chub (*Gila mohavensis*); (d) Lost River sucker (*Catostomus luxatus*); (e) Modoc sucker (*Catostomus microps*); (f) shortnose sucker (*Chasmistes brevirostris*); (g) humpback sucker (*Xyrauchen texanus*); (h) Owens River pupfish (*Cyprinoden radiosus*); (i) unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*); and (j) rough sculpin (*Cottus asperrimus*).

2.2.3. California Wetlands and Other Water Policies

The SWRCB and its various departments do not authorize or approve projects that fill or otherwise harm or destroy coastal, estuarine, or inland wetlands. Exceptions may be granted if all of the following conditions are met:

- The project is water-dependent.
- No other feasible alternative is available.
- The public trust is not adversely affected.

Adequate compensation is proposed as part of the project.

2.2.3.1. PORTER-COLOGNE WATER QUALITY CONTROL ACT

Porter-Cologne Water Quality Control Act of 1966 (California Water Code §13000 et seq.; California Code of Regulations Title 23, Chapter 3, Subchapter 15) is the primary state regulation that addresses water quality. The requirements of the act are implemented by the SWRCB at the state level and at the local level by the Regional Water Quality Control Board (RWQCB). The RWQCB carries out planning, permitting, and enforcement activities related to water quality in California. The act provides for waste discharge requirements and a permitting system for discharges to land or water. Certification is required by the RWQCB for activities that can affect water quality.

2.2.3.2. CLEAN WATER ACT, SECTION 401 WATER QUALITY CERTIFICATON

CWA §401 (33 USC §1341) requires that any applicant for a federal license or permit, which may result in a pollutant discharge to WoUS, obtain a certification that the discharge will comply with EPA water quality standards. The state or tribal agency responsible for issuance of the §401 certification may also require compliance with additional effluent limitations and water quality standards set forth in state/tribal laws. In California, the SWRCB is the primary regulatory authority for CWA §401 requirements.

The Central Valley RWQCB is responsible for enforcing water quality criteria and protecting water resources in the project area. In addition, the RWQCB is responsible for controlling discharges to surface waters of the state by issuing waste discharge requirements (WDR), or commonly by issuing conditional waivers to WDRs. The RWQCB requires that a project proponent obtain a CWA §401 water quality certification for CWA §404 permits issued by the USACE. A request for water quality certification (including WDRs) by the RWQCB, and an application for a General Permit for Storm Water Discharges Associated with Construction Activities, are prepared and submitted following completion of the California Environmental Quality Act (CEQA) environmental document, and submittal of the wetland delineation to the USACE.

2.2.3.3. DELEGATED PERMIT AUTHORITY

California has been delegated permit authority for the National Pollutant Discharge Elimination System permit program including stormwater permits for all areas except tribal lands. Issuance of CWA §404 dredge and fill permits remains the responsibility of the USACE; however, the state actively uses its CWA §401 certification authority to ensure CWA §404 permits are in compliance with state water quality standards.

2.2.3.4. STATE DEFINITION OF COVERED WATERS

Under California state law, "waters of the state" means "any surface water or groundwater, including saline waters, within the boundaries of the state." Therefore, water quality laws apply to both surface and groundwater. After the US Supreme Court decision in *Solid Waste Agency* *of Northern Cook County v. US Army Corps of Engineers*, the Office of Chief Counsel of the SWRCB released a legal memorandum confirming the state's jurisdiction over isolated wetlands. The memorandum stated that under the California Porter-Cologne Water Quality Control Act (Porter-Cologne), discharges to wetlands and other waters of the state are subject to state regulation, and this includes isolated wetlands. In general, the SWRCB regulates discharges to isolated waters in much the same way as it does for WoUS, using the Porter-Cologne Act rather than CWA authority.

2.3. Nongovernmental Agency

2.3.1. California Native Plant Society

The California Native Plant Society (CNPS) is a non-governmental agency that classifies native plant species according to current population distribution and threat level, in regard to extinction. These data are utilized by CNPS to create and maintain a list of native California plants that have low numbers or limited distribution, or are otherwise threatened with extinction. This information is published in the *Inventory of Rare and Endangered Plants of California* (CNPS 2014). Potential impacts to populations of CNPS-listed plants receive consideration under CEQA review.

The following identifies the definitions of the CNPS listings:

List 1A: Plants believed to be extinct

List 1B: Plants that are rare, threatened, or endangered in California and elsewhere

List 2B: Plants that are rare, threatened, or endangered in California, but are more numerous elsewhere

All of the plant species on Lists 1 and 2 meet the requirements of the Native Plant Protection Act §1901, Chapter 10, or FGC §2062 and §2067 and are eligible for state listing. Plants appearing on List 1 or 2 are considered to meet the criteria of California Environmental Quality Act (CEQA) §15380, and effects on these species are considered "significant." Plants on List 3 (plants about which we need more information) and/or List 4 (plants of limited distribution), as defined by CNPS, are not currently protected under state or federal law. Therefore, no detailed descriptions or impact analysis was performed on species containing these classifications.

2.4. Local

2.4.1. City of Elk Grove General Plan

The City's General Plan identifies specific goals, objectives, and policies regarding natural resources (City of Elk Grove 2009). The General Plan serves as the overall guiding policy document for land use, development, and environmental quality for the City. The Conservation and Air Quality Elements of the General Plan include goals and policies to preserve, protect, enhance, and promote the City's valuable natural resources. The General Plan identifies specific goals and policies regarding biological and natural resources. The following policies are applicable to the proposed project.

CAQ-9: Wetlands, vernal pools, marshland and riparian (streamside) areas are considered to be important resources. Impacts to these resources shall be avoided whenever technically feasible.

PRO-5: The City views open space lands of all types as an important resource that should be preserved in the region, and supports the establishment of multi-purpose open space areas to address a variety of needs, including, but not limited to:

- Maintenance of agricultural uses
- Wildlife habitat
- Recreational open space
- Aesthetic benefits
- Flood control

To the extent possible, lands protected in accordance with this policy should be in proximity to Elk Grove, to facilitate use of these areas by Elk Grove residents, assist in mitigation of habitat loss within the city, and provide an open space resource close to the urbanized areas of Elk Grove.

2.4.2. City of Elk Grove Swainson's Hawk Impact Mitigation Fees

Chapter 16.130 of the City Municipal Code, Swainson's Hawk Impact Mitigation Fees, requires mitigation for the loss of Swainson's hawk habitat at a 1:1 ratio. Mitigation can be achieved through the payment of a fee, which is used to fund the City's Swainson's hawk habitat restoration program. Other options for achieving mitigation through the code include the direct transfer to the City of a Swainson's hawk habitat conservation easement along with an easement monitoring endowment or the purchase of credits at a CDFW-approved conservation bank. The site must be surveyed to determine whether it is suitable Swainson's hawk foraging habitat.

2.4.3. South Sacramento County Habitat Conservation Plan

The South Sacramento County Habitat Conservation Plan is in the process of being prepared and will address the conservation and development of lands in this portion of the county. The purpose of the plan is to encourage and simplify the process of conserving sensitive habitats for special-status species. Once the plan is approved, it will allow for incidental take of covered species with the requirement of mitigation for lost habitat at approved ratios. Only some of the total listed species analysis that will be included in the plan are complete and include white-tailed kite, northern harrier (*Circus cyaneus*), tricolored blackbird (*Agelaius tricolor*), giant garter snake (*Thamnophis gigas*), vernal pool fairy shrimp (*Branchinecta lynchi*), and Sanford's arrowhead (*Sagittaria sanfordii*). The complete list can be found on the Sacramento County, Planning and Community Development Department website (Sacramento County 2006).

Chapter 3. Study Methods

This section describes the survey methods used to collect data on biological resources on and in the vicinity of the project.

3.1. Studies Required

Pedestrian surveys were conducted across the BSA to assess the biological resources that could be impacted as a result of the proposed project. A habitat assessment was performed to identify the habitat present within the BSA and vicinity. Additionally, a formal evaluation of potentially jurisdictional waters was performed in compliance with USACE guidelines. Biologists reviewed the proposed project design plans and project description, performed literature reviews and database searches, and conducted biological surveys to obtain information regarding habitat quality and the presence of sensitive plant and wildlife species within the BSA.

3.1.1. Literature Review

A list of special-status species and habitats that have the potential to occur within the BSA or in the vicinity was prepared using information provided by the USFWS Sacramento Office's Species Lists (2014a), the USFWS Critical Habitat Portal (2014b), the CDFW's California Natural Diversity Database (CNDDB, 2014a), and the CNPS's Inventory of Rare and Endangered Plants of California (2014).

A search of the USFWS Sacramento Office Species List database was performed for the Elk Grove, Florin, Bruceville, Sloughhouse, Clay, Galt, Buffalo Creek, Sacramento East, and Carmichael, California, USGS 7.5-minute quadrangles to identify special-status species under their jurisdiction that may be affected by the proposed project. In addition, a query of the USFWS Critical Habitat Portal was conducted to identify any designated critical habitat on or in the vicinity of the BSA. CNDDB provided a list of mapped and unprocessed occurrences for special-status species within the quadrangles mentioned above. Lastly, the CNPS database was queried to identify special-status plant species with the potential to occur within the aforementioned USGS quadrangles. Please see **Appendix A** for the raw data returned from the database queries.

3.1.2. Habitat Assessment

A reconnaissance-level survey was conducted by PMC biologists Leslie Parker and Heather White on October 22, 2014. The purpose of this survey was to identify habitat types within the BSA, including potentially sensitive natural communities. Field investigations included a general inspection of the BSA with emphasis on areas having the potential to support special-status species. Data collected during the survey was used to generate a habitat layer for the BSA using ESRI's ArcGIS mapping program. Habitat classifications were assigned using CDFW's *California Wildlife Habitat Relationships System* (2014b).

3.1.3. Jurisdictional Delineation

A preliminary jurisdictional delineation of ditches and reverification of previous delineations was conducted by PMC biologist Leslie Parker concurrently with the habitat assessment on October 22, 2014. These efforts involved the collection of information on OHWM, hydrophytic vegetation, and signs of hydrology at several locations to establish the jurisdictional extent of WoUS within the BSA. All jurisdictional data was collected using a Trimble GeoXH Geoexplorer 6000 series global positioning system and was digitized using ESRI's ArcGIS mapping program. Upon verification by the USACE, the jurisdictional delineation will be valid for five years. The preliminary delineation map is provided in **Appendix B.**

3.1.4. Impact Assessment

The impact assessment is based on the project design plans and information provided in the project description; the biological and regional setting; and on federal, state, and local regulatory requirements regarding impacts to biological resources. In addition, the impact analysis utilized data collected from the literature review, reconnaissance level surveys, habitat mapping, and jurisdictional delineation. When information about the presence of a particular special-status species is unknown, but suitable habitat is present, then the impact analysis takes a conservative approach by inferring presence of special-status species within the BSA until preconstruction or protocol level surveys determine otherwise. Impact acreages are based on preliminary designs and impacts may change as plans become finalized. Impacts to specific biological resources are identified and appropriate avoidance, minimization, compensation, and/or mitigation measures are discussed further in **Chapter 5.**

Chapter 4. Biological Setting

This chapter describes the existing biological conditions of the BSA.

4.1. Vegetative Communities

Vegetative communities are assemblages of plant species that occur in the same area and are defined by species composition and relative abundance. The BSA is characterized by three vegetative communities: urban, annual grassland, and aquatic features (**Figure 5**).

4.1.1. Urban

Urban land uses encompass the entire BSA west of Waterman Road as well as the two residences and associated structures east of Waterman Road. Urban communities are classified as areas that have been heavily modified by humans, including roadways, existing buildings, and structures, as well as recreation fields, lawns, and landscaped vegetation found in residential yards. Because of the high degree of disturbance in these areas, they generally have low habitat value for wildlife; however, migratory birds may find limited nesting and foraging opportunities in trees and shrubs scattered throughout urban areas.

Typically, the species composition in urban areas consists of a mix of native and non-native trees, shrubs, flowers, and turf grass. Common landscaped trees in the BSA include valley oak (*Quercus lobata*), redwoods (*Sequoia sempervirens*), *Eucalyptus* sp., and various pines (*Pinus* spp.) and ornamentals. Wildlife adapted to living in heavily urbanized areas includes common raccoon (*Procyon lator*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), black rat (*Rattus rattus*), American crow (*Corvus brachyrhyncos*), mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), cliff swallow (*Hirundo pyrrhonota*), Northern mockingbird (*Mimus polyglottus*), and common ground dove (*Columbina passerina*).

4.1.2. Annual Grassland

Annual grassland habitats are open grasslands dominated by annual plant species found from the flat plains of the Central Valley to the coastal mountain ranges of Mendocino County, and scattered locations across the southern portion of the state. This community is associated with undeveloped areas east of Waterman Road. In the BSA this community is composed of primarily introduced species and includes Italian ryegrass (*Festuca perennis*), medusa head (*Taeniatherum caput-medusae*), tarweed (*Holocarpha virgata*), Bermuda grass (*Cynodon dactylon*), soft brome (*Bromus hordeaceus*), rat-tail fescue (*Vulpia myuros*), ripgut brome (*Bromus diandrus*), barleys (*Hordeum* spp.), filarees (*Erodium* spp.), yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), black mustard (*Brassica nigra*), chicory (*Cichorium intybus*), wild oat (*Avena fatua*), and native dove weed (*Croton setigerus*).

Annual grasslands provide foraging habitat for a wide variety of wildlife species including raptors, seed-eating birds, small mammals, amphibians, and reptiles. Reptiles likely associated with this habitat type in the BSA include western fence lizard (*Sceloporus occidentalis*) and common garter snake (*Thamnophis sirtalis*). Black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Otospermophilus beecheyi*), western harvest mouse (*Reithrodontomys megalotis*), Botta's pocket gopher (*Thomomys bottae*), and California vole (*Microtus californicus*) are mammals commonly found in this habitat type. Western meadowlarks (*Sturnella neglecta*) may breed in the grassland community in the BSA.

4.1.3. Aquatic Features

Two aquatic classifications occur in the BSA: drainage ditch and man-made swale. Ditch features are characterized by flashy, ephemeral flows of stormwater runoff from roads and adjacent uplands. These waters drain into the man-made swales and eventually into Laguna Creek. Vegetation in the swales in the BSA is different from the surrounding uplands. Dominant species include Mediterranean barley (*Hordeum marinum*), Italian ryegrass, loosestrife (*Lythrum hyssopifolia*), and prostrate knotweed (*Polygonum aviculare*). Vegetation in the ditches is characterized by a mix of upland plants and hydrophytic species similar to those found in swales. Species composition in the ditches is dependent upon hydroperiod.

4.2. Regional Species and Habitats of Concern

4.2.1. Special-Status Natural Communities

Sensitive habitats include areas of special concern to resource agencies, areas protected under CEQA, areas designated as sensitive natural communities by CDFW, areas outlined in Section 1600 of the FGC, areas regulated under Section 404 of the federal CWA, and areas protected under local regulations and policies. Annual grassland is considered a special-status community in the sense that it provides foraging habitat for the state-threatened Swainson's hawk and is protected under Chapter 16.130 of the Elk Grove Municipal Code. No other sensitive natural communities were identified in the BSA.

4.2.1.1. WETLANDS AND OTHER WATERS OF THE US

Jurisdictional WoUS and isolated wetlands provide a variety of functions for plants and wildlife. Wetlands and other water features provide habitat, foraging, cover, migration, and movement corridors for both special-status and common species. In addition to habitat functions, these features provide physical conveyance of surface water flows capable of handling large stormwater events. Large storms can produce extreme flows that cause bank cutting and sedimentation of open waters and streams. Jurisdictional waters can slow these flows and lessen the effects of these large storm events, protecting habitat and other resources.

The jurisdictional delineation identified ±516 linear feet (0.13 acre) of man-made swales and ±9,497 linear feet (0.44 acre) of roadside ditches. This delineation has not been verified by the USACE to date; however, submittal for verification is anticipated. A copy of the preliminary delineation map has been provided in **Appendix B.**

4.2.2. Special-Status Species

Candidate, sensitive, or special-status species are commonly characterized as species that are at potential risk or actual risk to their persistence in a given area or across their native habitat. These species have been identified and assigned a status ranking by governmental agencies such as CDFW and USFWS, and private organizations such as CNPS. The degree to which a species is at risk of extinction is the determining factor in the assignment of a status ranking. Some common threats to a species' or a population's persistence include habitat loss, degradation, and fragmentation, as well as human conflict and intrusion. For the purposes of this BRA, special-status species are defined by the following codes:

- Listed, proposed, or candidates for listing under FESA (50 CFR Section 17.11 – listed; 61 Federal Register Section 7591, February 28, 1996, candidates).
- Listed or proposed for listing under CESA (FGC 1992 Section 2050 et seq.; 14 California Code of Regulations (CCR) Section 670.1 et seq.).
- Designated as Species of Special Concern by CDFW.
- Designated as Fully Protected by CDFW (FGC Sections 3511, 4700, 5050, 5515).
- Species that meet the definition of rare or endangered under CEQA (14 CCR Section 15380), including CNPS List 1 and 2.

The USFWS, CNDDB, and CNPS database queries identified several special-status species with the potential to be impacted by the proposed project. **Figure 7** depicts CNDDB occurrence data within 1 mile of the BSA. **Table 1** provides a summary of all species identified in the database queries, a description of the habitat requirements for each species, and conclusions regarding the potential for each species to be impacted by the proposed project. Only species for which a "may affect" determination was made will be discussed further (**Table 1**).

4.2.2.1. SPECIAL-STATUS PLANTS

No special-status plants were detected during reconnaissance-level surveys and none are expected to occur on-site due to a lack of suitable habitat and the heavily disturbed nature of the site. Additional information regarding the status and potential for special-status plants to be impacted by project-related activities can be found in **Table 1**.

4.2.2.2. SPECIAL-STATUS WILDLIFE

Based on the results of the database queries, three special-status wildlife species have the potential to occur in the BSA. Each species considered in the impact analysis and described below is based on the data obtained from CDFW's *California Wildlife Habitat Relationships System Life History Accounts and Range Maps* (2014c) as well as other published data sources, as cited.

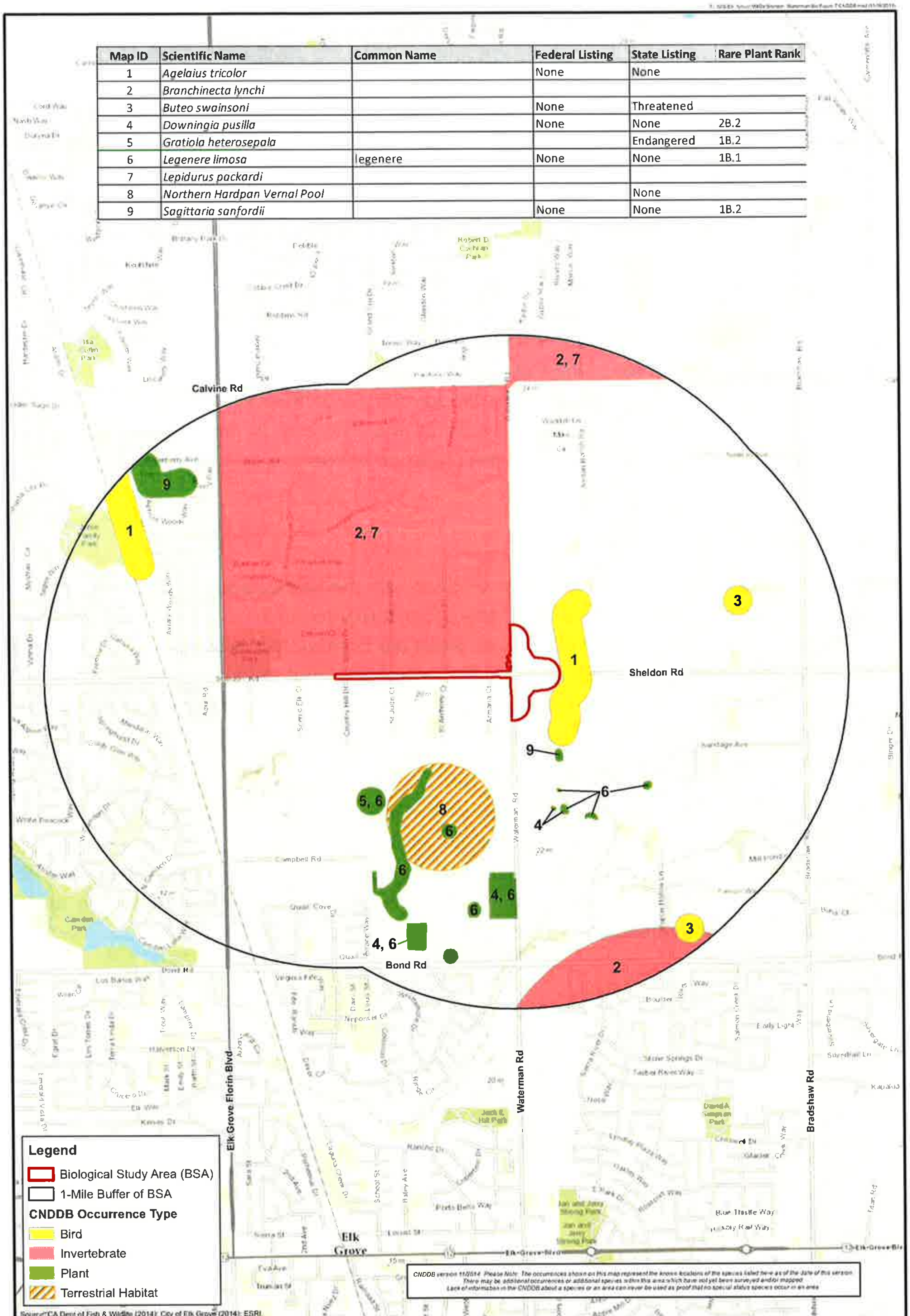
Burrowing Owl (Athene cunicularia)

The burrowing owl is a California species of special concern, and is federally protected under the Migratory Bird and Treaty Act and as a bird of prey under the Raptor Recovery Act. Burrowing owls prefer nesting in mammal burrows in open areas of dry, open, rolling hills, grasslands, fallow fields, sparsely vegetated desert scrub with gullies, washes, arroyos, and along the edges of human-disturbed lands. This species can also be found inhabiting golf courses, airports, cemeteries, vacant lots, and road embankments with friable soils for nesting. The elevation range for this species extends from 200 feet (60 meters) below mean sea level (bmsl) to 12,000 feet (3,636 meters) amsl at the Dana Plateau in Yosemite (Bates 2006).

There are no records of burrowing owls within 1 mile of the BSA; however, there are a total of seven previous occurrences within 5 miles of the BSA (CDFW 2014d). The annual grassland community and disturbed areas in the BSA provide suitable habitat for burrowing owl. This species may occur within the BSA due to the presence of potential suitable habitat and previous occurrences in the vicinity of the BSA.

Swainson's Hawk (Buteo swansoni)

Swainson's hawks are listed by the state of California as threatened. Swainson's hawks are typically complete migrants in that they breed in North America and winter in South America. They typically arrive at their breeding grounds in early to mid-April and begin their southern migration in early September. The majority of breeding Swainson's hawk occurs in two disjunct populations in California—the Great Basin and the Central Valley—although they can be found in desert, shrubsteppe, grassland, and agricultural habitats across the state. This species is not an obligate riparian species; the correlation with riparian habitat is variable and dependant on the availability and distribution of suitable nest sites in proximity to high-value foraging habitat (Woodbridge 1998).



Map ID	Scientific Name	Common Name	Federal Listing	State Listing	Rare Plant Rank
1	*Agelaius tricolor*		None	None	
2	*Branchinecta lynchi*				
3	*Buteo swainsoni*		None	Threatened	
4	*Downingia pusilla*		None	None	2B.2
5	*Gratiola heterosepala*			Endangered	1B.2
6	*Legenere limosa*	legenere	None	None	1B.1
7	*Lepidurus packardi*				
8	*Northern Hardpan Vernal Pool*			None	
9	*Sagittaria sanfordii*		None	None	1B.2

Figure 7
CNDDB Occurrences of Special-Status Species Within 1 Mile of Biological Study Area

PMC

High-value foraging habitat is largely a function of prey abundance and availability. Different crop types support different levels of prey abundance, and the timing of tilling and harvest affects prey availability within each crop type. Alfalfa fields contain low prey abundance, but prey is accessible throughout the growing season due to the low stature of this crop type. Tomato and beet crops support a high prey density, but due to crop heights and density, prey access is limited to harvest periods. Fallow fields along with dry and irrigated pastures also provide important foraging habitat, whereas vineyards, mature orchards, and cotton fields contain low prey abundance and availability (Woodbridge 1998).

There are two records of Swainson's hawks within 1 mile of the BSA, and a total of 39 previous records occur within 5 miles of the PSA (CDFW 2014d). The annual grassland community in the BSA provides suitable foraging habitat for this species. Large trees in the BSA provide potential nesting habitat. This species may occur within the BSA due to the presence of suitable foraging and nesting habitat, as well as the presence of previous occurrences in the vicinity of the BSA.

White-Tailed Kite (Elanus leucurus)

The white-tailed kite can be found in association with the herbaceous and open stages of a variety of habitat types. The white-tailed kite is found year-round in both the coastal zones and lowlands of the Central Valley in California. Nests are constructed near the top of dense oaks (*Quercus spp.*), willows, or other tree stands located adjacent to foraging areas. The species forages in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. White-tailed kites are seldom observed more than 0.5 mile from an active nest during the breeding season (CDFW 2014d).

There are no records of white-tailed kites within 1 mile of the BSA; however, there are three previous occurrences within 5 miles of the BSA (CDFW 2014d). The annual grassland community in the BSA provides suitable foraging habitat, and the trees provide suitable nesting habitat. This species may occur in the BSA due to the presence of potentially suitable nesting and foraging habitat, as well as the presence of nearby occurrences.

Table 1: Special-Status Species in the Project Vicinity

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Plants							
Brasenia schreberi	watershield	-	-	2B.3	Freshwater marshes and swamps. Elev: 98-7,218 ft (30-2,200 m) Blooms: Jun-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Carex comosa	bristly sedge	-	-	2B.1	Marshes, swamps, and lake margins. Elev: 0-2,051 ft (0-625 m) Blooms: May-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Castilleja campestris ssp. succulenta	succulent owl's-clover	FT	SE	1B.1	Acidic vernal pools. Elev: 164-2,461 ft (50-750 m) Blooms: Apr-May (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
	Critical Habitat, succulent owl's-clover	X	-	-		A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Cicuta maculata var. bolanderi	Bolander's water-hemlock	-	-	2B.1	Coastal, fresh or brackish marshes and swamps. Elev: 0-656 ft (0-200 m) Blooms: Jul-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	-	-	2B.2	Freshwater marshes and swamps. Elev: 49-919 ft (15-280 m) Blooms: Jul-Oct (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Downingia pusilla	dwarf downingia	-	-	2B.2	Vernal pools and mesic valley and foothill grasslands. Elev: 3-1,459 ft (1-445 m) Blooms: Mar-May (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present. No vernal pools within BSA. The swales are heavily disturbed, man-made, and not expected to support special-status plants.
Gratiola heterosepala	Boggs Lake hedge-hyssop	-	SE	1B.2	Clay soils in marshes, swamps, lake margins, and vernal pools. Elev: 33-7,792 ft (10-2,375 m) Blooms: Apr-Aug (CNPS 2014).	A	**Not likely to affect.** Suitable soils not present. Entire BSA is composed of gravelly loam (USDA 2014).
Hibiscus lasiocarpus var. occidentalis	woolly rose-mallow	-	-	1B.2	Freshwater marshes and swamps. Elev: 0-394 ft (0-120 m) Blooms: Jun-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Juglans hindsii	Northern California black walnut	-	-	1B.1	Riparian forest/woodland. Elev: 0-1,444 ft (0-440 m) Blooms: Apr-May (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Juncus leiospermus var. ahartii	Ahart's dwarf rush	-	-	1B.2	Mesic valley and foothill grasslands. Elev: 98-751 ft (30-229 m) Blooms: Mar-May (CNPS 2014).	A	**Not likely to affect.** Suitable soils not present. Mapped soil unit within BSA is defined as moderately well drained (USDA 2014).
Lathyrus jepsonii var. jepsonii	Delta tule pea	-	-	1B.2	Freshwater and brackish marshes and swamps. Elev: 0-13 ft (0-4 m) Blooms: May-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Legenere limosa	legenere	-	-	1B.1	Vernal pools. Elev: 3-2,887 ft (1-880 m) Blooms: Apr-Jun (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present. No vernal pools within BSA. The swales are heavily disturbed, man-made, and not expected to support special-status plants.
Lepidium latipes var. heckardii	Heckard's pepper-grass	-	-	1B.2	Alkaline flats in valley and foothill grasslands. Elev: 7-656 ft (2-200 m) Blooms: Mar-May (CNPS 2014).	A	**Not likely to affect.** Alkaline soils not present within BSA (USDA 2014).
Lilaeopsis masonii	Mason's lilaeopsis	-	SR	1B.1	Riparian scrub, and brackish or freshwater marshes and swamps. Elev: 3-33 ft (0-10 m) Blooms: Apr-Nov (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Limosella australis	Delta mudwort	-	-	2B.1	Usually mud banks in riparian scrub, and freshwater or brackish marshes and swamps. Elev: 0-10 ft (0-3 m) Blooms: May-Aug (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Orcuttia tenuis	slender Orcutt grass	FT	SE	1B.1	Vernal pools. Elev: 115-5,774 ft (35-1,760 m) Blooms: May-Oct (CNPS	A	**Not likely to affect.** BSA is below species elevation range.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
	Critical Habitat, slender Orcutt grass	X	-	-	2014).	A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Orcuttia viscida	Sacramento Orcutt grass	FE	SE	1B.1	Vernal pools. Elev: 98-328 ft (30-100 m) Blooms: Apr-Sep (CNPS 2014).	A	**Not likely to affect.** BSA is below species elevation range.
	Critical Habitat, Sacramento Orcutt grass	X	-	-		A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Sagittaria sanfordii	Sanford's arrowhead	-	-	1B.2	Assorted shallow freshwater marshes and swamps. Elev: 0-2,133 ft (0-650 m) Blooms: May-Oct (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Scutellaria galericulata	marsh skullcap	-	-	2B.2	Lower montane coniferous forest, meadows, seeps, marshes, and swamps. Elev: 0-6,890 ft (0-2,100 m) Blooms: Jun-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Scutellaria laterifolia	side-flowering skullcap	-	-	2B.2	Marshes, swamps, mesic meadows and seeps. Elev: 0-1,640 ft (0-500 m) Blooms: Jul-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Trifolium hydrophilum	saline clover	-	-	1B.2	Marshes & swamps, valley & foothill grassland (mesic, alkaline), and vernal pools. Elev: 0-984 ft (0-300 m) Blooms: Apr-Jun (CNPS 2014).	A	**Not likely to affect.** Alkaline soils not present within BSA (USDA 2014).
Invertebrates							
Branchinecta conservatio	conservancy fairy shrimp	FE	-		Vernal pools, often large and turbid pools (USFWS 2005).	A	**Not likely to affect.** Suitable habitat not present.
Branchinecta lynchi	vernal pool fairy shrimp	FT	-		Found only in vernal pools and ephemeral wetlands. Distributed throughout the Central Valley, including Sacramento County (USFWS 2005).	A	**Not likely to affect.** Suitable habitat not present.
	Critical Habitat, vernal pool fairy shrimp	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	-		Dependent on hostplant, elderberry (*Sambucus* spp.), which generally grows in riparian woodlands and upland habitats of the Central Valley. Current distribution in the Central Valley from Shasta County to Fresno County (USFWS 1999).	A	**No effect.** Host plant not present within BSA.
	Critical Habitat, valley elderberry longhorn beetle	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Lepidurus packardi	vernal pool tadpole shrimp	FE	-		Wide variety of ephemeral wetland habitats, including vernal pools. Distributed throughout Central Valley and San Francisco Bay Area (USFWS 2005).	A	**Not likely to affect.** Suitable habitat not present.
	Critical Habitat, vernal pool tadpole shrimp	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Fish							
Acispenser medirostris	green sturgeon	FT	SSC		Entire coast of California. Spawning occurs in Sacramento River and Klamath River (USFWS 1996b). Oceanic waters, bays, and estuaries during non-spawning season. Spawning habitat = deep pools in large, turbulent, freshwater mainstems (NMFS 2005).	A	**No effect.** Suitable habitat not present.
Hypomesus transpacificus	delta smelt	FT	SE		Distribution includes the Sacramento River below Isleton, San Joaquin River below Mossdale, and Suisun Bay. Spawning areas include the Sacramento River below Sacramento, Mokelumne River system, Cache Slough, the Delta, and Montezuma Slough (USFWS 1996b).	A	**No effect.** Suitable habitat not present.
	Critical Habitat, delta smelt	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
Lampetra ayresii	river lamprey	-	SSC		Adults require clean, gravelly riffles in permanent streams for spawning, while the ammocoetes require sandy backwaters or stream edges in which to bury themselves, where water quality is continuously high and temperatures do not exceed 25°C (Moyle et al. 1995).	A	**No effect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Mylopharodon conocephalus	hardhead	-	SSC		Small to large streams in a low to mid-elevation environment. May also inhabit lakes or reservoirs. Their preferred stream temperature might easily exceed 20°C, though these fish do not favor low dissolved oxygen levels. Therefore the hardhead minnow is usually found in clear deep streams with a slow but present flow. Though spawning may occur in pools, runs, or riffles, the bedding area will typically be characterized by gravel and rocky substrate (UC Davis 2014).	A	**No effect.** Suitable habitat not present.
Oncorhynchus mykiss	Central Valley steelhead	FT	-		Spawning habitat = gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning = estuarine, marine waters (Busby et al. 1996).	A	**No effect.** Suitable habitat not present.
	Critical Habitat, Central Valley steelhead	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Oncorhynchus tshawytscha	Central Valley spring-run chinook salmon	FT	ST		Spawning habitat = fast-moving, freshwater streams and rivers. Juvenile habitat = brackish estuaries. Non-spawning = marine waters (Myers et al. 1998).	A	**No effect.** Suitable habitat not present.
	Critical Habitat, Central Valley spring-run chinook salmon	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).
	winter-run chinook salmon, Sacramento River	FE	SE			A	**No effect.** Suitable habitat not present.
	chinook salmon, Central Valley fall/late fall-run ESU	-	SSC			A	**No effect.** Suitable habitat not present.
Pogonichthys macrolepidotus	Sacramento splittail	-	SSC		Prefer slow-moving sections of freshwater rivers and sloughs. Most abundant in Suisun Bay and Marsh region. Largely absent from Sacramento River except during spawning (USFWS 1996b).	A	**No effect.** Suitable habitat not present.
Spirinchus thaleichthys	longfin smelt	FC	ST/SSC		Adults and juveniles require salt or brackish estuary waters. Spawning takes place in freshwater over sandy-gravel substrates, rocks, and aquatic plants (Moyle et al. 1995).	A	**No effect.** Suitable habitat not present.
Amphibians							
Ambystoma californiense	California tiger salamander, central population	FT	ST		Occurs in grasslands of the Central Valley and oak savannah communities in the Central Valley, the Sierra Nevada and Coast ranges, and the San Francisco Bay Area. Needs seasonal or semi-permanent wetlands to reproduce, and terrestrial habitat with active ground squirrel or gopher burrows (Bolster 2010).	A	**Not likely to affect.** Suitable habitat not present. BSA outside known range in Sacramento County (Bolster 2010).
	Critical Habitat, CA tiger salamander, central population	X	-			A	**No effect.** BSA not located within Critical Habitat Unit (USFWS 2014b).

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Rana draytonii	California red-legged frog	FT	SSC		Found mainly near ponds in humid forests, woodlands, grasslands, coastal scrub, and streamsides with plant cover. Most common in lowlands or foothills. Frequently found in woods adjacent to streams. Breeding habitat is in permanent or ephemeral water sources: lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. Ephemeral wetland habitats require animal burrows or other moist refuges for estivation when the wetlands are dry. From sea level to 5,000 ft. (1,525 m.) (Nafis 2014).	A	**Not likely to affect.** Suitable habitat not present. Species mostly extirpated from Central Valley floor (CDFW 2014c).
Spea hammondii	western spadefoot	-	SSC		Open areas with sandy/gravelly soils. Variable habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Rainpools which do not contain bullfrogs, fish, or crayfish are necessary for breeding (Nafis 2014).	P	**Not likely to affect.** Suitable habitat may be present; however, nearest known occurrence of this species is near Sloughhouse, over 7.5 miles northeast of the BSA. Occurrences are clustered around the foothills, with none occurring in the lowlands (CDFW 2014d).

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Reptiles							
Emys marmorata	western pond turtle	-	SSC		Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. May enter brackish water and even seawater. Found at elevations from sea level to over 5,900 ft (1,800 m). (Nafis 2014).	A	**No effect.** Suitable aquatic habitat not present. Hydroperiod of drainage ditches and swales not long enough to provide aquatic habitat. BSA is over 200 feet away from Laguna Creek; thus, no upland habitat is present.
Thamnophis gigas	giant garter snake	FT	ST		Marshes, sloughs, ponds, small lakes, low-gradient streams, irrigation and drainage canals, rice fields and their associated uplands. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November—mid-March). Ranges in the Central Valley from Butte County to Buena Vista Lake in Kern County. Endemic to valley floor wetlands (USFWS 2012).	A	**No effect.** Suitable aquatic habitat not present. Hydroperiod of drainage ditches and swales not long enough to provide aquatic habitat. BSA is over 200 feet away from Laguna Creek; thus, no upland habitat is present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
					Birds		
Agelaius tricolor	tricolored blackbird	-	SSC		Nests in wetlands or in dense vegetation near open water. Dominant nesting substrates: cattails, bulrushes, blackberry, agricultural silage. Nesting substrate must either be flooded, spinous, or in some way defended against predators (Hamilton 2004).	A	**Not likely to affect.** Suitable nesting substrate not present.
Ammodramus savannarum	grasshopper sparrow	-	SSC		In the foothills and lowlands west of the Cascades/Sierras. Dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches (CDFW 2014c)	A	**Not likely to affect.** Suitable habitat not present. Grassland is composed of weedy annual species. Shrubs are absent.
Aquila chrysaetos	golden eagle	-	FP		Uncommon resident and migrant throughout California, except center of Central Valley. Habitat typically rolling foothills, mountain areas, sage-juniper flats, desert (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Athene cunicularia	burrowing owl	-	SSC		Open, flat expanses with short, sparse vegetation and few shrubs, level to gentle topography and well-drained soils. Requires underground burrows or cavities for nesting and roosting. Can use rock cavities, debris piles, pipes and culverts if burrows unavailable. Habitats include grassland, shrub steppe, desert, agricultural land, vacant lots and pastures (CDFW 2014c).	P	**May affect.** Suitable habitat present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Buteo swainsoni	Swainson's hawk	-	ST		Nests in stands with few trees in riparian areas, juniper-sage flats, and oak savannah in the Central Valley. Forages in adjacent grasslands, agricultural fields and pastures (CDFW 2014c).	P	**May affect.** Suitable foraging habitat present.
Chaetura vauxi	Vaux's swift	-	SSC		Prefers redwood and Douglas fir habitats with nest sites in large hollow trees and snags, especially tall, burnt-out stubs (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Circus cyaneus	northern harrier	-	SSC		Nests on the ground in patches of dense, tall vegetation in undisturbed areas. Breeds and forages in variety of open habitats such as marshes, wet meadows, weedy borders of lakes, rivers and streams, grasslands, pastures, croplands, sagebrush flats and desert sinks (Shuford and Gardali 2008). Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas (CDFW 2014c).	A	**Not likely to affect.** Suitable nest ng habitat not present.
Coccyzus americanus occidentalis	western yellow-billed cuckoo	PT	SE		Requires large, dense tracts of riparian woodland with well-developed understories. Occurs in deciduous trees or shrubs. Prefers willow, but will also nest in orchards adjacent to streams in Sacramento Valley. Restricted to moist habitats along slow-moving waterways during breeding season (CDFW 2014c).	A	**No effect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Elanus leucurus	white-tailed kite	-	FP		Typically nests in the upper third of trees that may be 10–160 ft (33-525 m) tall. These can be open-country trees growing in isolation, or at the edge of or within a forest (CDFW 2014c).	P	**May affect.** Suitable foraging and nesting habitat present.
Grus canadensis canadensis	lesser sandhill crane	-	SSC		In summer, occurs in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. In winter, frequents moist croplands with rice or corn stubble, and open, emergent wetlands. Prefers treeless plains. Nests in remote portions of extensive wetlands or sometimes shortgrass prairies (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Grus canadensis tabida	greater sandhill crane	-	ST/FP			A	**No effect.** Suitable habitat not present.
Ixobrychus exilis	least bittern	-	SSC		Large, freshwater wetlands with dense emergent vegetation (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Lanius ludovicianus	loggerhead shrike	-	SSC		Breeds in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground (Shuford and Gardali 2008).	A	**Not likely to affect.** Suitable habitat not present.
Melospiza melodia	song sparrow ("Modesto" population)	-	SSC		Breeds and winters in riparian, fresh or saline emergent wetland, and wet meadows. Breeds in riparian thickets of willows, other shrubs, vines, tall herbs, and fresh or saline emergent vegetation (CDFW 2014c).	A	**Not likely to affect.** Suitable habitat not present.
Progne subis	purple martin	-	SSC		Woodland and forest habitats with numerous suitable nest cavities, open air space above nest sites, and aerial insect prey (Shuford and Gardali 2008).	A	**No effect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Riparia riparia	bank swallow	-	ST		Riparian areas with sandy, vertical bluffs or riverbanks. Also nests in earthen banks and bluffs, as well as sand and gravel pits (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Sternula antillarum browni	California least tern	FE	SE/FP		Nests and roosts in colonies on open beaches; forages near shore ocean waters and in shallow estuaries ad lagoons (USFWS 2006).	A	**No effect.** Suitable habitat not present.
Xanthocephalus xanthocephalus	yellow-headed blackbird	-	SSC		Nests in marshes with tall, emergent vegetation (e.g., tules and cattails) adjacent to deepwater (Shuford and Gardali 2008).	A	**No effect.** Suitable habitat not present.

Mammals							
Lasiurus blossevillii	western red bat	-	SSC		Roosting habitat includes forests and woodlands, often in edge habitats adjacent to streams, fields, or urban areas (CDFW 2014c).	A	**No effect.** Suitable habitat not present.
Taxidea taxus	American badger	-	SSC		Open shrub, forest and herbaceous habitats with friable soils. Associated with treeless regions, prairies, park lands, and cold desert areas. Range includes most of California, except the North Coast (CDFW 2014c).	P	**Not likely to affect.** Suitable habitat may be present; however, closest known occurrences are over 5 miles away and are separated from the BSA by urban sprawl (CDFW 2014d).

Key
Federal & State Status
(FE) Federal Endangered
(FT) Federal Threatened
(FC) Federal Candidate
(X) Designated Critical Habitat
(SE) State Endangered
(ST) State Threatened
(SR) State Rare
(SSC) State Species of Special Concern
(SCE) State Candidate Endangered
(SCT) State Candidate Threatened
CNPS Rare Plant Rank
Rareness Ranks
(1A) Presumed Extinct in California
(1B) Rare, Threatened, or Endangered in California and Elsewhere
(2) Rare, Threatened, or Endangered in California, But More Common Elsewhere
Threat Ranks
(0.1) Seriously threatened in California
(0.2) Fairly threatened in California
(0.3) Not very threatened in California

Chapter 5. Discussion of Impacts and Mitigation

This chapter of the BRA discusses impacts to special-status natural communities and species with the potential to occur in the BSA. Impact acreages are based on preliminary designs and impacts may change as plans become finalized. Potential effects to species are based on the current project design and description; likelihood of each species to occur within the BSA; and each species' biological growth, reproduction, feeding, resting, and cover requirements as appropriate. Each species is discussed, including results of surveys for the species; designated critical habitat for the species within the BSA (if applicable); avoidance and minimization measures proposed to avoid or reduce project-related impacts to the species; expected or potential project-related effects to the species; and cumulative effects to the species when considered with other proposed, completed, or reasonably foreseeable projects in the project vicinity. Project-related effects to plant and wildlife species can be direct, indirect, permanent, temporary, and cumulative. Direct impacts are those caused by the proposed project and occur at the time of project construction or implementation. Indirect effects are those that are caused by the proposed project and are reasonably certain to occur, but occur later in time.

5.1. Standards of Significance

The impact analysis provided below is based on the following CEQA Guidelines Appendix G thresholds of significance:

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 CDFW or USFWS.

2) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFW or USFWS.

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

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.

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

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.

7) Reduce the number or restrict the range of an endangered, rare, or threatened plant or animal species or biotic community, thereby causing the species or community to drop below self-sustaining levels.

5.2. Methodology

The impact assessment below discusses impacts from implementation of project activities. The impact assessment was based on the project description and design plans, information described in the project and biological setting, and the standards of significance described above. In addition, the impact analysis is organized by the significance criteria noted above: special-status plant and wildlife species, sensitive vegetation communities, federally protected wetlands, wildlife movement corridors, and compliance with local plans and policies, or existing habitat conservation plans. Each impact category includes a description of the specific potential impacts as well as avoidance, minimization, and mitigation measures that can potentially reduce and mitigate potentially significant impacts.

5.3. Impacts to Candidate, Sensitive, or Special-Status Species (Standard of Significance 1)

The species or species groups identified below were determined to have the potential to be substantially adversely affected by project-related activities, either directly or through habitat modifications. Impacts to these species would be considered **potentially significant.** However, mitigation measures are presented below to reduce the potential impacts to a **less than significant** level.

5.3.1. Burrowing Owl

Impact BIO-1 Implementation of project-related activities could result in substantial adverse effects, either directly or through habitat modifications, to burrowing owl. These effects would be considered a **potentially significant** impact.

There are seven records of burrowing owl within 5 miles of the BSA (CDFW 2014d). The open grassland communities and disturbed areas in the BSA provide suitable habitat for this species. Due to the proximity of known occurrences and the presence of suitable habitat in the BSA, burrowing owl may be adversely impacted by implementation of project-related activities. In order to reduce potential impacts to a **less than significant** level, implementation of mitigation measure **MM-BIO-1** is recommended.

5.3.1.1. AVOIDANCE AND MINIMIZATION MEASURES

MM-BIO-1 If clearing and construction activities would occur during the nesting period for burrowing owls (February 1–August 31), the City shall retain a qualified biologist to conduct preconstruction surveys in accordance with the CDFW's *Staff Report on Burrowing Owl Mitigation*, published March 7, 2012. Surveys shall be conducted within 14 days prior to ground-breaking activities and shall be repeated if project activities are suspended or delayed for more than 15 days during nesting season.

If no burrowing owls are detected, no further mitigation is required. If active burrowing owl nest sites are detected, the project applicant shall implement the avoidance, minimization, and mitigation methodologies outlined in the CDFW's *Staff Report on Burrowing Owl Mitigation* prior to initiating project-related activities that may impact burrowing owls.

5.3.2. Swainson's Hawk, White-tailed Kite, and Raptors and Migratory Birds

Impact BIO-2 Implementation of project-related activities could result in substantial adverse effects, either directly or through habitat modifications, to migratory birds and raptors, including Swainson's hawk and white-tailed kite. These effects would be considered **potentially significant**.

Two occurrences of Swainson's hawks have been reported within 1 mile of the BSA, and three occurrences of a white-tailed kite have been reported within 5 miles of the BSA. The ±13.4 acres of annual grassland habitat in the BSA provides suitable foraging habitat for these species and other raptor species not identified in **Table 1.** Approximately ±1.6 acres of foraging habitat will be permanently impacted by project-related activities (**Figure 8**).

In addition, trees within and adjacent to the BSA provide suitable nesting habitat for raptors and migratory birds. The BSA provides nesting habitat for migratory birds not identified in **Table 1**. All native breeding birds (except game birds during the hunting season), regardless of their listing status, are protected under the Migratory Bird Treaty Act. As a result, vegetation clearing during the nesting season could result in direct impacts to nesting birds should they be present. Although no trees will be removed as part of the proposed project, noise and other human activity may result in nest abandonment if nesting birds are present within 200 feet (500 feet for raptors) of a project impact area. Due to the presence of suitable habitat for these species, implementation of project-related activities may result in adverse impacts should they be present in areas proposed for disturbance. In order to reduce potential impacts to a **less than significant** level, implementation of mitigation measures **MM-BIO-2a** and **MM-BIO-2b** is recommended.

5.3.2.1. AVOIDANCE AND MINIMIZATION MEASURES

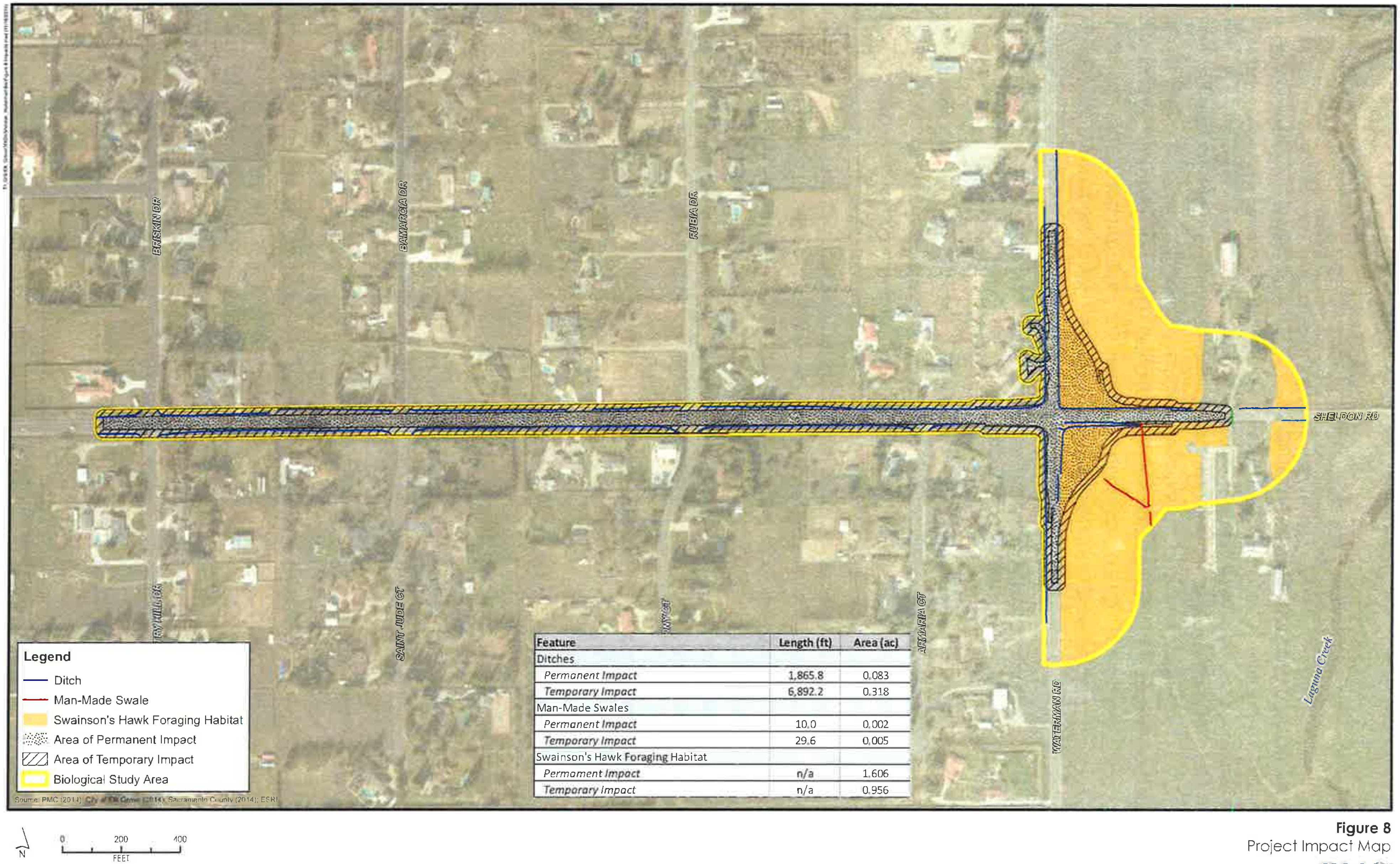
MM-BIO-2a If clearing and/or construction activities would occur during the bird nesting season (January 15–August 15), preconstruction surveys to identify active migratory bird and raptor nests shall be conducted by a qualified biologist within 14 days of construction initiation. Preconstruction surveys must be performed by a qualified biologist for the purposes of determining presence/absence of active nest sites in the project area, and a 200-foot (500-foot for raptors) buffer. If no active nests are found, no further mitigation is required. Surveys shall be repeated if construction activities are delayed or postponed for more than 30 days.

If active nest sites are identified within 200 feet (500 feet for raptors) of project activities, the applicant shall impose an exclusionary buffer for all active nest sites prior to commencement of any project-related activities to avoid construction or access-related disturbances to nesting raptors. An exclusionary buffer constitutes an area where project-related activities (i.e., vegetation removal, earth moving, and construction) will not occur, and shall be imposed within 100 feet (250 feet for raptors) of any active nest sites until the nest is deemed inactive by a qualified biologist. Activities permitted within the exclusionary buffer and the size (i.e., 250 feet) of exclusionary buffers may be adjusted through consultation with CEQA lead agency.

MM-BIO-2b The City shall mitigate for the loss of Swainson's hawk foraging habitat at a 1:1 ratio. Mitigation can be accomplished through the City of Elk Grove Swainson's Hawk Impact Mitigation Fees Ordinance or other method determined acceptable to the CDFW.

5.3.3. Recommended Additional Mitigation Measures

MM-BIO-2c A qualified biologist(s) shall monitor construction activities that could potentially cause significant impacts to sensitive biological resources. In addition, the applicant shall retain a qualified biologist to conduct mandatory contractor/worker awareness training for construction personnel. The awareness training will be provided to all construction personnel to brief them on the identified location of sensitive biological resources, including how to identify species (visual and auditory) most likely to be present, the need to avoid impacts to biological resources (e.g., plants, wildlife, and jurisdictional waters), and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the project, the contractor will ensure that they receive the mandatory training before starting work.



Feature	Length (ft)	Area (ac)
Ditches		
Permanent Impact	1,865.8	0.083
Temporary Impact	6,892.2	0.318
Man-Made Swales		
Permanent Impact	10.0	0.002
Temporary Impact	29.6	0.005
Swainson's Hawk Foraging Habitat		
Permanent Impact	n/a	1.606
Temporary Impact	n/a	0.956

Figure 8
Project Impact Map
PMC

5.4. Impacts to Riparian Habitat or Sensitive Natural Communities (Standard of Significance 2)

Impact BIO-3 Implementation of project-related activities could result in the loss of sensitive natural communities, which would be considered a **potentially significant** impact.

Implementation of project-related activities may result in adverse impacts to sensitive natural communities. The annual grassland community could be considered sensitive as it provides foraging habitat for state-threatened Swainson's hawk. No other sensitive natural communities were documented within the BSA. The ±13.4 acres of annual grassland habitat in the BSA provides suitable foraging habitat for Swainson's hawk. Approximately ±1.6 acres of foraging habitat will be permanently impacted by project-related activities (**Figure 8**). Previous mitigation measure **MM-BIO-2b** will ensure that impacts to Swainson's hawk foraging habitat will be **less than significant**.

5.5. Impacts to Federally Protected Wetlands (Standard of Significance 3)

Impact BIO-4 Implementation of project-related activities could result in the disturbance, degradation, and/or removal of federally protected wetlands, which would be considered a **potentially significant impact**.

A total of ±0.56 acre (10,012 linear feet) of man-made drainage ditches and swales occur in the BSA. A total of ±0.083 acre of roadside ditch and ±0.002 acre of man-made swale is anticipated to be permanently impacted by project-related activities. In addition, ±0.318 acre and of ditch ±0.005 acre of man-made swale occurs within the TCZ and may be temporarily affected by project activities. Therefore, implementation of project activities may result in adverse impacts to federally protected waters should they be present in areas proposed for disturbance. In order to reduce potential impacts to a **less than significant** level, implementation of mitigation measure **MM-BIO-4** is recommended.

MM-BIO-4 **No Net Loss of Federally Protected Waters.** For every acre of roadside ditch and/or man-made swale permanently or temporarily affected by the proposed project, the City shall replace the affected acreage at a minimum 1:1 ratio, or another approved ratio as determined by the USACE. Impacts shall be offset through the restoration and relocation of roadside ditches and/or swales within the project area or through purchase of credits or payment of an in-lieu fee.

5.6. Impacts to the Movement of Native Resident or Migratory Fish or Wildlife Species or within Established Migratory Corridors (Standard of Significance 4)

Implementation of project-related activities is not expected to result in impacts to the movement of native resident or migratory fish or wildlife species or established migratory corridors. As such, there would be **no impact.**

Available data on movement corridors and linkages was accessed via the CDFW BIOS Viewer (2014d). Data reviewed included the Essential Connectivity Areas [ds623] layer and the Missing Linkages in California [ds420] layer. The BSA is not located within an identified corridor. In addition, the majority of the BSA is either developed or has been disturbed by previous and ongoing tilling, grazing, or some other form of disturbance, and while it could occasionally provide opportunity for local wildlife movement, adjacent lands such as Laguna Creek are farther removed from anthropogenic activities and, therefore, offer more optimal movement opportunities. Furthermore, the BSA is abutted by urban uses to the west, which further impair any corridor function. As such, **no impact** is anticipated, and no additional avoidance and minimization measures are proposed.

5.7. Conflict with Local Policies and Ordinances (Standard of Significance 5)

Implementation of the proposed project is not expected to conflict with any local policies or ordinances protecting biological resources. As such, there would be **no impact**.

The proposed project would not conflict with any local policies or ordinances protecting biological resources. No trees will be removed as a result of project-related activities; thus, there will be no conflict with the Elk Grove Tree Protections Ordinance (Chapter 19.12 of the City Municipal Code). In addition, implementation of mitigation measure **MM BIO-2b** will ensure the project's compliance with the Elk Grove Swainson's Hawk Mitigation Fees Ordinance (Chapter 16.130 of the City Municipal Code). As such, **no impact** is anticipated, and no additional avoidance and minimization measures are proposed.

5.8. Conflict with Conservation Plans (Standard of Significance 6)

Implementation of project-related activities would not conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or any adopted biological resources recovery or conservation plan of any federal or state agency. As such, there would be **no impact.**

The proposed project would not 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 BSA is located within the South Sacramento County

Habitat Conservation Plan planning area; however, this plan has not been adopted to date. As a result, the proposed project would not conflict with the plan, and **no impact** is anticipated. No avoidance and minimization measures are proposed.

5.9. Special-Status Species Population Impacts (Standard of Significance 7)

Implementation of project-related activities would not reduce the number or restrict the range of an endangered, rare, or threatened plant or animal species or biotic community, thereby causing the species or community to drop below self-sustaining levels. As such, there would be **no impact**.

Mitigation measures **MM-BIO-1** through **MM-BIO-4** will ensure that the proposed project does not reduce sensitive plant, wildlife, habitats, and/or other biological resources below self-sustaining levels. As such, there would be **no impact**, and no additional avoidance and minimization measures are proposed.

5.10. Cumulative Impacts

5.10.1. Cumulative Setting

The BSA and the surrounding area of Sacramento County as a whole must be considered for the purpose of evaluating land use conversion issues associated with biological resources on a cumulative level. In particular, this cumulative setting condition includes planned development under the current Land Use Element of the Elk Grove General Plan (2009), existing land use conditions, and planned and proposed land uses in communities near the BSA, as well as consideration of development patterns of communities in the rest of Sacramento County. These land uses and developments have the potential to adversely affect the biological resources in the region and could considerably contribute to the cumulative loss of potential habitat in the region.

Two residential development projects are planned in and adjacent to the BSA. The Stonebridge Development will be located southwest of the intersection and is anticipated to be 26 single-family residence lots. This project includes several easements that will act as setbacks for vernal pools, giant garter snake, and Laguna Creek. The other development project, known as Sheldon Park Estates, consists of 45 single-family lots as well as an open space lot. The purpose of the Sheldon-Waterman Intersection Improvement Project is to accommodate an increase in traffic associated with these developments.

The implementation of project-related activities could contribute incrementally to the cumulative loss of native plant communities, wildlife habitat values, special-status species and their potential habitat, and wetland/aquatic resources within the region. On a cumulative level, the change in land uses will contribute to a loss of potential habitat for special-status species including but not limited to burrowing owls, Swainson's hawks, migratory birds, and raptors that currently inhabit the area or could inhabit the area in the future. In addition to potential direct impacts on biological resources from project-related activities, the increased human presence would be anticipated to cause potential indirect impacts. These could disturb breeding and foraging behavior of wildlife, and would result in a significant and unavoidable cumulative impact. The combined effect of all new developments approved or planned in the area would create a significant and unavoidable cumulative impact associated with increased human presence.

5.10.2. Impacts and Mitigation Measures

Impact BIO-5 The proposed project in combination with other reasonably foreseeable projects could result in mortality and loss of habitat for special-status species, wetlands, and WoUS. Therefore, this impact is considered **cumulatively considerable**.

The vegetation communities/habitats within the BSA represent only a small portion of the communities/habitats available for special-status species within the project vicinity. However, implementation of the proposed project may result in degradation of habitat through a variety of actions which, when combined with other habitat impacts occurring from development within surrounding areas, would result in significant cumulative impacts. Future development in the vicinity of the BSA would have an unknown and unquantifiable impact on special-status species, biologically sensitive habitats, and potentially jurisdictional wetlands and WoUS. Furthermore, increased development and disturbance created by human activities could result in direct mortality, habitat loss, and deterioration of habitat suitability. As project-related activities may contribute incrementally to these effects, the impact is considered **cumulatively considerable**.

Implementation of mitigation measures **MM-BIO-1** through **MM-BIO-4** described above will reduce the proposed project's impact and, therefore, result in a **less than cumulatively considerable** contribution to the cumulative impacts by mitigating the project's contribution to impacts to special-status species and sensitive habitats.

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Appendix A – Database Results

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 141001053925

Current as of: October 1, 2014

Quad Lists

Listed Species

Invertebrates

Branchinecta conservatio
- Conservancy fairy shrimp (E)

Branchinecta lynchi
- Critical habitat, vernal pool fairy shrimp (X)
- vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
- Critical habitat, valley elderberry longhorn beetle (X)
- valley elderberry longhorn beetle (T)

Lepidurus packardi
- Critical habitat, vernal pool tadpole shrimp (X)
- vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris
- green sturgeon (T) (NMFS)

Hypomesus transpacificus
- Critical habitat, delta smelt (X)
- delta smelt (T)

Oncorhynchus mykiss
- Central Valley steelhead (T) (NMFS)
- Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
- Central Valley spring-run chinook salmon (T) (NMFS)
- Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
- winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
- California tiger salamander, central population (T)
- Critical habitat, CA tiger salamander, central population (X)

Rana draytonii
- California red-legged frog (T)

Reptiles

Thamnophis gigas
- giant garter snake (T)

Plants

Castilleja campestris ssp. succulenta
- Critical habitat, succulent (=fleshy) owl's-clover (X)
- succulent (=fleshy) owl's-clover (T)

Orcuttia tenuis
- Critical habitat, slender Orcutt grass (X)

slender Orcutt grass (T)

Orcuttia viscida

Critical habitat, Sacramento Orcutt grass (X)
Sacramento Orcutt grass (E)

Quads Containing Listed, Proposed or Candidate Species:

SLOUGHHOUSE (495B)

CLAY (495C)

ELK GROVE (496A)

FLORIN (496B)

BRUCEVILLE (496C)

GALT (496D)

BUFFALO CREEK (511C)

SACRAMENTO EAST (512C)

CARMICHAEL (512D)

County Lists

Sacramento County

Listed Species

Invertebrates

Apodemia mormo langei

Lange's metalmark butterfly (E)

Branchinecta conservatio

Conservancy fairy shrimp (E)

Branchinecta lynchi

Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

Critical habitat, valley elderberry longhorn beetle (X)
valley elderberry longhorn beetle (T)

Elaphrus viridis

delta green ground beetle (T)

Lepidurus packardi

Critical habitat, vernal pool tadpole shrimp (X)
vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)
delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)

Rana draytonii
California red-legged frog (T)

Reptiles

Thamnophis gigas
giant garter snake (T)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Vireo bellii pusillus
Least Bell's vireo (E)

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)

Sylvilagus bachmani riparius
riparian brush rabbit (E)

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Arctostaphylos myrtifolia
Ione manzanita (T)

Calystegia stebbinsii
Stebbins's morning-glory (E)

Castilleja campestris ssp. succulenta
Critical habitat, succulent (=fleshy) owl's-clover (X)
succulent (=fleshy) owl's-clover (T)

Ceanothus roderickii
Pine Hill ceanothus (E)

Cordylanthus mollis ssp. mollis
soft bird's-beak (E)

Cordylanthus palmatus
palmate-bracted bird's-beak (E)

Eriogonum apricum var. apricum
Ione buckwheat (E)

Eriogonum apricum var. prostratum
Irish Hill buckwheat (E)

Erysimum capitatum ssp. angustatum
Contra Costa wallflower (E)
Critical Habitat, Contra Costa wallflower (X)

Fremontodendron californicum ssp. decumbens
Pine Hill flannelbush (E)

Galium californicum ssp. sierrae
El Dorado bedstraw (E)

Lasthenia conjugens
Contra Costa goldfields (E)

Neostapfia colusana
Colusa grass (T)

Oenothera deltoides ssp. howellii
Antioch Dunes evening-primrose (E)
Critical habitat, Antioch Dunes evening-primrose (X)

Orcuttia tenuis
Critical habitat, slender Orcutt grass (X)
slender Orcutt grass (T)

Orcuttia viscida
Critical habitat, Sacramento Orcutt grass (X)
Sacramento Orcutt grass (E)

Senecio layneae
Layne's butterweed (=ragwort) (T)

Sidalcea keckii
Keck's checker-mallow (=checkerbloom) (E)

Candidate Species

Birds

Coccyzus americanus occidentalis
Western yellow-billed cuckoo (C)

Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
Critical Habitat - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 30, 2014.

CNPS California Native Plant Rare and Endangered Plant Inventory

Plant List

24 matches found. *Click on scientific name for details*

Search Criteria

Found in 9 Quads around 38121D3

Scientific Name	Common Name	Family	Lifeform	Rare Plant Rank	State Rank	Global Rank
Brasenia schreberi	watershield	Cabombaceae	perennial rhizomatous herb	2B.3	S2	G5
Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	2B.1	S2	G5
Centromadia parryi ssp. rudis	Parry's rough tarplant	Asteraceae	annual herb	4.2	S3.2	G3T3
Cicuta maculata var. bolanderi	Bolander's water-hemlock	Apiaceae	perennial herb	2B.1	S2	G5T3T4
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Convolvulaceae	annual vine (parasitic)	2B.2	SH	G5T4T5
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	2B.2	S2	GU
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	1B.2	S2	G2
Hesperevax caulescens	hogwallow starfish	Asteraceae	annual herb	4.2	S3.2	G3
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	Malvaceae	perennial rhizomatous herb	1B.2	S2	G5T2
Juglans hindsii	Northern California black walnut	Juglandaceae	perennial deciduous tree	1B.1	S1	G1
Juncus leiospermus var. ahartii	Ahart's dwarf rush	Juncaceae	annual herb	1B.2	S1	G2T1
Lasthenia ferrisiae	Ferris' goldfields	Asteraceae	annual herb	4.2	S3.2	G3
Lathyrus jepsonii var. jepsonii	Delta tule pea	Fabaceae	perennial herb	1B.2	S2	G5T2
Legenere limosa	legenere	Campanulaceae	annual herb	1B.1	S2	G2
Lepidium latipes var. heckardii	Heckard's pepper-grass	Brassicaceae	annual herb	1B.2	S2	G4T2
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	1B.1	S2	G2
Limosella australis	Delta mudwort	Scrophulariaceae	perennial stoloniferous herb	2B.1	S2	G4G5
Navarretia eriocephala	hoary navarretia	Polemoniaceae	annual herb	4.3	S3.3	G3
Orcuttia tenuis	slender Orcutt grass	Poaceae	annual herb	1B.1	S2	G2
Orcuttia viscida	Sacramento Orcutt grass	Poaceae	annual herb	1B.1	S1	G1
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae		1B.2	S3	G3

			perennial rhizomatous herb			
Scutellaria galericulata	marsh skullcap	Lamiaceae	perennial rhizomatous herb	2B.2	S2	G5
Scutellaria lateriflora	side-flowering skullcap	Lamiaceae	perennial rhizomatous herb	2B.2	S1	G5
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	1B.2	S2	G2

Suggested Citation

CNPS, Rare Plant Program. 2014. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 01 October 2014].

CNDDB 9-Quad Species List 274 records.

Element Type	Scientific Name	Common Name	Element Code	Federal Status	State Status	CDFW Status	CA Rare Plant Rank	Quad Code	Quad Name	Data Status	Taxonomic Sort
Animals - Amphibians	Ambystoma californiense	California tiger salamander	AAAAA01180	Threatened	Threatened	SSC	-	3812132	Clay	Mapped and Unprocessed	Animals - Amphibians - Ambystomatidae - Ambystoma californiense
Animals - Amphibians	Ambystoma californiense	California tiger salamander	AAAAA01180	Threatened	Threatened	SSC	-	3812133	Galt	Mapped and Unprocessed	Animals - Amphibians - Ambystomatidae - Ambystoma californiense
Animals - Amphibians	Ambystoma californiense	California tiger salamander	AAAAA01180	Threatened	Threatened	SSC	-	3812142	Sloughhouse	Unprocessed	Animals - Amphibians - Ambystomatidae - Ambystoma californiense
Animals - Amphibians	Spea hammondii	western spadefoot	AAABF02020	None	None	SSC	-	3812142	Sloughhouse	Mapped	Animals - Amphibians - Scaphiopodidae - Spea hammondii
Animals - Amphibians	Spea hammondii	western spadefoot	AAABF02020	None	None	SSC	-	3812152	Buffalo Creek	Mapped	Animals - Amphibians - Scaphiopodidae - Spea hammondii
Animals - Amphibians	Spea hammondii	western spadefoot	AAABF02020	None	None	SSC	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Amphibians - Scaphiopodidae - Spea hammondii
Animals - Birds	Accipiter cooperii	Cooper's hawk	ABNKC12040	None	None	WL	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Accipitridae - Accipiter cooperii
Animals - Birds	Accipiter cooperii	Cooper's hawk	ABNKC12040	None	None	WL	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Birds - Accipitridae - Accipiter cooperii
Animals - Birds	Accipiter cooperii	Cooper's hawk	ABNKC12040	None	None	WL	-	3812154	Sacramento East	Mapped	Animals - Birds - Accipitridae - Accipiter cooperii
Animals - Birds	Accipiter cooperii	Cooper's hawk	ABNKC12040	None	None	WL	-	3812143	Elk Grove	Mapped	Animals - Birds - Accipitridae - Accipiter cooperii
Animals - Birds	Accipiter cooperii	Cooper's hawk	ABNKC12040	None	None	WL	-	3812144	Florin	Mapped	Animals - Birds - Accipitridae - Accipiter cooperii
Animals - Birds	Aquila chrysaetos	golden eagle	ABNKC22010	None	None	FP , WL	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Accipitridae - Aquila chrysaetos
Animals - Birds	Aquila chrysaetos	golden eagle	ABNKC22010	None	None	FP , WL	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Accipitridae - Aquila chrysaetos
Animals - Birds	Buteo regalis	ferruginous hawk	ABNKC19120	None	None	WL	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Accipitridae - Buteo regalis
Animals - Birds	Buteo regalis	ferruginous hawk	ABNKC19120	None	None	WL	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Accipitridae - Buteo regalis
Animals - Birds	Buteo regalis	ferruginous hawk	ABNKC19120	None	None	WL	-	3812144	Florin	Mapped	Animals - Birds - Accipitridae - Buteo regalis
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812144	Florin	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812143	Elk Grove	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812142	Sloughhouse	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812132	Clay	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni

Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812133	Galt	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812134	Bruceville	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Buteo swainsoni	Swainson's hawk	ABNKC19070	None	Threatened	-	-	3812154	Sacramento East	Mapped	Animals - Birds - Accipitridae - Buteo swainsoni
Animals - Birds	Circus cyaneus	northern harrier	ABNKC11010	None	None	SSC	-	3812153	Carmichael	Unprocessed	Animals - Birds - Accipitridae - Circus cyaneus
Animals - Birds	Circus cyaneus	northern harrier	ABNKC11010	None	None	SSC	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Accipitridae - Circus cyaneus
Animals - Birds	Circus cyaneus	northern harrier	ABNKC11010	None	None	SSC	-	3812142	Sloughhouse	Unprocessed	Animals - Birds - Accipitridae - Circus cyaneus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812143	Elk Grove	Mapped	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812142	Sloughhouse	Mapped	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812134	Bruceville	Unprocessed	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812133	Galt	Mapped	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Elanus leucurus	white-tailed kite	ABNKC06010	None	None	FP	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Birds - Accipitridae - Elanus leucurus
Animals - Birds	Pandion haliaetus	osprey	ABNKC01010	None	None	WL	-	3812153	Carmichael	Unprocessed	Animals - Birds - Accipitridae - Pandion haliaetus
Animals - Birds	Pandion haliaetus	osprey	ABNKC01010	None	None	WL	-	3812134	Bruceville	Unprocessed	Animals - Birds - Accipitridae - Pandion haliaetus
Animals - Birds	Chaetura vauxi	Vaux's swift	ABNUA03020	None	None	SSC	-	3812153	Carmichael	Unprocessed	Animals - Birds - Apodidae - Chaetura vauxi
Animals - Birds	Ardea alba	great egret	ABNGA04040	None	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Ardeidae - Ardea alba
Animals - Birds	Ardea alba	great egret	ABNGA04040	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Birds - Ardeidae - Ardea alba
Animals - Birds	Ardea alba	great egret	ABNGA04040	None	None	-	-	3812133	Galt	Mapped and Unprocessed	Animals - Birds - Ardeidae - Ardea alba
Animals - Birds	Ardea alba	great egret	ABNGA04040	None	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Ardeidae - Ardea alba
Animals - Birds	Ardea herodias	great blue heron	ABNGA04010	None	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Ardeidae - Ardea herodias

Animals - Birds	Ardea herodias	great blue heron	ABNGA04010	None	None	-	-	3812133	Galt	Mapped	Animals - Birds - Ardeidae - Ardea herodias
Animals - Birds	Ardea herodias	great blue heron	ABNGA04010	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Birds - Ardeidae - Ardea herodias
Animals - Birds	Ardea herodias	great blue heron	ABNGA04010	None	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Ardeidae - Ardea herodias
Animals - Birds	Ardea herodias	great blue heron	ABNGA04010	None	None	-	-	3812154	Sacramento East	Mapped	Animals - Birds - Ardeidae - Ardea herodias
Animals - Birds	Botaurus lentiginosus	American bittern	ABNGA01020	None	None	-	-	3812144	Florin	Unprocessed	Animals - Birds - Ardeidae - Botaurus lentiginosus
Animals - Birds	Egretta thula	snowy egret	ABNGA06030	None	None	-	-	3812144	Florin	Unprocessed	Animals - Birds - Ardeidae - Egretta thula
Animals - Birds	Egretta thula	snowy egret	ABNGA06030	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Birds - Ardeidae - Egretta thula
Animals - Birds	Ixobrychus exilis	least bittern	ABNGA02010	None	None	SSC	-	3812144	Florin	Unprocessed	Animals - Birds - Ardeidae - Ixobrychus exilis
Animals - Birds	Nycticorax nycticorax	black-crowned night heron	ABNGA11010	None	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Ardeidae - Nycticorax nycticorax
Animals - Birds	Nycticorax nycticorax	black-crowned night heron	ABNGA11010	None	None	-	-	3812133	Galt	Mapped	Animals - Birds - Ardeidae - Nycticorax nycticorax
Animals - Birds	Cardinalis cardinalis	northern cardinal	ABPBX60010	None	None	WL	-	3812133	Galt	Unprocessed	Animals - Birds - Cardinalidae - Cardinalis cardinalis
Animals - Birds	Pica nuttalli	yellow-billed magpie	ABPAV09020	None	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Birds - Corvidae - Pica nuttalli
Animals - Birds	Coccyzus americanus occidentalis	western yellow-billed cuckoo	ABNRB02022	Proposed Threatened	Endangered	-	-	3812134	Bruceville	Unprocessed	Animals - Birds - Cuculidae - Coccyzus americanus occidentalis
Animals - Birds	Ammodramus savannarum	grasshopper sparrow	ABPBXA0020	None	None	SSC	-	3812134	Bruceville	Unprocessed	Animals - Birds - Emberizidae - Ammodramus savannarum
Animals - Birds	Ammodramus savannarum	grasshopper sparrow	ABPBXA0020	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Birds - Emberizidae - Ammodramus savannarum
Animals - Birds	Ammodramus savannarum	grasshopper sparrow	ABPBXA0020	None	None	SSC	-	3812144	Florin	Unprocessed	Animals - Birds - Emberizidae - Ammodramus savannarum
Animals - Birds	Chondestes grammacus	lark sparrow	ABPBX96010	None	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Birds - Emberizidae - Chondestes grammacus
Animals - Birds	Melospiza melodia	song sparrow (-inModesto-in population)	ABPBXA3010	None	None	SSC	-	3812154	Sacramento East	Mapped	Animals - Birds - Emberizidae - Melospiza melodia
Animals - Birds	Melospiza melodia	song sparrow (-inModesto-in population)	ABPBXA3010	None	None	SSC	-	3812144	Florin	Mapped	Animals - Birds - Emberizidae - Melospiza melodia
Animals - Birds	Melospiza melodia	song sparrow (-inModesto-in population)	ABPBXA3010	None	None	SSC	-	3812134	Bruceville	Mapped	Animals - Birds - Emberizidae - Melospiza melodia
Animals - Birds	Spizella breweri	Brewer's sparrow	ABPBX94040	None	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Birds - Emberizidae - Spizella breweri

Animals - Birds	Falco columbarius	merlin	ABNKD06030	None	None	WL	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Falconidae - Falco columbarius
Animals - Birds	Falco columbarius	merlin	ABNKD06030	None	None	WL	-	3812144	Florin	Mapped	Animals - Birds - Falconidae - Falco columbarius
Animals - Birds	Falco mexicanus	prairie falcon	ABNKD06090	None	None	WL	-	3812154	Sacramento East	Unprocessed	Animals - Birds - Falconidae - Falco mexicanus
Animals - Birds	Spinus lawrencei	Lawrence's goldfinch	ABPBY06100	None	None	-	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Fringillidae - Spinus lawrencei
Animals - Birds	Grus canadensis canadensis	lesser sandhill crane	ABNMK01011	None	None	SSC	-	3812134	Bruceville	Unprocessed	Animals - Birds - Gruidae - Grus canadensis canadensis
Animals - Birds	Grus canadensis tabida	greater sandhill crane	ABNMK01014	None	Threatened	FP	-	3812134	Bruceville	Unprocessed	Animals - Birds - Gruidae - Grus canadensis tabida
Animals - Birds	Grus canadensis tabida	greater sandhill crane	ABNMK01014	None	Threatened	FP	-	3812144	Florin	Unprocessed	Animals - Birds - Gruidae - Grus canadensis tabida
Animals - Birds	Progne subis	purple martin	ABPAU01010	None	None	SSC	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Birds - Hirundinidae - Progne subis
Animals - Birds	Riparia riparia	bank swallow	ABPAU08010	None	Threatened	-	-	3812154	Sacramento East	Mapped	Animals - Birds - Hirundinidae - Riparia riparia
Animals - Birds	Riparia riparia	bank swallow	ABPAU08010	None	Threatened	-	-	3812153	Carmichael	Mapped	Animals - Birds - Hirundinidae - Riparia riparia
Animals - Birds	Riparia riparia	bank swallow	ABPAU08010	None	Threatened	-	-	3812142	Sloughhouse	Mapped and Unprocessed	Animals - Birds - Hirundinidae - Riparia riparia
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812142	Sloughhouse	Mapped	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812143	Elk Grove	Mapped	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812134	Bruceville	Mapped and Unprocessed	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812133	Galt	Mapped and Unprocessed	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812132	Clay	Mapped	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Agelaius tricolor	tricolored blackbird	ABPBXB0020	None	None	SSC	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Icteridae - Agelaius tricolor
Animals - Birds	Xanthocephalus xanthocephalus	yellow-headed blackbird	ABPBXB3010	None	None	SSC	-	3812144	Florin	Mapped	Animals - Birds - Icteridae - Xanthocephalus xanthocephalus
Animals - Birds	Lanius ludovicianus	loggerhead shrike	ABPBR01030	None	None	SSC	-	3812144	Florin	Unprocessed	Animals - Birds - Laniidae - Lanius ludovicianus
Animals - Birds	Lanius ludovicianus	loggerhead shrike	ABPBR01030	None	None	SSC	-	3812153	Carmichael	Unprocessed	Animals - Birds - Laniidae - Lanius ludovicianus
Animals - Birds	Lanius ludovicianus	loggerhead shrike	ABPBR01030	None	None	SSC	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Laniidae - Lanius ludovicianus
Animals - Birds	Lanius ludovicianus	loggerhead shrike	ABPBR01030	None	None	SSC	-	3812134	Bruceville	Unprocessed	Animals - Birds - Laniidae - Lanius ludovicianus

Animals - Birds	Sternula antillarum browni	California least tern	ABNNM08103	Endangered	Endangered	FP	-	3812144	Florin	Unprocessed	Animals - Birds - Laridae - Sternula antillarum browni
Animals - Birds	Baeolophus inornatus	oak titmouse	ABPAW01100	None	None	-	-	3812144	Florin	Unprocessed	Animals - Birds - Paridae - Baeolophus inornatus
Animals - Birds	Setophaga occidentalis	hermit warbler	ABPBX03090	None	None	-	-	3812133	Galt	Unprocessed	Animals - Birds - Parulidae - Setophaga occidentalis
Animals - Birds	Phalacrocorax auritus	double-crested cormorant	ABNFD01020	None	None	WL	-	3812134	Bruceville	Unprocessed	Animals - Birds - Phalacrocoracidae - Phalacrocorax auritus
Animals - Birds	Phalacrocorax auritus	double-crested cormorant	ABNFD01020	None	None	WL	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Phalacrocoracidae - Phalacrocorax auritus
Animals - Birds	Picoides nuttallii	Nuttall's woodpecker	ABNYF07020	None	None	-	-	3812144	Florin	Unprocessed	Animals - Birds - Picidae - Picoides nuttallii
Animals - Birds	Picoides nuttallii	Nuttall's woodpecker	ABNYF07020	None	None	-	-	3812152	Buffalo Creek	Unprocessed	Animals - Birds - Picidae - Picoides nuttallii
Animals - Birds	Picoides nuttallii	Nuttall's woodpecker	ABNYF07020	None	None	-	-	3812153	Carmichael	Unprocessed	Animals - Birds - Picidae - Picoides nuttallii
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812144	Florin	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812143	Elk Grove	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812142	Sloughhouse	Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812133	Galt	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812132	Clay	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Birds	Athene cunicularia	burrowing owl	ABNSB10010	None	None	SSC	-	3812134	Bruceville	Mapped and Unprocessed	Animals - Birds - Strigidae - Athene cunicularia
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812134	Bruceville	Mapped	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812132	Clay	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812133	Galt	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812142	Sloughhouse	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi

Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812143	Elk Grove	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta lynchi	vernal pool fairy shrimp	ICBRA03030	Threatened	None	-	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta lynchi
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812144	Florin	Mapped	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812143	Elk Grove	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812142	Sloughhouse	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812133	Galt	Mapped	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Branchinecta mesovallensis	midvalley fairy shrimp	ICBRA03150	None	None	-	-	3812132	Clay	Mapped and Unprocessed	Animals - Crustaceans - Branchinectidae - Branchinecta mesovallensis
Animals - Crustaceans	Dumontia oregonensis	hairy water flea	ICBRA23010	None	None	-	-	3812153	Carmichael	Mapped	Animals - Crustaceans - Dumontiidae - Dumontia oregonensis
Animals - Crustaceans	Dumontia oregonensis	hairy water flea	ICBRA23010	None	None	-	-	3812152	Buffalo Creek	Mapped	Animals - Crustaceans - Dumontiidae - Dumontia oregonensis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis

Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812132	Clay	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812133	Galt	Mapped	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812134	Bruceville	Mapped	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812142	Sloughhouse	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Linderiella occidentalis	California linderiella	ICBRA06010	None	None	-	-	3812143	Elk Grove	Mapped and Unprocessed	Animals - Crustaceans - Linderiellidae - Linderiella occidentalis
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812143	Elk Grove	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812142	Sloughhouse	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812134	Bruceville	Mapped	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812133	Galt	Mapped	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812132	Clay	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi

Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812144	Florin	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Crustaceans	Lepidurus packardi	vernal pool tadpole shrimp	ICBRA10010	Endangered	None	-	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Crustaceans - Triopsidae - Lepidurus packardi
Animals - Fish	Lavinia exilicauda exilicauda	Central Valley hitch	AFCJB19012	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Fish - Cyprinidae - Lavinia exilicauda exilicauda
Animals - Fish	Mylopharodon conocephalus	hardhead	AFCJB25010	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Cyprinidae - Mylopharodon conocephalus
Animals - Fish	Pogonichthys macrolepidotus	Sacramento splittail	AFCJB34020	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Cyprinidae - Pogonichthys macrolepidotus
Animals - Fish	Pogonichthys macrolepidotus	Sacramento splittail	AFCJB34020	None	None	SSC	-	3812144	Florin	Mapped	Animals - Fish - Cyprinidae - Pogonichthys macrolepidotus
Animals - Fish	Pogonichthys macrolepidotus	Sacramento splittail	AFCJB34020	None	None	SSC	-	3812134	Bruceville	Unprocessed	Animals - Fish - Cyprinidae - Pogonichthys macrolepidotus
Animals - Fish	Hysterocarpus traski traski	Sacramento-San Joaquin tule perch	AFCQK02012	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Fish - Embiotocidae - Hysterocarpus traski traski
Animals - Fish	Hysterocarpus traski traski	Sacramento-San Joaquin tule perch	AFCQK02012	None	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Embiotocidae - Hysterocarpus traski traski
Animals - Fish	Hypomesus transpacificus	Delta smelt	AFCHB01040	Threatened	Endangered	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Osmeridae - Hypomesus transpacificus
Animals - Fish	Hypomesus transpacificus	Delta smelt	AFCHB01040	Threatened	Endangered	-	-	3812134	Bruceville	Unprocessed	Animals - Fish - Osmeridae - Hypomesus transpacificus
Animals - Fish	Spirinchus thaleichthys	longfin smelt	AFCHB03010	Candidate	Threatened	SSC	-	3812144	Florin	Mapped	Animals - Fish - Osmeridae - Spirinchus thaleichthys
Animals - Fish	Entosphenus tridentatus	Pacific lamprey	AFBAA02100	None	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Petromyzontidae - Entosphenus tridentatus
Animals - Fish	Entosphenus tridentatus	Pacific lamprey	AFBAA02100	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Fish - Petromyzontidae - Entosphenus tridentatus
Animals - Fish	Lampetra ayresii	river lamprey	AFBAA02030	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Petromyzontidae - Lampetra ayresii
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - central California coast DPS	AFCHA0209G	Threatened	None	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812154	Sacramento East	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812153	Carmichael	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812144	Florin	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus

Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812133	Galt	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812134	Bruceville	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812142	Sloughhouse	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus mykiss irideus	steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	-	-	3812143	Elk Grove	Mapped	Animals - Fish - Salmonidae - Oncorhynchus mykiss irideus
Animals - Fish	Oncorhynchus tshawytscha	chinook salmon - Central Valley fall / late fall-run ESU	AFCHA0205N	None	None	SSC	-	3812134	Bruceville	Unprocessed	Animals - Fish - Salmonidae - Oncorhynchus tshawytscha
Animals - Fish	Oncorhynchus tshawytscha	chinook salmon - Central Valley spring-run ESU	AFCHA0205A	Threatened	Threatened	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Salmonidae - Oncorhynchus tshawytscha
Animals - Fish	Oncorhynchus tshawytscha	chinook salmon - Sacramento River winter-run ESU	AFCHA0205B	Endangered	Endangered	-	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Salmonidae - Oncorhynchus tshawytscha
Animals - Fish	Oncorhynchus tshawytscha	chinook salmon - Central Valley fall / late fall-run ESU	AFCHA0205N	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Fish - Salmonidae - Oncorhynchus tshawytscha
Animals - Insects	Andrena blennospermatis	Blennosperma vernal pool andrenid bee	IIHYM35030	None	None	-	-	3812142	Sloughhouse	Mapped	Animals - Insects - Andrenidae - Andrena blennospermatis
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812142	Sloughhouse	Mapped	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812143	Elk Grove	Mapped	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812134	Bruceville	Mapped	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812133	Galt	Mapped	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812153	Carmichael	Mapped and Unprocessed	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812154	Sacramento East	Mapped and Unprocessed	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus
Animals - Insects	Desmocerus californicus dimorphus	valley elderberry longhorn beetle	IICOL48011	Threatened	None	-	-	3812152	Buffalo Creek	Mapped	Animals - Insects - Cerambycidae - Desmocerus californicus dimorphus

Animals - Insects	Hydrochara rickseckeri	Ricksecker's water scavenger beetle	IICOL5V010	None	None	-	-	3812152	Buffalo Creek	Mapped	Animals - Insects - Hydrophilidae - Hydrochara rickseckeri
Animals - Insects	Hydrochara rickseckeri	Ricksecker's water scavenger beetle	IICOL5V010	None	None	-	-	3812153	Carmichael	Mapped	Animals - Insects - Hydrophilidae - Hydrochara rickseckeri
Animals - Insects	Hydrochara rickseckeri	Ricksecker's water scavenger beetle	IICOL5V010	None	None	-	-	3812134	Bruceville	Mapped	Animals - Insects - Hydrophilidae - Hydrochara rickseckeri
Animals - Mammals	Taxidea taxus	American badger	AMAJF04010	None	None	SSC	-	3812134	Bruceville	Mapped	Animals - Mammals - Mustelidae - Taxidea taxus
Animals - Mammals	Taxidea taxus	American badger	AMAJF04010	None	None	SSC	-	3812153	Carmichael	Mapped	Animals - Mammals - Mustelidae - Taxidea taxus
Animals - Mammals	Taxidea taxus	American badger	AMAJF04010	None	None	SSC	-	3812154	Sacramento East	Mapped	Animals - Mammals - Mustelidae - Taxidea taxus
Animals - Mammals	Taxidea taxus	American badger	AMAJF04010	None	None	SSC	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Mammals - Mustelidae - Taxidea taxus
Animals - Mammals	Taxidea taxus	American badger	AMAJF04010	None	None	SSC	-	3812144	Florin	Mapped and Unprocessed	Animals - Mammals - Mustelidae - Taxidea taxus
Animals - Mammals	Lasiurus blossevillii	western red bat	AMACC05060	None	None	SSC	-	3812144	Florin	Unprocessed	Animals - Mammals - Vespertilionidae - Lasiurus blossevillii
Animals - Mammals	Lasiurus cinereus	hoary bat	AMACC05030	None	None	-	-	3812144	Florin	Unprocessed	Animals - Mammals - Vespertilionidae - Lasiurus cinereus
Animals - Mammals	Lasiurus cinereus	hoary bat	AMACC05030	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Mammals - Vespertilionidae - Lasiurus cinereus
Animals - Mammals	Myotis ciliolabrum	western small-footed myotis	AMACC01140	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Mammals - Vespertilionidae - Myotis ciliolabrum
Animals - Mammals	Myotis lucifugus	little brown bat	AMACC01010	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Mammals - Vespertilionidae - Myotis lucifugus
Animals - Mammals	Myotis lucifugus	little brown bat	AMACC01010	None	None	-	-	3812144	Florin	Unprocessed	Animals - Mammals - Vespertilionidae - Myotis lucifugus
Animals - Mammals	Myotis yumanensis	Yuma myotis	AMACC01020	None	None	-	-	3812144	Florin	Unprocessed	Animals - Mammals - Vespertilionidae - Myotis yumanensis
Animals - Mammals	Myotis yumanensis	Yuma myotis	AMACC01020	None	None	-	-	3812134	Bruceville	Unprocessed	Animals - Mammals - Vespertilionidae - Myotis yumanensis
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812133	Galt	Mapped	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812132	Clay	Mapped and Unprocessed	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812134	Bruceville	Mapped	Animals - Reptiles - Emydidae - Emys marmorata

Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812142	Sloughhouse	Mapped	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812143	Elk Grove	Mapped	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812144	Florin	Mapped	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812152	Buffalo Creek	Mapped and Unprocessed	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812154	Sacramento East	Unprocessed	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Emys marmorata	western pond turtle	ARAAD02030	None	None	SSC	-	3812153	Carmichael	Mapped	Animals - Reptiles - Emydidae - Emys marmorata
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812144	Florin	Mapped	Animals - Reptiles - Natricidae - Thamnophis gigas
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812143	Elk Grove	Mapped	Animals - Reptiles - Natricidae - Thamnophis gigas
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812142	Sloughhouse	Unprocessed	Animals - Reptiles - Natricidae - Thamnophis gigas
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812134	Bruceville	Mapped	Animals - Reptiles - Natricidae - Thamnophis gigas
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812132	Clay	Mapped	Animals - Reptiles - Natricidae - Thamnophis gigas
Animals - Reptiles	Thamnophis gigas	giant garter snake	ARADB36150	Threatened	Threatened	-	-	3812133	Galt	Mapped and Unprocessed	Animals - Reptiles - Natricidae - Thamnophis gigas
Community - Terrestrial	Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	-	-	3812134	Bruceville	Mapped	Community - Terrestrial - Coastal and Valley Freshwater Marsh
Community - Terrestrial	Elderberry Savanna	Elderberry Savanna	CTT63440CA	None	None	-	-	3812154	Sacramento East	Mapped	Community - Terrestrial - Elderberry Savanna
Community - Terrestrial	Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	CTT61420CA	None	None	-	-	3812134	Bruceville	Mapped	Community - Terrestrial - Great Valley Mixed Riparian Forest
Community - Terrestrial	Great Valley Valley Oak Riparian Forest	Great Valley Valley Oak Riparian Forest	CTT61430CA	None	None	-	-	3812134	Bruceville	Mapped	Community - Terrestrial - Great Valley Valley Oak Riparian Forest
Community - Terrestrial	Great Valley Valley Oak Riparian Forest	Great Valley Valley Oak Riparian Forest	CTT61430CA	None	None	-	-	3812143	Elk Grove	Mapped	Community - Terrestrial - Great Valley Valley Oak Riparian Forest
Community - Terrestrial	Great Valley Valley Oak Riparian Forest	Great Valley Valley Oak Riparian Forest	CTT61430CA	None	None	-	-	3812133	Galt	Mapped	Community - Terrestrial - Great Valley Valley Oak Riparian Forest
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812133	Galt	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812132	Clay	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812143	Elk Grove	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool

Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812134	Bruceville	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812142	Sloughhouse	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812153	Carmichael	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812144	Florin	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	CTT44110CA	None	None	-	-	3812152	Buffalo Creek	Mapped	Community - Terrestrial - Northern Hardpan Vernal Pool
Community - Terrestrial	Valley Oak Woodland	Valley Oak Woodland	CTT71130CA	None	None	-	-	3812134	Bruceville	Mapped	Community - Terrestrial - Valley Oak Woodland
Community - Terrestrial	Valley Oak Woodland	Valley Oak Woodland	CTT71130CA	None	None	-	-	3812133	Galt	Mapped	Community - Terrestrial - Valley Oak Woodland
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812133	Galt	Mapped	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812134	Bruceville	Mapped	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812142	Sloughhouse	Mapped	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812143	Elk Grove	Mapped	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812144	Florin	Mapped and Unprocessed	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812153	Carmichael	Mapped	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Sagittaria sanfordii	Sanford's arrowhead	PMALI040Q0	None	None	-	1B.2	3812154	Sacramento East	Mapped and Unprocessed	Plants - Vascular - Alismataceae - Sagittaria sanfordii
Plants - Vascular	Cicuta maculata var. bolanderi	Bolander's water-hemlock	PDAPI0M051	None	None	-	2B.1	3812134	Bruceville	Mapped	Plants - Vascular - Apiaceae - Cicuta maculata var. bolanderi
Plants - Vascular	Lilaeopsis masonii	Mason's lilaeopsis	PDAPI19030	None	Rare	-	1B.1	3812134	Bruceville	Mapped	Plants - Vascular - Apiaceae - Lilaeopsis masonii
Plants - Vascular	Centromadia parryi ssp. rudis	Parry's rough tarplant	PDAST4R0P3	None	None	-	4.2	3812134	Bruceville	Unprocessed	Plants - Vascular - Asteraceae - Centromadia parryi ssp. rudis
Plants - Vascular	Centromadia parryi ssp. rudis	Parry's rough tarplant	PDAST4R0P3	None	None	-	4.2	3812144	Florin	Unprocessed	Plants - Vascular - Asteraceae - Centromadia parryi ssp. rudis
Plants - Vascular	Hesperevax caulescens	hogwallow starfish	PDASTE5020	None	None	-	4.2	3812144	Florin	Unprocessed	Plants - Vascular - Asteraceae - Hesperevax caulescens
Plants - Vascular	Lasthenia ferrisiae	Ferris' goldfields	PDAST5L070	None	None	-	4.2	3812134	Bruceville	Unprocessed	Plants - Vascular - Asteraceae - Lasthenia ferrisiae
Plants - Vascular	Lepidium latipes var. heckardii	Heckard's pepper-grass	PDBRA1M0K1	None	None	-	1B.2	3812144	Florin	Mapped	Plants - Vascular - Brassicaceae - Lepidium latipes var. heckardii

Plants - Vascular	Brasenia schreberi	watershield	PDCAB01010	None	None	-	2B.3	3812134	Bruceville	Mapped	Plants - Vascular - Cabombaceae - Brasenia schreberi
Plants - Vascular	Downingia pusilla	dwarf downingia	PDCAM060C0	None	None	-	2B.2	3812133	Galt	Mapped	Plants - Vascular - Campanulaceae - Downingia pusilla
Plants - Vascular	Downingia pusilla	dwarf downingia	PDCAM060C0	None	None	-	2B.2	3812132	Clay	Mapped	Plants - Vascular - Campanulaceae - Downingia pusilla
Plants - Vascular	Downingia pusilla	dwarf downingia	PDCAM060C0	None	None	-	2B.2	3812143	Elk Grove	Mapped	Plants - Vascular - Campanulaceae - Downingia pusilla
Plants - Vascular	Downingia pusilla	dwarf downingia	PDCAM060C0	None	None	-	2B.2	3812144	Florin	Mapped	Plants - Vascular - Campanulaceae - Downingia pusilla
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812144	Florin	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812152	Buffalo Creek	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812153	Carmichael	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812143	Elk Grove	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812142	Sloughhouse	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812132	Clay	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812133	Galt	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Legenere limosa	legenere	PDCAM0C010	None	None	-	1B.1	3812134	Bruceville	Mapped	Plants - Vascular - Campanulaceae - Legenere limosa
Plants - Vascular	Cuscuta obtusiflora var. glandulosa	Peruvian dodder	PDCUS01111	None	None	-	2B.2	3812144	Florin	Mapped	Plants - Vascular - Cuscutaceae - Cuscuta obtusiflora var. glandulosa
Plants - Vascular	Carex comosa	bristly sedge	PMCYP032Y0	None	None	-	2B.1	3812134	Bruceville	Mapped	Plants - Vascular - Cyperaceae - Carex comosa
Plants - Vascular	Lathyrus jepsonii var. jepsonii	Delta tule pea	PDFAB250D2	None	None	-	1B.2	3812134	Bruceville	Mapped	Plants - Vascular - Fabaceae - Lathyrus jepsonii var. jepsonii
Plants - Vascular	Trifolium hydrophilum	saline clover	PDFAB400R5	None	None	-	1B.2	3812134	Bruceville	Mapped	Plants - Vascular - Fabaceae - Trifolium hydrophilum
Plants - Vascular	Trifolium hydrophilum	saline clover	PDFAB400R5	None	None	-	1B.2	3812144	Florin	Mapped	Plants - Vascular - Fabaceae - Trifolium hydrophilum
Plants - Vascular	Juglans hindsii	Northern California black walnut	PDJUG02040	None	None	-	1B.1	3812144	Florin	Mapped	Plants - Vascular - Juglandaceae - Juglans hindsii
Plants - Vascular	Juncus leiospermus var. ahartii	Ahart's dwarf rush	PMJUN011L1	None	None	-	1B.2	3812152	Buffalo Creek	Mapped	Plants - Vascular - Juncaceae - Juncus leiospermus var. ahartii
Plants - Vascular	Juncus leiospermus var. ahartii	Ahart's dwarf rush	PMJUN011L1	None	None	-	1B.2	3812153	Carmichael	Mapped	Plants - Vascular - Juncaceae - Juncus leiospermus var. ahartii

Plants - Vascular	Scutellaria galericulata	marsh skullcap	PDLAM1U0J0	None	None	-	2B.2	3812134	Bruceville	Mapped	Plants - Vascular - Lamiaceae - Scutellaria galericulata
Plants - Vascular	Scutellaria lateriflora	side-flowering skullcap	PDLAM1U0Q0	None	None	-	2B.2	3812134	Bruceville	Mapped	Plants - Vascular - Lamiaceae - Scutellaria lateriflora
Plants - Vascular	Fritillaria agrestis	stinkbells	PMLIL0V010	None	None	-	4.2	3812142	Sloughhouse	Unprocessed	Plants - Vascular - Liliaceae - Fritillaria agrestis
Plants - Vascular	Fritillaria agrestis	stinkbells	PMLIL0V010	None	None	-	4.2	3812154	Sacramento East	Unprocessed	Plants - Vascular - Liliaceae - Fritillaria agrestis
Plants - Vascular	Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	PDMAL0H0R3	None	None	-	1B.2	3812144	Florin	Mapped	Plants - Vascular - Malvaceae - Hibiscus lasiocarpos var. occidentalis
Plants - Vascular	Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	PDMAL0H0R3	None	None	-	1B.2	3812134	Bruceville	Mapped	Plants - Vascular - Malvaceae - Hibiscus lasiocarpos var. occidentalis
Plants - Vascular	Gratiola heterosepala	Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	-	1B.2	3812142	Sloughhouse	Mapped	Plants - Vascular - Plantaginaceae - Gratiola heterosepala
Plants - Vascular	Gratiola heterosepala	Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	-	1B.2	3812143	Elk Grove	Mapped	Plants - Vascular - Plantaginaceae - Gratiola heterosepala
Plants - Vascular	Gratiola heterosepala	Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	-	1B.2	3812152	Buffalo Creek	Mapped	Plants - Vascular - Plantaginaceae - Gratiola heterosepala
Plants - Vascular	Gratiola heterosepala	Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	-	1B.2	3812153	Carmichael	Mapped	Plants - Vascular - Plantaginaceae - Gratiola heterosepala
Plants - Vascular	Orcuttia tenuis	slender Orcutt grass	PMPOA4G050	Threatened	Endangered	-	1B.1	3812152	Buffalo Creek	Mapped	Plants - Vascular - Poaceae - Orcuttia tenuis
Plants - Vascular	Orcuttia tenuis	slender Orcutt grass	PMPOA4G050	Threatened	Endangered	-	1B.1	3812143	Elk Grove	Mapped	Plants - Vascular - Poaceae - Orcuttia tenuis
Plants - Vascular	Orcuttia viscida	Sacramento Orcutt grass	PMPOA4G070	Endangered	Endangered	-	1B.1	3812143	Elk Grove	Mapped	Plants - Vascular - Poaceae - Orcuttia viscida
Plants - Vascular	Orcuttia viscida	Sacramento Orcutt grass	PMPOA4G070	Endangered	Endangered	-	1B.1	3812152	Buffalo Creek	Mapped	Plants - Vascular - Poaceae - Orcuttia viscida
Plants - Vascular	Orcuttia viscida	Sacramento Orcutt grass	PMPOA4G070	Endangered	Endangered	-	1B.1	3812153	Carmichael	Mapped	Plants - Vascular - Poaceae - Orcuttia viscida
Plants - Vascular	Navarretia eriocephala	hoary navarretia	PDPLM0C060	None	None	-	4.3	3812143	Elk Grove	Unprocessed	Plants - Vascular - Polemoniaceae - Navarretia eriocephala
Plants - Vascular	Limosella australis	Delta mudwort	PDSCR10050	None	None	-	2B.1	3812134	Bruceville	Mapped	Plants - Vascular - Scrophulariaceae - Limosella australis

Appendix B – Delineation Map

Map ID	Feature Type	Length (ft)	Width (ft)	Area (ac)	Area (sq ft)
D1	Ditch	1,340.2	2	n/a	2,680.5
D2	Ditch	2,148.2	2	n/a	4,296.4
D3	Ditch	539.8	2	n/a	1,079.6
D4	Ditch	435.8	2 - 4	n/a	989.5
D5	Ditch	1,381.3	2 - 5	n/a	2,888.6
D6	Ditch	463.2	2	n/a	926.3
D7	Ditch	868.0	2	n/a	1,736.0
D8	Ditch	665.3	2	n/a	1,330.7
D9	Ditch	96.8	1	n/a	96.8
D10	Ditch	442.9	1 - 2	n/a	861.8
D11	Ditch	245.1	2	n/a	490.3
D12	Ditch	224.8	2	n/a	449.7
D13	Ditch	82.9	2	n/a	165.9
D14	Ditch	165.8	1	n/a	165.8
D15	Ditch	392.5	2	n/a	785.0
	Ditch Total	9,496.7		0.435	
S1	Swale	329.7	8 - 16	n/a	4,067.4
S2	Swale	185.9	8	n/a	1,487.0
	Swale Total	515.6		0.128	

Source: ... Service (2014) City of Elk Grove (2014) Sacramento County (2014) ESRI

Legend

Biological Study Area

Contour Line (2' Interval)

Jurisdictional Features

Ditch

Swale

Non-Jurisdictional Features

Culvert

SCALE: 1" = 150'

Soils Legend

Biological Study Area

NRCS Soil Type

216 - San Joaquin Durixeralfs complex 0-1% slopes

Delineation of Wetlands and Waters of the Sheldon Rd and Waterman Rd Intersection, Elk Grove

Delineated By: Leslie Parker

Drafted By: Brian Schretzmann

City of Elk Grove
Development Services

Date: 11/18/2014

Appendix C – Site Photos

Sheldon-Waterman Intersection Improvement Project

Sheldon-Waterman Intersection Improvement Project

Appendix C – Wetland Delineation Report

CITY OF ELK GROVE

SHELDON WATERMAN INTERSECTION IMPROVEMENTS PROJECT

PRELIMINARY DELINEATION OF WETLANDS AND WATERS OF THE US

Prepared by:

PMC

2729 Prospect Park Drive, Suite 220
Rancho Cordova, CA 95670

Prepared for:

City of Elk Grove
8401 Laguna Palms Way
Elk Grove, CA 95758

December 2014

City of Elk Grove

Sheldon Waterman Intersection Improvements Project

Preliminary Delineation of Wetlands and Waters of the US

Date report prepared: December 8, 2014

Project site location: Sections 29, 20, 19, and 30, Township 7 North, Range 6 East
Elk Grove, CA
USGS Quad: Elk Grove

Prepared for: City of Elk Grove
8401 Laguna Palms Way
Elk Grove, CA 95758

Principal investigators: Leslie Parker – Biologist
PMC
2729 Prospect Park Drive, Suite 220
Rancho Cordova, CA 95670
(916) 231-3355
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Prepared by: Leslie Parker – Biologist

PMC biologists, on behalf of the City of Elk Grove, conducted a jurisdictional delineation (JD) of waters of the United States (WoUS) on the ±27.2-acre Sheldon Waterman Intersection Improvements project (**Figure 1**). The JD was conducted on October 22, 2014, in accordance with the methodologies outlined in Part IV, Section D, of the *Corps of Engineers Wetland Delineation Manual* (Corps Manual) (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0* (Supplement) (Environmental Laboratory 2008), and the US Army Corps of Engineers (Corps) regulatory guidance letter regarding *Ordinary High Water Mark Identification* (2005). For areas where the Corps Manual and the Supplement differ, the Supplement was followed.

This report presents the findings of a review of available literature, soil survey data, and previous JDs, along with the results and analysis of field data collected during the field investigation. Two types or classes of WoUS were identified, mapped, and evaluated on the proposed project site. These features are depicted on the delineation map (**Figure 5**) and include two man-made swales (S1 and S2) and nine roadside drainage ditches (D1 through D9). Due to the location, hydrology, and connectivity with traditionally navigable waters (Sacramento River), all of the features in the project study area (PSA) were considered WoUS. **Table ES-1** provides an acreage summary of jurisdictional features by type in the PSA.

TableES-1: Acreage Summary of Jurisdictional Features by Type

Ditch	0.19
Man-made Swale	0.13
Total Acreage	**0.32**

This JD is subject to verification by the Corps. PMC advises all parties to treat the information contained herein as preliminary until the Corps provides written verification of the extent of its jurisdiction on-site.

FIGURES

TABLES

City of Elk Grove
Development Services

Figure 1
Regional Vicinity Map

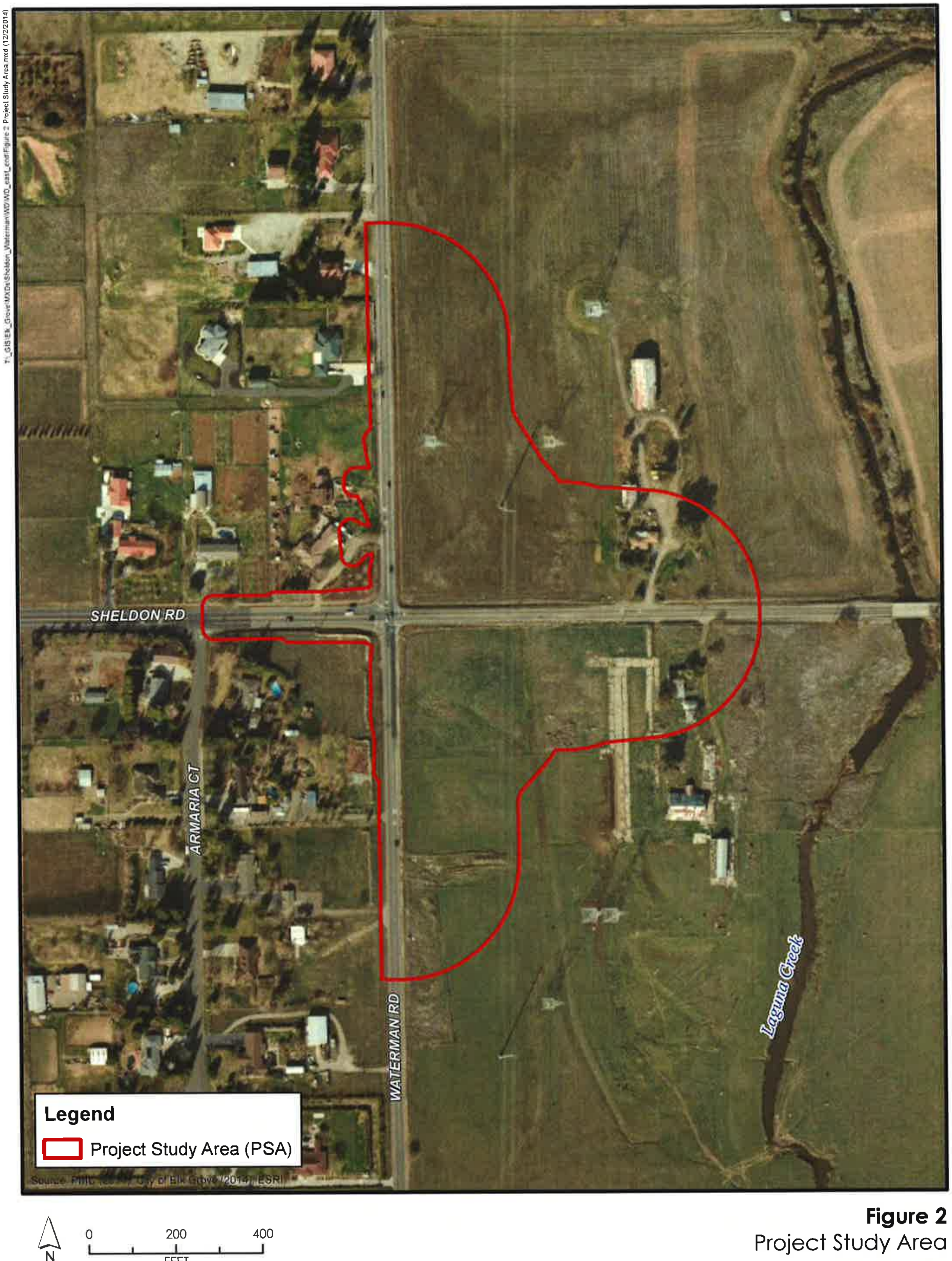

Figure 2
Project Study Area

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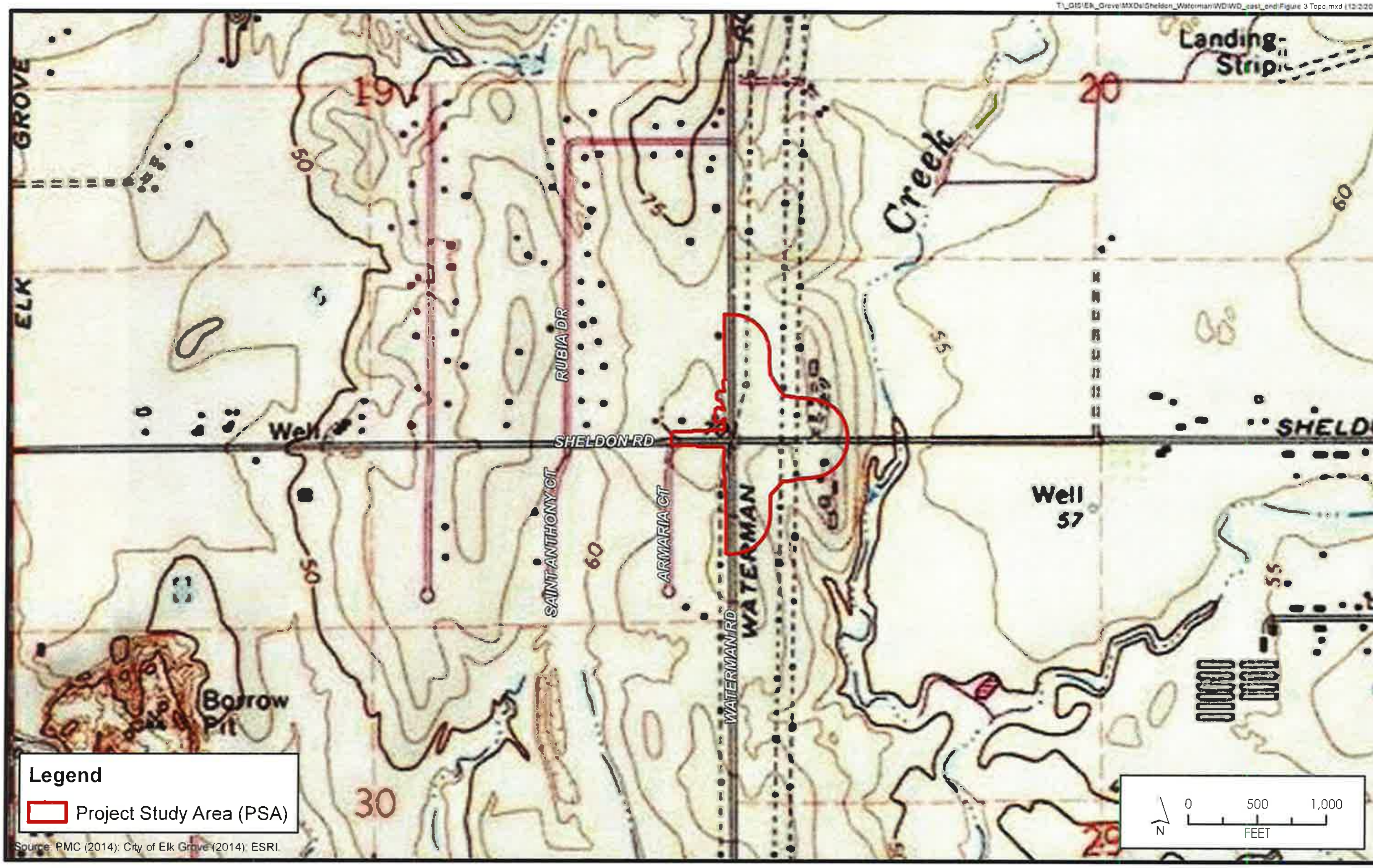

City of Elk Grove
Development Services

ELK GROVE

Figure 3

USGS Topographic Map

Typically, the species composition in urban areas consists of a mix of native and non-native trees, shrubs, flowers, and turf grass. Common landscaped trees in the PSA include valley oak (*Quercus lobata*), redwoods (*Sequoia sempervirens*), *Eucalyptus* sp., and various pines (*Pinus* spp.) and ornamentals. Wildlife adapted to living in heavily urbanized areas includes common raccoon (*Procyon lator*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), black rat (*Rattus rattus*), American crow (*Corvus brachyrhyncos*), mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), cliff swallow (*Hirundo pyrrhonota*), Northern mockingbird (*Mimus polyglottus*), and common ground dove (*Columbina passerina*).

ANNUAL GRASSLAND

Annual grassland habitats are open grasslands dominated by annual plant species found from the flat plains of the Central Valley to the coastal mountain ranges of Mendocino County, and scattered locations across the southern portion of the state. This community is associated with undeveloped areas east of Waterman Road. In the PSA this community is composed of primarily introduced species and includes Italian ryegrass (*Festuca perennis*), medusa head (*Taeniatherum caput-medusae*), tarweed (*Holocarpha virgata*), Bermuda grass (*Cynodon dactylon*), soft brome (*Bromus hordeaceus*), rat-tail fescue (*Vulpia myuros*), ripgut brome (*Bromus diandrus*), barleys (*Hordeum* spp.), filarees (*Erodium* spp.), yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), black mustard (*Brassica nigra*), chicory (*Cichorium intybus*), wild oat (*Avena fatua*), and native dove weed (*Croton setigerus*).

Annual grasslands provide foraging habitat for a wide variety of wildlife species including raptors, seed-eating birds, small mammals, amphibians, and reptiles. Reptiles likely associated with this habitat type in the PSA include western fence lizard (*Sceloporus occidentalis*) and common garter snake (*Thamnophis sirtalis*). Black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Otospermophilus beecheyi*), western harvest mouse (*Reithrodontomys megalotis*), Botta's pocket gopher (*Thomomys bottae*), and California vole (*Microtus californicus*) are mammals commonly found in this habitat type. Western meadowlarks (*Sturnella neglecta*) may breed in the grassland community in the PSA.

JURISDICTIONAL FEATURES

Two types of jurisdictional features occur in the PSA: drainage ditch and man-made swale. Ditch features are characterized by flashy, ephemeral flows of stormwater runoff from roads and adjacent uplands. These waters drain into the man-made swales and eventually into Laguna Creek. Vegetation in the swales in the PSA is different from the surrounding uplands. Dominant species include Mediterranean barley (*Hordeum marinum*), Italian ryegrass, loosestrife (*Lythrum hyssopifolia*), and prostrate knotweed (*Polygonum aviculare*). Vegetation in the ditches is characterized by a mix of upland plants and hydrophytic species similar to those found in swales. Species composition in the ditches is dependent upon hydroperiod.

Please refer to datasheets provided in **Appendix C** for details regarding vegetative cover by feature.

DELINEATION METHODOLOGY

PREVIOUS DELINEATIONS

Several previous JDs have been performed on lands overlapping the PSA, and are provided in **Appendix D**. Four wetland delineations were used as references to help quantify the jurisdictional waters in the PSA:

- Wetland Delineation Report Sheldon Lakes; conducted by Huffman and Associates 1990
- Sheldon Waters Addendum to Delineation Data Sheets; conducted by Gibson and Skordal 2003
- Revised Biological Resources Report for Newland Hansen Property; conducted by Gibson and Skordal 2006
- Other Water Determination within the Sheldon/Waterman Intersection Improvements Study Area; conducted by the City of Elk Grove 2005

PRELIMINARY INVESTIGATION

Prior to conducting the field investigation, PMC reviewed the following background data to develop a preliminary map of wetlands and other aquatic features to be evaluated during the field investigation.

- Elk Grove, California, USGS 7.5-minute topographic quadrangle map.
- Current and historic aerial photography for vegetative, topographic, and hydrologic signatures (Google Earth 2014).
- NRCS's Web Soil Survey for information about onsite soils and geomorphology (USDA 2014).

FIELD INVESTIGATION

This wetland delineation was conducted by PMC biologist Leslie Parker on October 22, 2014. The delineation used the Routine Determination Method as described in Part IV, Section D of the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), hereafter called the Corps Manual. The Corps Manual was used in conjunction with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0* (Supplement) (Environmental Laboratory 2008), and the Corps regulatory guidance letter regarding *Ordinary High Water Mark Identification* (2005). For areas where the Corps Manual and the Supplement differ, the Supplement was followed.

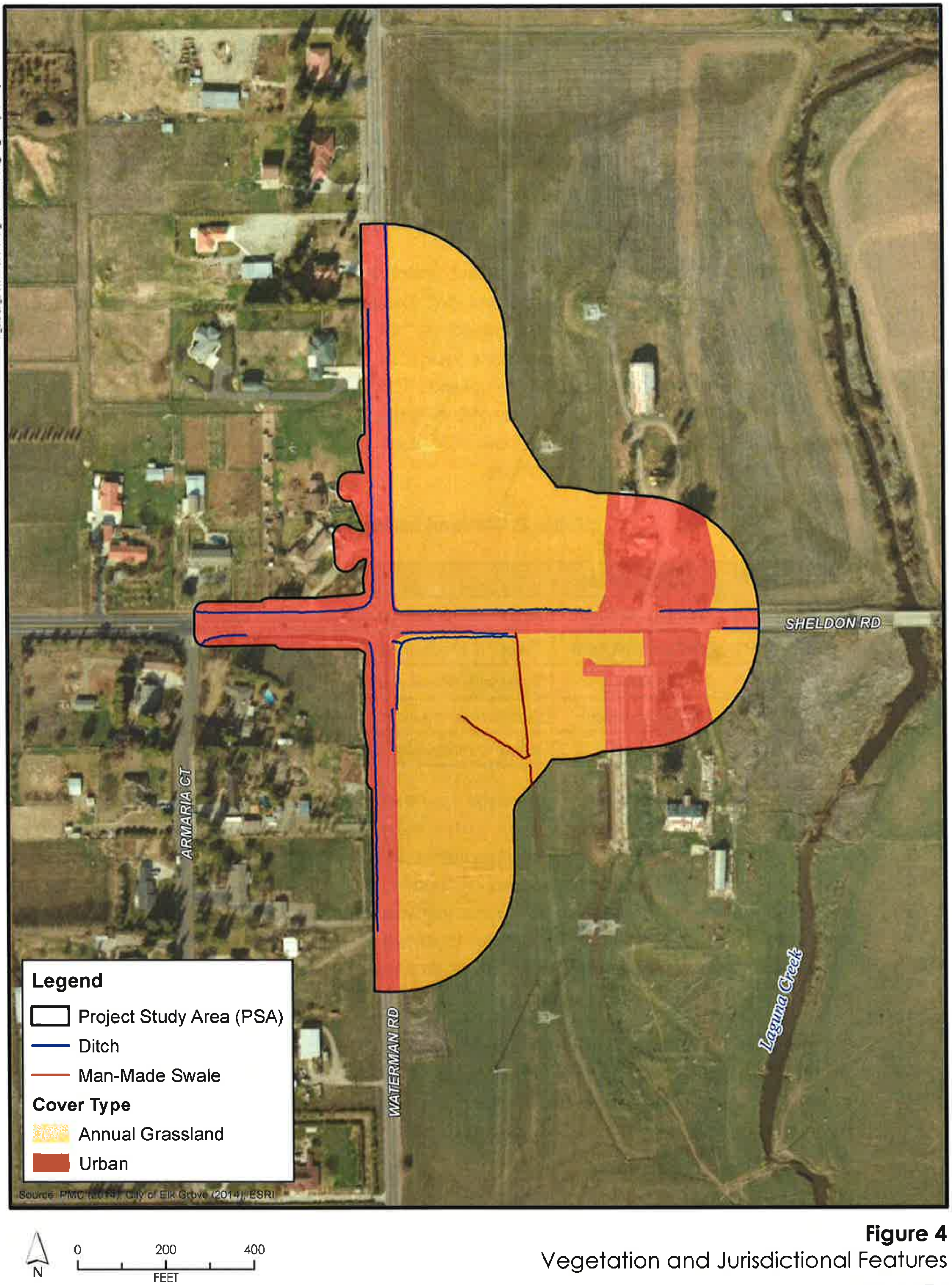

Figure 4
Vegetation and Jurisdictional Features

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Three positive wetland parameters must normally be present for an area to meet wetland criteria: (1) a dominance of wetland vegetation, (2) presence of hydric soils, and (3) presence of wetland hydrology. Potential wetland features identified in the previous delineations and during the preliminary investigation were evaluated for the presence of these indicators.

Dominant plant species within each wetland, linear drainage, and the adjacent uplands were identified to species using standard floras (UC Berkeley 2014). Each plant species was then assigned a wetland indicator status based on the Corps 2014 National Wetland Plant List website (Version 3.2). The Corps assigns indicator statuses to designate a plant species' likelihood of occurrence in wetlands or uplands (Corps 2014). The definition of each indicator status and the status codes are presented in **Table 1**. A hydrophyte is a plant species that possesses physiological traits that allow the plant to grow and persist in soils subject to inundation and anaerobic soil conditions.

Table 2: Wetland Indicator Status

Code	Indicator Status	Definition
OBL	Obligate Wetland	Almost always is a hydrophyte, rarely in uplands
FACW	Facultative Wetland	Usually is a hydrophyte but occasionally found in uplands
FAC	Facultative	Commonly occurs as either a hydrophyte or non-hydrophyte
FACU	Facultative Upland	Occasionally is a hydrophyte but usually occurs in uplands
UPL	Upland	Rarely is a hydrophyte, almost always in uplands

Positive signs of hydrology were determined by the presence of one or more primary and/or secondary indicators including, but not limited to, surface water, soil saturation, water marks, iron deposits, soil cracking, and saturation visible on aerial imagery (Environmental Laboratory 2008). Linear features with defined bed and bank, such as ditches, were evaluated for the presence of shelving, changes in soil character, wracking, scouring, deposition, water staining, and changes in plant community in order to define the OHWM (Corps 2005). Representative cross sections were measured in each linear drainage feature to obtain an average bankfull width (i.e., OHWM).

Subsequent to evaluating vegetation and hydrology within potential wetland features, it was determined if soils needed to be characterized. Previous JDs were referenced, and presence of hydric soil was assumed in features that had been previously mapped. Data for each linear drainage and wetland feature was recorded and representative photographs taken (**Appendix C**).

All field data on the location and extent of wetlands and other aquatic features was collected using a Trimble GeoXT Global Positioning System. These data were then exported to

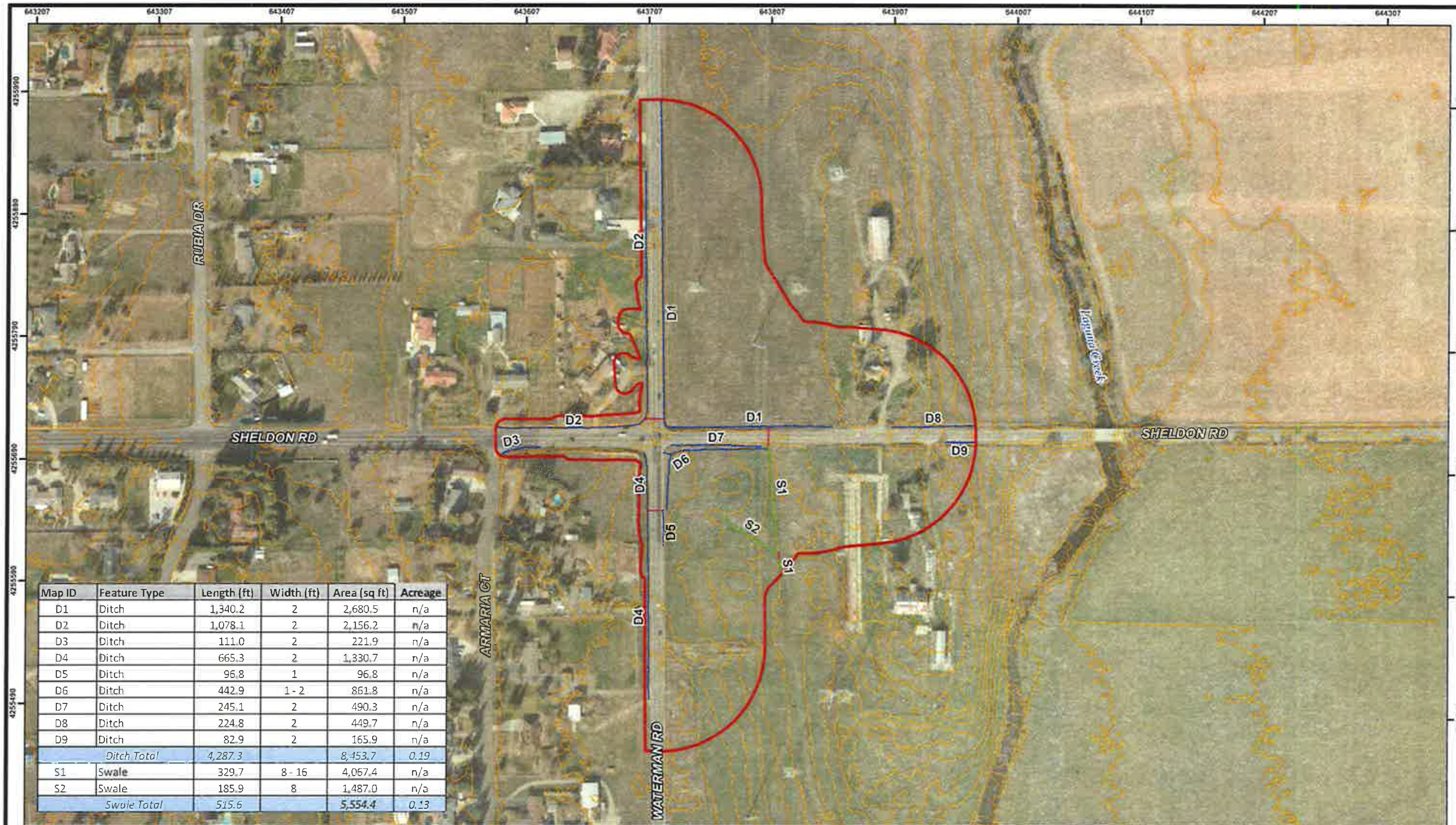
GoogleEarth (2014) and the extent of saturation/inundation visible on current and historical aerial imagery was evaluated for consistency with the extent delineated in the field. In addition, data collected in the field was compared to data collected in previous delineations.

JURISDICTIONAL ANALYSIS

The Corps and the US Environmental Protection Agency (EPA) issued guidance related to the Rapanos decision in the *US Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (2007). The Rapanos-Carabell consolidated decisions addressed several issues including the question of jurisdiction over non-relatively permanent waters (RPWs). The agencies will typically assert jurisdiction over the following waters: (1) traditional navigable waters (TNW); (2) all wetlands adjacent to TNWs; (3) RPWs that are non-navigable tributaries to TNWs and have relatively permanent flow or seasonally continuous flow (typically three months); and (4) wetlands that directly abut jurisdictional RPWs. Case-by-case investigations are usually conducted by the agencies to ascertain whether there is a significant nexus to a TNW for waters that are non-navigable tributaries and do not contain relatively permanent or seasonal flow, wetlands adjacent to the aforementioned features, and wetlands adjacent to but not directly abutting RPWs. Jurisdiction is not generally asserted over swales, erosional features (e.g., gullies), or small washes characterized by low-volume/short-duration flow events; ditches (including roadside ditches) constructed wholly within and draining only uplands that do not have relatively permanent flow; or uplands transporting overland flow generated from precipitation (i.e., rain events and snowmelt). (Corps 2007)

The delineation identified 11 potentially jurisdictional features in the PSA, including 9 roadside ditches and 2 man-made swales (**Figure 5**). All of the features in the PSA have a hydrologic connection to a drainage network, which consists of ditches and man-made swales that run west-east through the PSA. This drainage network drains the PSA east toward into Laguna Creek. Laguna Creek flows south and eventually connects with Morrison Creek, which ultimately drains into the Sacramento River (TNW) west of the PSA.

Table 3 provides a summary of all of the mapped features in the PSA, along with their linear footage (as appropriate) and acreage.



Map ID	Feature Type	Length (ft)	Width (ft)	Area (sq ft)	Acreage
D1	Ditch	1,340.2	2	2,680.5	n/a
D2	Ditch	1,078.1	2	2,156.2	n/a
D3	Ditch	111.0	2	221.9	n/a
D4	Ditch	665.3	2	1,330.7	n/a
D5	Ditch	96.8	1	96.8	n/a
D6	Ditch	442.9	1 - 2	861.8	n/a
D7	Ditch	245.1	2	490.3	n/a
D8	Ditch	224.8	2	449.7	n/a
D9	Ditch	82.9	2	165.9	n/a
Ditch Total		4,287.3		8,453.7	0.19
S1	Swale	329.7	8 - 16	4,067.4	n/a
S2	Swale	185.9	8	1,487.0	n/a
Swale Total		515.6		5,554.4	0.13

Source: PMC (2014); Natural Resources Conservation Service (2014); City of Elk Grove (2014); Sacramento County (2014); ESRI

Legend

Project Study Area
Contour Line (2' Interval)
Non-Jurisdictional Features
Culvert
Jurisdictional Features
Ditch
Man-Made Swale

SCALE: 1" = 250'

0 50 100 200 300 400

FEET

Soils Legend

NRCS Soil Type

198 - Redding gravelly loam, 0-8% slopes

Parcel

Elk Grove Quadrangle
HUC: 180201630402
T07N R06E Sec. 19, 20, 29, 30
UTM Zone 10N NAD83

Figure 5: Delineation of Wetlands and Waters of the Sheldon Rd and Waterman Rd Intersection, Elk Grove

Delineated By: Leslie Parker

Drafted By: Brian Schretzmann

City of Elk Grove Development Services

Date: December 2, 2014

Table 3: Summary of Potentially Jurisdictional Features

Map ID	Feature Type	Length (ft)	Area (ac)	Area (sq ft)
D1	Ditch	1,340.2	n/a	2,680.5
D2	Ditch	1,078.1	n/a	2,156.2
D3	Ditch	111.0	n/a	221.9
D4	Ditch	665.3	n/a	1,330.7
D5	Ditch	96.8	n/a	96.8
D6	Ditch	442.9	n/a	861.8
D7	Ditch	245.1	n/a	490.3
D8	Ditch	224.8	n/a	449.7
D9	Ditch	82.9	n/a	165.9
	Ditch Total	**4,287.1**	**0.19**	**8,453.8**
S1	Man-made Swale	329.7	n/a	4,067.4
S2	Man-made Swale	185.9	n/a	1,487.0
	Man-made Swale Total	**515.6**	**0.13**	**5,554.4**
	TOTAL	**4,802.7**	**0.32**	**14,008.2**

CONCLUSION

Based on the jurisdictional analysis above, it is the opinion of PMC biologists that 0.19 acre of roadside ditches and 0.13 acre of man-made swales could be considered WoUS in the PSA. The Corps has final authority over the extent of wetlands and other WoUS under its jurisdiction, determination of area affected by the project, and the type of permits and conditions required.

This preliminary delineation report documents the limits of all aquatic features and the best professional judgment of PMC biologists. All conclusions presented should be considered preliminary and subject to change pending official review and verification in writing by the Corps.

REFERENCES

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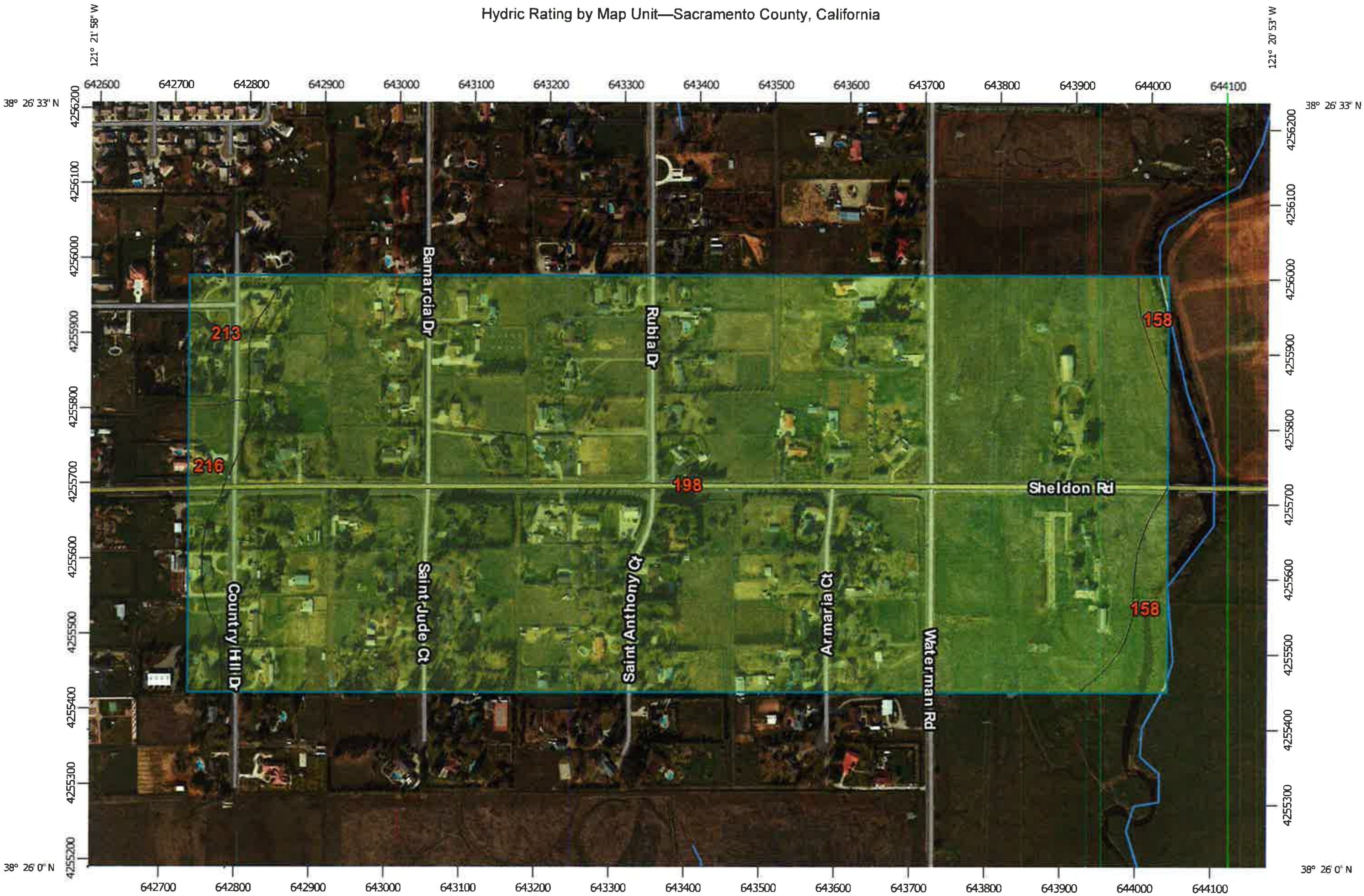
Hydric Rating by Map Unit—Sacramento County, California



Map Scale: 1:7,170 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 300, 600, 1200, 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 13, Sep 30, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2010—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Sacramento County, California (CA067)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
158	Hicksville loam, 0 to 2 percent slopes, occasionally flooded	5	4.3	2.4%
198	Redding gravelly loam, 0 to 8 percent slopes	1	167.3	93.2%
213	San Joaquin silt loam, leveled, 0 to 1 percent slopes	2	3.9	2.2%
216	San Joaquin-Durixeralfs complex, 0 to 1 percent slopes	4	4.0	2.3%
Totals for Area of Interest			**179.6**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Sheldon-Waterman Intersection Improvement Project

Sheldon-Waterman Intersection Improvement Project

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sheldon Waterman Intersection City/County: Elk Grove/Sacramento Sampling Date: 10/22/14
Applicant/Owner: City of Elk Grove State: CA Sampling Point: S1
Investigator(s): Leslie Parker, Heather White Section, Township, Range: 07N 06E 29
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): 0-2
Subregion (LRR): C Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: Redding gravelly loam NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No X
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes X No ______

Remarks:
Swale (man-made), heavily grazed + trampled by cattle
non-normal circumstances due to drought conditions

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	0		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0		
Herb Stratum (Plot size: ______)			
1. Hordeum marinum	45	Y	FAC
2. Festuca perennis	25	~~N~~ Y	FAC
3. Lythrum hyssopifolia	<1	N	OBL
4. Polygonum aviculare	<1	N	FACW
5.			
6.			
7.			
8.			
= Total Cover	70		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover	0		

% Bare Ground in Herb Stratum 35 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks:
vegetation extremely dry, difficult to identify
upland vegetation: Bromus hordeaceus (30%), Festuca perennis (30
Bromus diandrus (10%), Avena fatua (10%),
Taeniatherum caput-medusae (10%)

SOIL

Sampling Point: S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
*								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

* soil pits not dug assumed presence of hydric soils due to previous delineation data (Sheldon Lakes Delineation - Huffman + Assoc. 1990 Sheldon Waters Delineation - Gibson + Skordal 2003)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

aerial photos show signature of saturation

Remarks:

other - deep hoof prints from cattle

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sheldon Waterman Intersection City/County: Elk Grove/Sacramento Sampling Date: 10/22/14

Applicant/Owner: City of Elk Grove State: CA Sampling Point: S2

Investigator(s): Leslie Parker, Heather White Section, Township, Range: 07N 06E 29

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): 0-2

Subregion (LRR): C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Redding gravelly loam NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
non-normal circumstances due to drought conditions
site heavily grazed and trampled by cattle, man-made swale

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	0		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0		
Herb Stratum (Plot size: ______)			
1. Hordeum marinum	40	Y	FAC
2. Festuca perennis	30	Y	FAC
3. Polygonum aviculare	<1	N	FACW
4.			
5.			
6.			
7.			
8.			
= Total Cover	70		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover	0		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:
vegetation extremely dry, difficult to identify
upland vegetation: Bromus hordeaceus (30%), Festuca perennis (30%),
Bromus diandrus (10%), Avena fatua (10%)
Taeniatherum caput-medusae (10%)

SOIL

Sampling Point: S2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
*								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:
* soil pits not dug
assumed presence of hydric soils due to previous delineation data
(Sheldon Lakes Delineation - Huffman + Assoc. 1990
Sheldon Waters Delineation - Gibson + Skordal 2003)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

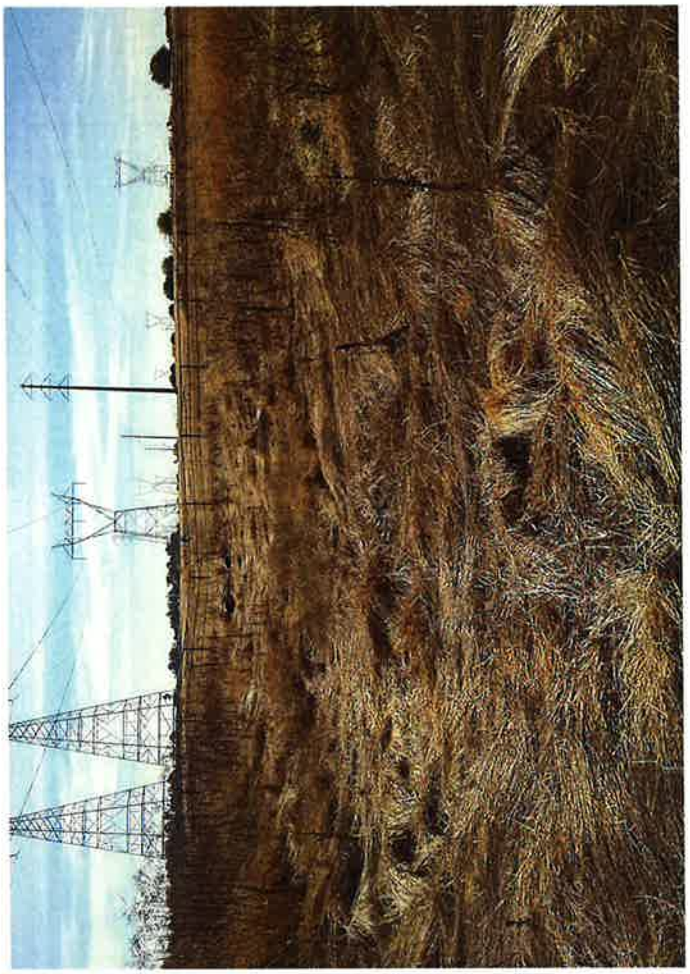
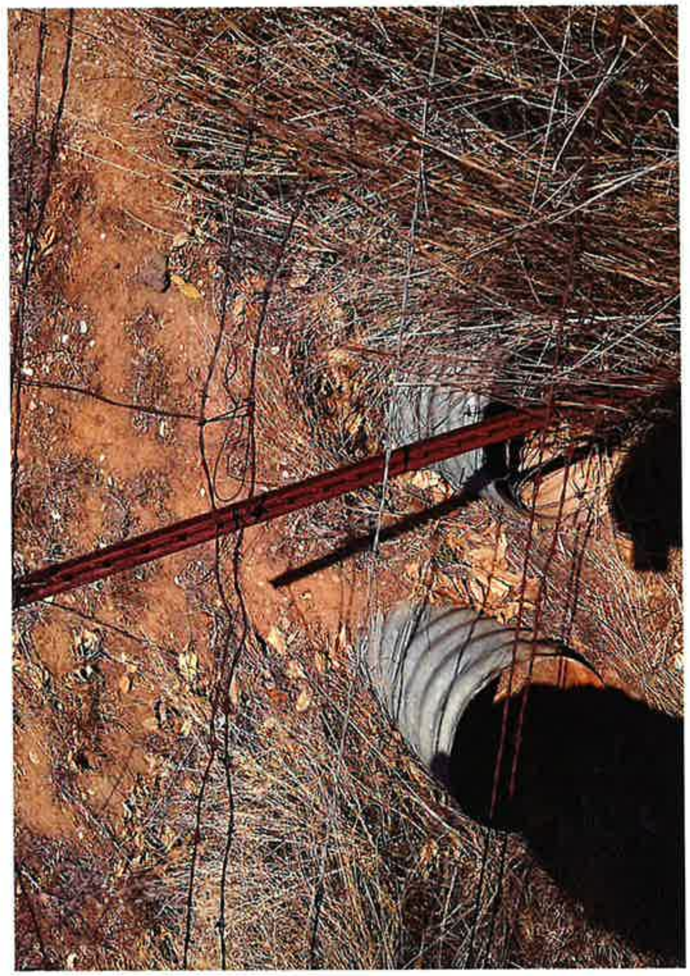
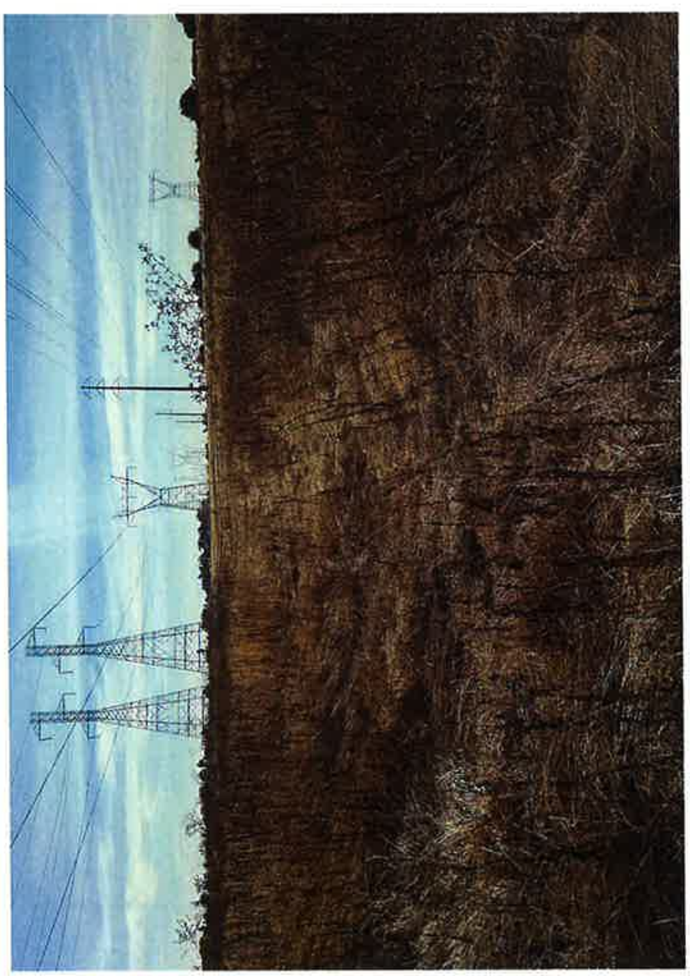
Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
alrial photos show signature of saturation

Remarks:
other - deep hoofprints from cattle


Sheldon Waterman Intersection Improvements
Ditch Photos

D1

D1

D2

D2

Sheldon Waterman Intersection Improvements
Ditch Photos

D3

D4

D5

D6

Sheldon Waterman Intersection Improvements
Ditch Photos

D7

D8

D9

Delineations provided on enclosed CD.

APPENDIX D – SPECIES LIST

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Plants							
Brasenia schreberi	watershield	-	-	2B.3	Freshwater marshes and swamps. Elev: 98-7,218 feet (30-2,200 m.) Blooms: June-September (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Carex comosa	bristly sedge	-	-	2B.1	Marshes, swamps and lake margins. Elev: 0-2,051 feet (0-625 m.) Blooms: May-September (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Castilleja campestris ssp. succulenta	succulent owl's-clover	FT	SE	1B.1	Acidic vernal pools. Elev: 164-2,461 ft (50-750m). Blooms: Apr-May (CNPS 2014.	A	**Not likely to affect** Suitable habitat not present.
	Critical Habitat, succulent owl's-clover	X	-	-		A	**No effect.** BSA not located within Critical Habitat Unit.
Cicuta maculata var. bolanderi	Bolander's water-hemlock	-	-	2B.1	Coastal, fresh or brackish marshes and swamps. Elev: 0-656 ft. (0-200 m.) Blooms: July-Sept (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	-	-	2B.2	Freshwater marshes and swamps. Elev: 49-919 ft. (15-280 m.) Blooms: July-Oct (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Downingia pusilla	dwarf downingia	-	-	2B.2	Vernal pools and mesic valley and foothill grasslands. Elev: 3-1,459 ft. (1-445 m.) Blooms: Mar-May (CNPS 2014).	P	**May affect.** Suitable vernal pool/swale habitat present; however, site has been historically disturbed.
Gratiola heterosepala	Boggs Lake hedge-hyssop	-	SE	1B.2	Clay soils in marshes, swamps, lake margins and vernal pools. Elev: 33-7,792 ft. (10-2,375 m.) Blooms: April-August (CNPS 2014).	A	**Not likely to affect.** Suitable soils not present. Entire BSA is composed of gravelly loam (NRCS 2014).
Hibiscus lasiocarpus var. occidentalis	woolly rose-mallow	-	-	1B.2	Freshwater marshes and swamps. Elev: 0-394 ft. (0-120 m.) Blooms: June-September (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Juglans hindsii	Northern California black walnut	-	-	1B.1	Riparian forest/woodland. Elev: 0-1,444 feet (0-440 m.) Blooms: Apr-May (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Juncus leiospermus var. ahartii	Ahart's dwarf rush	-	-	1B.2	Mesic valley and foothill grasslands. Elev: 98-751 ft. (30-229 m.) Blooms: March-May (CNPS 2014).	A	**Not likely to affect.** Suitable soils not present. Mapped soil unit within BSA is defined as moderately well drained (NRCS 2014).
Lathyrus jepsonii var. jepsonii	Delta tule pea	-	-	1B.2	Freshwater and brackish marshes and swamps. Elev: 0-13 ft. (0-4 m.) Blooms: May-Sept (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Legenere limosa	legenere	-	-	1B.1	Vernal pools. Elev: 3-2,887 ft (1-880 m) Blooms: Apr-June (CNPS 2014).	P	**May affect.** Suitable vernal pool/swale habitat present; however, site has been historically disturbed.
Lepidium latipes var. heckardii	Heckard's pepper-grass	-	-	1B.2	Alkaline flats in valley and foothill grasslands. Elev: 7-656 feet (2-200 m.) Blooms: March-May (CNPS 2014).	A	**Not likely to affect.** Alkaline soils not present within BSA (NRCS 2014).
Lilaeopsis masonii	Mason's lilaeopsis	-	SR	1B.1	Riparian scrub, and brackish or freshwater marshes and swamps. Elev: 3-33 ft. (0-10 m.) Blooms: Apr-Nov (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Limosella australis	Delta mudwort	-	-	2B.1	Usually mud banks in riparian scrub, and freshwater or brackish marshes and swamps. Elev: 0-10 ft. (0-3 m.) Blooms: May-Aug (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Orcuttia tenuis	slender Orcutt grass	FT	SE	1B.1	Vernal pools. Elev: 115-5,774 ft. (35-1,760 m.) Blooms: May-October (CNPS 2014).	A	**Not likely to affect.** BSA is below species elevation range.
	Critical Habitat, slender Orcutt grass	X	-	-		A	**No effect.** BSA not located within Critical Habitat Unit.
Orcuttia viscida	Sacramento Orcutt grass	FE	SE	1B.1	Vernal pools. Elev: 98-328 ft. (30-100 m.) Blooms: Apr-Sep (CNPS 2014).	A	**Not likely to affect.** BSA is below species elevation range.
	Critical Habitat, Sacramento Orcutt grass	X	-	-		A	**No effect.** BSA not located within Critical Habitat Unit.
Sagittaria sanfordii	Sanford's arrowhead	-	-	1B.2	Assorted shallow freshwater marshes and swamps. Elev: 0-2,133 ft. (0-650 m.) Blooms: May-October (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Scutellaria galericulata	marsh skullcap	-	-	2B.2	Lower montane coniferous forest, meadows, seeps, marshes, and swamps. Elev: 0-6,890 feet (0-2,100 m.) Blooms: Jun-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Scutellaria laterifolia	side-flowering skullcap	-	-	2B.2	Marshes, swamps, mesic meadows and seeps. Elev: 0-1,640 feet (0-500 m.) Blooms: Jul-Sep (CNPS 2014).	A	**Not likely to affect.** Suitable habitat not present.
Trifolium hydrophilum	saline clover	-	-	1B.2	Marshes & swamps, valley & foothill grassland (mesic, alkaline), and vernal pools. Elev: 0-984 ft (0-300m) Blooms: Apr-June (CNPS 2014).	A	**Not likely to affect.** Alkaline soils not present within BSA (NRCS 2014).
Invertebrates							
Branchinecta conservatio	conservancy fairy shrimp	FE	-		Vernal pools, often large and turbid pools (USFWS 2005).	A	**Not likely to affect.** Suitable habitat (large, turbid pools) not present.
Branchinecta lynchi	vernal pool fairy shrimp	FT	-		Found only in vernal pools and ephemeral wetlands. Distributed throughout the Central Valley, including Sacramento County (USFWS 2005).	P	**May affect.** Seasonally inundated swales and pools provide suitable habitat.
	Critical Habitat, vernal pool fairy shrimp	X	-			A	**No effect.** PSA not located within Critical Habitat Unit.
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	-		Dependent on hostplant, elderberry (Sambucus spp.), which generally grows in riparian woodlands and upland habitats of the Central Valley. Current distribution in the Central Valley from Shasta County to Fresno County (USFWS 1999).	A	**No effect.** Host plant not present within BSA.
	Critical Habitat, valley elderberry longhorn beetle	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.
Lepidurus packardi	vernal pool tadpole shrimp	FE	-		Wide variety of ephemeral wetland habitats, including vernal pools. Distributed throughout Central Valley and San Francisco Bay area (USFWS 2005).	P	**May affect.** Seasonally inundated swales and pools provide suitable habitat.
	Critical Habitat, vernal pool tadpole shrimp	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.
Fish							
Acispenser medirostris	green sturgeon	FT	SSC		Entire coast of California. Spawning occurs in Sacramento River and Klamath River (USFWS 1996). Oceanic waters, bays, and estuaries during non-spawning season. Spawning habitat = deep pools in large, turbulent, freshwater mainstems (NMFS 2005).	A	**No effect.** Suitable habitat not present.
Hypomesus transpacificus	delta smelt	FT	SE		Distribution includes the Sacramento River below Isleton, San Joaquin River below Mossdale, and Suisun Bay. Spawning areas include the Sacramento River below Sacramento, Mokelumne River system, Cache Slough, the delta, and Montezuma Slough (USFWS 1995).	A	**No effect.** Suitable habitat not present.
	Critical Habitat, delta smelt	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Lampetra ayresii	river lamprey	-	SSC		Adults require clean, gravelly riffles in permanent streams for spawning, while the ammocoetes require sandy backwaters or stream edges in which to bury themselves, where water quality is continuously high and temperatures do not exceed 25°C (Moyle et. al).	A	**No effect.** Suitable habitat not present.
Mylopharodon conocephalus	hardhead	-	SSC		Small to large streams in a low to mid-elevation environment. May also inhabit lakes or reservoirs. Their preferred stream temperature might easily exceed 20°C, though these fish do not favor low dissolved oxygen levels. Therefore the hardhead minnow is usually found in clear deep streams with a slow but present flow. Though spawning may occur in pools, runs, or riffles, the bedding area will typically be characterized by gravel and rocky substrate (CalFish 2014).	A	**No effect.** Suitable habitat not present.
Oncorhynchus mykiss	Central Valley steelhead	FT	-		Spawning habitat = gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning = estuarine, marine waters (Busby 1996)	A	**No effect.** Suitable habitat not present.
	Critical Habitat, Central Valley steelhead	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.
Oncorhynchus tshawytscha	Central Valley spring-run chinook salmon	FT	ST		Spawning habitat = fast moving, freshwater streams and rivers. Juvenile habitat = brackish estuaries. Non-spawning = marine waters (Myers 1998).	A	**No effect.** Suitable habitat not present.
	Valley spring-run chinook salmon	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.
	winter-run chinook salmon, Sacramento River	FE	SE			A	**No effect.** Suitable habitat not present.
	chinook salmon, Central Valley fall/late fall-run ESU	-	SSC			A	**No effect.** Suitable habitat not present.
Pogonichthys macrolepidotus	Sacramento splittail	-	SSC		Prefer slow-moving sections of freshwater rivers and sloughs. Most abundant in Suisun Bay and Marsh region. Largely absent from Sacramento River except during spawning (USFWS 1995).	A	**No effect.** Suitable habitat not present.
Spirinchus thaleichthys	longfin smelt	FC	ST/SSC		Adults and juveniles require salt or brackish estuary waters. Spawning takes place in freshwater over sandy-gravel substrates, rocks, and aquatic plants (Moyle et. al 1995).	A	**No effect.** Suitable habitat not present.
					Amphibians		
Ambystoma californiense	California tiger salamander, central population	FT	ST		Occurs in grasslands of the Central Valley and oak savannah communities in the Central valley, the Sierra Nevada and Coast ranges, and the San Francisco Bay area. Needs seasonal or semi-permanent wetlands to reproduce, and terrestrial habitat with active ground squirrel or gopher burrows (Bolster 2010).	P	**Not likely to affect.** Suitable habitat not present. BSA outside know range in Sacramento Count (Bolster 2010).
	Critical Habitat, CA tiger salamander, central population	X	-			A	**No effect.** BSA not located within Critical Habitat Unit.
Rana draytonii	California red-legged frog	FT	SSC		Found mainly near ponds in humid forests, woodlands, grasslands, coastal scrub, and streamsides with plant cover. Most common in lowlands or foothills. Frequently found in woods adjacent to streams. Breeding habitat is in permanent or ephemeral water sources: lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. Ephemeral wetland habitats require animal burrows or other moist refuges for estivation when the wetlands are dry. From sea level to 5,000 ft. (1,525 m.) (Nafis 2014).	A	**Not likely to affect.** Suitable habitat not present. Species mostly extirpated from Central Valley floor (CDFW 2014b).
Spea hammondii	western spadefoot	-	SSC		Open areas with sandy/gravelly soils. Variable habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Rainpools which do not contain bullfrogs, fish, or crayfish are necessary for breeding (Nafis 2014).	P	**Not likely to affect.** Suitable habitat may be present; however, nearest known occurrence of this species is near Sloughhouse, over 7.5 miles northeast of the BSA. Occurrences are clustered around the foothills, with none occurring in the lowlands (CDFW 2014c).
					Reptiles		
Emys marmorata	western pond turtle	-	SSC		Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. May enter brackish water and even seawater. Found at elevations from sea level to over 5,900 ft (1,800 m). (Nafis 2014).	A	**No effect.** Suitable aquatic habitat not present. Hydroperiod of drainage ditches and swales not long enough to provide aquatic habitat. Project boundary is over 200 feet away from Laguna Creek; thus, no upland habitat is present.
Thamnophis gigas	giant garter snake	FT	ST		Marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, rice fields and their associated uplands. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November- mid March). Ranges in the Central Valley from Butte County to Buena Vista Lake in Kern County. Endemic to valley floor wetlands (USFWS 2012).	A	**No effect.** Suitable aquatic habitat not present. Hydroperiod of drainage ditches and swales not long enough to provide aquatic habitat. Project boundary is over 200 feet away from Laguna Creek; thus, no upland habitat is present.
					Birds		
Agelaius tricolor	tricolored blackbird	-	SSC		Nest in wetlands or in dense vegetation near open water. Dominant nesting substrates: cattails, bulrushes, blackberry, agricultural silage. Nesting substrate must either be flooded, spinous, or in some way defended against predators (Hamilton 2004).	A	**Not likely to affect.** Suitable nesting substrate not present.
Ammodramus savannarum	grasshopper sparrow	-	SSC		In the foothills and lowlands west of the Cascades/Sierras. Dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches (CDFW 2014b)	A	**Not likely to affect.** Suitable habitat not present. Grassland is composed of weedy annual species. Shrubs are absent.
Aquila chrysaetos	golden eagle	-	FP		Uncommon resident and migrant throughout California, except center of Central Valley. Habitat typically rolling foothills, mountain areas, sage-juniper flats, desert (CDFW 2014b).	A	**No effect.** Suitable habitat not present.

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur
Athene cunicularia	burrowing owl	-	SSC		Open, flat expanses with short, sparse vegetation and few shrubs, level to gentle topography and well drained soils. Requires underground burrows or cavities for nesting and roosting. Can use rock cavities, debris piles, pipes and culverts if burrows unavailable. Habitats include grassland, shrub steppe, desert, agricultural land, vacant lots and pastures (CDFW 2014b).	P	**May affect.** Suitable habitat present.
Buteo swainsoni	Swainson's hawk	-	ST		Nests in stands with few trees in riparian areas, juniper-sage flats, and oak savannah in the Central Valley. Forages in adjacent grasslands, agricultural fields and pastures (CDFW 2014b).	P	**May affect.** Suitable foraging habitat present.
Chaetura vauxi	Vaux's swift	-	SSC		Prefers redwood and Douglas fir habitats with nest sites in large hollow trees and snags, especially tall, burnt-out stubs (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Circus cyaneus	northern harrier	-	SSC		Nest on the ground in patches of dense, tall vegetation in undisturbed areas. Breed and forage in variety of open habitats such as marshes, wet meadows, weedy borders of lakes, rivers and steams, grasslands, pastures, croplands, sagebrush flats and desert sinks (Shuford 2008). Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas (CDFW 2014b).	A	**Not likely to affect.** Suitable nesting habitat not present.
Coccyzus americanus occidentalis	western yellow-billed cuckoo	PT	SE		Requires large, dense tracts of riparian woodland with well-developed understories. Occurs in deciduous trees or shrubs. Prefers willow, but will also nest in orchards adjacent to streams in Sacramento Valley. Restricted to moist habitats along slow-moving waterways during breeding season (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Elanus leucurus	white-tailed kite	-	FP		Typically nest in the upper third of trees that may be 10–160 ft. (33-525 m.) tall. These can be open-country trees growing in isolation, or at the edge of or within a forest (Cornell 2013).	P	**May affect.** Suitable foraging and nesting habitat present.
Grus canadensis canadensis	lesser sandhill crane	-	SSC		In summer, occurs in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. In winter, frequents moist croplands with	A	**No effect.** Suitable habitat not present.
Grus canadensis tabida	greater sandhill crane	-	ST/FP		rice or corn stubble, and open, emergent wetlands. Prefers treeless plains. Nests in remote portions of extensive wetlands or sometimes shortgrass prairies (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Ixobrychus exilis	least bittern	-	SSC		Large, freshwater wetlands with dense emergent vegetation (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Lanius ludovicianus	loggerhead shrike	-	SSC		Breed in shrublands or open woodlands with a fair amount of grass cover and areas of bare ground (Shuford 2008).	A	**Not likely to affect.** Suitable habitat not present.
Melospiza melodia	song sparrow ("Modesto" population)	-	SSC		Breeds and winters in riparian, fresh or saline emergent wetland, and wet meadows. Breeds in riparian thickets of willows, other shrubs, vines, tall herbs, and fresh or saline emergent vegetation (CDFW 2014b).	A	**Not likely to affect.** Suitable habitat not present.
Progne subis	purple martin	-	SSC		Woodland and forest habitats with numerous suitable nest cavities, open air space above nest sites, and aerial insect prey (Shuford 2008).	A	**No effect.** Suitable habitat not present.
Riparia riparia	bank swallow	-	ST		Riparian areas with sandy, vertical bluffs or riverbanks. Also nest in earthen banks and bluffs, as well as sand and gravel pits (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Sternula antillarum browni	California least tern	FE	SE/FP		Nest and roost in colonies on open beaches, forage near shore ocean waters and in shallow estuaries ad lagoons (USFWS 2006).	A	**No effect.** Suitable habitat not present.
Xanthocephalus xanthocephalus	yellow-headed blackbird	-	SSC		Nest in marshes with tall, emergent vegetation (e.g., tules and cattails) adjacent to deepwater (Shuford 2008).	A	**No effect.** Suitable habitat not present.
Mammals							
Lasiurus blossevillii	western red bat	-	SSC		Roosting habitat includes forests and woodlands, often in edge habitats adjacent to streams, fields, or urban areas (CDFW 2014b).	A	**No effect.** Suitable habitat not present.
Taxidea taxus	American badger	-	SSC		Open shrub, forest and herbaceous habitats with friable soils. Associated with treeless regions, prairies, park lands and cold desert areas. Range includes most of California, except the North Coast (CDFW 2014b).	P	**Not likely to affect.** Suitable habitat may be present; however, closest known occurrences are over 5 miles away and are seperated from the BSA by urban sprawls (CDFW 2014c).

Sources: CDFW 2014a, CNPS 2014, USFWS 2014

Key
Federal & State Status
(FC) Federal Candidate
(FD) Federally Delisted
(FE) Federal Endangered
(FP) Fully Protected
(FT) Federal Threatened
(PT) Proposed Threatened
(SCE) State Candidate Endangered
(SCT) State Candidate Threatened
(SE) State Endangered
(SR) State Rare
(SSC) State Species of Special Concern
(ST) State Threatened
(X) Federally Designated Critical Habitat
CNPS Rare Plant Rank
Rareness Ranks
(1A) Presumed Extinct in California
(1B) Rare, Threatened, or Endangered in California and Elsewhere
(2B) Rare, Threatened, or Endangered in California, But More Common Elsewhere
Threat Ranks
(0.1) Seriously threatened in California
(0.2) Fairly threatened in California
(0.3) Not very threatened in California

Scientific Name	Common Name	Federal Status	State Status	CNPS Rare Plant Rank	Habitat	Habitat Present/ Absent	Potential to Occur

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APPENDIX E – ARCHAEOLOGICAL ASSESSMENT

cogstone

PALEONTOLOGY - ARCHAEOLOGY - HISTORY

ARCHAEOLOGICAL ASSESSMENT OF THE SHELDON ROAD AND WATERMAN ROAD INTERSECTION IMPORVEMENTS PROJECT, ELK GROVE, SACRAMENTO COUNTY, CALIFORNIA

Prepared for:
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Molly Valasik, M.A.
Registered Professional Archaeologist

January 2015

Cogstone Project Number: 2374-002
Type of Study: Cultural resources assessment
Archaeological Sites: P-34-1102
USGS Quadrangle: Elk Grove 7.5'
Area: 14.95 acres
Key Words: Plains Mi-wuk, Elk Grove

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MANAGEMENT SUMMARY

The purpose of this study is to determine the potential Project-related effects on cultural resources of construction-related activities of the Sheldon Road/Waterman Road Intersection Improvement Project. The City of Elk Grove proposes to improve the Sheldon Road/Waterman Road intersection in Sacramento County, California. The proposed project consists of a single-lane roundabout realigned to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road.

Cogstone Resource Management Inc. was retained by PMC to complete the cultural resources inventory of the Project Area. Identification efforts by Cogstone for this report included a review of existing literature and historic maps, review of a record search conducted by the North Central Information Center, and intensive pedestrian survey. Native American consultations were conducted with the Native American Heritage Commission and nine individuals.

The record search indicates five studies have been previously completed within a portion of the Project Area, while seven additional studies have been completed within a half-mile radius of the Project Area. The results of these studies indicate there is one known historical architectural resource, P-34-1102, Historic Hurley-Tracy Transmission Line No. 1, within the Project Area. A total of seven cultural resources have been previously documented outside the Project Area within the half-mile radius. Of these seven resources outside the Project Area, three are prehistoric sites, two are prehistoric isolates, and 2 are historical architectural resources (a road and a commercial building).

An intensive-level pedestrian survey of the 14.95-acre Project Area was completed on December 15, 2014. Within the Project Area, outside the hardscaped segments of Sheldon Road and Waterman Road, ground visibility ranged from poor to excellent depending on the density of vegetation coverage. Historic Hurley-Tracy Transmission Line No. 1, P-34-001102, was identified trending north-south along the eastern boundary of the Project Area. The transmission towers for P-34-001102 are not located within the Project Area and therefore no negative impacts are anticipated for this resource.

The Project Area has a low sensitivity for discovery of prehistoric, ethnohistoric, or historic-era cultural resources. Located within the Morrison Creek Stream Group drainage basin, the broad, low-relief alluvial plain has been heavily impacted by alluvial deposition, historic period settlement, levee construction, and agricultural practices. Additionally, prior archaeological research conducted in the basin in the early 1970s found no evidence of historic or prehistoric mound, midden, housepit, village, or satellite village sites along the Laguna Creek drainage system. This finding is supported by prehistoric and ethnographic settlement data that indicate a preference within this region for occupation near watercourses on high ridges, knolls, elevated natural levees, such as found along the Cosumnes River, or the sandy islands in the Delta, not on more unstable landforms like the Laguna Creek floodplain and alluvial deposits.

Unanticipated finds during excavation require that the Project halt work in the vicinity of the find (minimum 50 foot radius) until it can be evaluated by a qualified archaeologist.

INTRODUCTION

PURPOSE OF STUDY

The purpose of this study is to determine the potential Project-related effects on cultural resources of construction-related activities of the Sheldon Road/Waterman Road Intersection Improvement Project. The City of Elk Grove proposes to improve the Sheldon Road/Waterman Road intersection in Sacramento County, California (Figure 1). The study was requested by The City of Elk Grove to meet their responsibilities as the lead agency under California Environmental Quality Act (CEQA).

PROJECT DESCRIPTION

The Project proposes to realign and improve the existing stop-sign controlled intersection at Sheldon Road and Waterman Road (Figure 2). The Sheldon-Waterman intersection will be realigned to the east and replaced with a roundabout configuration. Existing land uses surrounding the project site includes rural residential and agricultural. Sheldon Road is a two-lane rural roadway that runs east to west and connects Center Parkway with Grant Line Road and provides access for residential areas. Sheldon Road is ultimately planned as a four-lane arterial within the City of Elk Grove Planning Area boundaries in the City of Elk Grove General Plan Circulation Element. Waterman Road is a two-lane rural roadway that runs north to south and provides local access to industrial businesses, residential neighborhoods, and agricultural land uses. Waterman Road is also ultimately planned as a four-lane arterial in the City of Elk Grove General Plan Circulation Element. Specifically, the Project is depicted on the Elk Grove 7.5-minute quadrangle in Sections 19, 20, 29, and 30 of Township 7 North, Range 6 East, Mount Diablo Baseline and Meridian (see Figure 2).

The City's Rural Road Improvement Policy, applicable to the Rural Sheldon Area in which the project is located, sets forth a value based approach from incremental, rather than ultimate, road improvements that solve specific traffic issues. The City's Rural Road Improvement Standards, in conjunction with the Rural Road Improvement Policy, establishes rural road improvement design standards for roadway improvement projects located in the Rural Residential areas of Elk Grove. The Sheldon-Waterman Intersection Improvement Project is required to comply with the Rural Road Improvement Policy and the Rural Road Improvement Standards established and adopted by the City.

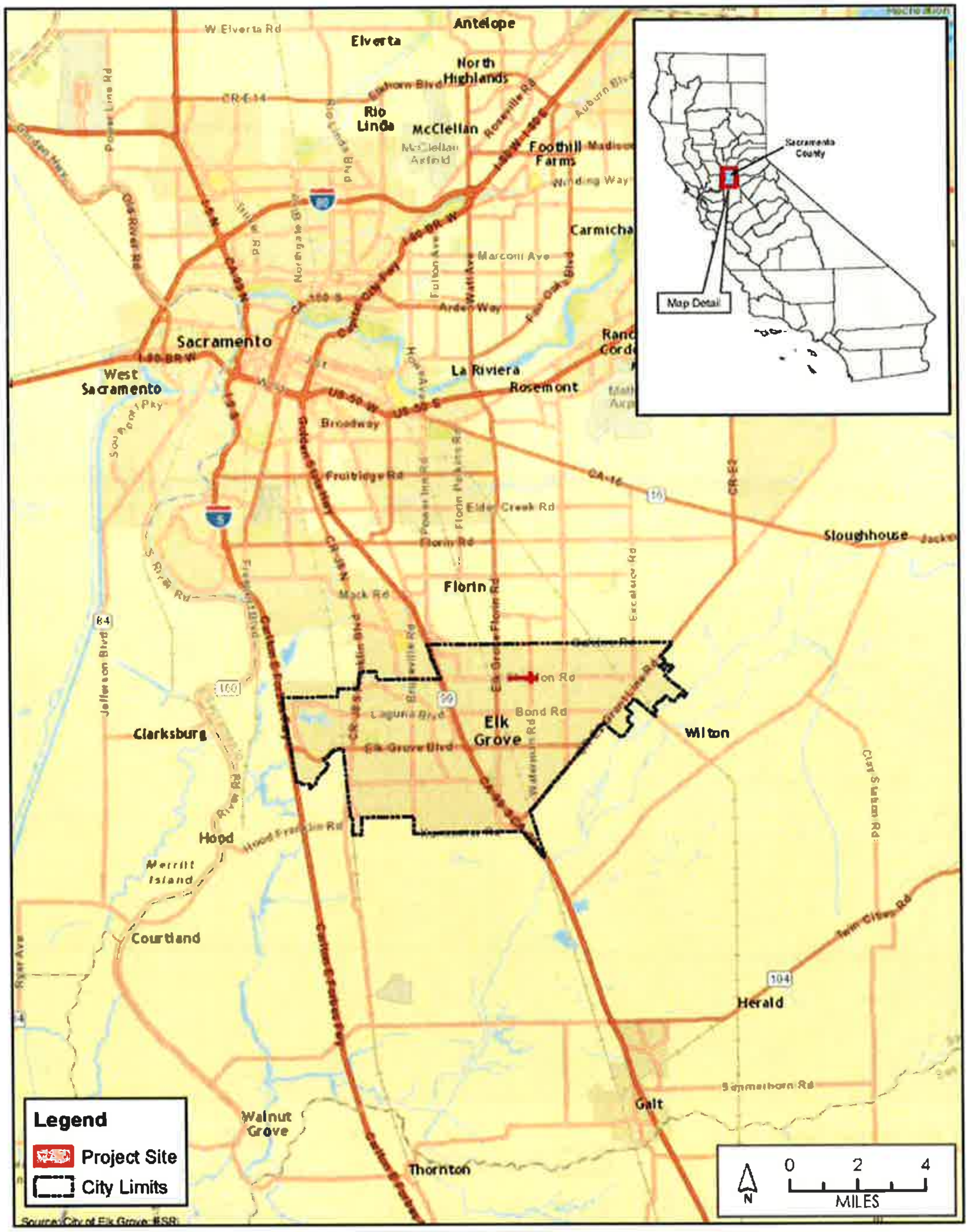

Figure 1. Project vicinity

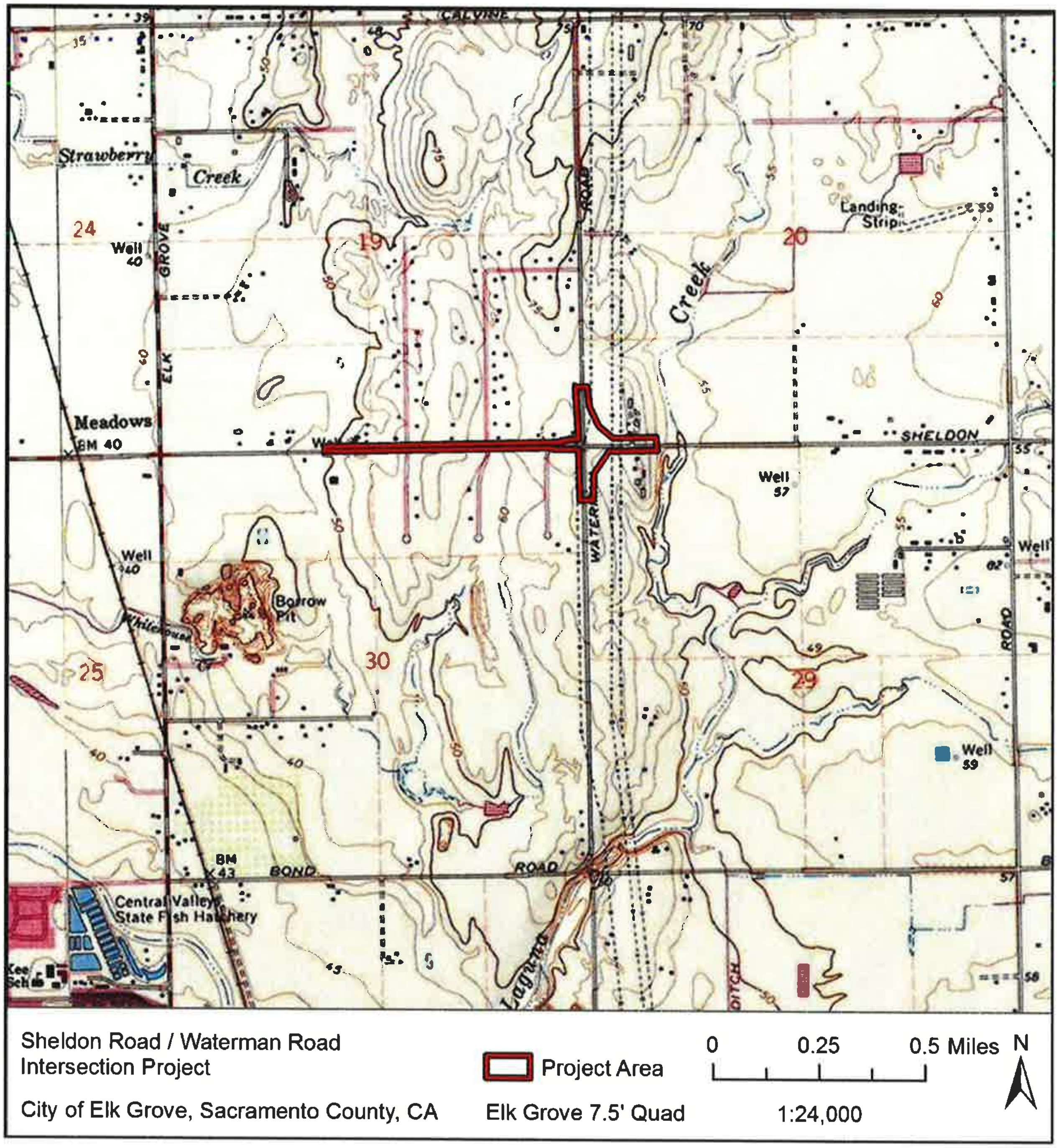

Figure 2. Project area

The Sheldon Road/Waterman Road Intersection Improvement project would include a single-lane roundabout realigned to the east with a separate southbound right turn lane from southbound Waterman Road to westbound Sheldon Road (Figure 3). Other improvements will include pedestrian accessible crossings at the intersection (roundabout), drainage improvements, and other incidental features. Realigned portions of Waterman Road may extend about 700 feet north and south of Sheldon Road. Sheldon Road will also be reconfigured from Briskin Drive to Waterman Road. Sheldon Road improvements, including new roundabout, will extend about 900 feet east of the existing intersection. Realigned driveway access will be provided to adjacent properties on the west side of Waterman Road.

The widening would require acquisition of right-of-way from the following properties:

1. Parcel at northeast quadrant of intersection, Assessor's Parcel No. 121-0180-012
2. Parcel at southeast quadrant of intersection, Assessor's Parcel No. 127-0010-077

Additional right-of-way would be acquired for ultimate improvements to the intersection. Existing drainage patterns in the project area will be maintained, although ditches may be improved. All work on Sheldon Road from Briskin Drive to Waterman Road will be performed within the existing right of way.

PROJECT PERSONNEL

Cogstone Resource Management Inc. (Cogstone) conducted the cultural resources studies. Molly Valasik prepared portions of this report, including the sources consulted and history sections. Ms. Valasik is a RPA and holds a M.A. in Anthropology from Kent State University in Kent, Ohio. She has more than five years of experience in California archaeology. Nancy Sikes wrote the prehistoric setting and ethnography. Dr. Sikes is a Registered Professional Archaeologist (RPA) who holds a Ph.D. in Anthropology from the University of Illinois at Urbana-Champaign and a B.A. in Anthropology from the University of Nevada, Reno. Dr. Sikes has more than 20 years of experience with the cultural resources of California and the Great Basin. Qualifications of Cogstone personnel are provided in Appendix A.

Figure 3. Project aerial

REGULATORY ENVIRONMENT

This study was completed under the provisions of the California Environmental Quality Act of 1970 (CEQA) (California Code of Regulations [CCR] Title 14 Section 15064.5 and Public Resources Code [PRC] Section 21083.2). CEQA declares that it is state policy to "take all action necessary to provide the people of this state with...historic environmental qualities." It further states that public or private projects financed or approved by the state are subject to environmental review by the state. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies that analyze the environmental effects of a proposed project. In the event that a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered.

CEQA includes historic built-environment and archaeological resources as integral features of the environment. CEQA requires a lead agency to determine whether a project may have a significant effect on historical resources. A historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources (CRHR) (Section 21084.1), a resource included in a local register of historical resources (Section 15064.5(a) (2)), or any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant (Section 15064.5 (a) (3)).

Public Resources Code (PRC) Section 5024.1, Section 15064.5 of the Guidelines, and Sections 21083.2 and 21084.1 of the Statutes of CEQA were used as the basic guidelines for the cultural resources study. PRC Section 5024.1 directs evaluation of historical resources to determine their eligibility for listing on the CRHR. The purpose of the register is to maintain listings of the state's historical resources and to indicate which properties are to be protected from substantial adverse change. Note that California Historical Landmarks with numbers 770 or higher are automatically included in the CRHR.

The criteria for listing resources on the CRHR were expressly developed to be in accordance with previously established criteria developed for listing on the National Register of Historic Places (NRHP), and require similar protection to what Section 106 of the National Historic Preservation Act (NHPA) mandates for historic properties. According to Public Resources Code (PRC) Section 5024.1(c) (1-4), a resource is considered historically significant if it meets at least one of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States

2. Is associated with the lives of persons important to local, California or national history
3. Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values
4. Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation

Under CEQA, if an archeological site is not a significant "historical resource" but meets the definition of a "unique archeological resource" as defined in PRC Section 21083.2, then it should be treated in accordance with the provisions of that section. A unique archaeological resource is defined in PRC Section 21083.2(g) as follows:

An archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Resources that neither meet any of these criteria for listing on the NRHP or CRHR nor qualify as a "unique archaeological resource" under CEQA PRC Section 21083.2 are viewed as not significant. Under CEQA, "A non-unique archaeological resource need be given no further consideration, other than the simple recording of its existence by the lead agency if it so elects" [PRC Section 21083.2(h)].

Impacts to historical resources that alter the characteristics that qualify the historical resource for listing on the CRHR are considered to be a significant effect under CEQA. The impacts to a historical resource are considered significant if the project activities physically destroy or damage all or part of a resource, change the character of the use of the resource or physical feature within the setting of the resource which contribute to its significance, or introduce visual, atmospheric, or audible elements that diminish the integrity of significant features of the resource.

If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that they cannot be left undisturbed, mitigation measures are required (Section 21083.2 (a), (b), and (c)).

BACKGROUND

ENVIRONMENT

The Project area is located in the Sacramento Valley within the Great Valley Geomorphic Province. The Great Valley Province is a long, narrow northwest-trending alluvial valley that lies between the Sierra Nevada Range to the east and the Coast Ranges to the west (Wagner 2002). The Sacramento Valley is located in the northern portion of the Great Valley and is bounded by the Klamath Mountains to the north and the Stockton Arch to the south. This region formed as a forearc basin during the subduction of the Pacific plate underneath the North American plate. Valley sediments range from Jurassic to Holocene in age and record a history of alternating marine and terrestrial depositional environments (McPherson and Garven 1999).

The Cosumnes River is located approximately 4.0 miles southeast of the APE, the American River 9.0 miles to the north, and the Sacramento River 7.6 miles to the west. The project vicinity contains a number of creek drainages, including Deer, Elder, Laguna, and Morrison creeks. Laguna Creek is located approximately 300 feet to the east of the Project Area. Laguna Creek is approximately 25 miles long, extending southwestward to its termination within the City limits at Morrison Creek. Morrison Creek empties into the Sacramento River. The Morrison Creek Stream Group drainage basin, which includes Laguna Creek and its tributaries, covers 192 square miles.

The Project area is best characterized as a broad, low-relief alluvial plain, with an elevation of 60 feet above mean sea level. It is underlain by recent Holocene alluvium and by alluvial fan deposits of the Pleistocene Riverbank Formation (Helley and Harwood 1985; Page 1986; Wagner et al. 1981). These alluvial deposits vary in thickness from a few centimeters to 10 meters (30 feet). Such deposits typically form levees along the major rivers in this region, and are comprised primarily of a mixture of unweathered gravel, sand, and silt of Holocene age.

The Mediterranean climate near the project area is characterized by hot, dry summers and warm, moist winters. The project area falls within a climate region where the winter precipitation falls as rain, with rare snowfalls. Average annual rainfall is about 20 inches, with the rainy season generally from November through March. The temperature ranges from 20 to 115 degrees

Fahrenheit during the year. Summer highs are usually in the 90s, while winter lows only occasionally are below freezing. When California initially was occupied, the climate was moister and cooler than today's Mediterranean climate (Major 1988).

The current environmental setting of the Project area is mixed rural/residential with single-family residential parcels and agricultural lands, some of which are used for livestock grazing. The residential parcels include landscaping with non-native plants.

PREHISTORIC CULTURAL SETTING

The archaeology of California's Central Valley is divided into five temporal periods (Fredrickson 1973, 1974, 1994; Rosenthal et al. 2007) (Table 1). Variation in climate and environment generally coincide with these broad chronological divisions. The transition from the Paleoindian to Lower Archaic periods, for example, corresponds to the drying of Pleistocene pluvial lakes. Within the greater project region, the cultural framework is also divided into three regionally based "patterns" that mark changes in distinct artifact types, subsistence orientation, and settlement patterns.

The Windmiller, Berkeley, and Augustine patterns generally conform to the Middle Archaic, Upper Archaic, and Emergent temporal divisions, and were defined four decades ago by Fredrickson (1973, 1974). Fredrickson initially identified each pattern at specific archaeological sites in the region; namely, the Windmiller site (CA-SAC-107) near the Cosumnes River in Sacramento County, the West Berkeley site (CA-ALA-307) in Alameda County on the east side of the Bay, and the Augustine site (CA-SAC-127) in the Sacramento–San Joaquin Delta. Each pattern or cultural tradition represents a general expression of resource exploitation that began circa 5,550 cal B.C. during the Middle Archaic Period and lasted until historic contact in the early 1800s.

TABLE 1. CULTURAL PERIODS FOR THE CENTRAL VALLEY

Period	Regional Pattern	Dates *
Paleoindian		11,500–8,550 cal B.C.
Lower Archaic		8,550–5,550 cal B.C.
Middle Archaic	Windmiller	5,550–550 cal B.C.
Upper Archaic	Berkeley	550 cal B.C.–cal A.D. 1100
Emergent Period	Augustine	cal A.D. 1100–Historic Contact

* Timeframes are adjusted for modern calibration curves for radiocarbon dates (cal=calibrated).

Paleoindian and Lower Archaic Periods (11,500–5,550 cal B.C.)

Few archaeological sites that predate 5,000 years ago have been discovered in the region. Near the end of the Pleistocene (approximately 9,050 cal B.C.) and during the early Middle Holocene (approximately 5,550 cal B.C.), there were periods of climate change and associated alluvial deposition throughout the central California lowlands (Rosenthal et al. 2007:151). The change in climate and rising sea levels at the start of the Middle Holocene also led to the development of the extensive marshland known as the Sacramento–San Joaquin Delta (Atwater and Belknap 1980). Recent geoarchaeological studies (e.g., Meyer and Rosenthal 2008; Rosenthal and Meyer 2004a, 2004b; White 2003) have verified that large segments of the Late Pleistocene landscape were removed or buried by periodic episodes of deposition or erosion during the Middle Holocene. These studies confirm estimates advanced by Moratto (1984:214) that Paleoindian and Lower Archaic sites were buried during the last 5,000 to 6,000 years by deposits of Holocene alluvium up to 10 meters thick along the lower stretches of the Sacramento River and San Joaquin River drainage systems.

One of the few Early Holocene sites in the region was discovered buried approximately two meters below the surface within an alluvial fan (Meyer and Rosenthal 1998). Located just above the valley floor in the foothills of eastern Contra Costa County, CA-CCO-637 has a record of human occupation dating to 8,500 years ago during the Lower Archaic Period. Other Lower Archaic Period sites have been excavated in the foothills of Calaveras County, notably at the Skyrocket site (CA-CAL-629/630) (LaJeunesse and Pryor 1996).

Middle Archaic Period/Windmiller Pattern (5550–550 cal B.C.)

Middle Archaic Period archaeological sites are more common in the foothills, particularly in buried contexts between circa 4,050 and 2,050 cal B.C., and are relatively scarce on the valley floor (Rosenthal et al. 2007:153). The archaeological record indicates Windmiller Pattern populations followed a seasonal foraging strategy and exploited a wide range of natural resources, including a variety of large and small mammals, fish, waterfowl, and plant resources (Fredrickson 1973; Heizer 1949; Ragir 1972; Moratto 1984). It is also likely that populations occupied higher elevations in the summer and shifted to lower elevations during the winters (Moratto1984:206), and that residential stability along river corridors within the Central Valley increased during this period (Rosenthal et al. 2007:153).

Faunal remains recovered from Windmiller Pattern sites include tule elk, deer, pronghorn, and rabbits, while fish remains include salmon, sturgeon, and smaller fishes. Seeds or acorns apparently formed an important part of the diet during this period (Moratto 1984:201; Rosenthal et al. 2007:153, 155). The remains of acorns and pine nuts have been recovered from foothill sites in Calaveras (CA-CAL-629/630 and CA-CAL-789) and Fresno (CAL-FRE-61) counties, and milling implements found at Windmiller Pattern sites include grinding slabs (metates) and handstones (manos), as well as mortar fragments.

Projectile points common at Windmiller Pattern sites are classified within the Sierra Contracting Stem and Houx Contracting Stem series (Justice 2002:266, 276). Spears, angling hooks, composite bone hooks, and baked clay artifacts that may have been used as net or line sinkers represent the variety of fishing implements found at sites dating to this period. Other baked clay items include pipes and discoids, as well as cooking "stones." Impressions of twined basketry, bone tools, shell beads, and ground and polished charmstones have also been recovered. A variety of grave goods accompanied burials in cemetery areas, which were separate from habitation areas.

The presence during the Middle Archaic of an established trade network is indicated by a variety of exotic cultural materials, including obsidian tools, quartz crystals, and *Olivella* shell beads. Obsidian sources during this period included quarries in the eastern Sierra, Cascades, and North Coast Ranges (Rosenthal et al. 2007:153, 155).

Upper Archaic Period/Berkeley Pattern (550 cal B.C.–cal A.D. 1100)

The Windmiller Pattern shifted to a more specialized, adaptive pattern over a 1,000-year period during the Upper Archaic. An increase in mortars and pestles, accompanied by a decrease in slab milling stones and handstones, indicates a shift to a greater reliance on acorns as a dietary staple during the Berkeley Pattern (Fredrickson 1974:125; Moratto 1984:209; Wohlgemuth 2004; Rosenthal et al. 2007:156). Archaeologists generally agree that milling slabs and handstones may have been used primarily for grinding wild grass grains and seeds, while mortars and pestles are better suited to crushing and grinding acorns (Moratto 1984:209–210).

Berkeley Pattern populations continued to exploit a variety of natural resources. Subsistence strategies varied regionally, focusing on seasonally available resources suited for harvesting in bulk, such as salmon, shellfish, deer, rabbits, and acorns (Rosenthal et al. 2007:156). Numerous large shell mounds dating to this period are located near fresh or salt water and indicate exploitation of a variety of aquatic resources was relatively intensive. The artifact assemblage also demonstrates hunting persisted as an important aspect of food procurement (Fredrickson 1973:125-126). Specialized technologies proliferated, producing numerous types of bone tools, *Olivella* shell beads, *Haliotis* ornaments, and ceremonial blades, among other cultural items.

The accumulations of cultural debris and habitation features, such as rock-lined ovens, house floors, burials, hearths and fire-cracked rock, reflect long-term residential occupation (Bouey 1995:348-349). Mortuary practices continued to be dominated by interment, although a few cremations have been discovered from Berkeley Pattern sites. The stratigraphic record at CA-

SAC-107 in the eastern delta shows replacement of the Windmiller Pattern by the Berkeley tradition.

The subsistence pattern characteristic of the Berkeley tradition may have developed initially in the San Francisco Bay region, and then spread to the surrounding coastal areas and central California. As suggested by Moratto (1984:207-211), the Berkeley Pattern is likely related to Eastern Miwok population expansion, spreading from the San Francisco Bay area to the Sacramento Valley and Sierran foothills.

Emergent Period/Augustine Pattern (cal A.D. 1100–Historic Contact)

A growth in population accompanies a substantial increase in the intensity of subsistence exploitation associated with the Augustine Pattern during the Emergent Period (Moratto 1984:211-214; Rosenthal et al. 2007:157-159). Fishing, hunting, and gathering plant foods continue as the foci of subsistence practices, including intensive harvesting of acorns. The Emergent Period is marked by the introduction of the bow and arrow. Small Gunther barbed series projectile points are present early in the period, with Desert-side notched points occurring later in the period (Rosenthal et al. 2007:158). A unique arrow point style (Stockton serrated) also developed during this period.

The Augustine Pattern toolkit also included bone fish hooks, harpoons, and gorge hooks for fishing. Hopper mortars and shaped mortars and pestles, as well as bone awls used for producing coiled baskets, are also common components of the artifact assemblages. Cosumnes Brownware has been recovered from sites in some parts of the lower Sacramento Valley. The appearance of ceramics is likely an outgrowth and direct improvement on the prior baked clay industry, although baked clay balls, which were probably used for cooking in the absence of stone, remain common.

Accompanying the increase in sedentism and population growth during this period is the development of social stratification, including an elaborate ceremonial and social organization. Cultural items associated with ceremonials and rituals include flanged tubular pipes and baked clay effigies representing humans and animals, among others. Clamshell disk beads were used as a form of currency and accompanied the development of extensive exchange networks. Mortuary practices included flexed burials, the cremation of high-status individuals, and pre-interment burning of offerings in grave pits (Fredrickson 1973:127-129; Moratto 1984:211). House floors or other structural remains have been discovered at Augustine Pattern sites in the valley and foothills, including ones in Calaveras and Sacramento counties (CA-CAL-1180/H, CA-SAC-29, CA-SAC-267) (Rosenthal et al. 2007:158).

The cultural patterns known from historic period Native American groups in the region are reflected in the subsistence and land use patterns practiced during the Emergent Period, as well as in the increase in sedentism and the development of social stratification typical of the Augustine Pattern (Rosenthal et al. 2007:157-158). According to Moratto (1984:211-214), the Augustine Pattern may represent the southward expansion of Wintu populations. In addition, many of the large villages with house pits that developed along the rivers, major tributaries, and the Delta have been attributed to known ethnographic settlements.

ETHNOGRAPHY

The Plains Mi-wuk (also spelled Miwok) historically occupied the Project area (Kroeber 1925; Levy 1978). They are one of four other Eastern Mi-wuk groups (Bay, Northern Sierra, Central Sierra, and Southern Sierra) whose Eastern Miwok language is a subfamily of the Miwokan branch of the Utian language family, Penutian stock. Prior to Euro-American contact, Plains Mi-wuk territory included the lower Mokelumne River, Cosumnes River, and the Sacramento River from Rio Vista to Freeport (Levy 1978:398-399). Neighboring groups included the Washoe to the east, Northern Valley Yokuts to the south, Patwin and Bay Miwok to the west, and the Nisenan to the north.

The Sacramento–San Joaquin Delta and surrounding areas provided the Plains Miwok with an abundance of natural resources. Seasonally mobile hunter-gatherers, their semi-permanent settlements or winter villages were located on high ridges or knolls near watercourses or on the sandy islands in the Delta. They also established hunting and fishing base camps on the Delta islands.

Political units among the Plains Mi-wuk were structured by similarities in language and ethnicity, and villages were divided into “tribelets” (Levy 1978:410). Tribelets averaged 300 to 500 individuals, and controlled specific lands and the natural resources within that territory. Each tribelet’s territory included a main village and smaller satellite villages. In the main village, a large semi-subterranean structure or a simpler circular brush structure served as the dance or assembly house (Kroeber 1925:447). Villages also contained dwellings, acorn granaries, conical sweathouses, and winter grinding houses (Levy 1978:408-409). Their dwellings were either aboveground conical houses made with tule-matting or were semi-subterranean. Cremation, rather than interment, was practiced by the Plains Mi-wuk (Kroeber 1925:452).

Ethnohistoric accounts from the Spanish colonial period have provided some information on tribelet locations along the west bank of the Sacramento River, the south bank of the Cosumnes River, and the banks of the Mokelumne River (Levy 1978:399; Kroeber 1925:446, Plate 37). In the Project vicinity, the principal tribelet villages included *Mayeman*, *Sukididi*, and *Yomit* along the Cosumnes River north of the Project area.

Similar to many other Native American groups in California, the acorn was the primary food staple of the Plains Mi-wuk, supplemented by fish, shellfish, waterfowl, and large and small mammals (Bennyhoff 1977; Levy 1978:402-403). Acorns from the prevalent valley oak (*Quercus lobata*) were collected in the late fall/early winter, plant greens and roots in the spring; and nuts and seeds in the spring, summer, and early fall. Acorns were stored in the conical-shaped granaries prior to processing. Large and small animals regularly hunted by the Plains Mi-wuk included mule deer, tule elk, pronghorn, rabbits, squirrels, beaver, and woodrats. Salmon were an important fish resource, along with sturgeon and lamprey.

The Plains Mi-wuk employed a variety of tools, implements, and enclosures for hunting and collecting natural resources (Levy 1978:403-404, 406). These included the bow and arrow, snares, traps, nets, and enclosures or blinds were used for hunting land mammals and birds, and nets, seines, hook and line, harpoons, and basketry traps for fishing. On navigable rivers, the principal water craft was the tule balsa canoe. They made both twined and coiled basketry, and used woven burden baskets were used to transport the seeds, roots, or nuts for processing or storage.

The array of tools and implements used by the Plains Mi-wuk to process food resources included bedrock mortars, cobblestone pestles, anvils, and portable stone mortars and pestles to grind or mill acorns and seeds (Levy 1978:405). During food preparation, a variety of knives, leaching and boiling baskets, woven strainers and winnowers, and woven drying trays, among others, were employed. Earth ovens were used to bake acorn bread.

Plains Mi-wuk participated in an extensive east-west trade network between the coast and the Great Basin (Levy 1978:411-412). They obtained marine shell (*Olivella* and abalone) and steatite from coastal groups. Basketry was an important trade item and moved in both directions. Salt and obsidian from the Sierras and Great Basin were traded westward.

The Native American population in the Sacramento Valley came into contact with Spanish explorers in the late 1700s as the Franciscan missions sought to convert interior peoples with the dwindling of coastal indigenous populations (Levy 1978:400). Plains Mi-wuk converts were transported to Mission San José in the early 1800s, although many resisted and tried to return to their villages in the Delta. Many Plains Mi-wuk labored on the large ranchos awarded during the Mexican period (Levy 1978:400-402), although in the 1820s and 1830s, many tribelets banded together to repel the invaders and with neighboring Yokuts, attacked Mexican coastal settlements.

During two epidemics in 1830 and 1837, foreign diseases decimated the indigenous populations in the Sacramento Valley (Cook 1955). Soon after the discovery in 1848 of gold in the Sierran foothills and the ensuing Gold Rush, the number of non-indigenous peoples into the California interior and Plains Mi-wuk territory increased exponentially. Population estimates show a momentous decline in Eastern Mi-wuk numbers from nearly 20,000 in 1805 to only 3,000 by 1856 (Cook 1943). With the resulting loss of the majority of their traditional lands, population numbers, and experiencing drastic alterations of their traditional lifeways, surviving Mi-wuk labored for the growing mining, ranching, farming, and lumber industries.

During the first half of the 1900s, the federal government acquired lands and established *rancherias* (reservations) from two acres to more than 300 acres), for the Plains Mi-wuk, Northern Sierra Mi-wuk and Central Sierra Mi-wuk (Levy 1978:401). Between 1934 and 1972, the U.S. Bureau of Indian Affairs terminated relations with most of these rancherias, but beginning in 1984, status to the majority has been restored.

At present, there are eight federally-recognized tribal rancherias with Eastern Mi-wuk populations. These include: Auburn Rancheria (Sierran Miwok, Placer County), Buena Vista (Plains Me-wuk, Amador County), Chicken Ranch (Central Sierra division of Eastern Me-wuk, Tuolumne County), Ione (Northern Sierra and Plains Miwok, Amador County), Jackson (Northern Sierra and Plains Me-wuk, Amador County), California Valley (formerly Sheep Ranch; Northern Sierra Miwok, Calaveras County), Shingle Springs (Plains Miwok, El Dorado County), Tuolumne (Central Sierra Me-wuk, Tuolumne County), and Wilton Rancheria (Plains and Sierra Miwok, Sacramento County) (BIA 2012).

HISTORICAL SETTING

SPANISH PERIOD (1769-1822)

Exploration between 1529 and 1769 of Alta (upper) California by Spanish expeditions was limited. The spring of 1769 marks the true beginning of Spanish settlement with the establishment by Gaspar de Portolá at San Diego of the first of 21 missions to be built along the California coast by the Spanish and Franciscan Order between 1769 and 1823. In the fall of 1769, Portolá reached San Francisco Bay. Later expeditions by Pedro Fages in 1772 and Juan Bautista De Anza in 1776 explored the land east of San Francisco Bay and into the vast plains to the east (Gunsky 1989:2-3).

The first expedition into the Sacramento Valley was led by Spanish Lieutenant Gabriel Moraga in 1808. Scouting for new mission locations and also searching for runaway Native American neophytes from the coastal missions, they traveled south as far as the Merced River and explored parts of the American, Calaveras, Cosumnes, Feather, Mokelumne, Sacramento, and Stanislaus

Rivers to the north. Luis Arguello led the final Spanish expedition into the interior of Alta California in 1817. They traveled up the Sacramento River, past today's City of Sacramento, to the mouth of the Feather River, before returning to the coast (Beck and Haase 1974:18, 20; Gunsky 1989:3-4).

MEXICAN PERIOD (1822-1848)

After Mexico gained independence from Spain in 1822, the Mission lands were secularized under the Secularization Act of 1833, but much of the land was transferred to political appointees. A series of large land grants (ranchos) that transferred Mission properties to private ownership were awarded by the various governors of California. Land grants were also awarded in the interior to increase the population away from the coastal areas that were settled during the Spanish Period. Captain John Sutter received the two largest land grants in the Sacramento Valley. In 1839, Sutter founded a trading and agricultural empire called *New Helvetia*, which was headquartered at Sutter's Fort near the divergence of the Sacramento and American Rivers, in Valley Nisenan territory.

The Mexican Period also marks the exploration by American fur trappers west of the Sierra Nevada Mountains. Jedediah Smith was the first trapper to enter California; his small party trapped and explored along the Sierra Nevadas in 1826 and then entered the Sacramento Valley in 1827. They traveled along the American and Cosumnes rivers, and camped near the Rosemont section of modern-day Sacramento and Wilton. The explorations by Smith and other trappers resulted in the creation and then circulation of maps of the Sacramento Valley in the 1830s (Gunsky 1989:9-11).

AMERICAN PERIOD (1848-PRESENT)

The Mexican-American War followed on the heels of the Bear Flag Revolt of June 1846 (Ohles 1997). General Andrés Pico and John C. Frémont signed the Articles of Capitulation in December 1847, and with the signing of Treaty of Guadalupe Hidalgo in February 1848, hostilities ended and Mexico relinquished California to the United States. Under the treaty, Mexico ceded the lands of present-day California, New Mexico and Texas to the U.S. for $15 million (Fogelson 1993:10). Within two years following the treaty, California applied for admission as a state.

Gold was discovered in 1848 on the American River at Sutter's Mill near Coloma. One year later, nearly 90,000 people had journeyed to the gold fields of California. California became the 31st state in 1850, and three years later the population of the state exceeded 300,000. In 1854, Sacramento became the state capital. Thousands of new settlers and immigrants poured into the state after the transcontinental railroad was completed in 1869, spurring California's economic growth. The fertile soils in the vast Central Valley combined with the rise in the number of irrigation canals promoted the state's role as a national leader in agricultural production. Products included fruits, vegetables, and nuts, field crops, such as barley, cotton, hay, and rice, and livestock (cattle and sheep).

Local History

Rancho Omochumnes, which consists of 18,662 acres, is located 2.9 miles southeast of the Project area along the north bank of the Cosumnes River (Figure 4). The land grant was awarded to Jared Dixon Sheldon in 1844 by Mexican Governor Manuel Micheltorena. Sheldon and his partner, William Daylor, divided the grant into three parcels: Sheldon Ranch, Upper Daylor Ranch, and Lower Daylor Ranch (Pinkerton 2007). Sheldon and Daylor ranched and farmed the area, and with the discovery of gold in 1848 in the nearby foothills at Coloma, they profited from the variety of goods and services they provided to the miners and early settlers (Hoover et al. 2002:306). In 1870, the land grant was patented to Sheldon's widow, Catherine Rhoads. Grant Line Road, which marks the western boundary of the rancho (see Figure 4), is the area's most prominent physical remnant from the Mexican Period.

James Watson Hall is credited with founding Elk Grove in 1850 (Elk Grove Historical Society 2013). Hall built a hotel (Elk Grove House) that was among the finest stage stops along Upper Stockton Road (today's State Route 99) between Sacramento and Stockton. In 1868, when the Sacramento-Stockton line of the Central Pacific Railroad was constructed about one mile east of the town, the community moved to its current location alongside the railroad. The new post office at Elk Grove Station was in place by 1869 (Pinkerton 2002). Julius Everson founded the Elk Grove Building Company in 1876 and within two years, established a variety of businesses in the new town (Davis 1890). Over the course of a ten-year period, the business association built two hotels, a flour mill, general store, hardware store, meat market, furniture manufactory, a carriage and wagon manufactory, dressmaker and milliner shops, and a grain warehouse (Thompson and West 1880:234). By 1887, the businesses along Main Street, as well as high crop yields, particularly from wheat, contributed substantially to the town's growing economy.

Patent records show that two land patents were granted to individuals for portions of the Project Area in 1866. No historical information was found on these individuals. One land patent was granted to the State of California for a portion of the Project Area in 1871.

The town of Elk Grove, the railroad line, the community of Sheldon, the Pleasant Grove School, and the Upper Stockton Road, as well as intersection of present-day Sheldon and Waterman roads within the Project Area, are shown on the historic 1909 Elk Grove USGS topographic map (1:31,680 scale). Like other roads established during this period (e.g., Elk Grove Boulevard, Bond Road, Bradshaw Road) , Sheldon Road and Waterman Road developed along the boundaries of section lines. Two structures are also shown near but outside the Project Area on the 1909 map. Aerial imagery dating to 1957 shows additional structures adjacent to but outside the Project Area on parcel 121-0170-009 on Sheldon Road.

Today, the City's Planning Area includes several place names that represent early place names or schools, such as Sheldon, Sloughhouse, Franklin, and Pleasant Grove. In the 1950s, suburban and commercial developments near cities such as Elk Grove expanded at the expense of agricultural lands. The incorporation of the City of Elk Grove in 2000 highlights the residential and commercial development of formerly rural areas surrounding Sacramento. Currently, the City and its surrounding area are experiencing a rapid expansion of residential units and businesses. This expansion has precipitated the need for the Sheldon Road/Waterman Road Intersection Improvement Project.

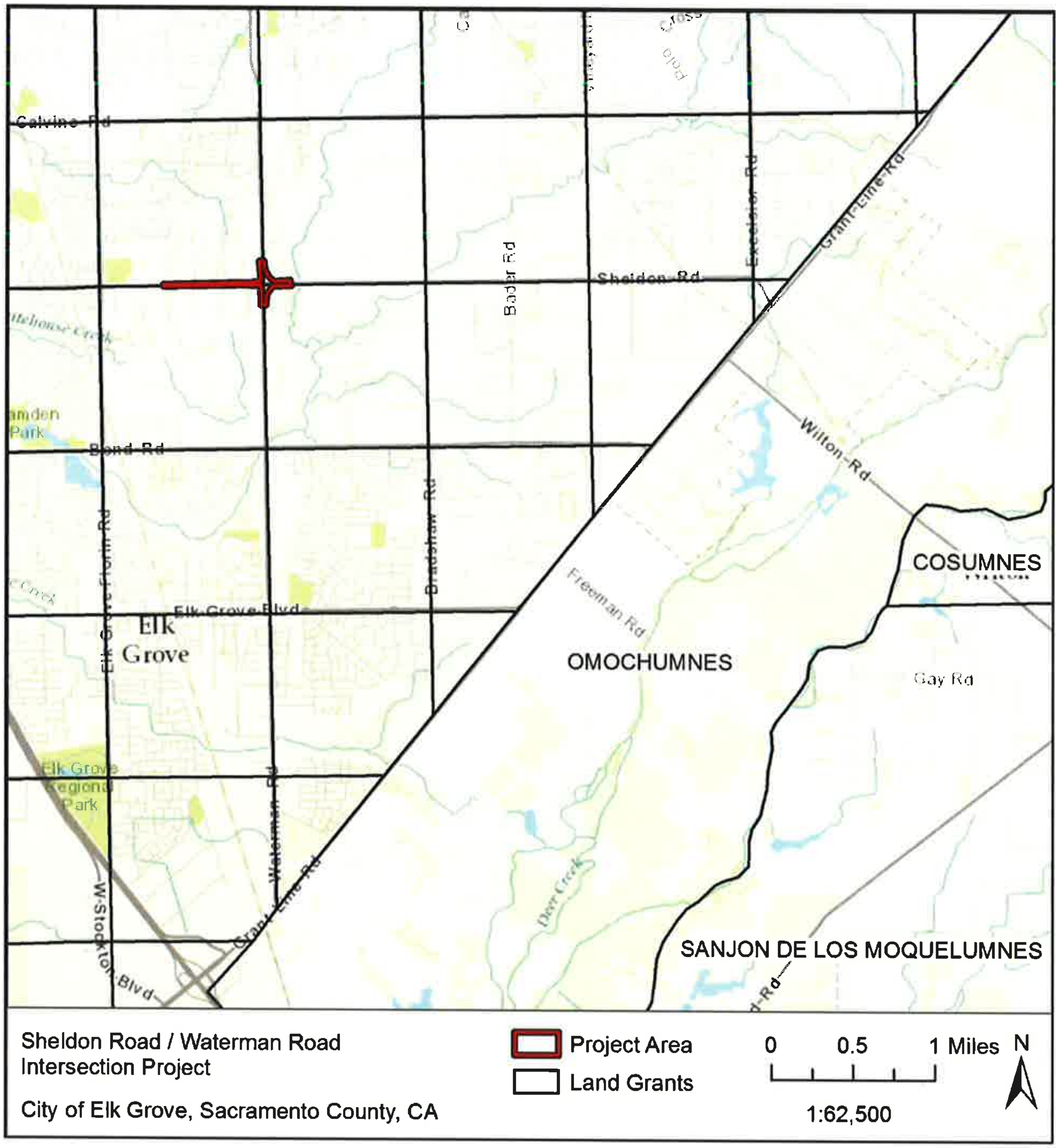

Figure 4. Land grant map

LITERATURE REVIEW AND RECORD SEARCHES

CULTURAL RESOURCES

A search for archaeological and historical records was completed by the North Central Information Center (NCIC) of the California Historic Resources Inventory System (CHRIS) on November 26, 2014 (NCIC File No. SAC-14-140) (Appendix B). The record search covered a half-mile radius around the Project Area. The record search indicates a total of 12 cultural resources investigations have been completed previously within a half-mile radius of the Project Area (Table 2). Of these, five studies included a portion of the Project Area, three were completed within a 0.25-mile radius of the Project Area and four studies were completed within a 0.5-mile radius of the Project Area.

TABLE 2. PREVIOUS STUDIES WITHIN A HALF-MILE RADIUS OF THE PROJECT AREA

Author	Report Number	Report Title	Date	USGS Quad	Proximity to Project Area
Johnson, Jerald J.	88	Reconnaissance Archaeological Survey of the Morrison Stream Group in Sacramento County, California	1974	Bruceville, Carmichael, Clarksburg, Courtland, Elk Grove, Florin, Sacramento East	Within a 1/4 mile
Scully, Margaret E.	406	An Archaeological Survey of the Perry Ranch Estates Project (Control No. 87-GP-1265)	1989	Elk Grove	Within a 1/2 mile
Peak, Ann S. and Associates	418	Cultural Resource Assessment of Sacramento Municipal Utility District's Project A, Phase I, 230kV Transmission Line, Sacramento County, California	1979	Carmichael, Elk Grove, Galt	Within Project Area
Warner, Laurie	1874	Draft Environmental Impact Report For Elk Ridge Estates, General Plan Amendment, Community Plan Amendment, Rezone and Subdivision Map (Control No.: 91-GPB-CZB-SDP-0829)	1993	Elk Grove	Within a 1/4 mile
Pacific Municipal Consultants	4473	Archaeological and Historic Investigations for the Sehdlon Road Widening Project	2003	Elk Grove, Florin	Within a 1/2 mile
Peak & Associates, Inc.	5917	Cultural Resource Assessment of the Hanson and Newland Properties	2003	Elk Grove	Within Project Area
PAR Environmental Services, Inc.	5929	Cultural Resources Inventory of the Proposed Sheldon Lakes Project	2002	Elk Grove	Within Project Area

Author	Report Number	Report Title	Date	USGS Quad	Proximity to Project Area
Pacific Municipal Consultants	5942	Archaeological and Historic Investigations for the Thompson Rezone Project	2004	Elk Grove	Within a 1/2 mile
Woodward-Clyde Consultants	6154	Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project	1995	Buffalo Creek, Charmichael, Clay, Elk Grove, Florin, Galt, Sacramento East, Sloughhouse	Within Project Area
Nelson, Wendy J. & Kimberley Carpenter	9188	Cultural Resources Survey for Right-of-Way Maintenance Along the Western Area Power Administration Transmission	2002	Carmichael, Elk Grove, Folsom, Galt, Lodi North, Pleasant Grove, Rio Linda, Rocklin, Roseville, Sacramento East	Within Project Area
Panich, Lee	10410	Cultural Resources Study Elk Gove Rail Stop Project (PL-2330-01)	2009	Elk Grove	Within a 1/2 mile
Wills, Carrie	11151	Cultural Resources Records Search and Site Visit Results for T-Mobile West, LLC Candidate SC06855A (Waterman/Sheldon Rd.), 9345 Sheldon Road, Elk Grove, Sacramento County, California	2012	Elk Grove	Within a 1/4 mile

Results of these cultural resources studies indicate that there is one historical architectural resource, P-34-1102, Historic Hurley-Tracy Transmission Line No. 1, within the Project Area. A total of seven cultural resources have been previously documented outside the Project Area within the half-mile radius (Table 3). Of these seven resources outside the Project Area, three are prehistoric sites, two are prehistoric isolates, and 2 are historical architectural resources (a road and a commercial building). None of the previously recorded archaeological resources are listed in the Archaeological Determinations of Eligibility maintained by the California Office of Historic Preservation (OHP). None of the previously recorded architectural resources are listed in the Historical Resources Inventory.

TABLE 3. RECORDED SITES WITHIN A HALF MILE-RADIUS OF THE PROJECT AREA

Primary No. (P-34-)	Trinomial (CA-SAC-)	Site Description	Date Recorded	USGS Quad	Proximity to Project Area
147	120	Prehistoric mound	1937	Elk Grove	Within a 1/4 mile
148	121	Prehistoric site with fire-fractured rocks, obsidian flakes, burned faunal bone, and shell	1937	Elk Grove	Within a 1/4 mile
162	135	Prehistoric mound	1937	Elk Grove	Within a 1/4 mile
700	545H	Historic Elk Grove-Florin Road	1993	Elk Grove	Within a 1/2 mile
1102		Historic Segment of Hurley-Tracy Transmission Line No. 1.	2001	Elk Grove	Within the Project Area
1103		Prehistoric isolate chisel-ended pestle.	2002	Elk Grove	Within a 1/2 mile
1104		Prehistoric unshaped cobble pestle.	2002	Elk Grove	Within a 1/4 mile
1250		Historic commercial building	2003	Elk Grove	Within a 1/2 mile

OTHER SOURCES

In addition to the records at the NCIC, a variety of sources were consulted by Molly Valasik in January 2015 to obtain information regarding the Project Area (Table 4). Sources include the National Register of Historical Places (NRHP), California Register of Historical Resources (CRHR), California Historical Resources Inventory (CHRI), California Historical Landmarks (CHL), California Points of Historical Interest (CPHI) and local historical registers. Specific information about the Project Area, obtained from historical maps and aerial photographs, is presented above in Project Area History.

TABLE 4. ADDITIONAL SOURCES CONSULTED

Source	Results
National Register of Historic Places (1979-2002 & supplements)	Negative
Historic United States Geological Survey topographic maps	1909 topo shows the existence of Sheldon and Waterman Roads. Two structures are depicted near but outside the Project Area.
Historic United States Department of Agriculture aerial photos	1957 aerial, the earliest available, shows structures adjacent to but outside the Project Area on parcel 121-0170-009.

Source	Results
California Register of Historical Resources (1992-2014)	Negative
California Inventory of Historic Resources (1976-2014)	Negative
California Historical Landmarks (1995 & supplements to 2014)	Negative
California Points of Historical Interest (1992 to 2014)	Negative
Local Historical Register Listings	Negative
Bureau of Land Management General Land Office Records	Three land patents were granted for portions of the Project Area

A search of the BLM General Land Office Records available online revealed that two land patents were issued in 1866 for portions of the APE (BLM n.d., Table 5).

TABLE 5. BLM LAND PATENTS FOR PROPOSED APE

Name	Year	Aliquots	Section	Township	Range
Clark Cleaver, Clarkson Cleaver, Alfred Dixon, and William H. Lyons	1866	SE ¼	19	7N	6E
Joseph Maitland and Clement D. McNair	1866	SW ¼	20	7N	6E
The State of California	1871	NW ¼	29	7N	6E
		E ½	30	7N	6E

NATIVE AMERICAN CONSULTATION

A sacred lands record search was requested by Cogstone staff from the Native American Heritage Commission (NAHC) on November 14, 2014. The Commission responded on January 21, 2015 that there are no known sacred lands within a one-half mile of the Project Area (Appendix C). The NAHC requested that nine Native American tribes or individuals be contacted for further information regarding the general project vicinity.

Cogstone subsequently sent letters to the nine Native American contacts on December 16, 2014, requesting any information related to cultural resources or heritage sites within or adjacent to the Project Area. Additional attempts at contact by email or phone call were made on December 30, 2014 and January 6, 2015.

Mr. Andrew Ramey of the Ione Band of Miwok Indians responded on December 29, 2014 by email requesting more information which Cogstone provided on December 30, 2014. Mr.

Ramey then requested a meeting with the City of Elk Grove and a site visit. Mr. Ramey was provided the City Project Manager's contact information on January 6, 2015. Mr. Steven Hutchason, Environmental Director of the Wilton Rancheria, responded on December 30, 2014 requesting more information which Cogstone provided on January 5, 2015. Mr. Hutchason then requested a site visit and was provided the City Project Manager's contact information on January 6, 2014. No other responses have been received to date from the individuals or tribes on the contact list. All consultation correspondence is provided as Appendix C to this report.

SURVEY RESULTS

The cultural resources survey stage is important in a Project's environmental assessment phase to verify the exact location of each identified cultural resource, the condition or integrity of the resource, and the proximity of the resource to areas of other areas of cultural resources sensitivity. An intensive cultural resources survey of the Project area was completed on December 15, 2014 by Dylan Stapleton, a Cogstone Staff Archaeologist. The survey consisted of walking parallel transects, spaced at no greater than 5-meter intervals within the Project Area while closely inspecting the ground surface. Existing disturbances (e.g., rodent burrows, cut banks) were examined for artifacts or buried cultural deposits.

The existing segments of Sheldon Road and Waterman Road within the Project Area are completely hardscaped; thus, visibility within the paved roadways was negligible (Figure 5). Ground surface visibility was good (50-90 percent) within road shoulder and drainage ditches along the roadways. Ground surface visibility within the vacant parcels within the Project Area was poor (0-10 percent) due to long thick grass (Figure 6). Visibility within the segments of the residential parcels within the Project varied from fair to excellent (50-90 percent) with pockets of rodent burrows and bare ground scattered throughout (Figure 7).

Two parcels, 9345 and 9350 Sheldon Road, are currently used for livestock grazing. The remaining parcels had some form of residence and landscaping within their confines. Sporadic modern trash consisting of beer bottles, plastic, and paper were noted during the survey.

Several transmission lines cross the Project Area, one of which is the previously recorded Historic Hurley-Tracy Transmission Line No. 1, P-34-001102, trending north-south along the eastern boundary of the Project Area (Figure 8). The transmission towers for P-34-001102 are not located within the Project Area and therefore no negative impacts are anticipated for this resource. A cursory observation of the transmission towers showed that no noticeable changes had been made to the towers since it was previously recorded by PAR Environmental in 2001. As such, no new DPR form was completed.

No new cultural resources were observed within or immediately adjacent to the Project Area. While Sheldon Road and Waterman Road both appear on the 1909 topographic map of the area, the roadways have been heavily modified over the last century. Additionally, the setting of the roads has changed from strictly rural to mixed rural/residential. Therefore these roadways were not considered to be historic resources and were not documented as such.

Figure 5. Sheldon Road and Waterman Road, view toward east

Figure 6. Example of poor visibility within vacant parcel

Figure 7. Residential parcel

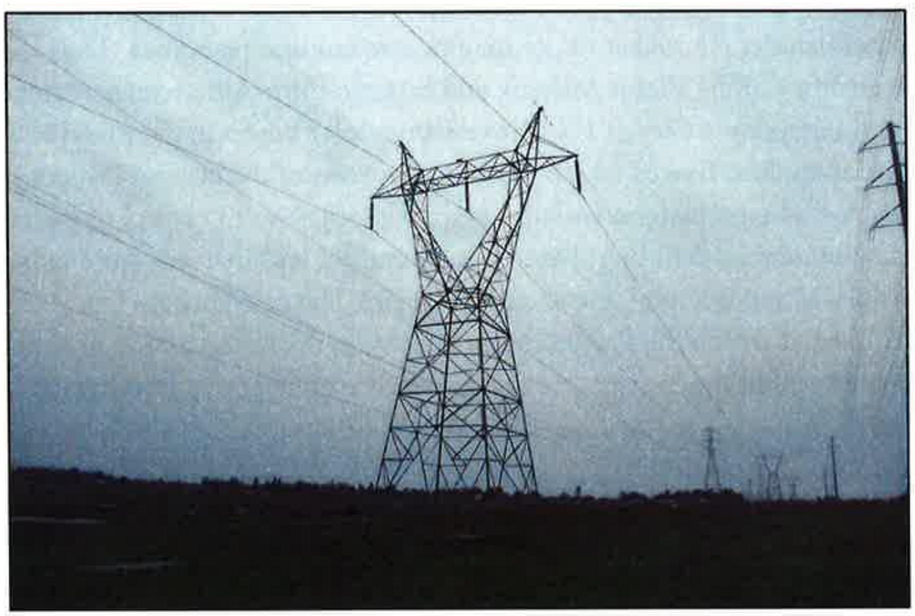

Figure 8. Historic Transmission Line, P-34-001102, view toward south

CONCLUSIONS AND RECOMMENDATIONS

Prehistoric and ethnographic habitation sites in this part of Sacramento County are primarily found near watercourses on high ridges, knolls, elevated natural levees, or the sandy islands in the Delta. As part of the Morrison Creek Stream Group Basin study, Johnson (1974), for example, inventoried 31 prehistoric or multi-component sites along approximately 9 miles of the Sacramento River, including around three lakeshores just east of the river (Beach Lake, North and South Stone Lakes), and one site approximately 5 miles east of the river on Franklin Creek. Johnson reported no evidence of historic or prehistoric mound, midden, housepit, village, or satellite village sites along the Morrison and Laguna Creek drainage systems east of the Sacramento River, although he did note that stone mortars have occasionally been found in the Morrison Creek Basin (Johnson 1974:2, 6). Decades of agriculture use in the Project vicinity have reduced Laguna Creek to one primary channel; historically, the creek occupied multiple channels along the floodplains. It seems likely that smaller prehistoric and ethnographic period task sites within the basin have been heavily impacted by alluvial deposition, historic period settlement, levee construction, and agricultural practices.

Considering the results of the literature search, local ethnographic settlement patterns, and the prehistory and history of the area, the Project Area is within an area considered to have a low sensitivity for discovery of prehistoric, ethnohistoric, or historic-era cultural resources. The Project region is within the territory of the Plains Mi-wuk and historic Euro-American settlement of the greater Project area and the today's City of Elk Grove community began in the mid-1800s. However, as a result of 12 prior studies, five of which included portions of the current Project Area, only three prehistoric sites, two prehistoric isolates, and 3 historical architectural resources (transmission line, road, and commercial building) have been identified within a half-mile radius of the Project Area. One historical architectural resource, P-34-1102, Historic Hurley-Tracy Transmission Line No. 1, is located within the Project Area. However, the transmission towers for P-34-001102 are not located within the Project Area and therefore no negative impacts are anticipated for this resource.

Unanticipated finds during excavation require that the Project halt work in the vicinity of the find (minimum 50 foot radius) until it can be evaluated by a qualified archaeologist.

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APPENDIX A: QUALIFICATIONS

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PALEONTOLOGY · ARCHAEOLOGY · HISTORY

MOLLY VALASIK, RPA
Principal Investigator for Archaeology

EDUCATION

2009 M.A., Anthropology, Kent State University, Kent, Ohio
2006 B.A., Anthropology, Ohio State University, Columbus, Ohio

SUMMARY QUALIFICATIONS

Valasik is a Registered Professional Archaeologist with six years of professional field and academic research experience. In addition to serving as a Principal Archaeologist, she is GIS proficient and supervises mapping at Cogstone. She has performed all aspects of fieldwork, directed surveys and authored numerous reports. She routinely digitizes data, manages databases, and creates high resolution maps for technical reports.

SELECTED PROJECTS

Office/Warehouse Project, West of Perris. Principal Investigator. Prepared archaeological Phase I assessment including record search, Native American consultation, survey, impact analysis and recommendations for new office and warehouse complex. 2013

Trabuco Road at Monroe Avenue Project, Irvine. Principal Investigator. Prepared archaeological literature study including record search, Native American consultation, analysis and recommendations for a traffic signal improvement project. 2013

Santiago Canyon Bridges Project, south Orange County. Principal Investigator. Prepared archaeological Phase I assessment including record search, Native American consultation, survey, impact analysis and recommendations for nine bridge rehabilitation projects. 2013

13th Street Bridge Replacement Project, Ramona. Principal Investigator. Prepared archaeological Phase I assessment including record search, survey, impact analysis and recommendations for bridge replacement. 2013

Rose Creek Bike Trail, San Diego. Principal Investigator. Prepared archaeological Phase I assessment including record search, Native American consultation, survey, impact analysis and recommendations for new bike trail along creek. 2013

Gopher Canyon Restoration Project, Chatsworth. Principal Investigator. Prepared archaeological Phase I assessment including record search, survey, impact analysis and recommendations for stream restoration project. 2013

Sun Ranch, San Juan Capistrano. Principal Investigator. Directed archaeological and Native American monitoring of a City water system improvement project over several months. Prepared final monitoring compliance report. 2012

cogstone
PALEONTOLOGY · ARCHAEOLOGY · HISTORY

NANCY SIKES, RPA

Principal Investigator for Cultural Resources

EDUCATION

1995	Ph.D., Anthropology, University of Illinois, Urbana-Champaign
1990	M.A., Anthropology, University of Illinois, Urbana-Champaign
1985	B.A. with distinction, Anthropology/Museology, University of Nevada, Reno

SUMMARY QUALIFICATIONS

Dr. Sikes is a Registered Professional Archaeologist (RPA) with over 20 years of experience as a principal investigator and project manager—completing hundreds of projects and technical reports in compliance with federal, state, and local regulations and agencies throughout California, with additional experience in Nevada, Utah, Washington, Wyoming, and East Africa. She comprehends the maze of NEPA, Section 106 and CEQA regulations, and has completed numerous cultural resources sections for EIRs, EISs, EAs, and ISs. Dr. Sikes meets national standards in archaeology set by the Secretary of Interior and Bureau of Land Management and her credentials are accepted by the California Historical Resources Information System in both prehistoric and historical archaeology. She also has a wide range of technical knowledge in geophysics (remote sensing) and geochemistry (stable isotope analysis of various materials such as bone/teeth, soils and sediments to reconstruct prehistoric diets and environments).

SELECTED PROJECTS

California High Speed Train EIS/EIR. Comprehensive archaeological and architectural settings and records searches for project-level EIS/EIR, Merced to Fresno Section, Fresno, Madera and Merced Counties. Section 106/CEQA compliance. Principal Investigator. 2010-present.

National Register Evaluation and Stabilization Plans for Historic Building, Bitter Creek National Wildlife Refuge, U.S. Fish and Wildlife Service, Kern County, California. Managed preparation of eligibility assessment, stabilization plan, Historic Structure Report for Percy's Place, and recommendation for creation of Hudson Ranch Historic District. Client: U.S. Fish and Wildlife Service. Project Manager. 2009-2010.

Vineyard Road Bridge Replacement. Background searches, Native American consultation, survey, and technical reports (HPSR and ASR) for Sacramento County Department of Transportation project. Section 106 compliance; Caltrans District 3. CEQA. Principal Investigator. 2010.

Folsom Transit Oriented Development. Background searches, consultation, survey, and technical report for 400-acre planned development in Sacramento County. CEQA compliance. Principal Investigator. 2009.

Folsom Dos Coyotes Trail Segment. Completed background searches, survey, and technical report for multi-use trail by Parks & Recreation Dept., Folsom, CA. No adverse effect on National Register eligible dredge mining site. Lead agency: Bureau of Reclamation; also Caltrans District 3; Section 106 compliance. Principal Investigator. 2008.

Dry Creek Multi-Use Trails Project. Background survey, limited subsurface testing, and three reports (HPSR, ASR, and XPI) for County of Sacramento Department of Regional Parks and Open Space. Section 106 compliance; Caltrans District 3. Principal Investigator. 2007.

Projects for County of Sacramento Department of Environmental Review and Assessment (DERA). Over 65 projects involving cultural resources survey, testing, inventory, and reporting. Compliance with Section 106, CEQA, Caltrans, Bureau of Reclamation, U.S. Army Corps of Engineers. Principal Investigator. 2005-10.

Levee Repair Projects. Survey of 36 Locations in Colusa, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo, and Yuba Counties. Section 106 and U.S. Army Corps of Engineers oversight. Principal Investigator. 2008.

DYLAN STAPLETON, M.A.

Archaeologist

EDUCATION

2004	M.A., Anthropology, California State University, Sacramento
2000	B.A., Anthropology (minor in Geology), California State University, Sacramento

SUMMARY QUALIFICATIONS

Mr. Stapleton is an experienced cultural resources field and laboratory technician. He has fourteen years of professional experience conducting surveys, mitigation monitoring, site recordation, data recovery, and acting as crew chief. He is knowledgeable of the compliance requirements under CEQA, NEPA, and NHPA Section 106. He is a contributor to technical reports and environmental documents (EIS, EA, EIR, IS, ND). His experience includes record searches, identification, research and laboratory analysis of prehistoric and historic artifacts as well as conducting Section 106 architectural evaluations. He utilizes Garmin handheld GPS unit and the Trimble Geo XT GPS unit to conduct mapping and site recordation.

SELECTED PROJECTS

Three Bridge Replacement Projects, Caltrans District 6 / Madera County Road Department, Madera County, CA. Conducted field survey to support technical reports (HPSR/ASR set) for three bridge replacement projects, including built-environment studies (HRER) for two of the projects. Section 106 compliance. Sub to Quad Knopf. Archaeological Field Technician. 2013-2014

Surveys for PG&E Wood Pole Replacement Project. Santa Clara and Mountain View, CA. Parus Consulting, Inc. Field Surveys. Archaeological Field Technician. 2012-2013

Alviso Adobe, Milpitas, Santa Clara County, CA. While working with designated Native American monitor, responsible for monitoring daily construction activities and writing up corresponding monitoring logs and photo records. Archaeological Monitor.

U.S. Coast Guard CAMPSPAC Transmitter Station, Bolinas, Marin County, CA. While working with designated Native American monitor, responsible for monitoring daily construction activities and writing up corresponding monitoring logs and photo records. Archaeological Monitor.

Timber Hills Forest Energy Project, Shasta County, CA. Conducted an intensive pedestrian survey of varying sized parcels within the project corridor and recorded previously unknown archaeological sites using California DPR site recordation forms. Archaeological Field Technician.

Central California Clean Energy Transmission Project, Kings, Kern, Madera, Fresno and Tulare Counties. Conducted an intensive pedestrian survey, conducted multiple record searches at the Information Center, created a database of record search results, helped draft an updated cost estimate report and was responsible for recordation of new cultural resources. Archaeological Field Technician.

Freeport Regional Water Project, Freeport Regional Water Authority, Sacramento and San Joaquin Counties, CA. Responsible for monitoring daily construction efforts, conducting additional surveys and writing up the addendum reports for additional APE modification requests as they occurred during the course of the project, maintaining and submitting daily logs and ensuring contractors were in compliance with NEPA and the MOU and prepared the memorandums and cultural resources annual technical reports pertaining to the project. Archaeological Monitor.

APPENDIX B: NCIC RECORD SEARCH

California Historical Resources Information System

NORTH CENTRAL INFORMATION CENTER

AMADOR
EL DORADO
NEVADA
PLACER
SACRAMENTO
YUBA

California State University, Sacramento
6000 J Street, Folsom Hall, Suite 2042
Sacramento, California 95819-6100
phone: (916) 278-6217
fax: (916) 278-5162
email: ncic@csus.edu

11/26/2014

NCIC File No.: SAC-14-140

Molly Valasik
Cogstone Resource Management
1518 West Taft Avenue
Orange, CA 92865

Re: Sheldon Waterman Intersection Improvements

The North Central Information Center received your record search request for the project area referenced above, located on the Elk Grove and Florin USGS 7.5' quads. The following reflects the results of the records search for the project area and a ½-mile radius:

As indicated on the data request form, the locations of reports and resources are provided in the following format: ☐ custom GIS maps ☒ shapefiles ☐ hand-drawn maps

Resources within search area:	P-34-147 P-34-148 P-34-162 P-34-700 P-34-1102 P-34-1103 P-34-1104 P-34-1250
Reports within search area:	88 406 418 1874 4473 5917 5929 5942 6154 9188 10410 11151

Resource Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Report Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed

Resource Record Copies: ☒ enclosed ☐ not requested ☐ nothing listed

Report Copies: ☐ enclosed ☒ not requested ☐ nothing listed

OHP Historic Properties Directory:	☒ enclosed	☐ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☒ enclosed	☐ not requested	☐ nothing listed
CA Inventory of Historic Resources (1976):	☒ enclosed	☐ not requested	☐ nothing listed
Caltrans Bridge Survey:	☐ enclosed	☒ not requested	☐ nothing listed
Ethnographic Information:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Literature:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Maps:	☒ enclosed	☐ not requested	☐ nothing listed
Local Inventories:	☐ enclosed	☐ not requested	☒ nothing listed
GLO and/or Rancho Plat Maps:	☒ enclosed	☐ not requested	☐ nothing listed
Shipwreck Inventory:	☐ enclosed	☒ not requested	☐ nothing listed
Soil Survey Maps:	☐ enclosed	☒ not requested	☐ nothing listed

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Sincerely,

Nathan Hallam
Coordinator, North Central Information Center

APPENDIX C: NATIVE AMERICAN CONSULTATION

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

January 21, 2015

Sherri Gust
Cogstone
1518 W. Taft Ave.
Orange, CA 92865

Sent by Fax: 714-974-8303
Number of Pages: 2

Re: Sheldon –Waterman project, Sacramento County

Dear Ms. Gust:

A search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above. Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American traditional cultural places or cultural landscapes in any APE. While in this case, a search of the NAHC *Sacred Lands File* did not indicate the presence of any sites within the APE you provided, a Native American tribe or individual may be the only source for the presence of traditional cultural places. For that reason, enclosed is a list of Native American individuals/organizations who may have knowledge of traditional cultural places in your project area. This list should provide a starting place in locating any areas of potential adverse impact.

The NAHC makes no recommendation or preference of any single individual, or group over another. All of those on the list should be contacted, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: rw_nahc@pacbell.net.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
Sacramento County
January 21, 2015

Randy Yonemura
4305 - 39th Avenue — Miwok
Sacramento , CA 95824
randy_yonemura@yahoo.com
(916) 421-1600
(916) 601-4069 Cell

Buena Vista Rancheria
Rhonda Morningstar Pope, Chairperson
1418 20th Street, Suite 200 — Me-Wuk / Miwok
Sacramento , CA 95811
rhonda@buenavistatribe.com
(916) 491-0011 Office
(916) 491-0012 Fax

Ione Band of Miwok Indians
Yvonne Miller, Chairperson
P.O. Box 699 — Miwok
Plymouth , CA 95669
administrator@ionemiwok.org
(209) 245-5800 Office
(209) 245-3112 Fax

Ione Band of Miwok Indians Cultural Committee
Anthony Burris, Chairperson
P.O. Box 699 — Miwok
Plymouth , CA 95669
(209) 245-5800 Office
(209) 245-3112 Fax

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
(530) 883-2390 Office
(530) 883-2380 Fax

United Auburn Indian Community of the Auburn Rancheria
Marcos Guerrero, Tribal Preservation Committee
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
mguerrero@auburnrancheria.com
(530) 883-2364 Office
(530) 883-2320 Fax

United Auburn Indian Community of the Auburn Rancheria
Jason Camp, THPO
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
jcamp@auburnrancheria.com
(916) 316-3772 Cell
(530) 883-2390
(530) 888-5476 - Fax

Wilton Rancheria
Raymond Hitchcock, Chairperson
9728 Kent Street — Miwok
Elk Grove , CA 95624
rhitchcock@wiltonrancheria-nsn.gov
(916) 683-6000 Office
(916) 683-6015 Fax

Wilton Rancheria
Steven Hutchason, Executive Director Environmental Resources
9728 Kent Street — Miwok
Elk Grove , CA 95624
shutchason@wiltonrancheria-nsn.gov
(916) 683-6000, Ext. 2006
(916) 683-6015 Fax

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

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource 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 Sheldon-Waterman project, Sacramento County

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

December 16, 2014

Re: Sheldon-Waterman Intersection Improvements

Dear Chairperson,

The City of Elk Grove proposes to realign and improve the existing stop-sign controlled intersection at Sheldon Road and Waterman Road. The Sheldon-Waterman intersection will be realigned to the east and replaced with a roundabout configuration. The Sheldon and Waterman Roads are ultimately planned as four-lane arterials within the City of Elk Grove.

The Native American Heritage Commission (NAHC) was contacted on November 14, 2014 to perform a search of the Sacred Lands file. The NAHC has not yet responded despite multiple contact attempts.

A record search of the project area and a half-mile buffer was conducted at the NCIC on November 26th, 2014. The record search determined that there are seven previously recorded sites within a half-mile radius of the project APE. Three sites are prehistoric sites, two are prehistoric isolates, and three are historic structures/buildings. The only resource located in the project area is a Historic Transmission Line.

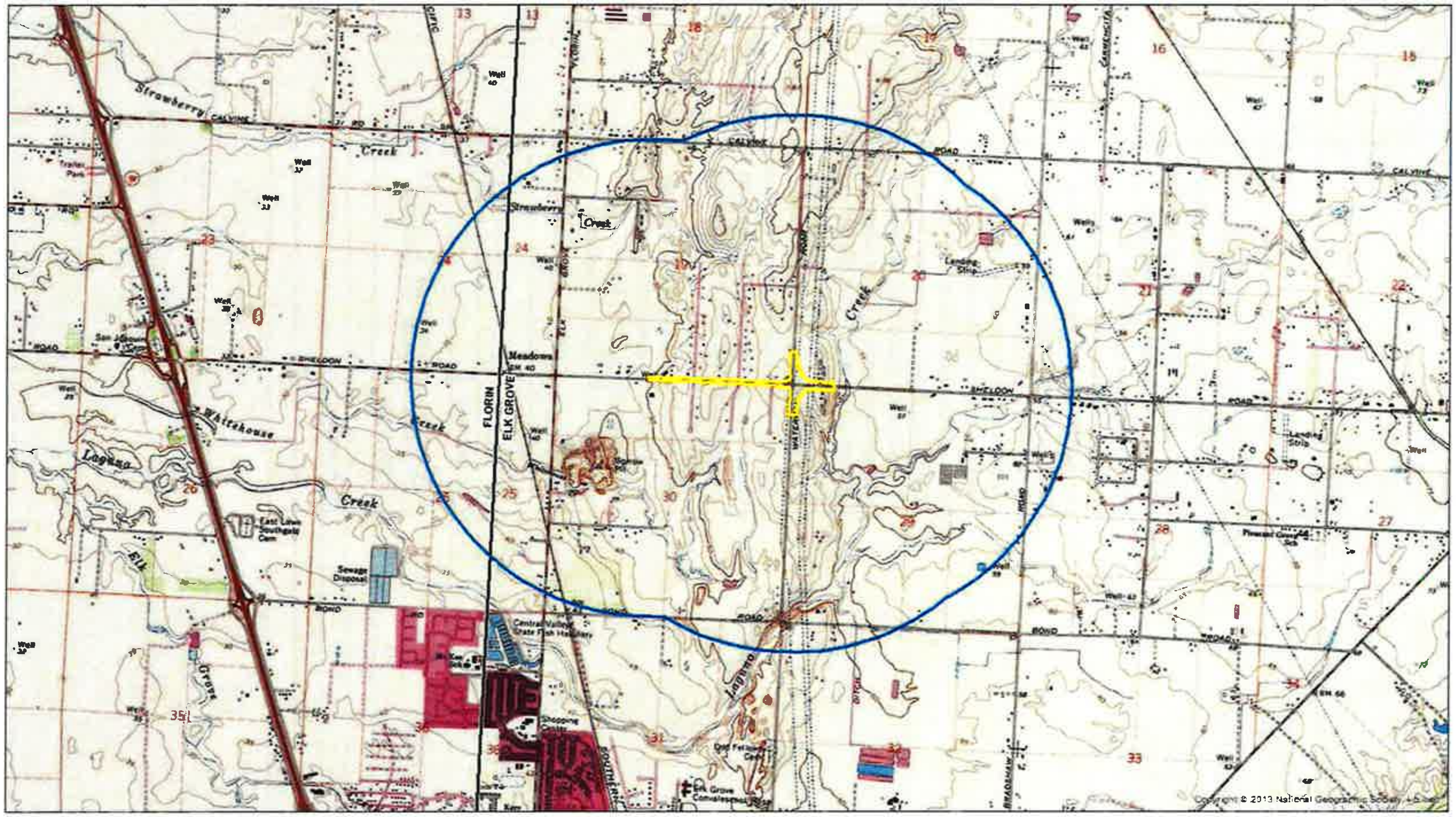
I would appreciate it if you could notify me if you have records of any sacred lands or other heritage sites that might be impacted by the proposed project. All information provided regarding cultural and historic sites or other areas of concern would be treated as confidential material. We need your response within 2 weeks to meet the deadline for our report. You can email your response to MWilson@cogstone.com or call the number below.

Sincerely,

Megan Wilson, M.A., R.P.A.
Archaeologist and GIS Technician
(714) 974-8300
MWilson@cogstone.com

Sheldon-Waterman 2374-002

COGSTONE PROJECT NUMBER:	2374-002
COGSTONE PROJECT NAME:	Sheldon-Waterman
PROJECT DESCRIPTION:	The City of Elk Grove proposes to realign and improve the existing stop-sign controlled intersection at Sheldon Road and Waterman The Sheldon-Waterman intersection will be realigned to the east and replaced with a roundabout configuration. Existing land uses surrounding the project site includes rural residential and agricultural. Sheldon Road is a two-lane rural roadway that runs east to west and connects Center Parkway with Grant Line Road and provides access for residential areas. Sheldon Road is ultimately planned as a four-lane arterial within the City of Elk Grove Planning Area boundaries in the City of Elk Grove General Plan Circulation Element. Waterman Road is a two-lane rural roadway that runs north to south and provides local access to industrial businesses, residential neighborhoods, and agricultural land uses. Waterman Road is also ultimately planned as a four-lane arterial in the City of Elk Grove General Plan Circulation Element.
USGS 7.5' QUAD:	Elk Grove
COUNTY:	Sacramento
TOWNSHIP/SECTION:	Township: 7N, Range 6E, Sections: 19,20,29,30
LINEAR MILES:	0.78 miles
1:24000 map attached	√



Sheldon-Waterman Project

City of Elk Grove, CA

APE
1 Mile Radius
USGS Quads

USGS 7.5 Quads:
Elk Grove
Florin

0 0.3 0.6 Miles
0 0.3 0.6 Kilometers N
1:24,000 1 in = 2,000 ft

From: Megan Wilson
Sent: Tuesday, January 06, 2015 10:59 AM
To: Andrew Ramey (andrew@ionemiwok.org)
Subject: RE: Sheldon-Waterman Intersection Improvements

Good Morning Andrew,
Below is the contact information for the point person for the Sheldon-Waterman Project located in the City of Elk Grove.
I will indicate in our Cultural Resource Assessment Report that you would like to discuss the project further with the City, as we as request a site visit.
The contact for the City of Elk Grove is:

Michael Karol
City of Elk Grove
Sr. Project Manager
(916) 478-3617
MKaroly@elkgrovecity.org
8401 Laguna Palms Way
Elk Grove, CA 95758

Thank you very much for your response, and please let me know if there is anything else I can assist you with regarding the Sheldon-Waterman Project,

-Megan Wilson

From: Megan Wilson
Sent: Tuesday, December 30, 2014 11:08 AM
To: Andrew Ramey
Subject: RE: Sheldon-Waterman Intersection Improvements

Hello Andrew,
We are doing the Cultural Assessment for the Sheldon-Waterman Project. The Project has no definite start date-yet, so there is no monitoring plan thus far. What I will do is indicate that you and other representatives from your tribe would like to meet with the Project managers (The City of Elk Grove).
I am happy to include your comments.
Thanks again and please let me know if there is anything else I can do.
-Megan

From: Andrew Ramey [mailto:andrew@ionemiwok.org]
Sent: Tuesday, December 30, 2014 10:51 AM
To: Megan Wilson

Subject: Re: Sheldon-Waterman Intersection Improvements

Good Morning Ms. Wilson,

Thank you for sending me the information so quickly. I have reviewed the documents and have a few questions for you. When is this project scheduled to start? Would you and the project managers be available for a site visit to discuss the project further with myself and other representatives from the Ione Band on a future date?

Thank you,
Andrew

On Tue, Dec 30, 2014 at 9:32 AM, Megan Wilson <MWilson@cogstone.com> wrote:
Good Morning Mr. Ramey,
Thank you very much for your response.
I have attached both the resource list and report list received from the NCIC. A pedestrian survey was conducted on December 15th, 2014 and offered no new information.
Please let me know if there is anything else I can provide for you and your tribe to asses this Project.

Again, thank you for your response. I look forward to your comments.

Megan Wilson
Archaeologist & GIS Technician
Cogstone
Paleontology, Archaeology and History
1518 W Taft Ave, Orange, CA 92865-4157
714-974-8300 ex. 108
MWilson@cogstone.com

From: Andrew Ramey [mailto:andrew@ionemiwok.org]
Sent: Monday, December 29, 2014 11:55 AM
To: Megan Wilson
Cc: Anthony Burris
Subject: Sheldon-Waterman Intersection Improvements

Ms. Wilson,

The Ione Band of Miwok Indians has received your letter dated December 16, 2014. The Ione Band would like to request a copy of the record search done on this project along with copies of pedestrian surveys, and environmental assessments. The Ione Band will review the copies and discuss amongst ourselves about the area and be in contact with you with our information.

Thank you,
Andrew Ramey

From: Megan Wilson
Sent: Tuesday, January 06, 2015 10:57 AM
To: 'Steven Hutchason'
Subject: RE: Request for comments on Sheldon-Waterman Project in Sacramento County

Good Morning Mr. Hutchason,
Below is the contact information for the point person for the Sheldon-Waterman Project located in the City of Elk Grove.
I will indicate in our Cultural Resource Assessment Report that you would like to discuss the project further with the City, as we as request a site visit.
The contact for the City of Elk Grove is:

Michael Karol
City of Elk Grove
Sr. Project Manager
(916) 478-3617
MKaroly@elkgrovecity.org
8401 Laguna Palms Way
Elk Grove, CA 95758

Thank you very much for your response, and please let me know if there is anything else I can assist you with regarding the Sheldon-Waterman Project,

-Megan Wilson

From: Steven Hutchason [mailto:shutchason@wiltonrancheria-nsn.gov]
Sent: Monday, January 05, 2015 9:39 AM
To: Megan Wilson
Cc: Antonio Ruiz Jr.
Subject: RE: Request for comments on Sheldon-Waterman Project in Sacramento County

Hello Megan,

I would like to discuss this project further. We have identified resources in close proximity and would like to request a site visit and further detail of the project. Would you send me the site records for the resources mentioned in the CHRIS report, and any draft or completed Cultural and our Environmental Reports.

Thank you,

Steven Hutchason
Executive Director

Environmental Resources Department
Tel: 916.683.6000 Ext. 2006 | Fax: 916.683.6015
9728 Kent Street | Elk Grove | CA | 95624
shutchason@wiltonrancheria-nsn.gov
www.wiltonrancheria-nsn.gov

APPENDIX F – TRAFFIC STUDY

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
428 J Street, Suite 500, Sacramento, CA 95814 P 916.266.2190 F 916.266.2195

MEMORANDUM

Date: October 17, 2014 Project #: 17287

To: Brent Lemon, P.E. and Mike Sanchez, P.E.; Quincy Engineering

From: Erin Ferguson, P.E.; Ryan Whitney; and Krista Purser; Kittelson & Associates, Inc.

Project: Sheldon Road/Waterman Road Intersection Improvements

Subject: Traffic Study

INTRODUCTION

Kittelson & Associates, Inc. (KAI) evaluated the traffic operations and collision data for the existing all-way stop controlled (AWSC) and potential roundabout control at the Sheldon Road/Waterman Road intersection in Elk Grove, California.

Our analysis findings indicate:

- Based on the City's intersection performance criteria, the existing AWSC exceeds the acceptable amount of delay in the weekday AM and PM peak hours;
- A single-lane roundabout provides acceptable operations per the City's traffic operations performance threshold for approximately 8 years measured from 2016 (estimated opening year);
- A single-lane roundabout with a southbound right-turn lane, has the ability to provide acceptable operations per the City's traffic operations performance threshold for approximately 12 years measured from 2016 (estimated opening year);
- Compared to other intersection forms such as traffic signals or two-way stop controlled intersections, roundabouts experience fewer collisions (e.g., 36% to 60% fewer total collisions than a signal); and
- A multilane roundabout with two lanes entering and exiting on the Waterman Road approaches has the ability to provide acceptable operations per the City's traffic operations performance threshold for approximately 19 years (through 2035) measured from 2016 (estimated opening year).

The following sections of this memorandum present information regarding the methodology and performance thresholds, traffic volumes, existing conditions, future conditions, and a summary of findings.

METHDOLOGY AND PERFORMANCE THRESHOLDS

The following outlines the methodology and performance thresholds used in evaluating the existing AWSC and potential roundabout alternatives for the Sheldon Road/Waterman Road intersection.

Traffic Operations Analysis Methodology

KAI used the Highway Capacity Manual 2010 (HCM 2010) methodologies for evaluating the existing AWSC intersection and the alternative roundabout configurations.

For the existing AWSC conditions, we used the Highway Capacity Software (HCS) to implement the methodology. We used SIDRA 6 software to implement the roundabout HCM 2010 method. Parameters A and B of the roundabout HCM 2010 method were modified to better reflect California driver behavior at roundabouts as described in the Caltrans document " Roundabout Geometric Design Guidance".

Performance Thresholds

The City of Elk Grove's Improvement Standards identify that intersections should operate at Level-of-Service (LOS) D or better at all times. The specific policy from the City's General Plan Circulation Element is:

Policy CI-13: The City shall require that all roadways and intersections in Elk Grove operate at a minimum Level of Service "D" at all times.

We evaluated the weekday AM and PM peak hours to capture the intersection traffic operations performance during the two highest peak hours of the day. If the intersection configuration is able to operate at LOS D or better during those hours then it will be able to operate at LOS D or better during the remaining hours of the day.

Level-of-Service categories are based on the average control delay (seconds per vehicle) experienced by motorists. Table 1 summarizes the delay ranges for each level-of-service category to provide a sense of the amount of delay considered acceptable for intersection operations in Elk Grove.

Table 1: Control Delay Related Level-of-Service thresholds for All-Way Stop and Roundabout Intersections

All-Way Stop Control Intersection Control			Roundabout Intersection Control		
Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio		Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio	
	v/c <= 1.0	v/c >= 1.0		v/c <= 1.0	v/c >= 1.0
>0-10	A	F	>0-10	A	F
>10-15	B	F	>10-15	B	F
>15-25	C	F	>15-25	C	F
>25-35	D	F	>25-35	D	F
>35-50	E	F	>35-50	E	F
>50	F	F	>50	F	F

Reference: Highway Capacity Manual 2010 (HCM 2010)

We used the LOS D threshold, less than 35 seconds/vehicle of average control delay, applied to each approach to identify roundabout lane configurations able to accommodate existing 2014, opening year 2016, and future 2035 traffic volumes at the intersection. This approach is consistent with the recent roundabout operations analysis we completed for the City at the adjacent Sheldon Road/Bradshaw Road intersection.

Additional Key Assumptions and Inputs

The key assumptions and inputs used in the traffic operations analyses are noted below.

- Heavy vehicle percentages of at least 2% on each intersection approach were used in the analysis scenarios; on approaches where traffic count data indicated a heavy vehicle percentage greater than 2% then that larger percentage was used in the analysis.
- For future traffic volume development, existing 2014 traffic volumes were increased at a uniform rate of 3% per year.
- Peak hour factors for existing 2014 and opening year 2016 analyses were calculated from the 2014 traffic count data collected. Peak hour factors for 2035 were assumed to be 1.0.

TRAFFIC VOLUMES AND ANALYSIS YEARS

This section presents the traffic volumes on each approach to the intersection within each of the analysis years. It also includes a comparison of daily traffic volumes from 2011 and 2014 that indicates the average growth in traffic over the last three years.

Intersection Turning Movement Counts

Intersection turning movement counts were collected during the AM (7:00-9:00) peak period and PM (4:00-6:00) peak period on Wednesday, May 14, 2014. Table 2 presents a summary of the traffic volumes for existing 2014 conditions as well as future years 2016 and 2035.

Table 2: Traffic Volumes for Sheldon Road/Waterman Road Intersection

Year	Weekday AM Peak Hour (7:20 AM – 8:20 AM)					Weekday PM Peak Hour (4:50 PM – 5:50 PM)				
	Number of Vehicles					Number of Vehicles				
	EB	WB	NB	SB	TEV	EB	WB	NB	SB	TEV
Data Collected May 14, 2014										
2014	512	188	469	450	1619	478	369	384	528	1759
Future Volume Calculated with 3% per year Uniform Growth Rate										
2016	543	199	498	477	1717	507	391	407	560	1865
2035	952	350	873	837	3012	890	686	714	983	3273

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound, TEV = Total Entering Volume

The City identified year 2016 as the approximate timeframe in which the intersection improvements would be completed. Year 2035 is the future planning horizon year; this is consistent with other recent intersection studies completed for the City (e.g., the neighboring Sheldon Road/Bradshaw Road intersection evaluation and improvements). Based on the forecasted growth in the regional SACMET model, the City decided to use a 3% per year uniform growth rate to estimate traffic volumes for opening year 2016 and the planning horizon year 2035.

Daily Traffic Volumes

On June 10-11, 2014, we collected 48-hour bi-directional traffic counts on each approach to the Sheldon Road/Waterman Road intersection. The City had on-hand, previous daily traffic volume information collected in February 2011. Table 3 summarizes and compares the daily traffic volume data from 2011 and 2014.

Table 3: Daily Traffic Volume Comparison of 2011 vs. 2014

Count Information	Total Vehicle Volume in 24 Hour Average Weekday				
	Waterman Road		Sheldon Road		Total
	Northbound	Southbound	Eastbound	Westbound	
2011 Daily Counts	4155	4181	5222	3398	16956
2014 Daily Counts	4055	4481	4516	4546	17598
Percent Change	-2.41%	7.16%	-13.52%	33.78%	3.78%

As Table 3 illustrates, daily traffic in total has increased approximately 3.8% since 2011 (i.e., average of 1.27% per year). The changes in volume vary by approach and direction with northbound Waterman Road and eastbound Sheldon Road decreasing, while southbound Waterman Road and westbound Sheldon Road increasing.

The changes by approach and direction could be a result of changes in travel patterns as surrounding land uses change. Additionally, Rubia Drive is temporarily closed at Waterman Road to prevent cut-through traffic to Sheldon Road, likely creating a shift in travel patterns at the intersection. The closure is reflected in the 2014 counts and was not in effect for the 2011 counts. Finally, travel to/from the Jan Rau Community Park at the Sheldon Road/Elk Grove Florin Road intersection (located west of the study intersection) may also influence travel through the intersection. The 2011 volumes were collected in February and 2014 volumes collected in June. Different travel patterns may be present through the intersection as recreational sports seasons (e.g., baseball, soccer) fluctuate through the year.

The comparison in daily volumes indicates that the 3% per year uniform growth rate assumption used in this analysis for the future years is conservative relative to recent past changes in traffic volumes. Traffic count worksheets are provided in Appendix 1.

EXISTING CONDITIONS

The Sheldon Road/Waterman Road intersection is located within the City's designated Rural Sheldon/Rural Residential Area. Sheldon Road and Waterman Road are classified as arterials. The land uses surrounding the intersection include primarily rural residential property. In the northeast, southeast, and southwest quadrants of the intersection, overhead utility lines are present that will require specific clearance considerations as potential intersection improvements move forward into design. Similarly, the City has recently received interest and/or applications from developers for residential development in the southeast quadrant of the intersection.

The following sub-sections present the existing conditions intersection traffic operations findings, collision data review, information on the existing transit service near the intersection, and summary of existing pedestrian and bicycle facilities near the intersection.

Intersection Operations

Table 4 summarizes existing intersection conditions including LOS and delay, calculated using the HCM2010 procedures implemented by the Highway Capacity Software (HCS).

Table 4: Peak Hour Intersection Delay and Level of Service for Existing Year 2014 Conditions

Control Type	Traffic Operations Performance			
	Intersection Delay (s/veh)	Intersection LOS	Critical Approach	Critical Approach Delay (s/veh)
Weekday AM Peak Hour				
AWSC	**82.2**	**F**	NB	**147.9**
Weekday PM Peak Hour				
AWSC	**100.4**	**F**	NB	**138.8**

Notes: Delay (measured in seconds per vehicle) and LOS reported as overall intersection unless specified otherwise. **Bold** text indicates unacceptable operations.

As illustrated in Table 4, the existing traffic control at the intersection does not meet the City's intersection performance threshold of LOS D or better. These results support the City's efforts to improve the intersection. Appendix 2 contains the output worksheets from the existing conditions analysis.

Collision Data Review

KAI obtained collision data from the University of California, Berkeley Transportation Injury Mapping System (TIMS) website for a five-year period, ranging from January 2007 to December 2011. TIMS collects collision data from the Statewide Integrated Traffic Records System (SWITRS) and provides spatial coordinates for the collisions. Table 5 summarizes the collision data within 500 feet of the Sheldon Road/Waterman Road intersection.

Table 5: Five-Year Accident History by Type for the Sheldon Road/Waterman Road Intersection (2007 – 2011)

Intersection	Collision Type			Total Collisions
	Rear End	Broadside	Hit Object	
Sheldon Road/Waterman Road	1	7	1	9

Source: University of California, Berkeley Transportation Injury Management System (TIMS)

During the five-year period, there were a total of nine collisions resulting in seven injuries and no fatalities. The collisions were generally dispersed throughout the year. The seven broadside collisions occurred within the intersection. The other two collisions occurred within sixty feet of the intersection on Waterman Road, one north and one south of the intersection. Appendix 3 shows a screenshot of the TIMS database.

Transit System

Local and county fixed route transit services are not provided near the study intersection.

Bicycle and Pedestrian Facilities

There are no bicycle lanes or sidewalks provided near the Sheldon Road/Waterman Road intersection. There are paved shoulders on the westbound approach of Sheldon Road and the southbound approach of Waterman Road. The eastbound approach of Sheldon Road and northbound approach of Waterman Road do not have paved shoulders.

FUTURE CONDITIONS

As noted above, the study intersection is located within the City's designated Rural Sheldon/Rural Residential Area; as a result, improvements at the intersection are subject to the City's Rural Road Improvement Policy and Standards. The City's Rural Road Improvement Policy and Standards aim to preserve the rural character within the Rural Sheldon/Rural Residential Area. Roundabouts are well known for their ability to decrease delays and collision frequencies and severities. They can also be implemented in a manner that preserves characteristics of the adjacent land uses. In the case of the

Sheldon Road/Waterman Road intersection, a roundabout could be implemented to help preserve the rural character of the area. Given the goals of the City as well as the benefits of roundabouts, several roundabout configurations were evaluated to improve traffic operations and reduce the risk of collisions at the study intersection.

Overview of Findings

A single-lane roundabout has sufficient capacity to accommodate traffic for approximately 8 years measured from opening year of 2016 (i.e., 2024) with the 3% per year uniform growth in traffic. Adding a yield-controlled southbound right-turn lane to the single-lane roundabout provides sufficient capacity for an additional 4 years (i.e., 2028). When the single-lane roundabout with the southbound right-turn lane reaches capacity, constructing a multilane roundabout with two-lane entries and exits on the northbound and southbound approaches (i.e., Waterman Road) is estimated to provide sufficient vehicle capacity through year 2035.

Based on these findings, KAI suggests the City move forward in designing and implementing the single-lane roundabout with the southbound right-turn lane, while preserving right-of-way to design and implement the multilane configuration in the future, if it becomes necessary. The single-lane roundabout with the southbound right-turn lane could be implemented in two phases: 1) By 2016 implement the single-lane roundabout; and 2) When capacity of the single-lane is reached, (potentially 2024), implement the southbound yield control right-turn lane. These near-term (2016) and interim (2024) improvements would be able to accommodate up to 42% increase in traffic growth. If at a point in the future, traffic exceeds the 42% growth, then the City will have preserved the right-of-way needed to implement a multilane roundabout. The following sub-sections present the analysis in more detail.

Intersection Operations

Table 6 reports the operational analysis results for a single-lane roundabout under year 2016 (estimated opening year) traffic conditions.

Table 6: 2016 Intersection Operations for Single-Lane Configuration

Year 2016	Level-of-Service	Volume-to-Capacity	Delay (sec/veh)	95% Queue (ft)
Weekday AM Peak Hour				
Northbound	B	0.61	13.7	119
Westbound	A	0.28	8.0	31
Southbound	A	0.49	9.4	78
Eastbound	B	0.61	12.9	125
Weekday PM Peak Hour				
Northbound	A	0.47	9.5	71
Westbound	B	0.48	10.2	75
Southbound	C	0.73	18.7	178
Eastbound	B	0.62	13.6	125

As shown in Table 6, a single-lane roundabout would operate acceptably per the City's intersection performance threshold (i.e., LOS D or better) under year 2016 traffic conditions in the weekday AM and PM peak hours.

Table 7 reports the operational analysis results for the single-lane roundabout under year 2035 traffic conditions.

Table 7: 2035 Intersection Operations for Single-Lane Configuration

Year 2035	Level-of-Service	Volume-to-Capacity	Delay (sec/veh)	95% Queue (ft)
Weekday AM Peak Hour				
Northbound	**F**	**1.08**	**79.2**	**888**
Westbound	B	0.51	14.4	71
Southbound	D	0.83	25.1	188
Eastbound	**F**	**1.10**	**86.8**	**1087**
Weekday PM Peak Hour				
Northbound	C	0.79	22.9	216
Westbound	D	0.85	30.5	252
Southbound	**F**	**1.32**	**173.1**	**1970**
Eastbound	**E**	**0.93**	**38.8**	**453**

As shown in Table 7, several approaches during the weekday AM and PM peak hour exceed LOS D threshold under year 2035 traffic conditions. During the weekday AM peak hour, the northbound and eastbound approaches have reached LOS F and volume-to-capacity ratios greater than 1.0. During the weekday PM peak hour, the southbound approach has reached LOS F and a volume-to-capacity ratio greater than 1.0 while the eastbound approach has reached LOS E. Analysis worksheets for the single-lane roundabout are included in Appendix 4.

Based on these results, KAI evaluated alternative lane configurations to identify the roundabout configuration that would provide capacity for year 2035 traffic conditions. Table 8 summarizes the alternatives considered and reports the year in which one or more of the intersection approaches exceeds the City's LOS D performance threshold.

Table 8: Roundabout Alternatives for Sheldon Road/Waterman Road Intersection

Alt. #	Roundabout Configuration	Capacity Year[1]	
		AM Peak Hour	PM Peak Hour
1	Single-Lane	2028 (12 years)	2024 (8 years)
2	Single-Lane + Yield Controlled Southbound Right-Turn (SBR) Lane	2028 (12 years)	2029 (13 years)
3	Single-Lane[2] + Northbound Left-Turn (NBL) Lane	2029 (13 years)	2024 (8 years)
4	Single-Lane[2] + SBR & NBL	2029 (13 years)	2029 (13 years)
5	Single-Lane[2] + SBR & NBL & Yield Controlled Eastbound Right-Turn Bypass (EBR) Lane	2034 (18 years)	2033 (17 years)
6	Multilane[3] Northbound & Southbound with Single-Lane Eastbound & Westbound	Beyond 2035 (>19 years)	Beyond 2035 (>19 years)

[1]Capacity year is defined as the year in which the critical approach exceeds LOS D. Number of years is measured from opening year of 2016.
[2] Addition of the northbound left-turn lane (NBL) requires two entering lanes on the northbound approach and two circulating lanes on the westbound approach.
[3] The multilane configuration in Alternative 6 requires two entering and two exiting lanes on the northbound and southbound approaches. Two circulating lanes would be required on the eastbound and westbound approaches.

As shown in Table 8, a single-lane roundabout with a southbound right-turn lane (Alternative 2) provides adequate capacity until approximately year 2028. Other lane configurations building off of a single-lane roundabout, such as those included in alternative 4 and 5, provide capacity longer than Alternative 2 but not enough to reach year 2035. To be able to accommodate estimated 2035 traffic volumes, a multilane roundabout with two lanes entering and exiting on the northbound and southbound approaches (Alternative 6) is needed. The sensitivity analysis for the roundabout alternatives considered is included in Appendix 5.

Roundabout Collision Performance

In addition to considering traffic operations performance for roundabouts, we compiled information from U.S.-based research on collision performance at roundabouts relative to other traffic controls. Table 9 presents a summary of collision performance information regarding roundabouts from the American Association of State Highway Transportation Officials' (AASHTO) *Highway Safety Manual* (HSM). The table summarizes the reduction in collisions found when intersections previously controlled by traffic signals or stop signs on the minor street approaches were converted to roundabouts. We chose to summarize the comparison of roundabouts to traffic signals and two-way stop controlled intersections because these are other primary traffic control alternatives to the existing AWSC.

Table 9: Roundabout Collision Performance

Previous Control	Change in Traffic Control	Reduction in Collisions (95% Confidence Interval)	
		Total Collisions	Injury Collisions
Traffic Signal	Modified to a Single-Lane or Multilane Roundabout	36% to 60%	64% to 92%
Two-Way Stop Control	Modified to a Single-Lane or Multilane Roundabout	34% to 54%	74% to 90%
Two-Way Stop Control	Modified to a Single-Lane Roundabout in a Rural Area	63% to 79%	79% to 95%

The summary presented in Table 9 is assembled from information in Part D, Chapter 14 of the HSM on pages 14-10 and 14-11. Previous roundabout implementations in the U.S. have indicated significant safety benefits in terms of reduction in total and more severe collisions.

Phased Implementation

Based on the traffic operations results, KAI suggests the City design and implement, at a minimum, the near-term (2016) single-lane roundabout with design and plans in-hand for the interim (2024) configuration to construct a yield-controlled southbound right-turn lane. While the southbound right-turn lane is not necessary in the near-term to meet level-of-service criteria, providing the yield-controlled southbound right-turn lane in the near-term would increase capacity during peak hour operations thereby helping to prevent southbound motorists from using Rubia Drive as an alternative to making a right-turn at the Sheldon Road/Waterman Road intersection. The single-lane roundabout with a yield-controlled southbound right-turn lane is estimated to provide sufficient capacity to accommodate estimated future traffic volumes for up to approximately 12 years (i.e., 42% growth in existing volumes). Once capacity is reached, the roundabout could be modified to a multilane roundabout with two entry and exit lanes on the northbound and southbound approaches, thus providing adequate capacity through year 2035 (i.e., capacity able to accommodate 63% growth in existing volumes).

Table 10 shows the operational results of Alternative 2 (i.e., the single-lane roundabout with a yield-controlled southbound right-turn lane) after construction in 2016 and in 2028 when it is expected to exceed LOS D based on future traffic volume estimates.

Table 10: Alternative 2 (Single-Lane with SBR) Acceptable Operations

Alternative 2 (Single-Lane with SBR)								
	Year 2016				Year 2028			
	LOS	v/c Ratio	Delay (s/veh)	95% Queue (ft)	LOS	v/c Ratio	Delay (s/veh)	95% Queue (ft)
	Weekday AM Peak Hour				Weekday AM Peak Hour			
Northbound	B	0.61	13.6	118	**E**	**0.91**	**37.7**	**347**
Westbound	A	0.27	7.9	31	B	0.42	11.8	54
Southbound	A	0.38	6.9	52	A	0.54	9.7	94
Eastbound	B	0.61	12.8	123	D	0.89	32.4	348
	Weekday PM Peak Hour				Weekday PM Peak Hour			
Northbound	A	0.46	9.4	70	B	0.64	14.7	133
Westbound	B	0.48	10.1	74	C	0.67	17.0	141
Southbound	B	0.53	10.3	89	C	0.76	18.8	183
Eastbound	B	0.62	13.5	124	D	0.87	30.9	302

As shown in Table 10, the northbound approach exceeds LOS D prior to year 2035 during the AM peak hour condition. The eastbound approach is also approaching capacity. Table 11 summarizes the performance of Alternative 6 (i.e., multilane roundabout with two-lane entries and exits on the northbound and southbound approaches) in year 2028 and year 2035. Analysis worksheets for the single-lane roundabout with a southbound right turn lane are included in Appendix 6.

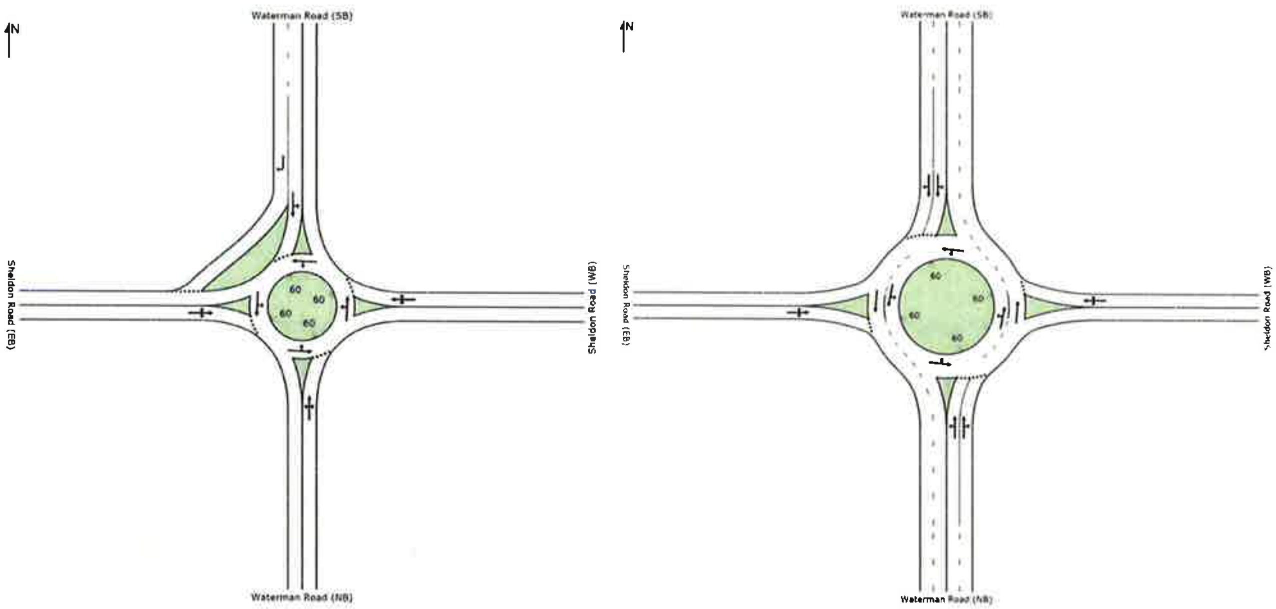
Table 11: Alternative 6 (Multilane NB & SB with Single-Lane EB & WB) Acceptable Operations

Multilane NB & SB with Single-Lane EB & WB								
	Year 2028				Year 2035			
	LOS	v/c Ratio	Delay (s/veh)	95% Queue (ft)	LOS	v/c Ratio	Delay (s/eveh)	95% Queue (ft)
	Weekday AM Peak Hour				Weekday AM Peak Hour			
Northbound	B	0.45	11.2	64	C	0.57	15.2	92
Westbound	A	0.34	8.7	41	B	0.44	11.1	57
Southbound	A	0.35	7.7	45	A	0.42	9.2	59
Eastbound	C	0.74	16.8	196	D	0.91	33.1	401
	Weekday PM Peak Hour				Weekday PM Peak Hour			
Northbound	A	0.32	7.8	39	A	0.40	9.5	52
Westbound	B	0.56	11.3	99	C	0.69	16.4	152
Southbound	B	0.52	12.8	80	C	0.66	18.8	121
Eastbound	C	0.72	16.4	176	D	0.89	31.5	346

As shown in Table 11, Alternative 6 improves operational results in year 2028, compared to Alternative 2. Year 2035 results are also acceptable per the City's standard of LOS D. Analysis worksheets for the multilane NB & SB with single-lane EB & WB are included in Appendix 7.

Figure 1 (on the following page) illustrates the lane configurations of Alternative 2 and Alternative 6. The images shown in Figure 1 are schematic and only for illustrating the lane configurations; they are not to scale and dimensions should not be inferred or extracted from them. In the previous roundabout feasibility study, KAI completed for the City at this intersection, we prepared a design concept for a roundabout with the same lane configuration as Alternative 2. The roundabout concept had an inscribed circle diameter (ICD) of 150 feet. We estimate the ICD for the multilane configuration (Alternative 6) to be in the range of 160 to 200 feet. We recently prepared a horizontal layout for a similar multilane configuration at the Sheldon Road/Bradshaw Road intersection with an ICD of 170 feet. We will establish an exact ICD, as well as other design features, in the upcoming concept development stages.

Figure 1: Alternative 2 on the left (Single-Lane Yield-Controlled SBR) and Alternative 6 on the right (Two-lane entries and exits on Waterman Road)



SUMMARY

Alternative 1, a single-lane roundabout at the study intersection, would operate acceptably per the City's LOS D threshold until 2024. Alternative 2, a single-lane roundabout with a yield-controlled right turn lane, would operate acceptably until approximately year 2028 (i.e., approximately 42% growth in existing traffic volumes). Converting the intersection to a multilane roundabout with two-lanes entering and exiting on Waterman Road is estimated to operate acceptably through year 2035 (i.e., accommodate at least 63% increase in existing traffic volumes).

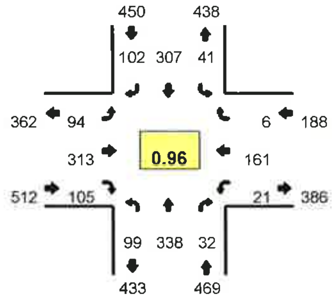
KAI suggests the City move forward in designing Alternative 2 (single-lane roundabout with the southbound right-turn lane), while preserving right-of-way to design and implement Alternative 6 if and/or when it is needed based on growth in traffic volumes. In the near-term, the City could implement Alternative 1 (single-lane roundabout) and postpone the construction of the southbound yield control right-turn lane until it is needed based on traffic volume growth. This is consistent with the Rural Roads Improvement Policy to make intersection improvements necessary to serve existing traffic volumes. This approach also enables the City to plan for and respond to anticipated growth in the interim and longer-term future. The City could also elect to construct the yield-controlled southbound right-turn in the near-term as a means to help prevent southbound motorists from using Rubia Drive to access westbound Sheldon Road. In addition to traffic operations benefits a roundabout will be able to provide at the intersection, research based on U.S. roundabouts has also shown that roundabouts have lower collision frequencies and severities than traffic signal controlled and two-way stop controlled intersections.

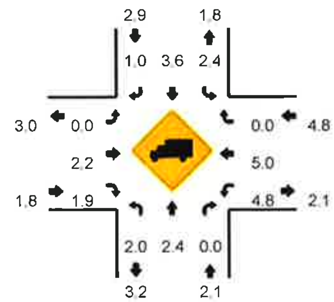
Appendix 1 Traffic Count Worksheets

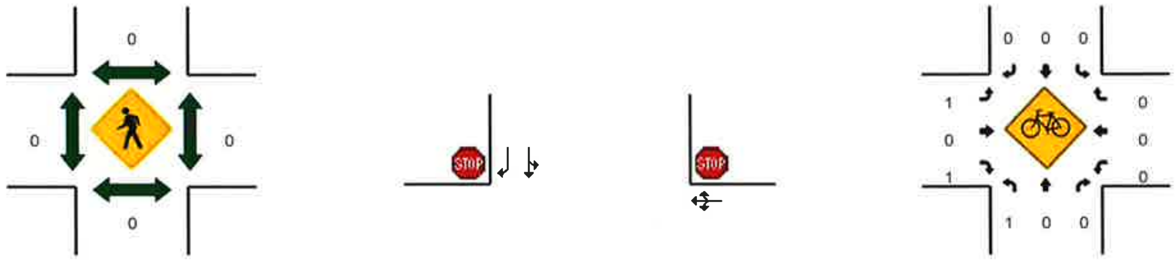
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

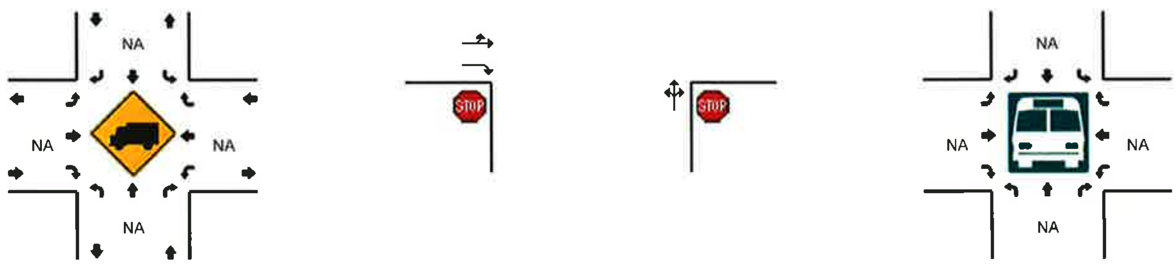
LOCATION: Waterman Rd -- Sheldon Rd | **QC JOB #:** 12489001
CITY/STATE: Elk Grove, CA | **DATE:** Wed, May 14 2014

Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 8:00 AM -- 8:15 AM









5-Min Count Period Beginning At	Waterman Rd (Northbound) Left	Thru	Right	U	Waterman Rd (Southbound) Left	Thru	Right	U	Sheldon Rd (Eastbound) Left	Thru	Right	U	Sheldon Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
7:00 AM	14	27	3	0	0	18	7	0	6	27	2	0	3	17	2	0	126	
7:05 AM	4	25	4	0	2	16	11	0	8	29	4	0	0	17	0	0	120	
7:10 AM	9	29	2	0	4	23	6	0	4	35	4	0	2	18	0	0	136	
7:15 AM	9	24	5	0	1	17	9	0	6	29	5	0	3	15	2	0	125	
7:20 AM	10	23	3	0	0	34	2	0	9	23	10	0	0	15	2	0	131	
7:25 AM	4	32	5	0	3	23	4	0	7	33	4	0	2	14	0	0	131	
7:30 AM	12	30	2	0	8	15	5	0	2	30	7	0	1	10	0	0	122	
7:35 AM	8	31	2	0	2	34	13	0	2	28	9	0	1	9	0	0	139	
7:40 AM	11	25	2	0	9	22	6	0	11	25	9	0	3	8	0	0	131	
7:45 AM	7	27	2	0	11	26	10	0	11	25	18	0	0	11	0	0	148	
7:50 AM	8	26	3	0	0	31	8	0	7	28	9	0	1	9	1	0	131	
7:55 AM	6	28	3	0	1	27	11	0	7	28	12	0	2	13	0	0	138	1578
8:00 AM	7	32	2	0	2	23	8	0	8	24	9	0	3	15	1	0	134	1586
8:05 AM	6	29	1	0	1	32	6	0	8	23	9	0	3	21	1	0	140	1606
8:10 AM	10	27	3	0	1	23	13	0	11	27	7	0	3	20	1	0	146	1616
8:15 AM	10	28	4	0	3	17	16	0	11	19	2	0	2	16	0	0	128	1619
8:20 AM	10	26	2	0	1	21	14	0	7	21	2	0	1	25	1	0	131	1619
8:25 AM	12	24	2	0	0	14	16	0	11	16	2	0	2	22	1	0	122	1610
8:30 AM	21	21	2	0	1	17	7	0	7	14	2	0	0	25	2	0	119	1607
8:35 AM	9	26	3	0	1	18	12	0	6	20	4	0	2	16	2	0	119	1587
8:40 AM	16	18	1	0	3	22	8	0	5	19	5	0	5	21	0	0	123	1579
8:45 AM	6	19	3	0	1	15	10	0	5	13	7	0	2	19	0	0	100	1531
8:50 AM	6	15	0	0	2	22	7	0	5	18	8	0	3	22	0	0	108	1508
8:55 AM	7	13	1	0	0	15	9	0	4	17	4	0	1	26	3	0	100	1470

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	92	352	24	0	16	312	108	0	108	296	100	0	36	224	12	0	1680
Heavy Trucks	0	8	0		4	20	0		0	8	0		4	8	0		52
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 5/20/2014 10:25 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

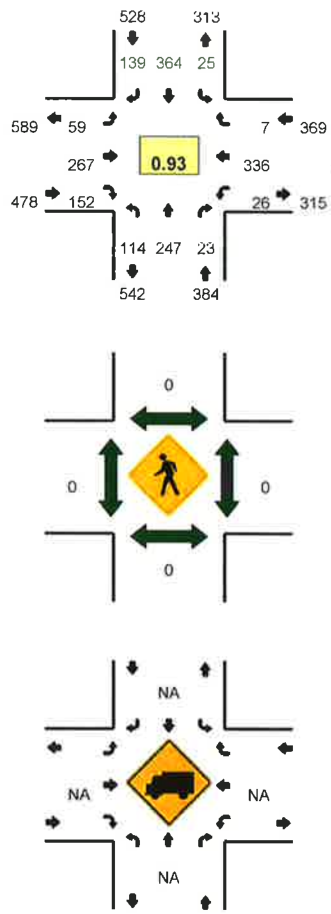
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

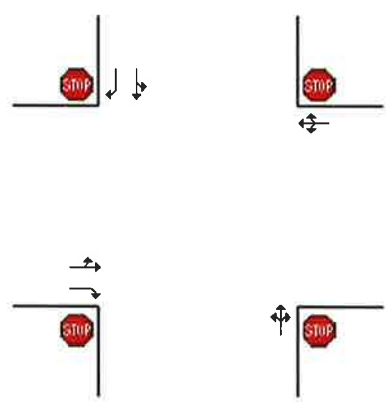
LOCATION: Waterman Rd -- Sheldon Rd | **QC JOB #:** 12489002

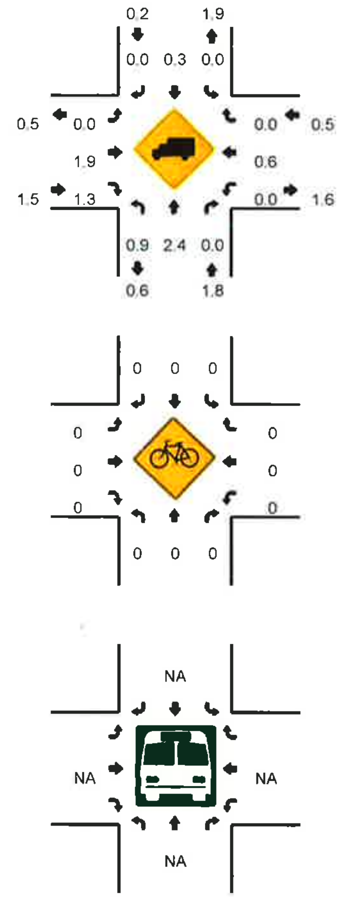
CITY/STATE: Elk Grove, CA | **DATE:** Wed, May 14 2014

Peak-Hour: 4:50 PM -- 5:50 PM

Peak 15-Min: 5:15 PM -- 5:30 PM







5-Min Count Period Beginning At	Waterman Rd (Northbound) Left	Thru	Right	U	Waterman Rd (Southbound) Left	Thru	Right	U	Sheldon Rd (Eastbound) Left	Thru	Right	U	Sheldon Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	8	13	0	0	0	22	15	0	3	12	7	0	0	28	1	0	109	
4:05 PM	4	19	1	0	1	22	8	0	6	25	11	0	4	23	2	0	126	
4:10 PM	9	18	3	0	3	34	12	0	5	12	6	0	0	23	1	0	126	
4:15 PM	8	15	1	0	4	29	11	0	8	16	14	0	7	23	0	0	136	
4:20 PM	9	25	1	0	3	27	12	0	4	13	22	0	1	19	2	0	138	
4:25 PM	5	17	1	0	2	29	8	0	6	23	20	0	2	18	0	0	131	
4:30 PM	8	19	0	0	1	24	14	0	3	20	13	0	1	16	0	0	119	
4:35 PM	7	14	2	0	2	24	16	0	8	21	16	0	1	26	0	0	137	
4:40 PM	12	19	1	0	3	26	14	0	6	19	12	0	4	18	2	0	136	
4:45 PM	8	20	0	0	4	32	12	0	3	13	12	0	2	29	0	0	135	
4:50 PM	16	16	1	0	0	32	6	0	4	24	13	0	2	30	2	0	146	
4:55 PM	9	18	3	0	1	34	11	0	8	23	9	0	2	32	2	0	152	1591
5:00 PM	6	29	2	0	3	32	10	0	0	17	9	0	4	30	1	0	143	1625
5:05 PM	6	26	3	0	2	29	12	0	6	25	15	0	0	34	0	0	158	1657
5:10 PM	14	17	1	0	2	29	7	0	5	22	15	0	4	24	0	0	140	1671
5:15 PM	11	24	2	0	0	34	19	0	6	15	8	0	2	32	1	0	154	1689
5:20 PM	6	22	4	0	2	34	15	0	4	28	14	0	1	27	0	0	157	1708
5:25 PM	12	16	3	0	2	27	22	0	3	31	18	0	0	28	1	0	163	1740
5:30 PM	7	20	1	0	5	27	10	0	7	20	12	0	1	23	0	0	133	1754
5:35 PM	7	15	0	0	1	28	12	0	3	16	13	0	3	22	0	0	120	1737
5:40 PM	11	19	1	0	2	26	10	0	7	28	13	0	2	25	0	0	144	1745
5:45 PM	9	25	2	0	5	32	5	0	6	18	13	0	5	29	0	0	149	1759
5:50 PM	10	15	3	0	5	30	8	0	9	19	10	0	2	21	0	0	132	1745
5:55 PM	5	25	0	0	2	39	10	0	3	21	15	0	1	17	0	0	138	1731

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	116	248	36	0	16	380	224	0	52	296	160	0	12	348	8	0	1896
Heavy Trucks	0	4	0		0	4	0		0	12	0		0	0	0		20
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Appendix 2 Existing Conditions Analysis

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	KZP	Intersection	Sheldon/Waterman
Agency/Co.	Kittelson & Associates	Jurisdiction	City of Elk Grove
Date Performed	7/4/2014	Analysis Year	Existing Year
Analysis Time Period	Existing AM Peak Hour		

Project ID *Sheldon Rd/Waterman Rd Intersection Analysis*

East/West Street: *Sheldon Road* | North/South Street: *Waterman Road*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	94	313	105	21	161	6
%Thrus Left Lane						
Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	99	338	32	41	307	102
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LTR		LTR		LT	R
PHF	0.96	0.96	0.96		0.96		0.96	0.96
Flow Rate (veh/h)	423	109	194		488		361	106
% Heavy Vehicles	2	2	5		2		3	3
No. Lanes	2		1		1		2	
Geometry Group	5		4b		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.1		0.2		0.1	0.0
Prop. Right-Turns	0.0	1.0	0.0		0.1		0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0		0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.2	0.2	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.1		0.0		0.1	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20		3.20	3.20
x, initial	0.38	0.10	0.17		0.43		0.32	0.09
hd, final value (s)	8.98	8.13	10.23		9.01		9.06	8.27
x, final value	1.05	0.25	0.55		1.22		0.91	0.24
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	6.7	5.8	7.9		6.7		6.8	6.0

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	423	359	346		488		397	356
Delay (s/veh)	90.36	13.46	24.81		147.92		55.48	13.61
LOS	F	B	C		F		F	B
Approach: Delay (s/veh)	74.60		24.81		147.92		45.98	
LOS	F		C		F		E	
Intersection Delay (s/veh)	82.19							
Intersection LOS	F							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	KZP	Intersection	Sheldon/Waterman
Agency/Co.	Kittelson & Associates	Jurisdiction	City of Elk Grove
Date Performed	7/4/2014	Analysis Year	Existing Year
Analysis Time Period	Existing PM Peak Hour		

Project ID *Sheldon Rd/Waterman Rd Intersection Analysis*

East/West Street: *Sheldon Road* — North/South Street: *Waterman Road*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	59	267	152	26	336	7
%Thrus Left Lane						
Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	114	247	23	25	364	139
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	R	LTR		LTR		LT	R
PHF	0.93	0.93	0.93		0.93		0.93	0.93
Flow Rate (veh/h)	350	163	395		411		417	149
% Heavy Vehicles	2	2	1		2		1	1
No. Lanes	2		1		1		2	
Geometry Group	5		4b		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2	0.0	0.1		0.3		0.1	0.0
Prop. Right-Turns	0.0	1.0	0.0		0.1		0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0		0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.2	0.2	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1	-0.7	0.0		0.1		0.0	-0.7

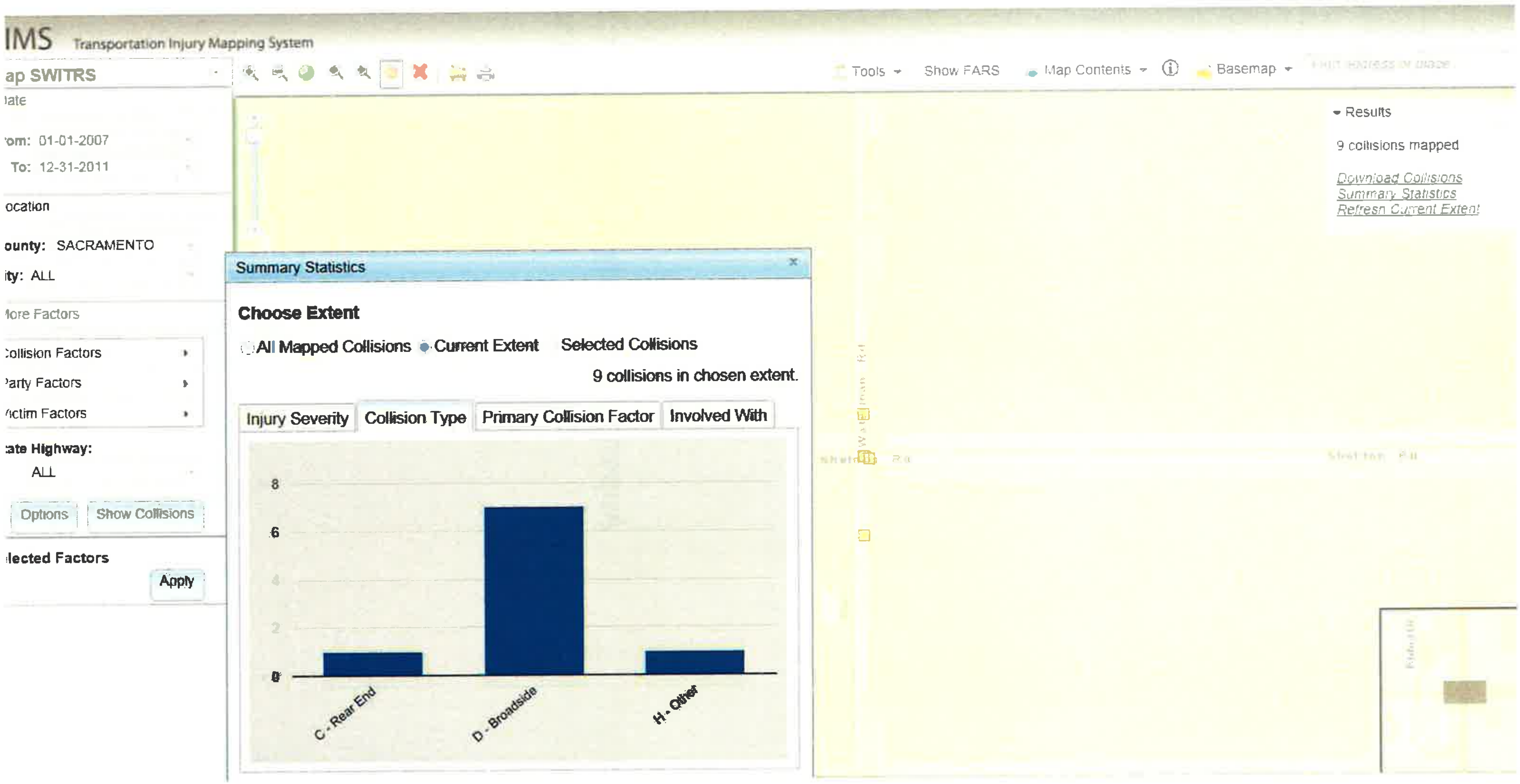
Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20		3.20	3.20
x, initial	0.31	0.14	0.35		0.37		0.37	0.13
hd, final value (s)	10.06	9.23	10.31		10.35		9.95	9.18
x, final value	0.98	0.42	1.13		1.18		1.15	0.38
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	7.8	6.9	8.0		8.1		7.7	6.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	358	391	395		411		417	393
Delay (s/veh)	74.57	18.39	120.91		138.78		126.69	17.40
LOS	F	C	F		F		F	C
Approach: Delay (s/veh)	56.72		120.91		138.78		97.92	
LOS	F		F		F		F	
Intersection Delay (s/veh)	100.44							
Intersection LOS	F							

Appendix 3 Screenshot of TIMS database


IMS Transportation Injury Mapping System
ap SWITRS
Tools
Show FARS
Map Contents
Basemap
late
om: 01-01-2007
To: 12-31-2011
ocation
ounty: SACRAMENTO
ity: ALL
lore Factors
Collision Factors
Party Factors
Victim Factors
tate Highway:
ALL
Options
Show Collisions
lected Factors
Apply
Results
9 collisions mapped
Download Collisions
Summary Statistics
Refresh Current Extent
Summary Statistics
Choose Extent
All Mapped Collisions
Current Extent
Selected Collisions
9 collisions in chosen extent.
Injury Severity
Collision Type
Primary Collision Factor
Involved With
8
6
4
2
0
C - Rear End
D - Broadside
H - Other

Appendix 4 Analysis Worksheets: Single-Lane Roundabout

MOVEMENT SUMMARY

Site: 2016 AM Peak

Sheldon Rd/Waterman Rd
Year 2016 AM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	109	2.0	0.610	13.7	LOS B	4.7	118.7	0.78	0.87	29.7
8	T1	373	2.4	0.610	13.7	LOS B	4.7	118.7	0.78	0.87	29.8
18	R2	35	2.0	0.610	13.7	LOS B	4.7	118.7	0.78	0.87	29.2
Approach		518	2.3	0.610	13.7	LOS B	4.7	118.7	0.78	0.87	29.7
East: Sheldon Road (WB)											
1	L2	23	4.8	0.275	8.0	LOS A	1.2	31.1	0.63	0.62	32.2
6	T1	178	5.0	0.275	8.0	LOS A	1.2	31.1	0.63	0.62	32.4
16	R2	7	2.0	0.275	8.0	LOS A	1.2	31.1	0.63	0.62	31.7
Approach		208	4.9	0.275	8.0	LOS A	1.2	31.1	0.63	0.62	32.3
North: Waterman Road (SB)											
7	L2	45	2.4	0.490	9.4	LOS A	3.0	77.8	0.62	0.53	31.7
4	T1	339	3.6	0.490	9.4	LOS A	3.0	77.8	0.62	0.53	31.8
14	R2	113	1.0	0.490	9.4	LOS A	3.0	77.8	0.62	0.53	31.2
Approach		497	2.9	0.490	9.4	LOS A	3.0	77.8	0.62	0.53	31.7
West: Sheldon Road (EB)											
5	L2	104	2.0	0.611	12.9	LOS B	4.9	124.6	0.76	0.79	30.1
2	T1	346	2.2	0.611	12.9	LOS B	4.9	124.6	0.76	0.79	30.2
12	R2	116	1.9	0.611	12.9	LOS B	4.9	124.6	0.76	0.79	29.6
Approach		565	2.1	0.611	12.9	LOS B	4.9	124.6	0.76	0.79	30.0
All Vehicles		1788	2.7	0.611	11.6	LOS B	4.9	124.6	0.71	0.72	30.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2016 PM Peak

Sheldon Rd/Waterman Rd
2016 PM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	130	0.9	0.466	9.5	LOS A	2.8	71.1	0.66	0.61	31.3
8	T1	282	2.4	0.466	9.5	LOS A	2.8	71.1	0.66	0.61	31.4
18	R2	26	2.0	0.466	9.5	LOS A	2.8	71.1	0.66	0.61	30.8
Approach		438	1.9	0.466	9.5	LOS A	2.8	71.1	0.66	0.61	31.3
East: Sheldon Road (WB)											
1	L2	30	2.0	0.479	10.2	LOS B	3.0	74.6	0.70	0.71	31.4
6	T1	383	0.6	0.479	10.2	LOS B	3.0	74.6	0.70	0.71	31.5
16	R2	8	2.0	0.479	10.2	LOS B	3.0	74.6	0.70	0.71	30.8
Approach		421	0.7	0.479	10.2	LOS B	3.0	74.6	0.70	0.71	31.5
North: Waterman Road (SB)											
7	L2	28	2.0	0.728	18.7	LOS C	7.1	178.5	0.89	1.04	28.1
4	T1	415	0.3	0.728	18.7	LOS C	7.1	178.5	0.89	1.04	28.2
14	R2	158	2.0	0.728	18.7	LOS C	7.1	178.5	0.89	1.04	27.7
Approach		602	0.8	0.728	18.7	LOS C	7.1	178.5	0.89	1.04	28.1
West: Sheldon Road (EB)											
5	L2	67	2.0	0.619	13.6	LOS B	4.9	125.3	0.79	0.86	29.9
2	T1	304	1.9	0.619	13.6	LOS B	4.9	125.3	0.79	0.86	30.0
12	R2	173	1.3	0.619	13.6	LOS B	4.9	125.3	0.79	0.86	29.4
Approach		545	1.7	0.619	13.6	LOS B	4.9	125.3	0.79	0.86	29.8
All Vehicles		2005	1.3	0.728	13.5	LOS B	7.1	178.5	0.77	0.83	29.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 AM Peak - Single

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Final Year): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	161	2.0	1.075	79.2	LOS F	34.9	888.3	1.00	2.34	16.0
8	T1	551	2.4	1.075	79.2	LOS F	34.9	888.3	1.00	2.34	16.0
18	R2	52	2.0	1.075	79.2	LOS F	34.9	888.3	1.00	2.34	15.8
Approach		764	2.3	1.075	79.2	LOS F	34.9	888.3	1.00	2.34	16.0
East: Sheldon Road (WB)											
1	L2	34	4.8	0.507	14.4	LOS B	2.7	71.2	0.77	0.85	29.5
6	T1	262	5.0	0.507	14.4	LOS B	2.7	71.2	0.77	0.85	29.6
16	R2	10	2.0	0.507	14.4	LOS B	2.7	71.2	0.77	0.85	29.1
Approach		306	4.9	0.507	14.4	LOS B	2.7	71.2	0.77	0.85	29.6
North: Waterman Road (SB)											
7	L2	67	2.4	0.834	25.1	LOS D	11.3	288.1	0.99	1.23	26.0
4	T1	500	3.6	0.834	25.1	LOS D	11.3	288.1	0.99	1.23	26.0
14	R2	166	1.0	0.834	25.1	LOS D	11.3	288.1	0.99	1.23	25.6
Approach		733	2.9	0.834	25.1	LOS D	11.3	288.1	0.99	1.23	25.9
West: Sheldon Road (EB)											
5	L2	153	2.0	1.103	86.8	LOS F	42.8	1086.7	1.00	2.56	15.1
2	T1	510	2.2	1.103	86.8	LOS F	42.8	1086.7	1.00	2.56	15.2
12	R2	171	1.9	1.103	86.8	LOS F	42.8	1086.7	1.00	2.56	15.0
Approach		835	2.1	1.103	86.8	LOS F	42.8	1086.7	1.00	2.56	15.1
All Vehicles		2639	2.7	1.103	59.0	LOS F	42.8	1086.7	0.97	1.93	18.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak - Single

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Final Year): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	186	0.9	0.786	22.9	LOS C	8.5	216.1	0.94	1.15	26.4
8	T1	403	2.4	0.786	22.9	LOS C	8.5	216.1	0.94	1.15	26.5
18	R2	37	2.0	0.786	22.9	LOS C	8.5	216.1	0.94	1.15	26.0
Approach		626	1.9	0.786	22.9	LOS C	8.5	216.1	0.94	1.15	26.4
East: Sheldon Road (WB)											
1	L2	42	2.0	0.845	30.5	LOS D	10.0	252.1	0.98	1.29	24.5
6	T1	548	0.6	0.845	30.5	LOS D	10.0	252.1	0.98	1.29	24.6
16	R2	11	2.0	0.845	30.5	LOS D	10.0	252.1	0.98	1.29	24.1
Approach		601	0.7	0.845	30.5	LOS D	10.0	252.1	0.98	1.29	24.5
North: Waterman Road (SB)											
7	L2	41	2.0	1.317	173.1	LOS F	78.3	1969.8	1.00	3.94	9.6
4	T1	593	0.3	1.317	173.1	LOS F	78.3	1969.8	1.00	3.94	9.6
14	R2	227	2.0	1.317	173.1	LOS F	78.3	1969.8	1.00	3.94	9.5
Approach		861	0.8	1.317	173.1	LOS F	78.3	1969.8	1.00	3.94	9.6
West: Sheldon Road (EB)											
5	L2	96	2.0	0.932	38.8	LOS E	17.9	453.1	1.00	1.49	22.4
2	T1	435	1.9	0.932	38.8	LOS E	17.9	453.1	1.00	1.49	22.4
12	R2	248	1.3	0.932	38.8	LOS E	17.9	453.1	1.00	1.49	22.1
Approach		779	1.7	0.932	38.8	LOS E	17.9	453.1	1.00	1.49	22.3
All Vehicles		2867	1.3	1.317	73.9	LOS F	78.3	1969.8	0.98	2.11	16.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Appendix 5 Sensitivity Analysis for Roundabout Alternatives

MOVEMENT SUMMARY

Site: 2035 AM Peak - Single - Fail

Sheldon Rd/Waterman Rd
Design Life AM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 13 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	138	2.0	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.7
8	T1	470	2.4	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.8
18	R2	44	2.0	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.4
Approach		652	2.3	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.7
East: Sheldon Road (WB)											
1	L2	29	4.8	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.7
6	T1	224	5.0	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.9
16	R2	8	2.0	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.3
Approach		261	4.9	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.8
North: Waterman Road (SB)											
7	L2	57	2.4	0.671	14.7	LOS B	6.1	156.0	0.80	0.85	29.5
4	T1	427	3.6	0.671	14.7	LOS B	6.1	156.0	0.80	0.85	29.6
14	R2	142	1.0	0.671	14.7	LOS B	6.1	156.0	0.80	0.85	29.0
Approach		625	2.9	0.671	14.7	LOS B	6.1	156.0	0.80	0.85	29.4
West: Sheldon Road (EB)											
5	L2	131	2.0	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.8
2	T1	435	2.2	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.9
12	R2	146	1.9	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.5
Approach		712	2.1	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.8
All Vehicles		2250	2.7	0.875	24.0	LOS C	12.0	305.3	0.91	1.13	26.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak - Single - Fail

Sheldon Rd/Waterman Rd
Design Life PM Peak Hour
Single Lane
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 9 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	145	0.9	0.544	11.4	LOS B	3.8	95.7	0.72	0.75	30.5
8	T1	314	2.4	0.544	11.4	LOS B	3.8	95.7	0.72	0.75	30.6
18	R2	29	2.0	0.544	11.4	LOS B	3.8	95.7	0.72	0.75	30.0
Approach		488	1.9	0.544	11.4	LOS B	3.8	95.7	0.72	0.75	30.5
East: Sheldon Road (WB)											
1	L2	33	2.0	0.565	12.6	LOS B	4.0	100.3	0.77	0.84	30.4
6	T1	427	0.6	0.565	12.6	LOS B	4.0	100.3	0.77	0.84	30.5
16	R2	9	2.0	0.565	12.6	LOS B	4.0	100.3	0.77	0.84	29.9
Approach		469	0.7	0.565	12.6	LOS B	4.0	100.3	0.77	0.84	30.5
North: Waterman Road (SB)											
7	L2	32	2.0	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.4
4	T1	462	0.3	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.5
14	R2	177	2.0	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.1
Approach		671	0.8	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.4
West: Sheldon Road (EB)											
5	L2	75	2.0	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	28.0
2	T1	339	1.9	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	28.1
12	R2	193	1.3	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	27.6
Approach		607	1.7	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	27.9
All Vehicles		2234	1.3	0.863	19.4	LOS C	11.7	294.6	0.86	1.02	27.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 AM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 13 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	138	2.0	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.7
8	T1	470	2.4	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.8
18	R2	44	2.0	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.4
Approach		652	2.3	0.875	33.0	LOS D	11.8	300.5	1.00	1.36	23.7
East: Sheldon Road (WB)											
1	L2	29	4.8	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.7
6	T1	224	5.0	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.9
16	R2	8	2.0	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.3
Approach		261	4.9	0.405	11.3	LOS B	2.0	50.9	0.72	0.76	30.8
North: Waterman Road (SB)											
7	L2	57	2.4	0.522	10.6	LOS B	3.4	88.2	0.69	0.66	31.1
4	T1	427	3.6	0.522	10.6	LOS B	3.4	88.2	0.69	0.66	31.2
14	R2	142	1.0	0.145	5.0	LOS A	0.6	16.2	0.49	0.38	33.5
Approach		625	2.9	0.522	9.4	LOS A	3.4	88.2	0.64	0.60	31.7
West: Sheldon Road (EB)											
5	L2	131	2.0	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.8
2	T1	435	2.2	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.9
12	R2	146	1.9	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.5
Approach		712	2.1	0.858	28.6	LOS D	12.0	305.3	1.00	1.30	24.8
All Vehicles		2250	2.7	0.875	22.5	LOS C	12.0	305.3	0.87	1.06	26.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 PM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 14 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	162	0.9	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.2
8	T1	351	2.4	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.3
18	R2	33	2.0	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	28.7
Approach		545	1.9	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.2
East: Sheldon Road (WB)											
1	L2	37	2.0	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.7
6	T1	477	0.6	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.8
16	R2	10	2.0	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.2
Approach		524	0.7	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.8
North: Waterman Road (SB)											
7	L2	36	2.0	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.7
4	T1	517	0.3	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.8
14	R2	197	2.0	0.266	7.9	LOS A	1.2	29.7	0.64	0.64	32.1
Approach		750	0.8	0.761	18.8	LOS C	7.3	183.1	0.85	0.99	28.0
West: Sheldon Road (EB)											
5	L2	84	2.0	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.3
2	T1	379	1.9	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.4
12	R2	216	1.3	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.0
Approach		679	1.7	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.2
All Vehicles		2498	1.3	0.867	20.8	LOS C	11.9	302.0	0.88	1.06	27.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 AM Peak + NBL

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
Single Lane + NBL
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 14 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	141	2.0	0.191	7.0	LOS A	0.8	20.4	0.62	0.60	31.1
8	T1	480	2.4	0.715	19.8	LOS C	6.2	156.9	0.88	1.04	27.9
18	R2	45	2.0	0.715	19.8	LOS C	6.2	156.9	0.88	1.04	27.3
Approach		666	2.3	0.715	17.1	LOS C	6.2	156.9	0.82	0.95	28.4
East: Sheldon Road (WB)											
1	L2	30	4.8	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.9
6	T1	229	5.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
16	R2	9	2.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.4
Approach		267	4.9	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
North: Waterman Road (SB)											
7	L2	58	2.4	0.691	15.6	LOS C	6.6	167.7	0.83	0.89	29.1
4	T1	436	3.6	0.691	15.6	LOS C	6.6	167.7	0.83	0.89	29.2
14	R2	145	1.0	0.691	15.6	LOS C	6.6	167.7	0.83	0.89	28.7
Approach		639	2.9	0.691	15.6	LOS C	6.6	167.7	0.83	0.89	29.1
West: Sheldon Road (EB)											
5	L2	133	2.0	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
2	T1	444	2.2	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
12	R2	149	1.9	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.5
Approach		727	2.1	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.8
All Vehicles		2299	2.7	0.887	20.5	LOS C	13.7	347.6	0.86	1.03	27.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak + NBL

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
Single Lane + NBL
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 9 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	145	0.9	0.160	5.5	LOS A	0.7	17.7	0.53	0.45	31.8
8	T1	314	2.4	0.384	8.4	LOS A	2.0	50.1	0.63	0.58	32.4
18	R2	29	2.0	0.384	8.4	LOS A	2.0	50.1	0.63	0.58	31.6
Approach		488	1.9	0.384	7.6	LOS A	2.0	50.1	0.60	0.55	32.2
East: Sheldon Road (WB)											
1	L2	33	2.0	0.470	9.1	LOS A	2.9	73.1	0.70	0.70	31.9
6	T1	427	0.6	0.470	9.1	LOS A	2.9	73.1	0.70	0.70	32.0
16	R2	9	2.0	0.470	9.1	LOS A	2.9	73.1	0.70	0.70	31.3
Approach		469	0.7	0.470	9.1	LOS A	2.9	73.1	0.70	0.70	32.0
North: Waterman Road (SB)											
7	L2	32	2.0	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.4
4	T1	462	0.3	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.5
14	R2	177	2.0	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.1
Approach		671	0.8	0.863	30.6	LOS D	11.7	294.6	1.00	1.33	24.4
West: Sheldon Road (EB)											
5	L2	75	2.0	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	28.0
2	T1	339	1.9	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	28.1
12	R2	193	1.3	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	27.6
Approach		607	1.7	0.728	18.6	LOS C	7.1	179.7	0.89	1.04	27.9
All Vehicles		2234	1.3	0.863	17.8	LOS C	11.7	294.6	0.82	0.95	28.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 AM Peak + SBR&NBL

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
Single Lane + SBR&NBL
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 14 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	141	2.0	0.191	7.0	LOS A	0.8	20.4	0.62	0.60	31.1
8	T1	480	2.4	0.715	19.8	LOS C	6.2	156.9	0.88	1.04	27.9
18	R2	45	2.0	0.715	19.8	LOS C	6.2	156.9	0.88	1.04	27.3
Approach		666	2.3	0.715	17.1	LOS C	6.2	156.9	0.82	0.95	28.4
East: Sheldon Road (WB)											
1	L2	30	4.8	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.9
6	T1	229	5.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
16	R2	9	2.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.4
Approach		267	4.9	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
North: Waterman Road (SB)											
7	L2	58	2.4	0.537	11.1	LOS B	3.6	93.7	0.70	0.69	30.9
4	T1	436	3.6	0.537	11.1	LOS B	3.6	93.7	0.70	0.69	31.0
14	R2	145	1.0	0.149	5.1	LOS A	0.7	16.7	0.49	0.39	33.5
Approach		639	2.9	0.537	9.7	LOS A	3.6	93.7	0.65	0.62	31.5
West: Sheldon Road (EB)											
5	L2	133	2.0	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
2	T1	444	2.2	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
12	R2	149	1.9	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.5
Approach		727	2.1	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.8
All Vehicles		2299	2.7	0.887	18.9	LOS C	13.7	347.6	0.82	0.96	27.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak + SBR&NBL

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
Single Lane + SBR&NBL
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 14 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	162	0.9	0.189	6.1	LOS A	0.8	21.0	0.57	0.51	31.5
8	T1	351	2.4	0.453	10.0	LOS A	2.6	66.3	0.69	0.70	31.7
18	R2	33	2.0	0.453	10.0	LOS A	2.6	66.3	0.69	0.70	31.0
Approach		545	1.9	0.453	8.8	LOS A	2.6	66.3	0.65	0.64	31.6
East: Sheldon Road (WB)											
1	L2	37	2.0	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	30.9
6	T1	477	0.6	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	31.1
16	R2	10	2.0	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	30.4
Approach		524	0.7	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	31.0
North: Waterman Road (SB)											
7	L2	36	2.0	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.7
4	T1	517	0.3	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.8
14	R2	197	2.0	0.266	7.9	LOS A	1.2	29.7	0.64	0.64	32.1
Approach		750	0.8	0.761	18.8	LOS C	7.3	183.1	0.85	0.99	28.0
West: Sheldon Road (EB)											
5	L2	84	2.0	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.3
2	T1	379	1.9	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.4
12	R2	216	1.3	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.0
Approach		679	1.7	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.2
All Vehicles		2498	1.3	0.867	18.3	LOS C	11.9	302.0	0.83	0.98	28.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 AM Peak + SBR&NBL&EBR

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
Single Lane + SBR&NBL&EBR
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 19 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	155	2.0	0.226	7.9	LOS A	1.0	24.1	0.65	0.65	30.7
8	T1	531	2.4	0.847	31.5	LOS D	9.7	246.9	0.97	1.29	24.3
18	R2	50	2.0	0.847	31.5	LOS D	9.7	246.9	0.97	1.29	23.9
Approach		736	2.3	0.847	26.5	LOS D	9.7	246.9	0.90	1.15	25.4
East: Sheldon Road (WB)											
1	L2	33	4.8	0.407	10.3	LOS B	2.0	52.0	0.73	0.76	31.2
6	T1	253	5.0	0.407	10.3	LOS B	2.0	52.0	0.73	0.76	31.3
16	R2	9	2.0	0.407	10.3	LOS B	2.0	52.0	0.73	0.76	30.7
Approach		295	4.9	0.407	10.3	LOS B	2.0	52.0	0.73	0.76	31.3
North: Waterman Road (SB)											
7	L2	64	2.4	0.621	13.7	LOS B	4.9	125.5	0.78	0.84	29.9
4	T1	482	3.6	0.621	13.7	LOS B	4.9	125.5	0.78	0.84	29.9
14	R2	160	1.0	0.172	5.5	LOS A	0.8	19.3	0.52	0.44	33.2
Approach		706	2.9	0.621	11.8	LOS B	4.9	125.5	0.72	0.75	30.6
West: Sheldon Road (EB)											
5	L2	148	2.0	0.826	26.7	LOS D	9.8	248.5	0.97	1.23	25.3
2	T1	491	2.2	0.826	26.7	LOS D	9.8	248.5	0.97	1.23	25.4
12	R2	165	1.9	0.199	6.4	LOS A	0.9	22.1	0.58	0.53	32.8
Approach		804	2.1	0.826	22.6	LOS C	9.8	248.5	0.89	1.09	26.6
All Vehicles		2542	2.7	0.847	19.3	LOS C	9.8	248.5	0.83	0.97	27.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak + SBR&NBL&EBR

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
Single Lane + SBR&NBL&EBR
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 18 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	176	0.9	0.213	6.6	LOS A	0.9	23.9	0.59	0.55	31.3
8	T1	380	2.4	0.513	11.6	LOS B	3.2	82.2	0.73	0.79	31.0
18	R2	35	2.0	0.513	11.6	LOS B	3.2	82.2	0.73	0.79	30.3
Approach		591	1.9	0.513	10.1	LOS B	3.2	82.2	0.69	0.72	31.0
East: Sheldon Road (WB)											
1	L2	40	2.0	0.632	13.8	LOS B	5.0	126.2	0.83	0.93	29.9
6	T1	517	0.6	0.632	13.8	LOS B	5.0	126.2	0.83	0.93	30.0
16	R2	11	2.0	0.632	13.8	LOS B	5.0	126.2	0.83	0.93	29.4
Approach		568	0.7	0.632	13.8	LOS B	5.0	126.2	0.83	0.93	30.0
North: Waterman Road (SB)											
7	L2	39	2.0	0.874	34.9	LOS D	11.1	278.4	1.00	1.37	23.4
4	T1	561	0.3	0.874	34.9	LOS D	11.1	278.4	1.00	1.37	23.5
14	R2	214	2.0	0.305	8.9	LOS A	1.3	34.2	0.67	0.67	31.6
Approach		813	0.8	0.874	28.0	LOS D	11.1	278.4	0.91	1.19	25.1
West: Sheldon Road (EB)											
5	L2	91	2.0	0.675	17.7	LOS C	5.4	137.8	0.85	0.98	28.3
2	T1	411	1.9	0.675	17.7	LOS C	5.4	137.8	0.85	0.98	28.4
12	R2	234	1.3	0.301	8.1	LOS A	1.4	35.0	0.64	0.64	32.0
Approach		736	1.7	0.675	14.6	LOS B	5.4	137.8	0.78	0.88	29.4
All Vehicles		2709	1.3	0.874	17.5	LOS C	11.1	278.4	0.81	0.95	28.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 AM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	161	2.0	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	28.8
8	T1	551	2.4	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	29.3
18	R2	52	2.0	0.573	15.2	LOS C	3.6	92.4	0.80	0.89	28.9
Approach		764	2.3	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	29.1
East: Sheldon Road (WB)											
1	L2	34	4.8	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.8
6	T1	262	5.0	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	31.0
16	R2	10	2.0	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.4
Approach		306	4.9	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.9
North: Waterman Road (SB)											
7	L2	67	2.4	0.422	9.3	LOS A	2.3	58.3	0.66	0.64	31.6
4	T1	500	3.6	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.8
14	R2	166	1.0	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.3
Approach		733	2.9	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.7
West: Sheldon Road (EB)											
5	L2	153	2.0	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.7
2	T1	510	2.2	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.7
12	R2	171	1.9	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.4
Approach		835	2.1	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.6
All Vehicles		2639	2.7	0.910	18.8	LOS C	15.8	401.3	0.82	0.99	27.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Worst Movement Level of Service Target): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	186	0.9	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	30.8
8	T1	403	2.4	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	31.6
18	R2	37	2.0	0.397	9.6	LOS A	2.0	52.0	0.68	0.70	31.1
Approach		626	1.9	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	31.3
East: Sheldon Road (WB)											
1	L2	42	2.0	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	28.9
6	T1	548	0.6	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	29.0
16	R2	11	2.0	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	28.4
Approach		601	0.7	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	29.0
North: Waterman Road (SB)											
7	L2	41	2.0	0.658	18.7	LOS C	4.8	120.8	0.85	0.99	28.0
4	T1	593	0.3	0.658	18.8	LOS C	4.8	120.8	0.85	0.99	28.2
14	R2	227	2.0	0.658	18.8	LOS C	4.8	120.3	0.85	0.99	27.5
Approach		861	0.8	0.658	18.8	LOS C	4.8	120.8	0.85	0.99	28.0
West: Sheldon Road (EB)											
5	L2	96	2.0	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.1
2	T1	435	1.9	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.2
12	R2	248	1.3	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	23.8
Approach		779	1.7	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.1
All Vehicles		2867	1.3	0.891	19.7	LOS C	13.7	346.3	0.86	1.04	27.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Appendix 6 Analysis Worksheets: Single-Lane Roundabout with SBR

MOVEMENT SUMMARY

Site: 2016 AM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2016 AM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	109	2.0	0.608	13.6	LOS B	4.6	118.1	0.78	0.86	29.7
8	T1	373	2.4	0.608	13.6	LOS B	4.6	118.1	0.78	0.86	29.8
18	R2	35	2.0	0.608	13.6	LOS B	4.6	118.1	0.78	0.86	29.2
Approach		517	2.3	0.608	13.6	LOS B	4.6	118.1	0.78	0.86	29.8
East: Sheldon Road (WB)											
1	L2	22	4.8	0.272	7.9	LOS A	1.2	30.7	0.63	0.62	32.3
6	T1	177	5.0	0.272	7.9	LOS A	1.2	30.7	0.63	0.62	32.4
16	R2	6	2.0	0.272	7.9	LOS A	1.2	30.7	0.63	0.62	31.8
Approach		206	4.9	0.272	7.9	LOS A	1.2	30.7	0.63	0.62	32.4
North: Waterman Road (SB)											
7	L2	45	2.4	0.379	7.6	LOS A	2.0	52.3	0.55	0.45	32.4
4	T1	338	3.6	0.379	7.6	LOS A	2.0	52.3	0.55	0.45	32.6
14	R2	112	1.0	0.106	4.3	LOS A	0.5	11.8	0.43	0.30	33.9
Approach		495	2.9	0.379	6.9	LOS A	2.0	52.3	0.52	0.42	32.8
West: Sheldon Road (EB)											
5	L2	103	2.0	0.608	12.8	LOS B	4.9	123.3	0.76	0.78	30.1
2	T1	346	2.2	0.608	12.8	LOS B	4.9	123.3	0.76	0.78	30.2
12	R2	116	1.9	0.608	12.8	LOS B	4.9	123.3	0.76	0.78	29.6
Approach		564	2.1	0.608	12.8	LOS B	4.9	123.3	0.76	0.78	30.1
All Vehicles		1782	2.7	0.608	10.8	LOS B	4.9	123.3	0.69	0.69	31.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2016 PM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2016 PM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	129	0.9	0.463	9.4	LOS A	2.8	70.3	0.65	0.61	31.4
8	T1	281	2.4	0.463	9.4	LOS A	2.8	70.3	0.65	0.61	31.4
18	R2	25	2.0	0.463	9.4	LOS A	2.8	70.3	0.65	0.61	30.8
Approach		436	1.9	0.463	9.4	LOS A	2.8	70.3	0.65	0.61	31.4
East: Sheldon Road (WB)											
1	L2	29	2.0	0.476	10.1	LOS B	2.9	73.8	0.70	0.71	31.4
6	T1	383	0.6	0.476	10.1	LOS B	2.9	73.8	0.70	0.71	31.6
16	R2	7	2.0	0.476	10.1	LOS B	2.9	73.8	0.70	0.71	30.9
Approach		419	0.7	0.476	10.1	LOS B	2.9	73.8	0.70	0.71	31.5
North: Waterman Road (SB)											
7	L2	28	2.0	0.531	11.8	LOS B	3.6	89.2	0.75	0.81	30.7
4	T1	414	0.3	0.531	11.8	LOS B	3.6	89.2	0.75	0.81	30.9
14	R2	158	2.0	0.187	6.2	LOS A	0.8	20.7	0.57	0.51	32.9
Approach		600	0.8	0.531	10.3	LOS B	3.6	89.2	0.70	0.73	31.4
West: Sheldon Road (EB)											
5	L2	67	2.0	0.616	13.5	LOS B	4.9	124.2	0.78	0.85	29.9
2	T1	304	1.9	0.616	13.5	LOS B	4.9	124.2	0.78	0.85	30.0
12	R2	173	1.3	0.616	13.5	LOS B	4.9	124.2	0.78	0.85	29.4
Approach		544	1.7	0.616	13.5	LOS B	4.9	124.2	0.78	0.85	29.8
All Vehicles		1998	1.3	0.616	10.9	LOS B	4.9	124.2	0.71	0.73	31.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2028 AM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2028 AM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Final Year): Results for 14 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	141	2.0	0.906	37.7	LOS E	13.6	347.4	1.00	1.44	22.6
8	T1	480	2.4	0.906	37.7	LOS E	13.6	347.4	1.00	1.44	22.6
18	R2	45	2.0	0.906	37.7	LOS E	13.6	347.4	1.00	1.44	22.3
Approach		666	2.3	0.906	37.7	LOS E	13.6	347.4	1.00	1.44	22.6
East: Sheldon Road (WB)											
1	L2	30	4.8	0.420	11.8	LOS B	2.1	53.7	0.73	0.77	30.5
6	T1	229	5.0	0.420	11.8	LOS B	2.1	53.7	0.73	0.77	30.7
16	R2	9	2.0	0.420	11.8	LOS B	2.1	53.7	0.73	0.77	30.1
Approach		267	4.9	0.420	11.8	LOS B	2.1	53.7	0.73	0.77	30.6
North: Waterman Road (SB)											
7	L2	58	2.4	0.537	11.1	LOS B	3.6	93.7	0.70	0.69	30.9
4	T1	436	3.6	0.537	11.1	LOS B	3.6	93.7	0.70	0.69	31.0
14	R2	145	1.0	0.149	5.1	LOS A	0.7	16.7	0.49	0.39	33.5
Approach		639	2.9	0.537	9.7	LOS A	3.6	93.7	0.65	0.62	31.5
West: Sheldon Road (EB)											
5	L2	133	2.0	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
2	T1	444	2.2	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.9
12	R2	149	1.9	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.5
Approach		727	2.1	0.887	32.4	LOS D	13.7	347.6	1.00	1.36	23.8
All Vehicles		2299	2.7	0.906	25.2	LOS D	13.7	347.6	0.87	1.11	25.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2028 PM Peak + SBR

Sheldon Rd/Waterman Rd
Year 2028 PM Peak Hour
Single Lane + SBR
Roundabout
Design Life Analysis (Final Year): Results for 14 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	162	0.9	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.2
8	T1	351	2.4	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.3
18	R2	33	2.0	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	28.7
Approach		545	1.9	0.641	14.7	LOS B	5.2	133.1	0.81	0.91	29.2
East: Sheldon Road (WB)											
1	L2	37	2.0	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.7
6	T1	477	0.6	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.8
16	R2	10	2.0	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.2
Approach		524	0.7	0.673	17.0	LOS C	5.6	141.0	0.85	0.98	28.8
North: Waterman Road (SB)											
7	L2	36	2.0	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.7
4	T1	517	0.3	0.761	22.7	LOS C	7.3	183.1	0.92	1.12	26.8
14	R2	197	2.0	0.266	7.9	LOS A	1.2	29.7	0.64	0.64	32.1
Approach		750	0.8	0.761	18.8	LOS C	7.3	183.1	0.85	0.99	28.0
West: Sheldon Road (EB)											
5	L2	84	2.0	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.3
2	T1	379	1.9	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.4
12	R2	216	1.3	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.0
Approach		679	1.7	0.867	30.9	LOS D	11.9	302.0	1.00	1.33	24.2
All Vehicles		2498	1.3	0.867	20.8	LOS C	11.9	302.0	0.88	1.06	27.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix 7 Analysis Worksheets: Multilane Roundabout

MOVEMENT SUMMARY

Site: 2028 AM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2028 AM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Final Year): Results for 14 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	141	2.0	0.453	11.2	LOS B	2.5	63.8	0.72	0.77	30.4
8	T1	480	2.4	0.453	11.2	LOS B	2.5	63.8	0.72	0.77	30.9
18	R2	45	2.0	0.453	11.2	LOS B	2.5	63.7	0.72	0.77	30.5
Approach		666	2.3	0.453	11.2	LOS B	2.5	63.8	0.72	0.77	30.7
East: Sheldon Road (WB)											
1	L2	30	4.8	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.9
6	T1	229	5.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
16	R2	9	2.0	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	31.4
Approach		267	4.9	0.342	8.7	LOS A	1.6	40.5	0.69	0.69	32.0
North: Waterman Road (SB)											
7	L2	58	2.4	0.346	7.7	LOS A	1.7	44.3	0.59	0.53	32.3
4	T1	436	3.6	0.346	7.7	LOS A	1.7	44.5	0.59	0.53	32.5
14	R2	145	1.0	0.346	7.6	LOS A	1.7	44.5	0.59	0.53	32.0
Approach		639	2.9	0.346	7.7	LOS A	1.7	44.5	0.59	0.53	32.4
West: Sheldon Road (EB)											
5	L2	133	2.0	0.738	16.8	LOS C	7.7	196.0	0.90	1.05	28.6
2	T1	444	2.2	0.738	16.8	LOS C	7.7	196.0	0.90	1.05	28.6
12	R2	149	1.9	0.738	16.8	LOS C	7.7	196.0	0.90	1.05	28.1
Approach		727	2.1	0.738	16.8	LOS C	7.7	196.0	0.90	1.05	28.5
All Vehicles		2299	2.7	0.738	11.7	LOS B	7.7	196.0	0.74	0.78	30.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2028 PM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2028 PM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Final Year): Results for 14 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	162	0.9	0.321	7.8	LOS A	1.5	39.1	0.62	0.59	31.5
8	T1	351	2.4	0.321	7.8	LOS A	1.5	39.1	0.62	0.59	32.3
18	R2	33	2.0	0.321	7.9	LOS A	1.5	39.0	0.62	0.59	31.9
Approach		545	1.9	0.321	7.8	LOS A	1.5	39.1	0.62	0.59	32.1
East: Sheldon Road (WB)											
1	L2	37	2.0	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	30.9
6	T1	477	0.6	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	31.1
16	R2	10	2.0	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	30.4
Approach		524	0.7	0.556	11.3	LOS B	3.9	99.2	0.77	0.84	31.0
North: Waterman Road (SB)											
7	L2	36	2.0	0.519	12.8	LOS B	3.2	80.4	0.77	0.84	30.3
4	T1	517	0.3	0.519	12.8	LOS B	3.2	80.4	0.77	0.83	30.4
14	R2	197	2.0	0.519	12.8	LOS B	3.2	80.1	0.76	0.83	29.7
Approach		750	0.8	0.519	12.8	LOS B	3.2	80.4	0.76	0.83	30.2
West: Sheldon Road (EB)											
5	L2	84	2.0	0.717	16.4	LOS C	7.0	176.5	0.88	1.03	28.8
2	T1	379	1.9	0.717	16.4	LOS C	7.0	176.5	0.88	1.03	28.9
12	R2	216	1.3	0.717	16.4	LOS C	7.0	176.5	0.88	1.03	28.4
Approach		679	1.7	0.717	16.4	LOS C	7.0	176.5	0.88	1.03	28.7
All Vehicles		2498	1.3	0.717	12.4	LOS B	7.0	176.5	0.77	0.83	30.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 AM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2035 AM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Final Year): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	161	2.0	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	28.8
8	T1	551	2.4	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	29.3
18	R2	52	2.0	0.573	15.2	LOS C	3.6	92.4	0.80	0.89	28.9
Approach		764	2.3	0.573	15.2	LOS C	3.6	92.5	0.80	0.89	29.1
East: Sheldon Road (WB)											
1	L2	34	4.8	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.8
6	T1	262	5.0	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	31.0
16	R2	10	2.0	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.4
Approach		306	4.9	0.435	11.1	LOS B	2.2	57.2	0.74	0.79	30.9
North: Waterman Road (SB)											
7	L2	67	2.4	0.422	9.3	LOS A	2.3	58.3	0.66	0.64	31.6
4	T1	500	3.6	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.8
14	R2	166	1.0	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.3
Approach		733	2.9	0.422	9.2	LOS A	2.3	58.6	0.66	0.64	31.7
West: Sheldon Road (EB)											
5	L2	153	2.0	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.7
2	T1	510	2.2	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.7
12	R2	171	1.9	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.4
Approach		835	2.1	0.910	33.1	LOS D	15.8	401.3	1.00	1.45	23.6
All Vehicles		2639	2.7	0.910	18.8	LOS C	15.8	401.3	0.82	0.99	27.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 PM Peak - N-S Multi

Sheldon Rd/Waterman Rd
Year 2035 PM Peak Hour
N-S Multilane
Roundabout
Design Life Analysis (Final Year): Results for 21 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Waterman Road (NB)											
3	L2	186	0.9	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	30.8
8	T1	403	2.4	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	31.6
18	R2	37	2.0	0.397	9.6	LOS A	2.0	52.0	0.68	0.70	31.1
Approach		626	1.9	0.397	9.5	LOS A	2.1	52.2	0.68	0.70	31.3
East: Sheldon Road (WB)											
1	L2	42	2.0	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	28.9
6	T1	548	0.6	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	29.0
16	R2	11	2.0	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	28.4
Approach		601	0.7	0.692	16.4	LOS C	6.1	152.2	0.87	1.02	29.0
North: Waterman Road (SB)											
7	L2	41	2.0	0.658	18.7	LOS C	4.8	120.8	0.85	0.99	28.0
4	T1	593	0.3	0.658	18.8	LOS C	4.8	120.8	0.85	0.99	28.2
14	R2	227	2.0	0.658	18.8	LOS C	4.8	120.3	0.85	0.99	27.5
Approach		861	0.8	0.658	18.8	LOS C	4.8	120.8	0.85	0.99	28.0
West: Sheldon Road (EB)											
5	L2	96	2.0	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.1
2	T1	435	1.9	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.2
12	R2	248	1.3	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	23.8
Approach		779	1.7	0.891	31.5	LOS D	13.7	346.3	1.00	1.41	24.1
All Vehicles		2867	1.3	0.891	19.7	LOS C	13.7	346.3	0.86	1.04	27.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MITIGATION MONITORING AND REPORTING PROGRAM

INTRODUCTION

The California Environmental Quality Act (CEQA) Guidelines, Section 15097, requires public agencies, as part of the certification of an environmental impact report or mitigated negative declaration, to adopt a reporting and monitoring program to ensure that changes made to the project as conditions of project approval to mitigate or avoid significant environmental effects are implemented. The Mitigation Monitoring and Reporting Program (MMRP) contained herein is intended to satisfy the requirements of CEQA as they relate to the Sheldon/Waterman Road Intersection Improvement Project (Project) in the City of Elk Grove (City). The MMRP is intended to be used by City staff and mitigation monitoring personnel during implementation of the Project.

The MMRP will provide for monitoring of project activities as necessary, in-the-field identification and resolution of environmental concerns, and reporting to City staff. The MMRP will consist of the components described below.

COMPLIANCE CHECKLIST

Table 1 contains a compliance-monitoring checklist that identifies all newly adopted mitigation measures, identification of agencies responsible for enforcement and monitoring, and timing of implementation.

FIELD MONITORING OF MITIGATION MEASURE IMPLEMENTATION

During implementation of the Project, the City of Elk Grove's designated construction inspector will be responsible for monitoring the implementation of mitigation measures. The inspector will report to the City of Elk Grove Department of Public Works, and will be thoroughly familiar with all plans and requirements of the project. In addition, the inspector will be familiar with construction contract requirements, construction schedules, standard construction practices, and mitigation techniques. Aided by Table 1, the inspector will typically be responsible for the following activities:

1. On-site, day to day monitoring of project activities;
2. Reviewing construction plans to ensure conformance with adopted mitigation measures;
3. Ensuring contractor knowledge of and compliance with all appropriate conditions of project approval;
4. Evaluating the adequacy of construction impact mitigation measures, and proposing improvements to the contractors and City staff;
5. Requiring correction of activities that violate project mitigation measures, or that represent unsafe or dangerous conditions. The inspector shall have the ability and authority to secure compliance with the conditions or standards through the City of Elk Grove Public Works Department, if necessary;
6. Acting in the role of contact for property owners or any other affected persons who wish to register observations of violations of project mitigation measures, or unsafe or dangerous conditions. Upon receiving any complaints, the inspector shall immediately contact the construction representative. The inspector shall be responsible for verifying any such

observations and for developing any necessary corrective actions in consultation with the construction representative and the City of Elk Grove Public Works Department;

7. Maintaining prompt and regular communication with City staff;

8. Obtaining assistance as necessary from technical experts, such as archaeologists and wildlife biologists, to develop site-specific procedures for implementing the mitigation measures adopted by the City for the Project; and

9. Maintaining a log of all significant interactions, violations of permit conditions or mitigation measures, and necessary corrective measures.

PLAN CHECK

Many mitigation measures will be monitored via plan check during Project implementation. City staff will be responsible for monitoring plan check mitigation measures.

MITIGATION MONITORING AND REPORTING PROGRAM

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
Initial Study Mitigation Measures:				
3.1.1	All areas disturbed or used for staging of vehicles and equipment shall be restored to their pre-construction condition upon completion of the Project. This is essential in order to provide sediment control and soil stabilization, which can best be accomplished by using a tackifying agent or mulch to cover bare soil to help prevent soil erosion. Some areas may also need a seed mix added to the erosion control measure.	During construction	City of Elk Grove Planning Department	
3.1.2	The removal of established vegetation shall be minimized and avoided where feasible. Environmentally sensitive area fencing shall be installed to demonstrate areas where vegetation is being preserved.	Prior to and during construction	City of Elk Grove Planning Department	
3.1.3	The Project shall comply with the City's Land Grading and Erosion Control ordinance outlined in Chapter 16.44 of the Elk Grove Municipal Code, which may include seeding, mulching, vegetative buffer strips, sod, plastic covering, burlap covering, watering, and other measures for temporary erosion control of disturbed areas during construction.	During construction	City of Elk Grove Planning Department	
3.1.4	Contour grading and slope rounding shall be utilized on all cut and fill slopes in order to help restore the environment in a manner that will blend with the surrounding natural landscape.	During construction	City of Elk Grove Planning Department	
3.1.5	The Project shall comply with the City's lighting standards provided in the City of Elk Grove Standard Details and Drawings and the City of Elk Grove Design Guidelines for nonresidential development.	During Project design and construction	City of Elk Grove Planning Department	

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
3.4.1	A qualified biologist(s) shall monitor construction activities that could potentially cause significant impacts to sensitive biological resources. In addition, the applicant shall retain a qualified biologist to conduct mandatory contractor/worker awareness training for construction personnel. The awareness training will be provided to all construction personnel to brief them on the identified location of sensitive biological resources, including how to identify species (visual and auditory) most likely to be present, the need to avoid impacts to biological resources (e.g., plants, wildlife, and jurisdictional waters), and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the Project, the contractor shall ensure that they receive the mandatory training before starting work.	Prior to the start of Project grading	City of Elk Grove Planning Department	
3.4.2	If clearing and construction activities would occur during the nesting period for burrowing owls (February 1–August 31), the City shall retain a qualified biologist to conduct preconstruction surveys in accordance with the CDFW's *Staff Report on Burrowing Owl Mitigation*, published March 7, 2012. Surveys shall be conducted within 14 days prior to ground-breaking activities and shall be repeated if Project activities are suspended or delayed for more than 15 days during nesting season. If no burrowing owls are detected, no further mitigation is required. If active burrowing owl nest sites are detected, the applicant shall implement the avoidance, minimization, and mitigation methodologies outlined in the CDFW's *Staff Report on Burrowing Owl Mitigation* prior to initiating Project-related activities that may impact burrowing owls.	Prior to the start of Project grading	City of Elk Grove Planning Department	
3.4.3	If clearing and/or construction activities would occur during the bird nesting season (January 15–August 15), preconstruction surveys to identify active migratory bird and raptor nests shall be			

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
	conducted by a qualified biologist within 14 days of construction initiation. Preconstruction surveys must be performed by a qualified biologist for the purposes of determining presence/absence of active nest sites in the Project area and a 200-foot (500-foot for raptors) buffer. If no active nests are found, no further mitigation is required. Surveys shall be repeated if construction activities are delayed or postponed for more than 30 days. If active nest sites are identified within 200 feet (500 feet for raptors) of Project activities, the applicant shall impose an exclusionary buffer for all active nest sites prior to commencement of any Project-related activities to avoid construction- or access-related disturbances to nesting raptors. An exclusionary buffer constitutes an area where Project-related activities (i.e., vegetation removal, earth moving, and construction) will not occur, and shall be imposed within 100 feet (250 feet for raptors) of any active nest sites until the nest is deemed inactive by a qualified biologist. Activities permitted within the exclusionary buffer and the size (i.e., 250 feet) of exclusionary buffers may be adjusted through consultation with the City of Elk Grove Planning Department.	Prior to the start of Project grading and throughout Project construction	City of Elk Grove Planning Department	
3.4.4	The City shall mitigate for the loss of Swainson's hawk foraging habitat at a 1:1 ratio. Mitigation can be accomplished through the City of Elk Grove Swainson's Hawk Impact Mitigation Fees (Chapter 16.130 of the Elk Grove Municipal Code) or other method determined acceptable to the CDFW.	Prior to the start of Project grading	City of Elk Grove Planning Department	
3.4.5	For every acre of roadside ditch and/or man-made swale permanently or temporarily affected by the proposed Project, the City shall replace the affected acreage at a minimum 1:1 ratio, or another approved ratio as determined by the US Army Corps of Engineers (USACE). Impacts shall be offset through the restoration and relocation of roadside ditches and/or swales within the Project area or through purchase of credits or payment of an in-	Prior to the start of Project grading and throughout Project construction	City of Elk Grove Planning Department	

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
	lieu fee.			
3.5.1	In accordance with California Public Resources Code Section 5097.5, which prohibits knowing and willful excavation of undiscovered cultural resources without permission from the appropriate public agency with jurisdiction over the lands, and in order to mitigate for the potential discovery of an archaeological or paleontological resources, the following measure will be implemented during construction and included in the construction contract: If buried archaeological and/or paleontological resources, such as chipped or ground stone, historic debris, building foundations, human bone, or fossils, are unexpectedly discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the find until a qualified archaeologist can access the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the City and all other appropriate agencies.	Throughout Project construction	City of Elk Grove Planning Department	
3.5.2	In order to mitigate for the potential discovery or disturbance of any human remains, the protocol of California Health and Safety Code Section 7050.5(b) will be adhered to as follows: In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with Section 27460) or Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of Section 27492 of the Government Code or any other	Throughout Project construction	City of Elk Grove Planning Department	

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
	related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code. If the remains are determined to be Native American, City policy would dictate that the procedures outlined in CEQA Section 15064.5(d) and (e) be followed.			
3.7.1	The City of Elk Grove Planning Department shall require that the Project divert 65 percent of the waste generated during the demolition of existing pavement and construction of new traffic improvement facilities, consistent with CAP measure RC-1.	During construction	City of Elk Grove Planning Department	
3.12.1	Construction activities shall be limited to between the hours of 7 a.m. and 7 p.m., Monday through Sunday.	During construction	City of Elk Grove Planning Department	
3.12.2	Construction equipment and equipment staging areas shall be located at the farthest distance possible from adjacent sensitive land uses.	During construction	City of Elk Grove Planning Department	
3.12.3	Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.	During construction	City of Elk Grove Planning Department	

MM Number	Mitigation Measure	Timing/ Implementation	Enforcement/ Monitoring	Verification (date and Signature)
3.12.4	When not in use, motorized construction equipment shall not be left idling.	During construction	City of Elk Grove Planning Department	

CERTIFICATION
ELK GROVE CITY COUNCIL RESOLUTION NO. 2016-019

STATE OF CALIFORNIA)
COUNTY OF SACRAMENTO) ss
CITY OF ELK GROVE)

I, Jason Lindgren, City Clerk of the City of Elk Grove, California, do hereby certify that the foregoing resolution was duly introduced, approved, and adopted by the City Council of the City of Elk Grove at a regular meeting of said Council held on February 10, 2016 by the following vote:

AYES :	***COUNCILMEMBERS:***	***Davis, Ly, Detrick, Hume, Suen***
NOES:	***COUNCILMEMBERS:***	***None***
ABSTAIN :	***COUNCILMEMBERS:***	***None***
ABSENT:	***COUNCILMEMBERS:***	***None***

Jason Lindgren, City Clerk
City of Elk Grove, California