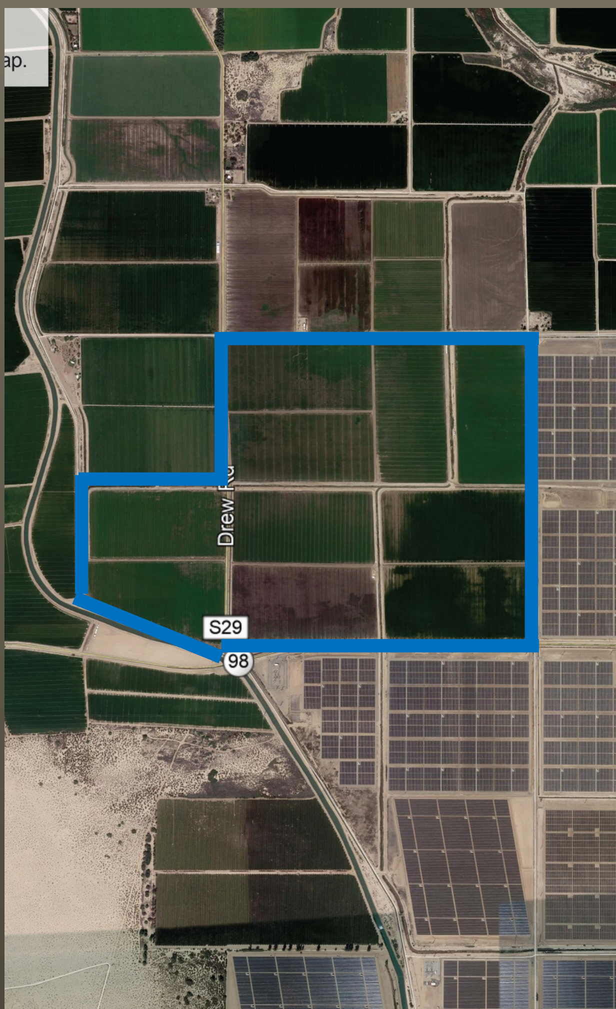
Drew Solar Project

SCH. No. 2018051036



FINAL ENVIRONMENTAL IMPACT REPORT

Prepared for

IMPERIAL COUNTY CALIFORNIA 1907

October 2019

Prepared by

egi
ericsson-grant inc.

FINAL
ENVIRONMENTAL IMPACT REPORT

for the

DREW SOLAR PROJECT

SCH. No. 2018051036
GPA#17-0006/ ZC#17-0007/ PM#02478
CUP#17-0031; CUP#17-0032; CUP#17-0033; CUP#17-0034; CUP#17-0035 & CUP#18-0001
V#17-0003, IS#17-0035

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October 2019

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LIST OF TABLES

ATTACHMENTS

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CHAPTER 1.0

INTRODUCTION

This Final Environmental Impact Report (Final EIR) was prepared in accordance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines Section 15132. The County of Imperial (County) is the lead agency for the environmental review of the Drew Solar Project (Project) and has the principal responsibility for approving the Project. This Final EIR assesses the expected environmental impacts resulting from approval of the Project and responds to comments received on the Draft EIR.

1.1 BACKGROUND AND PURPOSE OF THE FINAL EIR

1.1.1 OVERVIEW OF CEQA REQUIREMENTS FOR PREPARATION OF AN EIR

Imperial County has prepared this Final EIR to provide the public, responsible and trustee agencies with information about the potential environmental effects of the proposed Project. As set forth in the provisions of CEQA and implementing regulations, public agencies are charged with the duty to consider the environmental impacts of proposed development and to minimize these impacts where feasible while carrying out an obligation to balance a variety of public objectives, including economic, environmental, and social factors.

CEQA Guidelines Section 15121(a) states that an EIR is an informational document for decision-makers and the general public that analyzes the significant environmental effects of a project, identifies possible ways to minimize significant effects, and describes reasonable alternatives to the project that could reduce or avoid its adverse environmental impacts. Public agencies with discretionary authority are required to consider the information in the EIR, along with any other relevant information, in making decisions on the project.

CEQA requires the preparation of an environmental impact report prior to approving any project which may have a significant effect on the environment. For the purposes of CEQA, the term “project” refers to the whole of an action which has the potential for resulting in a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA Guidelines Section 15378[a]). With respect to the Drew Solar Project, the County has determined that the proposed development is a “project” within the definition of CEQA.

1.1.2 ENVIRONMENTAL REVIEW PROCESS OF THE PROJECT

The following is an overview of the environmental review process for the Project that led to the preparation of this Final EIR:

1.1.2.1 NOTICE OF PREPARATION AND INITIAL STUDY

In accordance with Section 15082 of the CEQA Guidelines, Imperial County prepared a Notice of Preparation (NOP) of an EIR on May 17, 2019. The County was identified as the lead agency for the proposed Project. The purpose of the notice was to solicit comments on the proposed Project; therefore, it was circulated to interested parties as well as to the public, local, state, and federal agencies. The NOP and comments responding to the NOP are presented in Appendix A of the Draft EIR.

1.1.2.2 DRAFT EIR

The Draft EIR was finalized in May 2019 and circulated for public and agency review from May 10, 2019 to July 1, 2019. The Draft EIR contains a description of the Project, description of the environmental setting, identification of Project impacts, and mitigation measures for impacts found to be significant, as well as an analysis of Project alternatives. The Draft EIR was provided to interested public agencies and the public and was made available for review at the Imperial County Planning and Development Services Department, the Imperial County Website, and local libraries.

1.1.2.3 FINAL EIR

This Final EIR presents the environmental information and analyses that have been prepared for the proposed Project, including comments received addressing the adequacy of the Draft EIR, and responses to those comments.

As required by CEQA, this document responds to all written comments received during the comment period which began on May 10, 2019 and ended on July 1, 2019. Following the close of the CEQA public review period, the County received eight individual comment letters from agencies and interest groups regarding the Draft EIR. This response to comments document, in conjunction with the Draft EIR, constitutes the Final EIR for the proposed Project. Copies of all comment letters submitted in response to the Draft EIR are presented in Chapter 3.0, Comments and Response to Comments of this document. These comments were reviewed, and revisions were incorporated into the Draft EIR where appropriate. Requirements for the preparation and disposition of the Response to Comments are provided for in Public Resources Code (PRC), Division 13, Section 21092.5 and CEQA Guidelines Section 15088.

In addition to the responses to comments, clarifications, corrections, or minor revisions have been made to the Draft EIR and are included as part of the Errata in Chapter 4.0 of this Final EIR.

1.2.2.4 CERTIFICATION OF THE FINAL EIR/PROJECT CONSIDERATION

The County will review and consider the Final EIR. If the County finds that the Final EIR is "adequate and complete," the County may certify the Final EIR at a public hearing. The rule of adequacy generally holds that the EIR can be certified if it: (1) shows a good faith effort at full disclosure of environmental information; and, (2) provides sufficient analysis to allow decisions to be made regarding the project in contemplation of its environmental consequences.

Upon review and consideration of the Final EIR, the County may take action to approve, revise, or reject the Project. A decision to approve the Project would be accompanied by written findings in accordance with CEQA Guidelines Section 15091 and Section 15093. Public Resources Code Section 21081.6 also requires lead agencies to adopt a mitigation monitoring and reporting program to describe measures that have been adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment.

The CEQA Guidelines identify several types of EIRs, each applicable to different project circumstances. The EIR for the Drew Solar Project has been prepared as a Project EIR pursuant to CEQA Guidelines Section 15161. The analysis associated with a Project EIR focuses primarily on the changes in the environment that would occur as a result of project implementation.

Ultimately, the EIR is used by the County as a tool in evaluating the proposed project's environmental impacts and can be further used to modify, approve, or deny approval of, the proposed project.

1.2.3 INTENDED USES OF THE EIR

The EIR is intended to evaluate the environmental impacts of the Project to the greatest extent possible. This EIR, in accordance with CEQA Guidelines Section 15126, should be used as the primary environmental document to evaluate all planning and permitting actions associated with the Project. These actions include, but are not limited to, the following:

- Approval of Project Site Plan
- General Plan Amendment
- Zone Change
- Variance

- Conditional Use Permits
- Parcel Map
- Lot Tie Agreements
- Development Agreement
- Grading Permits
- Construction Traffic Control Plan
- Building Permits
- Occupancy Permits
- Water Supply Assessment

1.2.4 ORGANIZATION AND SCOPE OF THE FINAL EIR

This document is organized in the following manner:

CHAPTER 1.0 - INTRODUCTION

Chapter 1.0 provides an overview of the EIR process to date and the required contents of the Final EIR.

CHAPTER 2.0 - EXECUTIVE SUMMARY

Chapter 2.0 summarizes the characteristics of the proposed Project and provides a concise summary matrix of the Project's environmental impacts and associated mitigation measures.

CHAPTER 3.0 - COMMENTS AND RESPONSES TO COMMENTS ON THE DRAFT EIR

Chapter 3.0 provides a list of commenters, copies of written comments (coded for reference), and the responses to those written comments made on the Draft EIR.

CHAPTER 4.0 - ERRATA

Chapter 4.0 consists of revisions to the Draft EIR that are a result of responses to comments, as well as minor staff edits that do not change the intent or content of the analysis; the conclusions regarding level of significance of impacts; or alter mitigation measures in their effectiveness to reduce impacts.

CHAPTER 5.0 - MITIGATION MONITORING AND REPORTING PROGRAM

Chapter 5.0 contains a matrix identifying each mitigation measure, the timing of the mitigation, the responsible agency and a place to check off when the mitigation has been completed.

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CHAPTER 2.0

EXECUTIVE SUMMARY

This chapter provides an overview of the Drew Solar Project (Project) and the environmental analysis. For additional detail regarding specific issues, please consult the appropriate sections (4.1 through 4.14) (Environmental Consequences) of Chapter 4.0 of the Draft Environmental Impact Report (Draft EIR).

2.1 PURPOSE AND SCOPE OF THE ENVIRONMENTAL IMPACT REPORT

The Draft EIR provided a thorough analysis of the potential environmental effects associated with the implementation of the Drew Solar Project pursuant to the California Environmental Quality Act (CEQA). The EIR analysis focuses upon potential environmental impacts arising from the project. The EIR adopts this approach in order to provide a credible worst-case scenario of the impacts resulting from project implementation.

2.2 PROJECT CHARACTERISTICS

Drew Solar, LLC (hereafter referred to as "Applicant") is proposing to build, operate, and maintain a solar generation facility capable of producing approximately 100 mega-watts (MW) on land within the boundaries of the Drew Solar Project. The Project site is located at the northeast corner of Drew Road and SR 98 in southern Imperial County, California. The proposed Project includes the following applications:

- Amendment (GPA#17-0006) to the Imperial County General Plan for amendment of the Renewable Energy & Transmission Element to create an Island Overlay for the Project Site;
- Zone Change (ZC#17-0007) to add the RE Overlay Zone to the Project Site;
- Parcel Map (PM#02478) to fix the existing inconsistency with the legal and physical boundary of the SW ¼ Section of the Project Site (APNs: 052-170-039-000 and 052-170-067-000), including APN 052-170-030 to the north of the Project Site as part of the Parcel Map;
- Five CUPs (CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034 and CUP#17-0035) to develop solar energy generating systems including potential energy storage on lands zoned A-2, A-2-R, and A-3 per Title 9, Division 5: Zoning Areas Established, Chapter 8, Sections 90508.02 and 90509.02;
- One CUP (CUP#18-0001) to develop energy storage as a component of solar on lands zoned A-2 and A-3 per Title 9, Division 5: Zoning Areas Established, Chapter 8, Sections 90508.02 and 90509.02 (A-2 & A-3). Said energy storage would be removed at the time of removal of associated solar facility;
- Variance (V#17-0003) for power pole structures that are over 120 feet in height in the Project Area including the existing Drew Switchyard. With approval of the Variance, the proposed structures could be up to 180 feet in height; and
- Up to five Lot Tie Agreements to hold some or all of the parcels that are part of the Project together as a single parcel in order to reduce/eliminate the setbacks for interior property lines of parcels that are part of the Project and adjacent to one another.
- A Development Agreement between the County and the Applicant to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement the proposed

Project could operate for up to 40 years (10 years from Development Agreement plus 30-years for the CUP). The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved.

The Project will use PV technology to convert sunlight directly into direct current (DC) electricity. The process starts with photovoltaic cells that make up photovoltaic modules (environmentally sealed collections of photovoltaic cells). PV modules are generally non-reflective. Groups of photovoltaic modules are wired together to form a PV array. The DC produced by the array is collected at inverters (power conversion devices) where the DC is converted to AC. The voltage of the electricity is increased by a transformer at each power conversion station to a medium voltage level (typically 34.5 kilovolts (kV)). Medium voltage electric lines (underground and/or overhead) are used to collect the electricity from each medium voltage transformer and transmit it to the facility substation(s), where the voltage is further increased by a high voltage transformer to match the electric grid for export to the point of interconnection at the Drew Road Switchyard. Disconnect switches, fuses, circuit breakers, and other miscellaneous equipment will be installed throughout the system for electrical protection and operations and maintenance purposes.

This EIR is being prepared to analyze the potential environmental impacts of the Project and fulfill the requirements of the California Environmental Quality Act (CEQA).

The following is a list of key public benefits that are fundamental to the Project's objectives:

- To create significant lease revenue for Imperial Irrigation District ("IID") as the property owner, a public agency, which will benefit the citizens of Imperial County.
- To support the Imperial County General Plan renewable energy policies and objectives.
- To locate the Project at a location along the existing transmission system which has available capacity to deliver electricity to major load centers in California.
- To meet the terms and requirements of any Power Purchase Agreement (PPA) and Large Generator Interconnection Agreement ("LGIA") that the Applicant has or may enter into and that require it to be interconnected directly to the CAISO grid at the existing Drew Switchyard.
- To deploy a technology that is safe, readily available, efficient, and environmentally responsible.
- To generate power, and store energy in an efficient manner and at a cost that is competitive in the renewable market on sites controlled by the applicant.
- To provide an additional source of renewable energy to assist the State of California in achieving and exceeding the RPS.
- To maximize local construction jobs for a variety of trades thereby helping maximize the reduction of unemployment in the construction sector.
- To locate the Project in an area that ranks among the highest in solar resource potential in the nation, as measured by the CEC.
- To minimize potential impacts to aesthetics, health and safety and other potential environmental impacts:
    - o Locating the Project on disturbed land.
    - o Grouping or collocating the Project's proposed electrical interconnection facilities with existing or proposed electrical interconnection facilities (consistent with County conditions on similar solar generation projects), to the extent that such grouping/collocation can be accommodated.

  - o Utilizing existing infrastructure (switchyards, transmission lines, roads, and water sources) where feasible to locate the project proximate to existing electric interconnection and transmission systems in Imperial County with capacity to deliver electricity to major load centers in California.
- To diversify Imperial County's economic base.
- To provide tax revenue through sales, use and property taxes generated by development within Imperial County.

2.3 AREAS OF CONTROVERSY

The County of Imperial was identified as the lead agency for the proposed project. In accordance with CEQA Guidelines Section 15082, the County prepared and distributed a Notice of Preparation (NOP) for the Drew Solar Project Draft EIR on May 17, 2018. This notice was circulated to the public, local, state, federal agencies and other interested parties to solicit comments on the proposed Project. The NOP is presented in Appendix A in the Draft EIR. In addition, an Initial Study was prepared for the project and released for public review at the same time as the NOP. The Initial Study is also included in Appendix A in the Draft EIR. Concerns raised in response to the NOP were considered during the preparation of the Draft EIR. Comments and areas of controversy are summarized in Table 1.0-1 of the Draft EIR.

2.4 PROJECT ALTERNATIVES SUMMARY

CEQA Guidelines Section 15126.6 requires that an EIR describe a range of reasonable alternatives to the project which could feasibly attain the objectives of the project and reduce the degree of environmental impact. In addition to the No Project Alternative and proposed Project, the Draft EIR examined one alternative (Alternative 1 — Reduced Prime Farmland Alternative). Alternatives are discussed in detail in Chapter 6.0, Alternatives, of the Draft EIR.

2.4.1 PROPOSED PROJECT

A. PROJECT COMPONENTS

Each of the components of the proposed Project is described in detail below. The components would be installed as part of construction, in use during operation, and removed and decommissioned as part of reclamation.

The net electrical output of the proposed Project is anticipated to be approximately 100 MWAC. The actual net electrical output of the Project will depend upon the technology selected and final design and layout.

<u>Solar Technology</u>

The Project may include only one PV technology or a combination of various PV technologies, including but not limited to crystalline silicon-based systems, thin-film systems, and perovskites. Concentrated photovoltaic (CPV) technology is not proposed.

When sunlight strikes a PV module, the energy absorbed is transferred to electrons in the atoms of the semiconductor causing them to escape from their normal positions and become part of the current in an electrical circuit. The PV modules convert the sunlight directly into low-voltage Direct current (DC) electricity that is subsequently transformed to alternative current (AC) electricity through an inverter. The system only operates when the sun is shining during daylight hours. The system operates at peak output when the sunlight is most intense, though it also produces power in low light conditions.

Fixed-Tilt and Tracker Structures

Depending on the selected manufacturer for the PV modules, the modules will be mounted on fixed-tilt or single-axis tracking structures. The modules will be grouped in nominal 1 to 4 MWAC arrays. Fixed tilt arrays will be oriented in east-west rows and will face in a generally southern orientation with a tilt angle between 10 and 35 degrees to maximize the amount of incidental solar radiation absorbed over the year. Single-axis trackers typically rotate ±60 degrees (degree zero is horizontal) along a nominally north-south axis to track the sun's movement throughout the day. Structural support elements will be constructed of corrosion-resistant steel, aluminum, or equivalent members that are attached to circular piers or I-beam posts that will be driven into the prepared base grade of the Project site. The solar array field is arranged in groups called "blocks." The entire array block is connected to an inverter and transformer station to convert the current from DC to AC and step up the voltage to a higher voltage which is more efficient for transmitting power to the project substation(s).

Inverters and Pad-mounted Transformers

At the center of each array is a power conversion station where inverters take the DC power output from the PV modules and convert it to AC power. The adjacent pad-mounted transformer steps the voltage up to a medium voltage level. The medium voltage outputs from each of the pad-mounted transformers are collected together in combining switchgear located at discrete locations on the Project site. The medium voltage output from the combining switchgear will be connected to the Project substation(s) where it will then be stepped up to 230-kV for export to the grid. The Project's two Gen-Tie lines will interconnect to the existing Drew Switchyard. Both gen-tie lines may be underground or one may be underground and one above-ground.

Substations and Switchyard

An on-site substation will step-up the voltage from the collection level voltage to 230-kV for each phase of the Project. Breakers, buswork, protective relaying, Supervisory Control and Data Acquisition (SCADA), and associated substation equipment will be constructed on the Project site. The communication system may include above or below ground fiber optic cable or microwave tower. The Project will be interconnected to the regional transmission system via the Drew Switchyard from the on-site substation(s)/switchyard(s) via the two Gen-Tie lines described in this project description.

Transmission Interconnection Facilities

The Project plans to connect to San Diego Gas & Electric's (SDG&E) Imperial Valley Substation by way of the existing Drew Switchyard. In order to minimize impacts to the environment, the Project will utilize the existing Drew Switchyard as its point of interconnection. The Project's two Gen-Tie lines are proposed to extend approximately 400 feet south from the south end of the Project site across Drew Road and SR 98 into the existing Drew Switchyard located on APN 052-190-039-000. Both gen-tie lines may be underground or one may be underground and one above-ground. If undergrounded, the Project may have twin borings under SR 98 to connect to the Drew Switchyard. Borings would be advanced using directional drilling at varying depths in a curved shape from entry point to exit point (Dessert pers. comm., 2019).

For the Solar Generation Gen-Tie line, a new pole may be constructed on the existing Centinela Solar Project on APN 052-190-041-000 and its line cutover into the new bay constructed by Drew Solar in the existing Drew Switchyard in order to minimize power line crossings.

For the Energy Storage Gen-Tie line, several on-site poles may be constructed to extend the Gen-Tie to the Southwest ¼ Section of the Project Area. This will require vehicles and equipment to work at each tower location as well as to utilize pull sites along the two Gen-Tie lines. If the Project is able to collocate with other facilities in the area, the Project may construct a new pole to the east of the existing pole that is on the northerly side of the existing Drew Switchyard in order to reduce Gen-Tie line crossings.

Whether or not the Project is built in phases or at one time, the use of collector lines to collect electricity from the array fields to the Project substation(s) would remain similar. Skid mounted enclosed switchgear would be used within panel fields/phases to collect and transmit the electricity from the panel array fields to the Project substation(s).

Operations and Maintenance (O&M) Building Complex

The Operations and Maintenance (O&M) Building Complexes may contain administrative offices, parts storage, a maintenance shop, plant security systems, a site control center, and plant monitoring equipment. A specific design for the building(s) has not yet been selected as the technology utilized in utility scale solar energy production continues to improve dramatically at a rapid pace. The final layout will be based on the technology selected. The building(s) may have exterior lighting on motion sensors and will have fire and security alarms. The building(s) will be located on a graded area(s) with adjacent worker parking. The parking lot will be surfaced with per Imperial County Department of Public Works (ICDPW) Engineering Design standards and have a handicapped parking space. Additionally, the access road/driveway to the parking lot would be surfaced per ICDPW Engineering Design standards.

The Project will collect wastewater from sanitary facilities such as sinks and toilets in the O&M building(s). This waste stream will be sent to an on-site sanitary waste septic system and leach field to be installed in compliance with standards established by Imperial County Environmental Health Services. Alternatively, the Project may be designed to direct these waste streams to an underground tank for storage until it is pumped out, on a periodic or as-needed basis, and transported for disposal at a licensed waste treatment facility.

During periodic major maintenance events, portable restroom facilities may be provided to accommodate additional maintenance workers. An on-site water treatment facility may be constructed. Each phase may have its own O&M Building Complex, and Phase 5 may have two O&M Building Complexes.

Energy Storage

The Project as proposed includes an energy storage component and each phase may have its own energy storage component. The field of energy storage is rapidly advancing; thus, a single technology or provider has not been selected for the energy storage portion of the Project. The storage components of the Project will utilize storage technologies that operate based upon the principles of potential including but not limited to compressed air or pumped storage, lithium (ion, oxygen, polymer, phosphate, sulphur), Nickel Metal Hydride, Nickel Cadmium, Lead Acid, antiperovskites or other batteries, including but not limited to solid state batteries that may be approved for commercial use within the United States of America, and flywheels. The storage components may be centralized and located adjacent to the substation or switchgear, or alternatively, the energy storage components may be distributed throughout the facility adjacent to individual power conversion centers. The storage components would be housed in a warehouse type building or alternatively in smaller modular structures such as cargo shipping containers. The Project may store energy generated onsite as well as energy from the CAISO grid. Whether storage components are centralized or distributed throughout the site, the Project's overall construction and operational impacts will remain the same because duration of construction and the construction activities would be the same under each development scenario, and all activities would occur within the Project disturbance area. The Renewable Energy and Transmission Element identifies public benefits associated with renewable energy. The Project with energy storage incorporated contributes to and enhances each of the eight public benefits associated with renewable energy generation.

Further details of the proposed are described in subsection 2.1.4 of the Draft EIR.

2.4.2 ALTERNATIVE 1 – REDUCED PRIME FARMLAND ALTERNATIVE

This alternative would exclude the portion of the proposed Project west of Drew Road where Prime Farmland occurs within CUP#17-0035 and CUP#18-0001 and would reduce potential impacts to Prime Farmland.

2.4.3 ALTERNATIVE 2 – NO PROJECT ALTERNATIVE

CEQA Guidelines Section 15126.6(e)(1) requires that a No Project Alternative be analyzed in order to allow the decision-makers to compare the impacts of approving a proposed Project with the impacts of not approving the proposed Project. Under the No Project Alternative, the proposed Drew Solar Project would not be developed. No GPA, Zone Change, Variance, CUP applications, Parcel Map, Lot Tie Agreements or other Project entitlement or permit would be approved. The Project site could remain in its existing condition as agricultural land owned by the IID.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Table 2.0-1 displays a summary of impacts and proposed mitigation measures that would avoid or minimize potential impacts. In the table, the level of significance is indicated both before and after the implementation of each mitigation measure. For detailed discussions of all project level mitigation measures, refer to Sections 4.1 through 4.14 in Chapter 4.0 of the Draft EIR and the Errata of this Final EIR.

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
AESTHETICS			
Adverse Effect on Scenic Vista **Impact 4.1.1** The Project Area is not considered a scenic vista nor does it contain any outstanding aesthetic features. Therefore, this impact is considered **less than significant** under both the Full-Buildout and Phased CUP scenarios.	LTS	None required.	LTS
Degrade Existing Visual Character or Quality of the Site and its Surroundings **Impact 4.1.2** The proposed Project would convert agricultural fields to a solar energy generation and storage facility thereby replacing flat crops with man-made structures. The Project would not significantly alter the overall character of the Project Area which is currently characterized by agricultural fields and solar energy facilities. Very few residences are in the area and agricultural land is not considered a significant visual resource. Therefore, impacts associated with changes to the existing visual character or quality of the site are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario**.**	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
New Source of Substantial Light or Glare **Impact 4.1.3** The proposed Project includes non-reflective PV panels which are not anticipated to create glare. Likewise, the proposed lighting system would be designed to provide minimum illumination. Therefore, impacts associated with creation of substantial light and glare are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario**.**	LTS	None required.	LTS

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TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Cumulative Visual and Light and Glare Impacts **Impact 4.1.4** Implementation of the proposed Project in combination with proposed, approved and reasonably foreseeable projects in the vicinity of the Project Site would not significantly alter the overall character of the Project Area which is currently characterized by agricultural fields and solar generation facilities. Very few residential homes are in the area nor are there any scenic resources within the Project viewshed. Potential visual impacts by other cumulative projects would be subject to review and approval by the County on a project-by-project basis. Therefore, the Project's contribution to cumulative aesthetics, light and glare impacts is considered **less than cumulatively considerable** for both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

LTS = Less than Significant
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PS = Potentially Significant
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SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
LAND USE			
Cause a Significant Environmental Impact due to a Conflict with Any Land Use Plan, Policy, or Regulation **Impact 4.2.1** Upon approval of the requested GPA, one ZC, one Parcel Map, six CUPs, one Variance and up to five Lot-Tie Agreements and a Development Agreement, the proposed Project would be consistent with the General Plan and Land Use Ordinance under both the Full-Buildout Scenario and Phased CUP Scenario. This is considered a **less than significant impact** under both the Full Build-out Scenario and Phased CUP Scenario**.**	LTS	None required.	LTS

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TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Cumulative Conflicts with Applicable Land Use Plans, Policies, or Regulations **Impact 4.2.2** Development of the proposed Project in combination with proposed, approved and reasonably foreseeable projects in the region would not incrementally cause a significant environmental impact due to a conflict with applicable land use plans, policies and regulations. Each CUP Area would be required to be overall consistent with the applicable plans, policies and regulations. Thus, environmental impacts associated with conflicts with applicable land use plans, policies and regulations are considered **less than cumulatively considerable** under both the Full Build-out Scenario and Phased Build-out Scenario.	LCC	None required.	LCC

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TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
TRANSPORTATION			
Conflict with Applicable Plan – Existing Year 2017 Plus Project Construction Conditions **Impact 4.3.1** Implementation of the proposed Project would add traffic to existing traffic volumes on Project study area intersections, roadway segments and freeway segments during (Year 2017) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** for (Year 2017) with Project construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Conflict with Applicable Plan – Near-Term (Year 2019) With Project **Impact 4.3.2** Implementation of the proposed Project would add traffic to existing traffic volumes on the Project study area intersections, roadway segments and freeway segments during Near-Term (Year 2019) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** under Near-Term (Year 2019) with Project Conditions under both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Conflict with Applicable Plan – Long-Term (Year 2027) Conditions **Impact 4.3.3** Implementation of the proposed Project would add traffic to existing traffic volumes on Project study area intersections, roadway segments and freeway segments during Long-Term (Year 2019) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** under Mid-Term (Year 2027) With Project conditions under both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Increase Hazards Due to a Geometric Design Feature – Driveways and Travel Speeds **Impact 4.3.4** Implementation of the proposed Project would not require provision of left-turn lanes at Project driveways to allow access to any of the CUPs. No geometric design features are proposed that would result in hazards. Likewise, area roadways are currently traveled by farm equipment similar in size and speed to construction equipment necessary for the proposed Project. Therefore, impacts resulting from an increase in hazards due to a geometric design feature or an incompatible use are considered **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	PS	**MM 4.3.5a All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** ~~The Project contractor shall utilize SR 98 for all equipment deliveries~~. Employee and vendor routes to each CUP shall be limited to ~~SR 98~~, Drew Road~~,~~ and Pulliam Road ~~and Kubler Road,~~ unless improvements are made to other county roads leading to individual CUP sites in advance of development of each CUP. **MM 4.3.5b All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** The CUP owner(s) shall limit the Project's construction traffic to paved County roadways. In the event the Applicant's construction traffic requires the use of unpaved County roadways, the Applicant shall mitigate those County unpaved roadways in accordance with ICAPCD Rule 805. In addition to complying with Rule 805, if 50 vehicle trips per day (VPD) (cumulative from public and project use) are triggered by the project on any single County unpaved roadway, the Applicant shall provide for the future maintenance cost of the affected roadway for the full term of the CUP which triggered the increase beyond the 50 VPD threshold.	LTS

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	PS	**MM 4.3.5c All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** As each CUP may be constructed individually and independently, the CUP owner(s) shall improve the roads per the approved haul route study. If the CUP owner(s) has already improved the roads that will be utilized by the next CUP to start construction, then no new road improvements are required. **MM 4.3.5d All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** ~~Construction traffic shall prioritize ingress and egress from SR 98~~. Project construction traffic will utilize County roads, therefore a fair share shall be paid per the approved haul route study, and the Developer will be required to repair any damages caused to County roads by construction traffic during construction and maintain them in safe conditions. The Imperial County Public Works Department/Road Commissioner shall have final authority as to the fair share percentage and the final payment amounts based on the final and approved access points in the project's grading and improvement plans. Fair share shall be paid in full prior to issuance of grading, building and encroachment permits.	LTS

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	PS	**MM 4.3.5e CUP#17-0031, <u>CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001</u>** Fair share payments shall be paid per the approved haul route study as approved by Imperial County Public Works Department prior to issuance of grading, building and encroachment permits. **MM 4.3.5f <u>CUP#17-0031,</u> CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001** Prior to issuance of final Certificate of Occupancy, CUP owner shall be responsible for repairing any damage caused to County roads and bridges it utilizes via improvements as determined by the County Road Commissioner based on the final and approved access points in the Project's grading and improvement plans.	LTS

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	PS	**MM 4.3.5g CUP#17-0031** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Drew Road from SR 98 to the Mount Signal Drain No. 1 or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner. **MM 4.3.5h CUP#17-0032** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Pulliam Road from SR 98 to the Carr Drain or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	LTS

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	PS	**MM 4.3.5i ~~4.3.5g~~ CUP#17-0033** Fair share payments shall be paid for future road maintenance of ~~2,800 feet of~~ at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving required on~~ along Pulliam Road from Carr Drain to Kubler Road ~~Pulliam Road north of SR 98~~ or as approved by ICDPW prior to issuance of the first grading permit ~~Final Certificate of Occupancy~~ based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner. ~~Fair share payments shall be paid for 1,600 feet of asphalt patching required on Kubler Road west of Pulliam Road relating to construction haul route, or as approved by Imperial County Public Works Department prior to issuance of Final Certificate of Occupancy.~~	LTS

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.		**MM 4.3.5j ~~4.3.5h~~ CUP#17-0034** Fair share payments shall be paid for future road maintenance of ~~Install up to 2,400 feet~~ at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving required on Kubler Road west of Pulliam Road relating to the construction haul route and 2,400 feet of Drew Road~~ along Drew Road from Mount Signal Drain No. 1 to Kubler Road, or as approved by Imperial County Public Works Department prior to issuance of ~~Final Certificate of Occupancy~~ the first grading permit based on the final and approved access points in the Project's grading and improvement plans, unless ~~already~~ the condition has already been satisfied as part of CUP#17-0033. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	

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Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.5** Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.		**MM 4.3.5k ~~4.3.5i~~ CUP#17-0035 and CUP#18-0001** Fair share payments shall be paid for future road maintenance of ~~Install up to 2,400 feet of~~ at least one mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving on~~ along Drew Road from SR 98 up to Kubler Road unless this condition has already been satisfied as part of CUP 17-0031 or CUP 17-0035 ~~required on Drew Road~~ relating to construction haul route, or as approved by Imperial County Public Works Department prior to issuance of ~~Final Certificate of Occupancy~~ the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	

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Emergency Access **Impact 4.3.6** The proposed Project includes emergency access points off of Kubler Road, Drew Road, Pulliam Road. Access of SR 98 is to a frontage road which connects with an emergency access. Final design will be review by the Imperial County Fire Department and Imperial County Sheriff's Office prior to approval. Therefore, impacts associated with adequate emergency access are **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS - Existing (Year 2017) With Project Construction With Cumulative Conditions **Impact 4.3.7** Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under (Year 2017) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to study area intersections, roadway, State Route and freeway segments under (Year 2017) With Project Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario under both the Full Build-Out Scenario and Phased CUP Scenario.	LCC	None required.	LCC

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Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS Near-Term (Year 2019) With Project Construction With Cumulative Conditions) **Impact 4.3.8** Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under Near-Term (Year 2019) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to Project study area intersections, roadway, State Route and freeway segments under Near-Term (Year 2019) With Project Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.	LCC	None required.	LCC

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Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS - Long-Term (Year 2027) With Project Construction With Cumulative Conditions **Impact 4.3.9** Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under Long-Term (Year 2027) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to Project study area intersection, roadway, State Route and freeway segments under Long-Term (Year 2027) With Project Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.	LCC	None required.	LCC

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Cumulative Increase Hazards Due to a Geometric Design Feature **Impact 4.3.10** Implementation of the proposed Project would not require improvements or modifications to any Project study area roadways. Therefore cumulative increases in hazards due to a geometric design feature are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.	LCC	None required.	LCC
Cumulative Increases in Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction **Impact 4.3.11** Construction of the proposed Project, in combination with other cumulative projects using Project study area roadways, will require movement of heavy-duty equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The high volume of trips in combination with the weight of construction vehicles would deteriorate the surface of Project study area roadways. This is considered a **cumulatively considerable impact** under both the Full Build-Out Scenario and Phased CUP Scenario.	LCC	Implement mitigation measures MM 4.3.5a thru MM 4.3.5k ~~4.3.5i.~~	LCC

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AIR QUALITY			
Conflict with or Obstruct Implementation of an Applicable Air Quality Plan **Impact 4.4.1** Implementation of the proposed Project would increase air pollutant emissions during Project construction and operation. No criteria pollutant thresholds were calculated to be exceeded during either Project construction or operation. Therefore, the Project's potential to conflict with or obstruct an applicable air quality plan is considered a **less than significant impact** during Project construction, operation and decommissioning/reclamation.	LTS	None required.	LTS

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Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant **Impact 4.4.2** The proposed Project is consistent with ICAPCD plans and would not exceed pollutant thresholds during construction, operation and reclamation. Therefore, the Project's potential to result in a cumulatively considerable net increase of any criteria pollutant is considered **less than significant** under the worst-case Full Build-out Scenario.	LTS	None required.	LTS

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Exposure of Sensitive Receptors to Substantial Pollutant Concentrations **Impact 4.4.3** The proposed Project would result in short-term diesel exhaust emissions during construction and decommissioning/reclamation. However, diesel exhaust operational emissions would be very low. Based on the worst-case Full Buildout Scenario, exposure of sensitive receptors in the vicinity of the Project Site would be for a limited duration and would not exceed the diesel particulate matter exposure threshold. Therefore, sensitive receptor exposure to substantial pollutant concentrations is considered a **less than significant impact** under the worst-case Full Build-out Scenario.	LTS	None required.	LTS
Result in Emissions Affecting a Substantial Number of People **Impact 4.4.4** Use of diesel equipment during Project construction, operation and decommissioning/reclamation activities could result in temporary emissions of adverse odors. This is considered a **less than significant impact** under the Full Build-out Scenario.	LTS	None required.	LTS

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Cumulative Air Quality Impacts – Violate Air Quality Standard/Cause Air Quality Violation **Impact 4.4.5** The proposed Project would generate criteria pollutant emissions during construction. However, the short-term construction emissions exceedances of ICAPCD thresholds would be mitigated through compliance with ICAPCD Regulation VIII. Operational emissions would not exceed ICAPCD thresholds. Therefore, the proposed Project would result in a **less than cumulatively considerable impact** with regard to violating an air quality standard under both the Full Buildout Scenario and Phased CUP Scenario.	LCC	None required.	LCC

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GREENHOUSE GASES			
Generation of Greenhouse Gas Emissions **Impact 4.5.1** The proposed Project would generate GHG emissions during construction and reclamation activities, primarily related to emissions from construction equipment. Operational emissions would occur to a lesser degree in relation to the use of maintenance equipment. Impacts resulting from Project-generated GHGs are considered **less than significant**.	LTS	None required.	LTS
Conflict with an Applicable Plan, Policy, or Regulation Adopted to Reduce Greenhouse Gas Emissions **Impact 4.5.2** The Project would help promote California's GHG policies by creating renewable energy resources and would not exceed applicable GHG screening levels. Therefore, the proposed Project would not conflict with an applicable plan, policy, or regulation adopted to reduce GHG emissions. Moreover, Project conflicts with an applicable plan, policy, or regulation adopted to reduce GHG emissions are considered **less than significant** during construction, operation and reclamation.	LTS	None required.	LTS

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GEOLOGY AND SOILS			
Alquist-Priolo Earthquake Fault Rupture **Impact 4.6.1** An unnamed fault mapped as an Alquist-Priolo Earthquake Fault Zone extends into CUP #17-0035. Surface rupture is considered low to moderate. This is considered a **potentially significant impact**.	PS	**MM 4.6.1** A Fault Hazard Study including fault trenching shall be prepared for CUP#17-0035 and CUP#18-0001 to address any issues associated with the presence of an Alquist-Priolo Earthquake Fault Zone.	LTS

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Strong Seismic Ground Shaking **Impact 4.6.2** The Project site is located in a seismically active region and would be subject to strong seismic ground shaking in the event of an earthquake. This is considered a **potentially significant impact**.	PS	**MM 4.6.2** Prior to approval of final building plans, a registered civil engineer or certified engineering geologist, having at least five years of experience in the field of seismic hazard evaluation and mitigation, shall prepare a Final Geotechnical and GeoHazards Report containing site-specific evaluations of the ground shaking hazards affecting the Project, identify the portions of the Project site containing ground shaking hazards, and identify appropriate Project design measures pursuant to the established and proven methodologies (e.g. Special Publication 117A). The Report shall also include site-specific evaluations of potential for liquefaction, expansive soils and corrosive soils for all solar field site parcels, energy storage components and Gen-Tie foundations. The Report shall identify appropriate Project design measures pursuant to the established and proven methodologies set forth in the 2016 CBC. All recommended Project design measures as set forth in the Final Geotechnical and GeoHazards Report	LTS

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Strong Seismic Ground Shaking **Impact 4.6.2** The Project site is located in a seismically active region and would be subject to strong seismic ground shaking in the event of an earthquake. This is considered a **potentially significant impact**.	PS	shall be incorporated into and reflected on the final design and building plans for each CUP. All recommended Project design measures as set forth in the Final Geotechnical and GeoHazards Report shall be incorporated into and reflected on the final design and building plans. The Final Geotechnical and GeoHazards Report and Project plans shall be submitted for review and approval by the Imperial County Planning and Development Services Department, Division of Building & Safety prior to approval of the final building plans.	LTS
Liquefaction **Impact 4.6.3** Soils throughout the solar field site parcels have characteristics prone to liquefaction. Evidence of liquefaction was also noted in the area of the Project site. Therefore, a **potentially significant** impact could occur with regard to liquefaction.	PS	Implement mitigation measure MM 4.6.2.	LTS

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Soil Erosion **Impact 4.6.4** Construction, maintenance, and decommissioning activities would result in earth moving and potential for erosion and loss of top soil. The Project is subject to mandatory compliance with several regulatory requirements established to address erosion. Therefore, soil erosion impacts are considered **less than significant**.	LTS	None required beyond compliance with state and local construction requirements as well as Phased CUP Scenario-Proposed Measures related to dust and erosion control.	LTS
Expansive Soils **Impact 4.6.5** Near surface soils within the Project site consist of silty clay and clay having a moderate to high expansion potential. Therefore, expansive soils impacts are considered **less than significant**.	LTS	Implement mitigation measure MM 4.6.2.	LTS

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Soil Capability to Support On-site Wastewater Treatment System **Impact 4.6.6** The Project would generate wastewater from sanitary facilities such as sinks and toilets in the O&M building(s). The Project proposes to construct an on-site sanitary waste septic system. Project site soils are capable of supporting an on-site wastewater treatment system. Therefore, impacts with regard to supporting an on-site wastewater treatment system are considered **less than significant**.	LTS	None required.	LTS
Soil Corrosivity **Impact 4.6.7** Soils within the Project Area are known to be corrosive. Steel and concrete structures could be damaged through contact with corrosive soils. This is considered a **potentially significant impact**.	PS	**MM 4.6.7a** Concrete mixed with higher cement contents (6 sacks Type V Portland Cement) and low water-cement ratios (0.45 w/c ratio) shall be used for all concrete structures proposed as part of the Project subject to approval by the County Engineer and Planning Director. **MM 4.6.7b** Zinc coatings (galvanizing) or increased structural sections shall be used to protect all steel posts and to compensate for metal loss due to corrosion subject to approval by the County Engineer and Planning Director.	LTS

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SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Impacts to Paleontological Resources **Impact 4.6.8** The Project Site and surrounding areas are underlain by geologic units comprised of quaternary lake deposits of the ancient Lake Cahuilla. As such, the potential exists for fossils to be impacted during construction. Thus, impacts to paleontological resources are considered **potentially significant** for both the Full Build-out Scenario and the Phased CUP Scenario.	PS	**MM 4.6.8** Qualified Paleontological monitor(s) shall be hired to oversee excavations or drilling activities greater than 10 feet in depth. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Recovered specimens shall be prepared to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Fossil specimens shall be curated by accessioning into an established, accredited museum repository with permanent retrievable paleontological storage. A report of findings with an appended itemized inventory of specimens shall be prepared. Submittal of the report and inventory to the Imperial County Planning and Development Services Department, along with confirmation of the curation of recovered specimens into an established, accredited museum repository, shall signify completion of the program to mitigate impacts to paleontological resources.	LTS

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Cumulative Exposure to Geologic and Seismic Impacts **Impact 4.6.9** Implementation of the proposed Project, in combination with proposed, approved and reasonably foreseeable projects in the region, may result in cumulative exposure to geologic and seismic hazards. However, geologic and seismic hazards are analyzed and mitigated on a project-by-project basis. Therefore, cumulative exposure to geologic and seismic impacts is considered **less than cumulatively considerable**.	LCC	Implement mitigation measures MM 4.6.1, MM 4.6.2, MM 4.6.7a, and MM 4.6.7b	LCC
Cumulative Impacts to Paleontological Resources **Impact 4.6.10** Implementation of the proposed Project in combination with proposed, approved and reasonably foreseeable projects in the region identified in the cumulative setting, has the potential to result in impacts to paleontological resources including fossil remains and fossil bearing geological formations. However, such impacts are addressed on a project-by-project basis through the CEQA process. Therefore, impacts to paleontological resources are considered **less than cumulatively considerable** or both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	Implement mitigation measure MM 4.6.8.	LCC

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CULTURAL RESOURCES & TRIBAL CULTURAL RESOURCES			
Impacts to Historical Resources **Impact 4.7.1** All historic age irrigation canals and drainage resources within the Project APE are recommended not eligible for the NRHP and CRHR based on a lack of historical significance, and in some cases, a lack of integrity. Therefore, impacts to historical resources are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Impacts to Unanticipated Archaeological Resources **Impact 4.7.2** The proposed Solar Field Site Parcels have been farmed since the late 1930's and most are currently in agricultural production. No known archaeological resources were identified during the Records Search or pedestrian survey. However, the potential exists for unanticipated archaeological resources to be discovered during construction. This is considered a **potentially significant impact** for both the Full Build-out Scenario and the Phased CUP Scenario.	PS	**MM 4.7.2a** A monitor from the Campo Band of Mission Indians and the Colorado River Indian Tribes shall be present as a Native American monitors for initial ground disturbing activities within the boundaries of the Project site. Following initial disturbance, a determination shall be made by the County in accordance with State regulations if continued monitoring is necessary based on the outcome of any discoveries or lack thereof. **MM 4.7.2b** In the event that archaeological resources (sites, features, or artifacts) are exposed during construction activities for the Project, all construction work occurring within 100 feet of the find shall immediately stop until a qualified archaeologist meeting the Secretary of the Interior's Professional Qualification Standards can evaluate the significance of the find and determine whether or not additional study is warranted. If the discovery is clearly not significant (e.g., an isolate) the archaeologist may simply record the find and allow work to continue. If the discovery proves potentially significant under CEQA, additional work such as preparation of an archaeological treatment plan, testing, or data recovery may be warranted.	LTS

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Impacts to Previously Unknown Subsurface Human Remains **Impact 4.7.3** Though unlikely, previously unknown human remains may be present within the Project Site which could be unearthed during construction. This is considered a **potentially significant impact** for both the Full Build-out Scenario and the Phased CUP Scenario.	PS	**MM 4.7.3** In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County Coroner shall be notified of the discovery immediately. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined, within 2 working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County Coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code Section 5097.98, the NAHC must immediately notify those persons it believes to be the MLD from the deceased Native American. The MLD shall complete inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the	LTS

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Impacts to Previously Unknown Subsurface Human Remains **Impact 4.7.3** Though unlikely, previously unknown human remains may be present within the Project Site which could be unearthed during construction. This is considered a **potentially significant impact** for both the Full Build-out Scenario and the Phased CUP Scenario.	PS	disposition of the human remains. In the event that any human remains or objects subject to provision of the Native American Graves Protection and Repatriation Act, or cultural resources such as sites, trails, artifacts are identified during ground disturbance, please contact the Colorado River Indian Tribes' Tribal Historic Preservation Office (CRIT THPO) within 48 hours.	LTS
Cause a Substantial Adverse Change in the Significance of a Tribal Cultural Resource **Impact 4.7.4** Implementation of the proposed Project under both the Full Build-out Scenario and Phased CUP Scenario would not result in a substantial adverse change in the significance of a tribal cultural resource. No tribal cultural resources were identified as part of the AB 52 process. Therefore, impacts to tribal cultural resources would be **less than significant** under both the Full Build-out Scenario and Phased CUP Scenario.	PS	Implement mitigation measure MM 4.7.2a.	LTS

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Cumulative Impacts to Historic and Archaeological Resources, Human Remains and Tribal Cultural Resources **Impact 4.7.5** Implementation of the proposed Project, in combination with proposed, approved, and reasonably foreseeable projects in the region identified in the cumulative setting, has the potential to result in impacts to historic and archaeological resources, human remains and tribal cultural resources. However, impacts to historic and archaeological resources, human remains and tribal cultural resources are addressed on a project-by-project basis through the CEQA process. Therefore, this is considered a **less than cumulatively considerable impact** for both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	Implement mitigation measures MM 4.7.2a, MM 4.7.2b and MM 4.7.3.	LCC

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NOISE			
Substantial Temporary or Permanent Noise Increase in Excess of Standards **Impact 4.8.1** Construction and decommissioning activities would cause short-term increases in noise on and in the vicinity of the Project. Likewise, operation of the Full Build-out Scenario or the Phased CUP Scenario could cause permanent noise levels to rise. However, the Project includes noise- and vibration-reducing design features which would reduce noise levels during construction, operation and decommissioning to be within County standards. Therefore, impacts with regard to noise levels in excess of standards and substantial temporary and permanent noise increases are considered **less than significant** for both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Groundborne Vibration or Groundborne Noise Level Impacts **Impact 4.8.2** The proposed Project would generate groundborne vibration or noise levels associated with construction and operation of on-site equipment. However, the levels are anticipated to be below the level of human annoyance and the significance threshold. Therefore, groundborne vibration and noise impacts are considered **less than significant** for both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS
Cumulative Noise Increases/Groundborne Vibration **Impact 4.8.3** Long-term operation of the proposed Project, in combination with other proposed, approved and reasonably foreseeable projects in the region, would not result in a substantial contribution to cumulative noise levels or groundborne vibration. Therefore, cumulative noise impacts and groundborne vibration would be considered **less than cumulatively considerable** for both the Full Build-Out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Cumulative Noise Increases **Impact 4.8.4** Long-term operation of the proposed Project, in combination with other proposed, approved and reasonably foreseeable projects in the region, would not result in a substantial contribution to cumulative noise levels. Therefore, cumulative noise impacts would be considered **less than cumulatively considerable**.	LCC	None required.	LCC
AGRICULTURAL RESOURCES			
Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance **Impact 4.9.1** The proposed Project, whether implemented as the Full Build-out Scenario or six individual CUPs proposed as part of the Phased CUP Scenario, would temporarily convert Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. This is considered a **potentially significant impact**.	PS	**MM 4.9.1a Payment of Agricultural and Other Benefit Fees** One of the following options included below shall be implemented prior to the issuance of a grading permit or building permit (whichever is issued first) for the proposed Project: <u>For Non-Prime Farmland</u>: **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a 1 to 1 basis on land of equal size, of equal quality of farmland, outside the path of development. The Conservation Easement shall meet the State Department of Conservation's	LTS

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Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance **Impact 4.9.1** The proposed Project, whether implemented as the Full Build-out Scenario or six individual CUPs proposed as part of the Phased CUP Scenario, would temporarily convert Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. This is considered a **potentially significant impact**.	PS	regulations and shall be recorded prior to issuance of any grading or building permits; **Option 2**: The Permittee shall pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 20% of the fair market value per acre for the total acres of proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis. The Agricultural In-Lieu Mitigation Fee, will be placed in a trust account administered by the Imperial County Agricultural Commissioner's office and will be used for such purposes as the acquisition, stewardship, preservation and enhancement of agricultural lands within Imperial County; or **Option 3**: The Permittee and County voluntarily enter into an enforceable Public Benefit Agreement or Development Agreement that includes an Agricultural Benefit Fee payment that is (1) consistent with Board Resolution 2012-005; (2) the Agricultural Benefit Fee must be held by the County in a restricted account to be used by the County only for such purposes as the stewardship, preservation and enhancement of agricultural lands within Imperial County and to implement the goals	LTS

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Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance **Impact 4.9.1** The proposed Project, whether implemented as the Full Build-out Scenario or six individual CUPs proposed as part of the Phased CUP Scenario, would temporarily convert Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. This is considered a **potentially significant impact**.	PS	and objectives of the Agricultural Benefit program, as specified the Development Agreement, including addressing the mitigation of agricultural job loss on the local economy. For Prime Farmland: **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a "2 to 1" basis on land of equal size, of equal quality farmland, outside of the path of development. The Conservation Easements shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits; or **Option 2**: The Permittee shall pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 30 percent of the fair market value per acre for the total acres of the proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis. The Agricultural In-Lieu Mitigation Fee, will be placed in a trust account administered by the Imperial County Agricultural Commissioner's office and will be used for such purposes as the acquisition, stewardship, preservation and enhancement of agricultural lands within Imperial	LTS

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Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance **Impact 4.9.1** The proposed Project, whether implemented as the Full Build-out Scenario or six individual CUPs proposed as part of the Phased CUP Scenario, would temporarily convert Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. This is considered a **potentially significant impact**.	PS	County. **Option 3**: The Permittee and County shall enter into an enforceable Public Benefit Agreement or Development Agreement that includes an Agricultural Benefit Fee payment that is (1) consistent with Board Resolution 2012-005; (2) the Agricultural Benefit Fee must be held by the County in a restricted account to be used by the County only for such purposes as the stewardship, preservation and enhancement of agricultural lands within Imperial County and to implement the goals and objectives of the Agricultural Benefit program, as specified the Development Agreement, including addressing the mitigation of agricultural job loss on the local economy; the Project and other recipients of the Project's Agricultural Benefit Fee funds; or emphasis on creation of jobs in the agricultural sector of local economy for the purpose of off-setting jobs displaced by this Project. **Option 4**: The Permittee shall revise their CUP Application/Site Plan to avoid Prime Farmland. **MM 4.9.1b Reclamation/Decommissioning Plan and Security** Prior to the issuance of a grading permit or building permit (whichever is issued first) for the proposed Project, the Permittee shall submit to Imperial	LTS

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Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance **Impact 4.9.1** The proposed Project, whether implemented as the Full Build-out Scenario or six individual CUPs proposed as part of the Phased CUP Scenario, would temporarily convert Prime Farmland and Farmland of Statewide Importance to non-agricultural uses. This is considered a **potentially significant impact**.	PS	County a Reclamation and Decommissioning Plan. The plan shall document the procedures by which each CUP area will be returned to its current agricultural condition/LESA score of 57.9. The Permittee shall also provide financial assurance/bonding in an amount equal to a cost estimate prepared by a California-licensed general contractor or civil engineer for implementation of the Reclamation Plan in the event Permittee fails to perform the Reclamation Plan.	LTS
Indirect Environmental Effects of Conversion of Farmland **Impact 4.9.2** The proposed Project would not involve other changes to the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use. Nuisance issues such as dust, pests and weeds are already addressed through ICAPCD Rules and County requirements to prepare Weed and Pest Management Plans. Thus, indirect effects of the temporary conversion of farmland are considered **less than significant**.	LTS	None required.	LTS

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Cumulative Agricultural Resources Impacts **Impact 4.9.3** Implementation of the Project under both the Full Build-out Scenario and the Phased CUP Scenario would incrementally add to the temporary conversion of agricultural land in Imperial County. Temporary impacts to agricultural resources are mitigated on a project-by-project basis through payment of in-lieu fees, conservation easements and/or execution of Public Benefit Agreements. Therefore, temporary impacts to agricultural resources are considered **less than cumulatively considerable**.	LCC	Implement MM 4.9.1a and MM 4.9.1b.	LTS

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HAZARDS AND HAZARDOUS MATERIALS			
Hazardous Materials Transport, Use, Disposal and Accidental Release **Impact 4.10.1** Implementation of both the Full Build-out Scenario and Phased Build-out Scenario would use some hazardous materials for the construction, operations, and decommissioning phases and could create a significant hazard to the public or the environment through the transport, use, or disposal of hazardous materials. All materials would be transported, used and disposed of in accordance with all applicable local, state and federal requirements. Therefore, impacts associated with accidental release during hazardous materials transport, use and disposal are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario**.**	LTS	None required.	LTS

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Hazard Through Upset/Release of Hazardous Materials **Impact 4.10.2** No hazardous materials that could be a significant hazard to the public or the environment were identified on the proposed solar field site parcels. Therefore, impacts associated with hazard through upset/release of hazardous materials are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario**.**	LTS	None required.	LTS
Cumulative Hazards and Hazardous Materials Impact **Impact 4.10.3** The proposed Project, in combination with other reasonably foreseeable projects in the vicinity of the solar field site parcels, would increase the density of development in the area, thereby potentially increasing the potential for the presence of hazards and use of hazardous materials. However, hazards are addressed on a case-by-case basis through federal and state hazardous materials laws, regulations, and policies. Therefore, cumulative hazards and hazardous materials impacts are considered **less than cumulatively considerable** for both the Full Build-out Scenario and the Phased CUP Scenario**.**	LCC	None required.	LCC

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HYDROLOGY AND WATER QUALITY			
Violate Water Quality Standards or Waste Discharge Requirements **Impact 4.11.1** Implementation of the proposed Project, whether under the Full Build-out Scenario or phased by CUP Area under the Phased CUP Scenario, would generate small amounts of runoff during construction, operation and decommissioning. The Project would comply with all applicable water quality regulations and implement Applicant-proposed BMPs in order to meet water quality standards and waste discharge requirements. Therefore, this impact is considered **less than significant** under both the Full Build-out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Result in Decreased Groundwater Supplies or Interfere Substantially with Groundwater Recharge **Impact 4.11.2** Project implementation under both the Full Build-out Scenario and the Phased CUP Scenario would not impact groundwater supply as the Project does not propose use of groundwater. During construction and decommissioning, there is a small potential for encountering groundwater while excavating for structure foundations or Gen-Tie footings. If groundwater is encountered, it would be contained locally in the vicinity of Gen-Tie pole locations and substation foundations. The CUP Areas would largely remain pervious during Project operation. Therefore, impacts associated with decreasing groundwater supplies or interfering with groundwater recharge are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Result in Substantial Erosion or Siltation On- or Off-site **Impact 4.11.3** During construction, operation and maintenance and decommissioning activities, the Project shall comply with a Project-specific SWPPP, file for coverage under the construction and operational NPDES permits and comply with all other applicable State and local regulations. Therefore, under both the Full Build-out Scenario and Phased CUP Scenario, Project implementation would result in a **less than significant** impact regarding earth disturbance and potential for erosion and loss of top soil.	LTS	None required.	LTS

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Alteration of Drainage Pattern Substantially Increasing Surface Runoff/Construction of Stormwater Drainage **Impact 4.11.4** Upon Project implementation under both the Full Build-out Scenario and Phased CUP Scenario, Project site drainage patterns and the general drainage system will remain similar to the existing condition. Runoff will follow existing drainage patterns to proposed basins/ponding areas for detention and infiltration with storm flows conveyed toward existing IID Drains. Project implementation will also result in less run-off from the Project site as compared to the existing agricultural uses. Therefore, Project implementation would result in a **less than significant impact** with regard to substantially altering the existing drainage pattern in a manner which would result in flooding on- or off-site under both the Full Build-out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Create or Contribute Runoff Exceeding Capacity/Provide Substantial Sources of Polluted Runoff **Impact 4.11.5** Implementation of the proposed Project would generate on-site runoff throughout the Project site as a whole under the Full Build-out Scenario and at each of the six CUP Areas if constructed under the Phased CUP Scenario. Alteration of the existing drainage pattern would not alter the course of a stream or river nor would the Project create additional sources of polluted runoff. Existing drainage patterns would be maintained and the surface of each CUP Area would remain mostly pervious. Sufficient capacity to collect on-site runoff is available in receiving IID drains and proposed on-site ponding areas/detention basins. Therefore, impacts associated with exceedance of existing or planned stormwater drainage systems capacity or providing additional sources of polluted runoff are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Cumulative Water Quality and Runoff Impacts **Impact 4.11.6** With the implementation of legally required SWRCB, RWQCB, and County policies, plans and ordinances governing land use activities that may degrade or contribute to the violation of water quality standards, the proposed Project, in combination with approved, proposed and other reasonably foreseeable projects in the Salton Sea watershed would not contribute to the cumulative effects of degradation of water quality, or result in changes in water runoff patterns. This impact is considered **less than cumulatively considerable** under both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	None required.	LCC

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
BIOLOGICAL RESOURCES			
Impacts to Special Status Species (Burrowing Owl) **Impact 4.12.1** The Project Area contains suitable habitat for burrowing owl. Several owls were discovered during field surveys of the Project site. Therefore, potential for impacts to special status species is considered **potentially significant** under both the Full Build-out and Phased CUP Scenarios.	PS	**MM 4.12.1a General Avoidance and Minimization Measures** Debris/Non-native Vegetation/Pollution • Fully covered trash receptacles that are animal-proof will be installed and used onsite to contain all food, food scraps, food wrappers, beverage containers, and other miscellaneous trash. • No litter or debris will be discharged into state-jurisdictional waters. • Work areas shall be kept clean of debris, such as trash, and construction materials. • Vehicle and Equipment Restrictions and Maintenance ~~• Night-time construction should be minimized to the extent possible. However, if night-time activity (e.g., equipment maintenance) is necessary, then the speed limit shall be 10 mph.~~ • Vehicle operation within jurisdictional resources when surface water is present will be prohibited except as necessary to perform work in IID facilities pursuant to USACE, RWQCB, and/or CDFW permits and/or authorizations. Any equipment or vehicles driven and/or operated within or adjacent to a state-jurisdictional channel will be checked and maintained by the	LTS

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Impacts to Special Status Species (California Black Rail and Yuma Ridgeway's Rail) **Impact 4.12.2** Suitable habitat for California Black Rail and Yuma Ridgeway's Rail is present within irrigation ditches located within the boundaries of the Project site. Therefore, potential for impacts to special status species is considered **potentially significant** during Project construction under both the Full Buildout and Phased CUP Scenarios.	PS	Implement mitigation measure MM 4.12.1a, MM 4.12.1b and MM 4.12.1d.	LTS

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Impacts on Riparian Habitat, Wetland Community or other Sensitive Natural Community (Arrow Weed Thicket and Cattail Marsh Alliance) **Impact 4.12.3** The Project site contains Arrow Weed Thickets and Cattail Marshes Alliance. Arrow Weed Thicket is a sensitive biological resource under CEQA and Cattail Marshes Alliance is a wetland community, which is typically afforded protection under CEQA and the Clean Water Act. Implementation of the proposed Project would require permanent removal of both vegetation communities within the boundaries of CUP#17-0033. This is considered a **potentially significant impact** during Project construction under both the Full Buildout and Phased CUP Scenarios.		**MM 4.12.3 CUP#17-0033 - Federal and State Agency Permits** To comply with the state and federal regulations for impacts to jurisdictional resources regulated by the United States and State of California, the following permits and agreement shall be obtained, or evidence shall be provided from the respective resource agency satisfactory to the County that such an agreement or permit is not required if development activities are proposed within jurisdictional waters: • A Clean Water Act Section 404 permit issued by the USACE for all Project-related disturbances of jurisdictional non-wetland waters and/or wetlands. • A Clean Water Act Section 401 permit issued by the RWQCB for all Project-related disturbances of jurisdictional non-wetland waters and/or wetlands. A Section 1602 Streambed Alteration Agreement issued by the CDFW for all Project-related disturbances of any streambed and associated riparian habitat.	

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IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Impacts on Wetlands/Jurisdictional Resources **Impact 4.12.4** Implementation of the proposed Project would result in the loss of both wetland waters under the jurisdiction of the USACE as well as riparian habitat during construction within the boundaries of CUP#17-0033. This is considered a **potentially significant impact** under both the Full Buildout and Phased CUP Scenarios.	PS	Implement mitigation measure MM 4.12.3, CUP#17-0033 **-** Federal and State Agency Permits.	LTS
Impacts to Wildlife Corridors/Habitat Linkage **Impact 4.12.5** The Project site is primarily surrounded by, and includes, extensive historical and present day agricultural practices. The Project site is also bordered on the east and south by operating solar facilities. Therefore, impacts to wildlife corridors or habitat linkage are considered **less than significant** under both the Full Buildout and Phased CUP Scenarios.	LTS	None required.	LTS

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Cumulative Impacts to Biological Resources **Impact 4.12.6** Implementation of the proposed Project in combination with other proposed, approved and reasonably foreseeable projects in the region could have cumulative impacts on special status species, sensitive vegetation communities, and jurisdictional waters. However, impacts to biological resources are addressed and mitigated on a project-by-project basis. Therefore, cumulative impacts to biological resources are considered **less than cumulatively considerable** under both the Full Buildout and Phased CUP Scenarios.	LCC	Implement mitigation measures MM 4.12.1a, MM 4.12.1b, MM 4.12.1c, MM 4.12.1d, MM 4.12.1e and MM 4.12.2.	LCC

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PUBLIC SERVICES & UTILITIES			
Impacts to ICFD Services **Impact 4.13.1** The Proposed Project would develop a solar energy generation and storage facility on agricultural land in Imperial County. The location of the Project and the potential for development of individual CUP Areas over time could result in increased demand on the ICFD services. However, the Project would not cause a need to expand ICFD's public facilities. Therefore, impacts to ICFD services are **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario. Additionally, the proposed Project has been designed to incorporate fire safety features and would contribute to the agency to offset any costs associated with the Project.	LTS	None required.	LTS
Impacts to ICFD Accessibility **Impact 4.13.2** The proposed Project will be designed to comply with ICFD access requirements. As such, impacts to ICFD accessibility are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Cumulative Impacts to ICFD Fire Protection and Emergency Response **Impact 4.13.3** Development of the proposed Project, in combination with proposed, approved and reasonably foreseeable projects in the ICFD service area, would increase demand for fire protection and emergency medical response. However, each individual project would be required to incorporate fire safety features, adequate access, and worker safety protocols in compliance with all applicable fire and occupational safety standards and codes. However, implementation of these projects would not cause ICFD to expand its public facilities. Therefore, environmental impacts related to fire protection and emergency response are considered less **than cumulatively considerable** for both the Full Build-out Scenario and the Phased CUP Scenario .	LCC	None required.	LCC

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Impacts to ICSO Services **Impact 4.13.4** Implementation of the Project could negatively affect the ICSO's response times and ability to carry out patrol duties. However, implementation of the proposed Project would result in the need to expand ICSO's public facilities. Therefore, potential environmental impacts to law enforcement services are considered **less than significant** for both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS
Cumulative Impacts to ICSO Services **Impact 4.13.5** Development of the proposed Project, in combination with other proposed, approved and reasonably foreseeable projects in Imperial County would result in an increased cumulative demand for law enforcement. However, cumulative projects would not cause the ICSO to expand its public facilities. Therefore, impacts to law enforcement services are **less than cumulatively considerable** under both the Full Build-out Scenario and as proposed under the Phased CUP Scenario.	LCC	None required.	LCC

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Construction of New Water Facilities **Impact 4.13.6** The Project may install on-site water treatment facilities within each CUP that has an O&M Building Complex. The facilities would be constructed within the footprint of the CUP and would not disturb off-site lands. Therefore, impacts associated with provision of water treatment facilities are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS
Water Supply Sufficiency **Impact 4.13.7** The Project proposes to obtain water from the IID canal network for construction, operation and maintenance, and decommissioning/reclamation activities. Project demands for water would be lower than current agricultural water supply requirements. The IID Canal system and water entitlements are adequate to meet the proposed water demands and the Project would not cause a need to expand water entitlements. Therefore, impacts to water supply are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Cumulative Water Supply Impacts **Impact 4.13.8** Development of the proposed Project would require use of surface water from the IID canal system. Requests for water supply are approved by the IID on a project-by-project basis. The proposed Project would require less water than current agricultural uses on the solar field site parcels. Therefore, the Project's contribution to cumulative water supply impacts is considered **less than cumulatively considerable** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Construction of New Wastewater Treatment and Wastewater Treatment Infrastructure **Impact 4.13.9** The Project area is not currently served by a wastewater system. On-site septic system(s) and leach field(s) are proposed for each CUP where an O&M Building will be constructed. Near-surface soils are considered good in supporting an on-site septic systems and leach fields for wastewater disposal. Therefore, impacts to wastewater treatment and wastewater conveyance infrastructure are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	None required.	LCC
Cumulative Wastewater Impacts **Impact 4.13.10** Development of the proposed Project would generate demand for on-site wastewater treatment. Septic systems and leach fields are proposed at individual CUP Areas where an O&M building will be constructed to provide wastewater service. Therefore, cumulative wastewater impacts are considered **less than cumulatively considerable** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

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Generate Solid Waste in Excess of Standards or in Excess of Capacity of Local Infrastructure/Comply with Statutes and Regulations Related to Solid Waste **Impact 4.13.11** Solid waste would be generated during construction, operation and maintenance, and decommissioning of the proposed Project. Solid waste materials would be disposed of using a locally-licensed waste hauling service and disposed of at a local landfill with sufficient capacity to accept this waste. Thus, a **less than significant impact** is identified for this issue under both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	None required.	LCC

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Cumulative Impacts to Solid Waste in Excess of Standards or in Excess of Capacity of Local Infrastructure/Comply with Statutes and Regulations Related to Solid Waste **Impact 4.13.12** Implementation of the proposed Project, in combination with other proposed, approved and reasonably foreseeable projects in the County of Imperial, would result in cumulative demand for solid waste service and landfill capacity. However, the proposed Project would not generate a substantial quantity of waste, and disposal service is available to serve the Project. Therefore, cumulative solid waste impacts are considered **less than cumulatively considerable impact** under both the Full Build-out Scenario and Phased CUP Scenario.	LTS	None required.	LTS

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Relocation or Construction of New or Expanded Electric Power Facilities **Impact 4.13.13** The proposed Project would increase the demand for electrical services from IID to operate the O&M building(s) and keeping inverters warm during the evening hours. Within its on-site disturbance area, the Project includes a substation feedback and transmission interconnection coordinated with IID through an Affected Systems Agreement and Back-feed and Station Power Service Agreement. No permanent expansion of IID electrical infrastructure is necessary for the proposed Project. Thus, the proposed Project's impacts to electricity and electrical infrastructure are **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	None required.	LCC

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SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Cumulative Impacts to Electric Service **Impact 4.13.14** Implementation of the proposed Project, in combination with proposed, approved and reasonably foreseeable projects in the County of Imperial, would result in a minimal increase in the current use of IID electricity and a substantial increase in solar energy generation. The Project does not require the relocation or construction of new or expanded IID facilities. Therefore, cumulative impacts to electrical service are considered **less than cumulatively considerable** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Impacts to Telecommunications Facilities **Impact 4.13.15** The proposed Project and surrounding area is not currently served by telecommunications facilities. The proposed Project would increase the demand for telephone and internet services. AT&T is anticipated to provide service to the Project as needed in accordance with all applicable fees. Therefore, impacts to telecommunication facilities are considered **less than significant** under both the Full Build-out Scenario and the Phased CUP Scenario.	LCC	None required.	LCC

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Cumulative Impacts to Telecommunications Facilities **Impact 4.13.16** Implementation of the Proposed Project, in combination with other existing, proposed, approved and reasonably foreseeable projects in the region, would result in cumulative demands to telephone and internet service. Telecommunication service providers procure service to individual development projects on an as-needed basis. Therefore, cumulative impacts to telecommunication facilities are considered **less than cumulatively considerable** under both the Full Build-out Scenario and the Phased CUP Scenario.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
ENERGY			
Use of Energy Resources During Project Construction and Operation **Impact 4.14.1** Energy requirements for construction, operation, and decommissioning of the Project under the Full Build-out Scenario and all CUP Areas (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001) as proposed under the Phased CUP Scenario would not result in inefficient energy use by amount or fuel type. Therefore, the Project would therefore have a **less than significant impact** on energy use by amount or fuel type.	LTS	None required.	LTS
Consumption of Energy - Effects on Local and Regional Energy Supplies **Impact 4.14.2** The proposed Project, whether implemented under the Full Build-out Scenario or the Phased CUP Scenario, would not use substantial amounts of local and regional energy supplies or create requirements for additional capacity. Therefore, the Project's impact on local and regional energy supplies would be **less than significant**.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Consumption of Energy - Effects on Peak and Base Period Demands **Impact 4.14.3** The proposed Project would not impose additional demands on peak and base period demands for electricity and other forms of energy. To the contrary, under both the Full Buildout Scenario and the Phased CUP Scenario, the Project would contribute electricity during peak and base period demands. Therefore, the Project's impact on peak and base period demands for electricity and other forms of energy would be **less than significant**.	LTS	None required.	LTS
Conflict with or Obstruct State or Local Plan - Compliance with Existing Energy Standards **Impact 4.14.4** Implementation of the Full Build-out Scenario or the Phased CUP Scenario would comply with existing energy standards. The Project would result in production of renewable solar energy that would help the State of California meet its goals for use and production of alternative renewable energy sources. Therefore, the Project's impact on compliance with existing energy standards would be **less than significant**.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

TABLE 2.0-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	LEVEL OF IMPACT/ SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF IMPACT/ SIGNIFICANCE AFTER MITIGATION
Energy Consumption - Effects on Energy Sources **Impact 4.14.5** Project implementation under the Full Build-out Scenario or the Phased CUP Scenario would not have an adverse effect on energy resources. The Project would create a new source of renewable energy resources. Therefore, the Project's effect on energy resources would be **less than significant**.	LTS	None required.	LTS
Energy Consumption - Transportation Energy Use **Impact 4.14.6** Implementation of the Full Build-out Scenario or Phased CUP Scenario will generate minimal traffic during the operational phase. The Applicant will implement strategies to minimize transportation energy use and ensure overall use of efficient transportation alternatives, as appropriate. Therefore, the Project's impact on transportation energy would be **less than significant**.	LTS	None required.	LTS

LTS = Less than Significant
LCC = Less than Cumulatively Considerable
PS = Potentially Significant
CC = Cumulatively Considerable
SU = Significant and Unavoidable
NI = No Impact

CHAPTER 3.0

COMMENTS AND RESPONSE TO COMMENTS

3.1 INTRODUCTION

This chapter includes all comments received on the Draft EIR during the 50-day public and agency review period (45-day minimum per CEQA, plus five days per County of Imperial Guidelines). No new significant environmental impacts or issues, beyond those already identified in the Draft EIR for the Drew Solar Farm were raised during the public review period. Acting as lead agency under CEQA, Imperial County directed responses to the comments received on the Draft EIR. Pursuant to CEQA Guidelines Section15088.5, none of the comments received during the comment period involve any new significant impacts or "significant new information" that would require recirculation of the Draft EIR.

3.2 LIST OF COMMENTERS

The following individuals and representatives of organizations and agencies submitted written comments on the Draft EIR. Note that two letters were received by Imperial County agencies after the close of the comment period but requested that they be included as part of the Response to Comments.

COMMENTS RECEIVED BY IMPERIAL COUNTY			
LETTER or E-MAIL	INDIVIDUAL OR SIGNATORY	AFFILIATION	DATE
1	Bryan Etsitty, Director	Colorado River Indian Tribes, Tribal Historic Preservation Office	May 23, 2019
2	John A. Belcher, Attorney at Law	Law Offices of John A. Belcher	May 29, 2019
3	Curtis Blondell, APC Environmental Coordinator	Imperial County Air Pollution Control District	June 26, 2019
4	Donald Vargas, Compliance Administrator II	Imperial Irrigation District	June 27, 2019
4A			June 18, 2019
4B			January 19, 2018
5	Monique Wilber, Conservation Program Support Supervisor	Department of Conservation	June 28, 2019
6	John A. Belcher, Attorney at Law	Law Offices of John A. Belcher	July 1, 2019
7	Maurice Eaton, Branch Chief Local Development and Intergovernmental Review Branch	California Department of Transportation (Caltrans)	July 1, 2019
8	Stephen Volker	Law Offices of Stephen C. Volker	July 1, 2019
9	Scott Morgan, Director State Clearinghouse	Governor's Office of Planning and Research	July 2, 2019
10	Andrew Loper, Lieutenant/ Fire Prevention Specialist Robert Malek, Deputy Fire Chief	Imperial County Fire Department, Fire Prevention Bureau	August 15, 2019
11	John A. Gay, P.E. Director of Public Works County of Imperial	County of Imperial Department of Public Works	September 9, 2019

3.3 COMMENTS AND RESPONSES

3.3.1 REQUIREMENTS FOR RESPONDING TO COMMENTS ON A DRAFT EIR

CEQA Guidelines Section 15088 requires that lead agencies evaluate all comments on environmental issues received on the Draft EIR and prepare a written response. The written response must address the environmental issue(s) raised and provide a detailed response. Rationale must be provided when specific comments or suggestions (e.g., additional mitigation measures) are not accepted. In addition, the written response must be a good faith and reasoned analysis. As long as a good faith effort at full disclosure is made in the EIR (CEQA Guidelines Section 15204), lead agencies need only to respond to significant environmental issues associated with the project and do not need to provide all the information requested by commenters.

CEQA Guidelines Section 15204 recommends that commenters provide detailed comments that focus on the sufficiency of the Draft EIR in identifying and analyzing the possible impacts on the environment and ways in which the significant effects of the project might be avoided or mitigated. CEQA Guidelines Section 15204 also notes that commenters should provide an explanation and evidence supporting their comments. Pursuant to CEQA Guidelines Section 15064, an effect shall not be considered significant in the absence of substantial evidence.

CEQA Guidelines Section 15088 also recommends that where the response to comments results in revisions to the Draft EIR, those revisions should be noted as a revision to the Draft EIR or in a separate section of the Final EIR.

3.3.2 COMMENTS AND RESPONSE TO COMMENTS

Written comments on the Draft EIR are reproduced on the following pages, along with responses to those comments. To assist in referencing comments and responses, the letters are coded using numbers (e.g., Comment Letter 1) and each issue raised in the comment letter is assigned a number that correlates with the letter (e.g. 1-1, 1-2, 1-3, etc.).

Where changes to the Draft EIR text result from responding to comments, those changes are included in the response and demarcated with revision marks (underline for new text, ~~strike-out~~ for deleted text). Comment-initiated text revisions to the Draft EIR and minor staff-initiated changes are compiled in their entirety and are demarcated with revision marks in Chapter 4.0, Errata, of this Final EIR.

COLORADO RIVER INDIAN TRIBES

Tribal Historic Preservation Office

26600 Mohave Road
Parker, Arizona 85344
Telephone: (928)-669-5822 Fax: (928) 669-5843

LETTER 1

May 23, 2019

Imperial County Planning & Development
Attn: Patricia Valenzuela
801 Main Street
El Centro, CA 92243

RECEIVED
MAY 23 2019
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

RE: Drew Solar Project – Draft EIR Review Period

Dear Ms. Patricia Valenzuela:

The Colorado River Indian Tribes' Tribal Historic Preservation Office ("CRIT THPO") has received your letter dated May 2019, regarding the *proposed Notice of Availability of Draft EIR for the construction, operation and reclamation of a 762.8 net acre, 100-MW solar photovoltaic energy project with energy storage component, two generation interconnection transmission lines to extend from the end of the project site, across Drew Road and State Route 98 and connecting into the Drew Switchyard for the DREW SOLAR PROJECT.* 1-1

As a preliminary matter, the Colorado River Indian Tribes are a federally recognized Indian tribe comprised of over 4,200 members belonging to the Mohave, Chemehuevi, Hopi and Navajo Tribes. The almost 300,000-acre Colorado River Indian Reservation sits astride the Colorado River between Blythe, California and Parker, Arizona. The ancestral homelands of the Tribe's members, however, extend far beyond the Reservation boundaries. Significant portions of public and private lands in California, Arizona and Nevada were occupied by the ancestors of the Colorado River Indian Tribes' Mohave and Chemehuevi members since time immemorial. These landscapes remain imbued with substantial cultural, spiritual and religious significance for the Tribes' current members and future generations. For this reason, we have a strong interest in ensuring that potential cultural resource impacts are adequately considered and mitigated. 1-2

In particular, the Colorado River Indian Tribes are concerned about the removal of artifacts from this area and corresponding destruction of the Tribes' footprint on this landscape. As such, the Tribes request that all prehistoric cultural resources, including both known and yet-to-be-discovered sites, be avoided if feasible. If avoidance of the site is infeasible, then the Tribes request that the resources be left in-situ or reburied in a nearby area, after consultation. This language should be incorporated into enforceable mitigation measures. 1-3

CRIT THPO
Project Name: Drew Solar Project
Date: May 23, 2019
Page 2

In addition, we respond as follows:

______Given the potential impact of the project on important cultural resources, the Colorado River Indian Tribes request in-person government-to-government consultation. Please contact the CRIT THPO to discuss our concerns and schedule a meeting with Tribal Council.

__X__In the event any human remains or objects subject to provision of the Native American Graves Protection and Repatriation Act, or cultural resources such as sites, trails, artifacts are identified during ground disturbance, please contact the CRIT THPO within 48 hours. 1-4

__X__The Colorado River Indian Tribes request tribal monitoring of any ground disturbing activity as a condition of project approval. The Tribes request notification of any opportunities to provide tribal monitoring for the project.

______The Colorado River Indian Tribes do not have any specific comment on the proposed project and instead defer to the comments of other affiliated tribes.

Thank you for your consideration. Please contact the undersigned if you have any questions or concerns.

Sincerely, 1-5

COLORADO RIVER INDIAN TRIBES
TRIBAL HISTORIC PRESERVATION OFFICE

/s/ Bryan Etsitty, Director
26600 Mohave Road
Parker, AZ 85344
Phone: (928) 669-5822
E-mail: betsitty@crit-nsn.gov

cc: critthpo@crit-nsn.gov

RECEIVED
MAY 23 2019
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

RESPONSE TO COMMENT LETTER 1

Commenter: Bryan Etsitty, Director, Colorado River Indian Tribes, Tribal Historic Preservation Office
Date of Letter: May 23, 2019

Response to Comment 1-1: Introductory comment acknowledging that the Colorado River Indian Tribes' (CRIT) Tribal Historic Preservation Office has received the Notice of Availability for the Drew Solar Project. No response is required.

Response to Comment 1-2: Comment describes the Colorado River Indian Tribes, reservation and ancestral homelands. The comment expresses interest in ensuring that potential cultural resource impacts are adequately considered and mitigated. This comment is noted.

Response to Comment 1-3: Comment express concern regarding the removal of artifacts from Tribes' "footprint". Comment requests that all pre-historic cultural resources, including known and yet to be discovered sites be avoided if feasible. Alternatively, if avoidance is not feasible, the comment requests that the resources be left in-situ or reburied in a nearby area following consultation. Commenter requests that this language be incorporated into mitigation measures. However, the Draft EIR did not identify sites within or immediately adjacent to the Project site. Mitigation Measure MM 4.7.2a provides for Native American monitoring and MM 4.7.2b addresses discovery of archaeological resources. These measures would address the Commenter's concern regarding discovery of pre-historic cultural resources, including yet to be discovered sites.

Response to Comment 1-4: Comment identifies two responses for consideration by the County with regard to human remains and tribal monitoring. These responses have been incorporated into the text of the EIR to address CRIT concerns. Specifically, Mitigation Measure MM 4.7.3 on page 4.7-34 and 4.7-35 has been revised as follows:

"**<u>Mitigation Measure</u>**

MM 4.7.3 In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County Coroner shall be notified of the discovery immediately. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined, within 2 working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County Coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code Section 5097.98, the NAHC must immediately notify those persons it believes to be the MLD from the deceased Native American. The MLD shall complete inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

<u>In the event that any human remains or objects subject to provision of the Native American Graves Protection and Repatriation Act, or cultural resources such as sites, trails, artifacts are identified during ground disturbance, please contact the Colorado River Indian Tribes' Tribal Historic Preservation Office (CRIT THPO) within 48 hours.</u>

Timing/Implementation:	*During construction.*
Enforcement/Monitoring:	*Imperial County Planning and Development Services Department, Imperial County Coroner in coordination with NAHC and CRIT THPO."*

Mitigation Measure MM 4.7.2 on page 4.7-32 has been revised as follows

"MM 4.7.2a A monitor from the Campo Band of Mission Indians and the Colorado River Indian Tribes may be present as ~~a~~ Native American monitors for initial ground disturbing activities within the boundaries of the Project site. Following initial disturbance, a determination shall be made by the County in accordance with State regulations if continued monitoring is necessary based on the outcome of any discoveries or lack thereof.

Timing/Implementation:	*During initial ground disturbing activities/as needed.*
Enforcement/Monitoring:	*Imperial County Planning and Development Services Department/Campo Band of Mission Indians and Colorado River Indian Tribes."*

Response to Comment 1-5: Comment provides contact information for the CRIT THPO. This comment is noted.

LETTER 2

Law Offices of John A. Belcher

ATTORNEYS AT LAW
150 EAST COLORADO BOULEVARD, SUITE 215
PASADENA, CALIFORNIA 91105
TELEPHONE (626) 577-5771
FAX (626) 577-7769

May 29, 2019

Via Email

Diana Robinson
Planning and Development
Imperial County
801 Main Street
El Centro, CA 92243
Phone: (442) 265-1735 x 1751
Email: dianarobinson@co.imperial.ca.us

Re: Protest of the proposed Drew Solar Project, SCH Number: 2018051036

Dear Ms. Robinson:

My law firm represents Save Our Mojave, a 501(c)(3) non-profit organization working to raise public awareness about some of the most pressing issues facing California's deserts, including unchecked damage to the environment and wildlife. Pursuant to California law, Save Our Mojave makes the following requests: 2-1

REQUEST FOR NOTICES:

My client hereby requests to be included in all notices related to the proposed Drew Solar Project (the "Project"). Specifically, please send to Save Our Mojave, care of my law firm, notice of any and all actions or hearings related to activities undertaken, authorized, approved, permitted, licensed, or certified the Bureau of Land Management and any of its subdivisions, and/or supported, in whole or in part, through contracts, grants, subsidies, loans or other forms of assistance from the Bureau of Land Management, that are connected in any way to the Project, including, but not limited to the following: 2-2

- Notice of any public hearing in connection with the Project.
- Any and all notices prepared pursuant to the California Environmental Quality Act ("CEQA") and involving the Project including, but not limited to:
    i. Notices of any public hearing held pursuant to CEQA and related to the Project.

Diana Robinson
Imperial County Planning and Development
May 29, 2019
Page 2

ii. Notices of determination that an Environmental Impact Report ("EIR") or supplemental EIR for the Project is required or finalized, prepared pursuant to Public Resources Code Section 21080.4.
iii. Notices of availability of an EIR for the Project or a negative declaration for the Project prepared pursuant to Public Resources Code Section 21152 and Section 15087 of Title 14 of the California Code of Regulations.
iv. Notices of approval and/or determination to carry out the Project, prepared pursuant to Public Resources Code Section 21152 or any other provision of law.
v. Notice of approval or certification of any EIR or negative declaration for the Project prepared pursuant to Public Resources Code Section 21152 or any other provision of law.
vi. Notice of exemption from CEQA for the Project prepared pursuant to Public Resources Code section 21152 or any other provision of law.
vii. Notice of any Final EIR for the Project prepared pursuant to CEQA.

Please note that Save Our Mojave is requesting notices of CEQA actions and notices of any public hearings to be held in connection with the Project under any provision of Title 7 of the California Government Code governing California Planning and Zoning Law. This request is filed pursuant to Public Resources Code Sections 21092.2, and 21167(f) and Government Code Section 65092, which require the County to mail such notices to any person who has filed a written request for them with the clerk of the agency's governing body. 2-2 Con't

Please send notice by mail and electronic mail to:

Law Offices of John A. Belcher
150 East Colorado Boulevard, Suite 215
Pasadena, California 91105
Phone: (626) 577-5771
Fax: (626) 577-7769
Email: johnbelcher@insuringlaw.com

REQUEST FOR PUBLIC RECORDS:

Save Our Mojave also requests access to records in your possession either electronically (if you have such documents in electronic form) or for the purpose of inspection and copying 2-3

Diana Robinson
Imperial County Planning and Development
May 29, 2019
Page 3

pursuant to the California Public Records Act (Government Code Section 6250 et seq.). The information she requests is as follows:

- Any and all application documents associated with the Project.
- Any and all staff emails related to the Project.
- Any and all correspondence with developer related to the Project.
- Any and all contracts related to the Project.

This request reasonably describes identifiable records. To our knowledge, there is no express provision of law exempting the records from disclosure. Pursuant to Government Code § 6253.9 (see Appendix A hereto), Save Our Mojave requests that you provide the documents in electronic format at no cost. The documents should be sent care of the Law Offices of John A. Belcher to the following email address: johnbelcher@insuringlaw.com 2-3 Con't

If you do not have such records electronically, pursuant to Government Code § 6253(b), please make the records available for inspection and copying, based on our payment of "fees covering direct costs of duplication, or statutory fee, if applicable."

Thank you for your timely attention to this request. Do not hesitate to contact me if my office can be of assistance to you as you assemble these documents. 2-4

Sincerely,

John A. Belcher

Diana Robinson
Imperial County Planning and Development
May 29, 2019
Page 4

California Government Code § 6253.9 — Information in Electronic Format

(a) Unless otherwise prohibited by law, any agency that has information that constitutes an identifiable public record not exempt from disclosure pursuant to this chapter that is in an electronic format shall make that information available in an electronic format when requested by any person and, when applicable, shall comply with the following:

(1) The agency shall make the information available in any electronic format in which it holds the information.

(2) Each agency shall provide a copy of an electronic record in the format requested if the requested format is one that has been used by the agency to create copies for its own use or for provision to other agencies. The cost of duplication shall be limited to the direct cost of producing a copy of a record in an electronic format.

(b) Notwithstanding paragraph (2) of subdivision (a), the requester shall bear the cost of producing a copy of the record, including the cost to construct a record, and the cost of programming and computer services necessary to produce a copy of the record when either of the following applies:

(1) In order to comply with the provisions of subdivision (a), the public agency would be required to produce a copy of an electronic record and the record is one that is produced only at otherwise regularly scheduled intervals. 2-5

(2) The request would require data compilation, extraction, or programming to produce the record.

(c) Nothing in this section shall be construed to require the public agency to reconstruct a record in an electronic format if the agency no longer has the record available in an electronic format.

(d) If the request is for information in other than electronic format, and the information also is in electronic format, the agency may inform the requester that the information is available in electronic format.

(e) Nothing in this section shall be construed to permit an agency to make information available only in an electronic format.

(f) Nothing in this section shall be construed to require the public agency to release an electronic record in the electronic form in which it is held by the agency if its release would jeopardize or compromise the security or integrity of the original record or of any proprietary software in which it is maintained.

(g) Nothing in this section shall be construed to permit public access to records held by any agency to which access is otherwise restricted by statute.

RESPONSE TO COMMENT LETTER 2

Commenter: John A. Belcher, Law Offices of Johan A. Belcher
Date of Letter: May 29, 2019

Response to Comment 2-1: Introductory comment explaining that the Commenter represents Save Our Mojave. The comment is noted. No response is required.

Response to Comment 2-2: Comment requests that Save Our Mojave be included in all notices related to the Drew Solar Project. The comment lists various notices required the CEQA. The comment notes that the request for these notices is filed pursuant to Public Resources Code Sections 21092.2 and21167(f) and Government Code Section 65092 which requires the County to mail such notices to any person who has filed a written request with the clerk of the agency's governing body. A contact name and mailing address is provided for mailing correspondence. This comment does not address the adequacy of the environmental analysis but is noted for the decision-makers' consideration.

Response to Comment 2-3: Commenter requests access to County records regarding the Project. This includes any and all application documents, staff e-mails, correspondence with the developer and contracts related to the Project. The documents are requested in electronic format to be e-mailed to johnblcher@insuringlaw.com. If the documents are not available electronically, they are requested in hard copy. This comment does not address the adequacy of the environmental analysis but is noted for the decision-makers' consideration.

Response to Comment 2-4: Comment provides closing remarks. No response is required.

Response to Comment 2-5: Comment provides text of California Government Code Section 6253.9 – Information in Electronic Format. Comment noted. No response is required.

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150 SOUTH NINTH STREET
EL CENTRO, CA 92243-2850

TELEPHONE: (442) 265-1800
FAX: (442) 265-1799

IMPERIAL COUNTY CALIFORNIA 1907

AIR POLLUTION CONTROL DISTRICT

June 26, 2019

LETTER 3

RECEIVED
JUN 26 2019
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

Jim Minnick
Planning & Development Services Director
801 Main Street
El Centro, CA 92243

SUBJECT: Notice of Availability of Draft Environmental Impact Report for Drew Solar Project (Drew Solar, LLC)

Dear Mr. Minnick:

The Imperial County Air Pollution Control District ("Air District") would like to thank you for the opportunity to review and comment on the Notice of Availability (NOA) for the Draft Environmental Impact Report (EIR) for the Drew Solar Project ("Project"). The Project is a proposal to build a 100-mega-watt (MW) solar photovoltaic energy generation facility on approximately 762.8 net acres collectively located on APNs 052-170-031, 052-170-032, 052-170-037, 052-170-039, 052-170-056 and 052-170-067, approximately 6.5 miles southwest of the City of El Centro and 7.5 miles west of Calexico, or roughly between Kubler Road on the north, Pulliam Road on the east, State Route 98 on the south, and the West Side Main Canal on the west. The project will require a General Plan Amendment (GPA 17-0006); a Zone Change (ZC 17-0007); an adjustment to a Parcel Map (PM 02478); six (6) Conditional Use Permits (CUPs 17-0031-0035, and 18-0001); a Variance (17-0003); plus five (5) Lot Tie Agreements. 3-1

Upon review, the Air District is concerned that the overall analysis may contain enough uncertainties to create a "less than significant" impact regarding NOx emissions during construction. Based on the Air District's historical emissions analysis of solar facilities under construction since 2005, equipment used during the construction phase of these solar farms has often exceeded construction NOx emission thresholds. While the CalEEMod analysis as prepared, Section 4.4 and Appendix D, meets the California Air Resources Board (CARB) Tier 3 standards it 3-2 does not account for the variability allowed by California regulation within fleets and or out of state use of equipment. The enforcement of such a condition, the use of only Tier 3 equipment would be at best difficult, resulting not only in construction delays but could potentially create a burdened budget in order to assure compliance. 3-2 Con't

The conditions that lend to an enforceable and sound method assuring compliance with construction NOx emissions result from existing California regulation and the use of out-of-state equipment by construction companies. For example, current California regulation allows for the grandfathering in of older lower-tiered vehicles under certain circumstances allowing for equipment variations, with differing Tiers, within identified California fleets. Another condition is the past use of out of state equipment where Tier requirements do not apply or cannot be confirmed. 3-3

Therefore, in order to assure that NOx emissions released during construction remain below the significance threshold, the Air District requests that on a periodic basis, the applicant submit to the Air District (beginning with prior to any construction activities), a Construction Equipment List (in Excel format) detailing the equipment type, make, model, year, horsepower, actual hours of daily operation, date equipment arrived on site, and date removed from the site, for the purpose of performing NOx evaluations. If the emissions are found to exceed CEQA thresholds of significance, the project would then be subject to Policy 5, which provides two options: proposing an off-site mitigation project and supporting documentation that the reductions are met, or; pay an in-lieu mitigation fee. 3-4

The mitigation of dust (PM10) during construction of the Project can be accomplished through compliance to Regulation VIII. These rules are designed to mitigate fugitive dust during construction. Therefore, the Air District requests that the applicant submit a Construction Dust Control Plan (CDCP) and notify the Air District 10 days prior to the commencement of construction activities. Additionally, the Air District requests that the applicant submit Operational Dust Control Plan (ODCP) and obtain Air District approval prior to issuance of a Certification of Occupancy. 3-5

Finally, the Air District formally requests copies of the Draft Conditional Use Permits to assure that the correct conditions are included prior to recording. 3-6

NOA Draft EIR Drew Solar Project

Page 2 of 3

The Air District's rule book can be accessed via the internet at http://www.co.imperial.ca.us/AirPollution. Should you have questions, please call our office at (442) 265-1800. 3-7

Sincerely,

Curtis Blondell

Curtis Blondell
APC Environmental Coordinator

Reviewed by Monica Soucier,
APC Division Manager

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RESPONSE TO COMMENT LETTER 3

Commenter: **Curtis Blondell, APC Environmental Coordinator**
(Reviewed by Monica Soucier APC Division Manager)

Date of Letter: **June 26, 2019**

Response to Comment 3-1: Introductory comments providing a brief description of the project. No response is required.

Response to Comment 3-2: Comment expresses concern regarding the analysis of NOx emissions with regard to Tier 3 standards. The Commenter states that the CalEEMod analysis does not account for the variability allowed by California regulation within fleets. Commenter states that the enforcement of use of only Tier 3 equipment could be difficult to achieve. The ICAPCD has been able to successfully achieve Tier 3 compliance on multiple prior solar projects without creating an undue burden for the developer. The ICAPCD anticipates similar achievability of Tier 3 compliance for the proposed Project.

Response to Comment 3-3: Comment notes that current California regulation allows for grandfathering in of older lower-tiered vehicles under certain circumstances allowing for equipment variations with differing Tiers within identified California fleets. Another condition is the past use of out of state equipment where Tier requirements do not apply or cannot be confirmed. As noted in Response to Comment 3-2, above the ICAPCD has been able to successfully achieve Tier 3 compliance on multiple prior solar projects and anticipates similar achievability of Tier 3 compliance for the proposed Project.

Response to Comment 3-4: Commenter requests that the applicant submit a Construction Equipment List (in Excel format) to the Air District prior to any construction activities. The Construction Equipment List should detail the equipment type, make, model, year, horsepower, actual hours of daily operation, date equipment arrived on site, and date removed from the site, for the purpose of performing NOx evaluations. The purpose of submitting the Construction Equipment List is to ensure that NOx emissions released during construction remain below the significance threshold. If the emissions are found to exceed CEQA thresholds of significance, the project would then be subject to Policy 5 which provides two options: proposing an off-site mitigation project and supporting documentation that the reductions are met; or pay an in-lieu mitigation fee.

The analysis of construction emissions in the Draft EIR pages 4.4-16 and 4.4-17 was based on the CalEEMod emissions model. Inputs to the model included a list of construction equipment. Construction emissions were all found to be below ICAPCD maximum daily construction air pollution thresholds as demonstrated in Table 4.4-7 of the Draft EIR (page 4.4-17). Prior to the start of construction, the applicant will be required to submit a Construction Equipment List to the ICAPCD. This requirement should be included in the Conditions of Approval for the Project.

Response to Comment 3-5: Commenter states that PM10 can be mitigated during construction through compliance with Regulation VIII. The ICAPCD requests that the applicant submit a Construction Dust Control Plan and notify the ICAPCD 10 days prior to commencement of construction. The Commenter also requests that the applicant submit an Operational Dust Control Plan and obtain ICAPCD approval prior to issuance of a Certificate of Occupancy.

The Section 4.4, Air Quality of the Draft EIR repeatedly references that short-term construction emissions would be mitigated through compliance with ICAPCD Regulation VIII which addresses fugitive dust control and PM10 emissions. As noted, compliance with ICAPCD Regulation VIII would reduce construction-phase PM_{10} emissions to less than significant levels.

Response to Comment 3-6: Comment requests that copies of the Draft Conditional Use Permits be made available to the ICAPCD to assure that the correct conditions are included prior to recording. The County submitted the Conditional Use Permits to the ICAPCD for review on August 15, 2019. No revisions were requested by the ICAPCD.

Response to Comment 3-7: Commenter provides link to access the ICAPCD's rule book. Commenter also provides contact information. No response is required.

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LETTER 4

June 27, 2019

Ms. Diana Robinson
Planner II
Planning & Development Services Department
County of Imperial
801 Main Street
El Centro, CA 92243

SUBJECT: NOA of a DEIR for the Drew Solar Project

Dear Ms. Robinson:

On May 13, 2019, the Imperial Irrigation District received from the Imperial County Planning & Development Services Department, the Notice of Availability of a Draft Environmental Impact Report for the Drew Solar Project. The applicant, Drew Solar, LLC; proposes to develop a 100 MW solar energy-generating project, and potentially include a stand-alone battery energy storage facility, on six parcels totaling approximately 763 acres (Conditional Use Permit applications 17-0031 through 17-0035), located at the northwest intersection of Pulliman Road and State Route 98 in Imperial County, CA. 4-1

The IID has reviewed the project information and, in addition to the comments provided in the June 18, 2018 district letter (see attached letter), has the following remark: if the lead agency (i.e., the County of Imperial) requires a Water Supply Assessment or Water Supply Verification pursuant to California Public Resources Code Section 21151.9 and California Water Code Sections 10631, 10656, 10910, 10911, 10912 and 10915, necessitating a water supply agreement between the applicant and IID, then the assessment or verification must be prepared in consultation with IID, and while not a guarantee of service, should provide the environmental assessment necessary to execute the water supply agreement with IID. Furthermore, the EIR prepared for the project must assess the volume of water the project proposes to use. 4-2

Should you have any questions, please do not hesitate to contact me at 760-482-3609 or at dvargas@iid.com. Thank you for the opportunity to comment on this matter. 4-3

Respectfully,

Donald Vargas
Compliance Administrator II

Enrique B. Martinez – General Manager
Mike Pacheco – Manager, Water Dept.
Marilyn Del Bosque Gilbert – Manager, Energy Dept.
Jamie Asbury – Deputy Manager, Energy Dept., Operations
Vance Taylor – Asst. General Counsel
Robert Laurie – Asst. General Counsel
Enrique De Leon – Asst. Mgr., Energy Dept., Distr., Planning, Eng. & Customer Service
Michael P. Kemp – Superintendent, Regulatory & Environmental Compliance
Laura Cervantes – Supervisor, Real Estate
Jessica Lovecchio – Environmental Project Mgr. Sr., Water Dept.

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ATTACHMENT A
TO LETTER 4

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June 18, 2018

Ms. Diana Robinson
Planner II
Planning & Development Services Department
County of Imperial
801 Main Street
El Centro, CA 92243

SUBJECT: NOP of a Draft EIR for the Drew Solar Project

Dear Ms. Robinson:

Pursuant to the Imperial County Planning & Development Services Department's Notice of Preparation of a Draft Environmental Impact Report for the Drew Solar Project, where the applicant, Drew Solar, LLC; proposes to develop a 100 MW solar energy-generating project, and potentially include a stand-alone battery energy storage facility, on six parcels totaling approximately 762 acres (Conditional Use Permit applications 17-0031 through 17-0035), located 4A-1
at the northwest intersection of Pulliman Road and State Route 98 in Imperial County, CA; The IID has reviewed the project information and and finds that the comments provided in the January 19, 2018 district letter (see attached letter) continue to apply. 4A-2

Should you have any questions, please do not hesitate to contact me at 760-482-3609 or at dvargas@iid.com. Thank you for the opportunity to comment on this matter. 4A-3

Respectfully,

Donald Vargas
Compliance Administrator II

Kevin Kelley – General Manager
Mike Pacheco – Manager, Water Dept.
Enrique B. Martinez – Manager, Energy Dept.
Charles Allegranza – Manager, Energy Dept., Operations
Jamie Asbury – Deputy Manager, Energy Dept., Operations
Carlos Vasquez – Deputy Manager, Energy Dept., Planning & Engineering.
Vance Taylor – Asst. General Counsel
Robert Laurie – Asst. General Counsel
Carlos Vasquez - Planning and Engineering Manager, Energy Dept.
Enrique De Leon – Asst. Mgr., Energy Dept., Distr., Planning, Eng. & Customer Service
Michael P. Kemp – Superintendent, Regulatory & Environmental Compliance
Harold Walk Jr. – Supervisor, Real Estate
Randy Gray – ROW Agent, Real Estate
Jessica Lovecchio – Environmental Project Mgr. Sr., Water Dept.

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DISTRICT WATER POWER **IID** A century of service.

ATTACHMENT B
TO LETTER 4

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January 19, 2018

Mr. Richard Cabanilla
Planner IV
Planning & Development Services Department
County of Imperial
801 Main Street
El Centro, CA 92243

SUBJECT: Drew Road Solar Project CUP Applications Nos.17-0031 through 17-0035

Dear Mr. Cabanilla:

On January 11, 2018, the Imperial irrigation District received from the Imperial County Planning & Development Services Department, a request for agency comments on Conditional Use Permit applications nos. 17-0031 through 17-0035. The applicant, Drew Solar, LLC, proposes to develop a 100 MW solar energy-generating project in five phases, and potentially include a stand-alone battery energy storage facility, on six parcels owned by the IID totaling approximately 762 acres, located at the northwest intersection of Pullman Road and State Route. The generation interconnection transmission line proposed will run from the south end of the site traversing Drew Road and SR 98 into the existing Drew switching station. 4B-1

The IID has reviewed the project information and has the following comment:

1. For temporary construction electrical service and permanent electrical service to the on-site substation and the battery storage facility, the applicant should contact the IID Customer Project Development Office at (760) 482-3300 and speak with the area's project manager. In addition to submitting a formal application for electrical service (available at the IID website http://www.iid.com/home/showdocument?id=12923), the applicant will be required to submit electrical loads, plan & profile drawings (hard copy and CAD files), project schedule, estimated in-service date and project's Conditional Use Permit. All associated fees, rights of way and environmental documentation is the responsibility of the applicant. 4B-2

2. Please note that a circuit study may be required prior to IID committing to serve the project. 4B-3

3. The IID water facilities that may be impacted include the Westside Main Canal, Wormwood Canal, Wormwood Lateral 1, Woodbine Lateral 7, Mt Signal Drain, Mt. Signal Drain No. 1A, Mt. Signal Drain No. 1, Carr Drain, and Carpenter Drain. 4B-4

4. Taking into account that the project may impact IID drains with site runoff flows and discharge from proposed storm water detention facilities, a comprehensive IID hydraulic drain system analysis will be required to determine impacts and mitigation if the project discharges into IID's drain system. IID's hydraulic drainage system analysis includes an associated drain impact fee. 4B-5

IMPERIAL IRRIGATION DISTRICT • P.O. BOX 937 • IMPERIAL, CA 92251

Richard Cabanilla
January 19, 2018
Page 2

5. To ensure there are no impacts to IID water facilities, County of Imperial approved grading, drainage and fencing plans should be submitted to the IID Water Engineering Section prior to final project design as well as the projects' Storm Water Pollution Prevention Plan. IID Water Engineering can be contacted at (760) 339-9265 for further information. 4B-6

6. To obtain water for the construction phase of the projects, the applicant should be advised to contact IID South End Division at (760) 482-9800. 4B-7

7. The IID Water Department will require that the applicant secure with the district the necessary Water Supply Agreements for industrial use. 4B-8

8. All new non-agricultural water supply requests are processed in accordance with the IID's Interim Water Supply Policy and Temporary Land Conversion Fallowing Policy. Policy documents are posted at http://www.iid.com/water/municipal-industrial-and-commercial-customers. For additional information regarding these water supply policies, applicant should contact the IID Water Supply Planning section at (760) 339-9755. 4B-9

9. IID's canal or drain banks may not be used to access the project sites. Any abandonment of easements or facilities shall be approved by IID based on systems (Irrigation, Drainage, Power, etc.) needs. 4B-10

10. Any construction or operation on IID property or within its existing and proposed right of way or easements including but not limited to: surface improvements such as proposed new streets, driveways, parking lots, landscape; and all water, sewer, storm water, or any other above ground or underground utilities; requires an encroachment permit, or encroachment agreement (depending on the circumstances). The permit application and its instructions are available at http://www.iid.com/home/showdocument?id=271. Additional information regarding encroachment permits or agreements can be provided by the IID Real Estate Section, which can be contacted at (760) 339-9239. 4B-11

11. In addition to IID's recorded easements, IID claims, at a minimum, a prescriptive right of way to the toe of slope of all existing canals and drains. Where space is limited and depending upon the specifics of adjacent modifications, the IID may claim additional secondary easements/prescriptive rights of ways to ensure operation and maintenance of IID's facilities can be maintained and are not impacted and if impacted mitigated. Thus, IID should be consulted prior to the installation of any facilities adjacent to IID's facilities. Certain conditions may be placed on adjacent facilities to mitigate or avoid impacts to IID's facilities. 4B-12

12. Any new, relocated, modified or reconstructed IID facilities required for and by the project (which can include but is not limited to electrical utility substations, electrical transmission and distribution lines, etc.) need to be included as part of the project's CEQA and/or NEPA documentation, environmental impact analysis and mitigation. Failure to do so will result in postponement of any construction and/or modification of IID facilities until such time as the environmental documentation is amended and environmental impacts are fully 4B-13

Richard Cabanilla
January 19, 2018
Page 3

mitigated. **Any and all mitigation necessary as a result of the construction, relocation and/or upgrade of IID facilities is the responsibility of the project proponent.** 4B-13 Con't

13. Electrical service is a public utility of utmost importance in the implementation and success of a project and not assessing a project's potential impact on this environmental factor could adversely affect the project as well as the capability of the Imperial Irrigation District to provide electrical service in an efficient and timely manner. Hence, the IID suggests that electrical service be included under the Environmental Factor titled "Utilities/Service Systems" of the checklist. It is important to note that per CEQA Statute and Guidelines the Environmental Checklist under Appendix G is a sample form and may be tailored to satisfy individual agencies' needs and project circumstances and substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in the checklist are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance, thus the inclusion of the items we suggest would lead to a more thorough evaluation of a project. 4B-14

Should you have any questions, please do not hesitate to contact me at 760-482-3609 or at dvargas@iid.com. Thank you for the opportunity to comment on this matter. 4B-15

Respectfully,

Donald Vargas
Compliance Administrator II

Kevin Kelley – General Manager
Mike Pacheco – Manager, Water Dept.
Vicken Kasarjian – Manager, Energy Dept.
Charles Allegranza – Manager, Energy Dept., Operations
Jamie Asbury – Deputy Manager, Energy Dept., Operations
Vance Taylor – Asst General Counsel
Robert Laurie – Asst. General Counsel
Carlos Vasquez - Planning and Engineering Manager, Energy Dept.
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Michael P. Kemp – Superintendent, Real Estate & Environmental Compliance
Harold Walk Jr. – Supervisor, Real Estate
Randy Gray – ROW Agent, Real Estate
Jessica Lovecchio – Environmental Project Mgr Sr., Water Dept.

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RESPONSE TO COMMENT LETTER 4

Commenter: Donald Vargas, Compliance Administrator II
Date of Letter: June 27, 2019

Response to Comment 4-1: Introductory comments regarding receipt of Notice of Availability and description of the proposed project. No response required.

Response to Comment 4-2: Commenter notes that the IID has reviewed the project information and references previously letter dated June 18, 2018. Commenter states that if the County requires a Water Supply Assessment or Water Supply Verification, it must be prepared in consultation with IID. If one of these documents is required, it should also provide the environmental assessment necessary to execute the water supply agreement with IID.

A Water Supply Assessment was prepared for the project by Fuscoe Engineering, Inc. (revised August 27, 2018) and was included as Appendix L of the Draft EIR. The Applicant is currently working with the IID for a verification letter that had not been issued at the writing of this Final EIR.

Response to Comment 4-3: Commenter provides closing remarks and contact information. This comment is noted.

RESPONSE TO COMMENT LETTER 4A

Commenter: Donald Vargas, Compliance Administrator II
Date of Letter: June 18, 2018

Note: This letter was an attachment to Letter 4 and was originally written in response to the NOP.

Response to Comment 4A-1: Comment notes that the IID has reviewed the proposed Project pursuant to the Notice of Availability. Comment also notes that the comments provided by IID in the January 19, 2018 letter continue to apply. This comment is noted.

Response to Comment 4A-2: Commenter provides closing remarks and contact information. This comment is noted.

LETTER 4B

Commenter: Donald Vargas, Compliance Administrator II
Date of Letter: January 19, 2018

Note: This letter was an attachment to Letter 4A and was originally written in response to the CUP Applications.

Response to Comment 4B-1: Comment states that the IID received a request from the Imperial County Planning & Development Services Department for comments on the Conditional Use Permit (CUP) Applications 17-0031 through 17-0035. The comment also describes the proposed project. No response is required.

Response to Comment 4B-2: Comment provides details regarding contact information for obtaining temporary construction electrical service and permanent electrical service. This comment is noted.

Response to Comment 4B-3: Comment states that a circuit study may be required for the project. This comment is noted.

Response to Comment 4B-4: Comment states the IID water facilities that may be impacted include the Westside Main Canal, Wormwood Canal, Wormwood Lateral 1, Woodbine Lateral 7, Mt. Signal Drain Mt. Signal Drain No 1A, Mt. Signal Drain No. 1, Carr Drain, and Carpenter Drain. As noted on pages 2.0-25 and 2.0-26 of the Project Description of the Draft EIR, the Project will include electric and vehicular crossings of IID facilities. For the purpose of the environmental analysis, the EIR and underlying documentation assume wherever an IID facility (drain, irrigation canal, electric line, etc.) intersects the Project, an electric or vehicular access crossing will occur. The Project crossings will not interfere with the purpose or continued use of these Agencies' facilities. For instance, where a drain flows, the Project crossing or access point will still allow the drain to flow. As required by IID, the Project may be required to make minor improvements to on-site drains. IID requires solar projects to improve existing drain outflow pipes. This typically involves installation of new drain outflow pipes to reduce erosion within the drains (Dessert pers. comm., 2018). As the exact locations of crossings are determined, the Applicant will coordinate with IID for the necessary encroachment permits.

Response to Comment 4B-5: Comment states that the project will require a comprehensive IID hydraulic drain system analysis to determine impacts and mitigation if the project discharges into IID's drain system. Comment noted. The Applicant will comply with the IID requirement as necessary.

Response to Comment 4B-6: Comment states that County of Imperial approved grading, drainage and fencing plans should be submitted to the IID Water Engineering Section prior to final project design as well as the project's Storm Water Pollution Prevent Plan. Contact information for IID Water Engineering is provided. This comment is noted.

Response to Comment 4B-7: Comment states that the applicant should contact IID South End Division to obtain water for the construction phase. Contact information is provided. This comment is noted.

Response to Comment 4B-8: Comment states that the IID Water Department will require the applicant to secure Water Supply Agreements with the District for industrial use. This comment is noted.

Response to Comment 4B-9: Comment states that all new non-agricultural water supply requests are processed in accordance with the IID's Interim Water Supply Policy and Temporary Land Conversion Fallowing Policy. Details for additional information are provided. This comment is noted.

Response to Comment 4B-10: Comment states that IID's canal or drain banks may not be used to access the project sites. Any abandonment of easements or facilities shall be approved by IID. This comment is noted.

Response to Comment 4B-11: Comment states that any construction or operation on IID property or within its existing and proposed right-of-way or easements requires an encroachment permit or encroachment agreement. Details for additional information regarding a permit application are provided. This comment is noted.

Response to Comment 4B-12: Comment states that IID should be consulted prior to the installation of any facilities adjacent to IID's facilities. Conditions may be placed on adjacent facilities to mitigate or avoid impacts to IID's facilities. This comment is noted.

Response to Comment 4B-13: Comment states that any new, relocated, modified or reconstructed IID facilities need to be included as part of the project's CEQA and/or NEPA documentation, environmental impact analysis and mitigation. Comment also states that mitigation resulting from construction, relocation and/or upgrade of IID facilities is the responsibility of the project proponent. The EIR prepared for the project addresses all infrastructure associated with the proposed Project and identifies mitigation for potentially significant impacts. For example, Mitigation measure MM 4.6.2 requires preparation of a Final Geotechnical and GeoHazards Report prior to construction (Draft EIR page 4.6-21); Mitigation Measures MM 4.7.2a and MM 4.7.2b (Draft EIR page 4.7-32 and 4.7-33) address ground disturbance and address discovery of archaeological resources during construction).

Response to Comment 4B-14: Comment suggest that electrical service be included under the Environmental Factor titled "Utilities/Service Systems" of the checklist. A discussion of Electricity is included on pages 4.13-39 through 4.13-43 of the Draft EIR.

Response to Comment 4B-15: Closing comments with contact information are provided. This comment is noted.

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State of California • Natural Resources Agency
Department of Conservation
Division of Land Resource Protection
801 K Street • MS 14-15
Sacramento, CA 95814
(916) 324-0850 • FAX (916) 327-3430

Edmund G. Brown Jr., *Governor*
Kathryn M. Lyddan, *Division Director*

June 28, 2019

LETTER 5

VIA EMAIL: DIANAROBINSON@CO.IMPERIAL.CA.US
Ms. Diana Robinson
Imperial County
Planning and Development Services Department
801 Main Street,
El Centro CA, 92243

Dear Ms. Robinson:

DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE DREW SOLAR PROJECT, SCH# 2018051036

The Department of Conservation's (Department) Division of Land Resource Protection (Division) has reviewed the Notice of Preparation submitted by Imperial County (County) for the Drew Solar Project. The Division monitors farmland conversion on a statewide basis and administers the California Land Conservation (Williamson) Act and other agricultural land conservation programs. We offer the following comments and recommendations with respect to the proposed project's potential impacts on agricultural land and resources. 5-1

Project Description

The proposed project consists of a photovoltaic solar facility capable of producing approximately 100 megawatts of alternating current energy storage and generation interconnection transmission lines on 762.8 net acres. Generation interconnection transmission lines will extend from the south end of the project site south across Drew Road and State Route 98 into the existing Drew Switchyard. The project site is located on six parcels approximately 6.5 miles southwest of the City of El Centro, California and 7.5 miles directly west of Calexico, California. 5-2

The project site is: zoned agriculture, currently under agricultural production and is designated as Prime Farmland and Farmland of Statewide Importance according to the most recent Important Farmland Map produced by the Department of Conservation's Farmland Mapping and Monitoring Program[1].

Department Comments

The Department is pleased to see the County offers so many choices in terms of agricultural mitigation, and the option to purchase agricultural easements at either a 1:1 or 2:1 ratio of easement to impacted agricultural land. However, the Department is concerned that under option two and/or three, the required 20 or 30 percent fair market value fee may not be enough for the County to mitigate at these same 1:1 or 2:1 levels. 5-3

[1] Department of Conservation, Farmland Mapping and Monitoring Program, California Important Farmland Finder, 2014, https://maps.conservation.ca.gov/DLRP/CIFF/

Ms. Diana Robinson
June 1, 2018
Page 2

The Department advocates the use of permanent agricultural conservation easements on land of at least equal quality and size as mitigation for the loss of agricultural land. Conservation easements will protect remaining land resources and mitigate the project impacts in accordance with CEQA Guideline § 15370. The Department highlights agricultural conservation easements because of their acceptance and use by lead agencies as an appropriate mitigation measure under CEQA. Agricultural conservation easements are an available mitigation tool and should always be considered; however, the use of conservation easements is only one form of mitigation that should be considered. Any other feasible mitigation measures should also be considered. 5-4

Conclusion

Thank you for giving us the opportunity to comment on the Draft Environmental Impact Report for the Drew Solar Project. Please provide this Department with notices of any future hearing dates as well as any staff reports pertaining to this project. If you have any questions regarding our comments, please contact Farl Grundy, Environmental Planner at (916) 324-7347 or via email at Farl.Grundy@conservation.ca.gov. 5-5

Sincerely,

Monique Wilber

Monique Wilber
Conservation Program Support Supervisor

RESPONSE TO COMMENT LETTER 5

Commenter: Monique Wilber, Conservation Program Support Supervisor
Date of Letter: June 28, 2019

Response to Comment 5-1: Introductory comments regarding receipt of Notice of Availability and the Division's role in monitoring farmland conversion on a statewide basis. The Divisions comments and recommendations are included in Comments 5-3 and 5-4. This comment is noted.

Response to Comment 5-2: The comment provides a brief description of the project. The comment notes that the project is currently designated as Prime Farmland and Farmland of Statewide Importance according to the most recent Important Farmland Map produced by the Department of Conservation Farmland Mapping and Monitoring Program. The Draft EIR documents that the proposed Project is comprised of 48.3 acres of Prime Farmland and 714.5 acres of Farmland of Statewide Importance. This comment is noted.

Response to Comment 5-3: The comment expresses concern that the required 20 or 30 percent fair market value fee may be not be enough for the county to mitigate at 1:1 or 2:1 levels for agricultural mitigation option 2 and/or option 3. The ratios and percentage of fair market value referenced in the comment were formulated based on a Staff Memorandum dated September 2, 2011 prepared by Planning and Development Services staff in response to concerns raised at a Planning Commission meeting held on August 7, 2011 related to the temporary loss of agricultural land in association with development of solar facilities. Thereafter, on January 24, 2015, the Board of Supervisors adopted Resolution No. 2015-005. The "Guidelines for the Public Benefit Program for Use with Solar Power Plants in Imperial County" (Guidelines) attached to the Resolution set forth the Agricultural, Community and Sales Tax Benefits which should accrue to the County from the use of farmland for non-agricultural purposes. In addition, Resolution No. 2015-005 established restricted accounts for the payments collected thereunder and set out an advisory committee to determine uses of the benefit payments collected for mitigation of solar plant impacts. The payment of fees at the ratios identified (i.e. 20 or 30 percent of fair market value) have been used extensively on industrial solar projects in the County to address conversion of prime and non-prime farmland.

Response to Comment 5-4: The comments states that the Department of Conservation advocates the use of permanent agricultural conservation easements. As noted on page 4.9-35 of the Draft EIR Mitigation Measure MM 4.9.1a Payment of Agricultural and Other Benefits (shown below), conservation easements are identified as mitigation for both non-prime farmland and prime farmland.

<u>For Non-Prime Farmland</u>:

- **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a 1 to 1 basis on land of equal size, of equal quality of farmland, outside the path of development. The Conservation Easement shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits;

<u>For Prime Farmland</u>:

- **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a "2 to 1" basis on land of equal size, of equal quality farmland, outside of the path of development. The Conservation Easements shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits; or

- **Response to Comment 5-5**: Commenter provides closing remarks and contact information. This comment is noted.

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LETTER 6

Law Offices of John A. Belcher
ATTORNEYS AT LAW
150 EAST COLORADO BOULEVARD, SUITE 215
PASADENA, CALIFORNIA 91105
TELEPHONE (626) 577-5771
FAX (626) 577-7769

July 1, 2019

Via Email

Diana Robinson
Planning and Development Department
Imperial County
801 Main Street
El Centro, CA 92243
(4420 265-1736 ext. 1751
dianarobinson@co.imperial.ca.us

Re: Protest re proposed Drew Solar Project, SCH# 2018051036

Dear Ms. Robinson:

This law firm represents Save Our Mojave, a 501(c)(3) non-profit organization working to raise public awareness about some of the most pressing issues facing California's deserts, including unchecked damage to the environment and wildlife. 6-1

Save Our Mojave has reviewed the Camera Ready Draft Environmental Impact Report ("EIR") for the proposed Drew Solar Project (the "Project"). The Drew Solar Project is a proposed 100 megawatt solar photovoltaic energy-generating facility on six parcels totaling 762.8 net acres. The Project includes a general plan amendment, variance, zone change and six conditional use permits. The Project includes construction of generation interconnection (gen-tie) transmission lines extending south across Drew Road and State Route 98 into the existing Drew Switchyard. The project may be constructed at one time over approximately 18 months, or it may be built out over an approximately 10-year period. 6-2

The EIR describes the proposed Project and assesses the potential adverse impacts on the surrounding physical environment, but concludes that the effects could be mitigated to "less-than-significant" levels. After investigation and after review of publicly available documents, Save Our Mojave believes that the Project does not adequately mitigate the impact of the Project on the environment and local wildlife, and neither does it adequately explore the cumulative impacts of this Project relative to the numerous others in the area. 6-3

Diana Robinson
Planning and Development Department
Imperial County
July 1, 2019
Page 2

"CEQA does not require technical perfection in an EIR, but rather adequacy, completeness, and a good-faith effort at full disclosure." CEQA Guidelines § 15003(I). Absent complete environmental impact analysis of the effect on the local environment and wildlife, the EIR is not a "good faith effort at full disclosure." 6-4

Our primary concern is for the sensitive plant and animal species that occupy, or have high potential to occupy, the proposed Project area. Those species include, but are not limited to:

- Burrowing Owl
- California Black Rail
- Yuma Ridgeway's Rail
- Arrow Weed Thicket
- Cattail Marshes Alliance

6-5

We are deeply concerned about the impact of the Project on the area's burrowing owl population. Long-term studies would need to be conducted on burrowing owls in the area in order to determine both the impact that this Project could have, but also what the impact has already been of the numerous surrounding solar projects. Previous studies on the project site were contained within one year, so are relatively short-term, and preconstruction or construction surveys would not accurately represent any ongoing, continuous effects on the local population. 6-6

Western burrowing owls are at risk of going extinct in some areas of California, and habitat degradation and fragmentation are the most pressing issues facing the species. This project has a potentially significant impact. 6-7

> Primary threats are habitat loss due to anthropogenic activities, reductions in abundances of burrowing mammals, and contaminants... Conservation efforts should focus on protection of suitable habitats in desert, grassland, and shrub-steppe environments.

U.S. Fish and Wildlife Service, *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States* § 24 (2003). 6-8

As burrowing owls are ground nesting, there are almost no possible methods of mitigation, and any amount of disturbance in their direct habitat would eliminate them from that area. Attempts have been made to relocate burrowing owls in other areas of California, but the success rates has been inconsistent. Attempts have also been made to create imitation burrows to attract owls to a new area, but those have also been mostly unsuccessful. San Diego Zoo 6-9

Diana Robinson
Planning and Development Department
Imperial County
July 1, 2019
Page 3

conservationists affirm that current mitigation strategies have no proven record of success and further research is required into the best methods of mitigation for this species. 6-9 Con't

Protection of the burrowing owls themselves is not the only relevant factor, as the owls rely heavily on ground squirrels as a primary source of prey, and on their burrows for nesting and protection. The Project could also potentially impact local ground squirrel populations but this analysis is absent from the EIR. Further surveys need to be done in order to better understand the permanent direct and indirect impacts on the area ground squirrel population as "[t]he conservation of burrowing mammals is essential to improve the status of Burrowing Owls." *Id.* 6-10

Neither does the EIR satisfactorily examine or mitigate the impact on nesting birds such as the California black rail and the Ridgway's rail. As stated in the EIR, the Project area contains two sensitive wetland plant communities which support the California black rail and the Ridgway's rail. The arrow weed thickets alliance and the cattail marshes alliance are both wetland communities and are protected by CEQA and the Clean Water Act. Most of the Southern California populations of the black rail are nonmigratory, so their habitats are used for breeding, foraging and overwintering. The highly threatened Ridgway's rail also relies on these types of wetland ecosystems for breeding and foraging. 6-11

More extensive studies are necessary to determine how often these species use the habitat in and around the Project area, and what impact there has already been from the surrounding operational solar projects. For these nesting birds there have been greatly reduced numbers and range, especially due to habitat encroachment and fragmentation. Even relatively small habitat and range areas can be essential for nesting and foraging. 6-12

Not only would this Project destroy wetland habitat that is potentially viable nesting and foraging territory, but solar arrays have been shown to be incredibly dangerous for birds. The larger the solar field, the more likely for high amounts of avian fatality. Discussion of this aspect of heat and glare is completely absent from the EIR except to say that any effects are unknown. Long-term surveys of these bird species in the area, including all surrounding operational projects, need to be conducted, and the element of heat and glare from the solar panels needs to be incorporated. As the EIR admits: 6-13

> Although avian collisions with towers and structures have been well documented, there are few published papers that study the possibility that large areas of solar PV panels in the desert environment may mimic water bodies and inadvertently attract migrating or dispersing wetland bird species. Polarized reflections from solar PV arrays have been observed to attract insects, which

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> could in turn attract other sensitive wildlife, such as bats, but the magnitude of this effect is unknown, since no comprehensive scientific studies have been conducted for this potential phenomenon.

6-13 Con't

Until comprehensive scientific studies have been conducted regarding this phenomenon, it is irresponsible for large-scale solar expansion to continue, especially in areas where large solar fields already exist. This impact cannot be dismissed when the impact is unknown.

The Project will also result in significantly compromised air quality in the area throughout the construction process, and potentially once the Project is completed. Removal of stabilized soils and biological soil crust creates a destructive cycle of airborne particulates and erosion. As more stabilized soils are removed, blowing particulates from recently eroded areas act as abrasive catalysts that erode the remaining crusts thus resulting in more airborne particulates. The EIR admits:

6-14

> The Project is located in an area defined by the ICAPCD's High Wind Exceptional Fugitive Dust Mitigation Plan 4.4 as a "high wind corridor" that is subject to periodic strong westerly winds that create wind-dust channels. Thus there, there is an increased potential for high winds to entrain fugitive dust during construction and operation of the Project.

The EIR also needs to go farther in addressing the spike in greenhouse gas emissions during the potentially 2-year (or up to 10 year) construction period. 6-15 Due to the use of heavy construction equipment, unsafe levels of air pollutants would have an impact on the surrounding community and wildlife during that time. The presence of toxic air contaminants during construction is discussed in relation the sensitive human receptors, but ignores construction pollutant impact on wildlife and the ecosystem. 6-16

Noise pollution, like air pollution, has significant health implications. Construction and traffic noise are some of the largest producers of noise pollution. Prolonged exposure to noise pollution can lead to hypertension and heart disease, hearing loss and consequential sleep disturbances. Noise pollution does not only adversely effect human lives. Wildlife, especially birds, are heavily impacted by increased noise pollution. Communication, mating behavior, hunting and survival instincts of animals are altered by excessive noise. The EIR does not adequately address potential the potential impacts of heightened noise pollution during the construction period and beyond. 6-17

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The EIR indicates that several mitigation measures have been deemed necessary in order for the Project to avoid making a significant negative impact on the surrounding environment. The language employed in addressing these potential impacts misguides the reader and downplays the significant risks inherent in the implementation of this project. The requirement of so many mitigation measures indicates how damaging the project has the potential to be. 6-18

As written, the EIR glosses over the aggregate environmental impacts of the Project and misleads the reader through words such as "may" and "potentially." 6-19 Additionally, this Project cannot be viewed independently from other existing and developing Projects in the region. The EIR needs to address the cumulative effects of the Project in relation to other nearby projects. 6-20

> The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. 6-21

CEQA Guidelines § 15355(b). Greenhouse gas emissions, noise and air pollution, habitat fragmentation, and other effects on wildlife are aggregate and have cumulative effects. It would be a massive oversight for this Project to be allowed to move forward without fully analyzing its impact in relation to the overall impact of other projects in the region that are operational, currently in development, or in the planning stages. 6-22

Here, the analysis failed to even address the immediately neighboring project. The analysis cannot withstand scrutiny, because here the lead agency and developer made no attempt to accurately describe cumulative conditions despite the existence of relevant data. 6-23 The failure is particularly pronounced because it is not possible to determine the significance of an impact without actual data. The data needs to include the ongoing impact and effects of the surrounding projects as that is the only way to determine the true cumulative impact. 6-24

The case law is in accord. In Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692, 729, 270 Cal.Rptr. 650, the Court of Appeal found the analysis of cumulative project impacts on water resources inadequate where it provided no information regarding the expected groundwater impacts of nearby energy projects except to say they "would impact regional water sources, but these impacts would be lessened by numerous programs and [conservation measures]." 6-25

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The absence of data was fatal. The court held that "[a]bsent some data indicating the volume of ground water used by all such projects, it is impossible to evaluate whether the impacts associated with their use of ground water are significant and whether such impacts will indeed be mitigated by the water conservation efforts upon which the EIR relies." 221 Cal.App.3d at 729-730. 6-25 Con't

Also relevant is Communities for a Better Environment v. California Resources Agency [(2002) 103 Cal.App.4th 98, 126 Cal.Rptr.2d 441. The Court invalidated certain CEQA provisions and clarified Kings County Farm Bureau v. City of Hanford [(1990) 221 Cal.App.3d 692, 270 Cal.Rptr. 650].

In Kings County, the Court rejected the cumulative analysis prepared for a proposed coal-fired cogeneration plant in which the lead agency determined the project's impact on air quality was not cumulatively considerable because it would contribute less than one percent of area emissions for all criteria pollutants. [221 Cal.App.3d at 718-719.] The court criticized the focus on the ratio between the project's impacts and the overall environmental problem, rather than on the combined effect of the project in addition to already adverse conditions. 6-26

Under this (impermissible) approach, which the court dubbed the "ratio theory," "the greater the overall problem, the less significance a project has in a cumulative impact analysis." [221 Cal.App.3d at 721.] Instead of trivializing a project's impacts by comparing them to the impacts of other past, present, and probable future projects, CEQA requires the lead agency to first combine the impacts. When this is done properly, the EIR may find that the scope of the environmental problem is so severe that even a minuscule incremental change would be cumulatively considerable and thus significant.

An adequate discussion of cumulative impacts must use one of the following methods, known respectively as the "list" approach and the "summary of projections" (or "plan") approach: (1) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (2) A summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect . ... [Guidelines § 15130(b)(l).] These represent two distinct ways of identifying the "other projects" that add to the proposed project's incremental impacts. 6-27

The California Supreme Court has explained that the requirement to assess past projects "signifies an obligation to consider the present project in the context of a realistic historical account of relevant prior activities that have had significant environmental impacts." [Environmental Protection Information Center v. California Dept. of Forestry & Fire Protection 6-28

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[(2008) 44 Cal.4th 459,524, 118 Cal.Rptr.3d 352].] To do this effectively, an EIR "must reasonably include information about past projects to the extent such information is relevant to the understanding of the environmental impacts of the present project considered cumulatively with other pending and possible future projects." [44 Cal.4th at 525.] 6-28 Con't

Analysis of any already existing negative environmental impacts from the surrounding solar projects is absent from the EIR, but it is that analysis that is essential to understanding the true cumulative impact of this project. What was the actual impact of adjacent solar projects on the local burrowing owl population? How many avian deaths can be attributed to adjacent solar projects? Have adjacent solar projects negatively impacted the air quality or hydrology? Have they allowed for an influx of invasive species? Etcetera. 6-29

For all of the reasons stated above, we oppose the project as currently proposed. The current EIR misleads the reader as to the impact of the Project, and only a rewritten and recirculated EIR will allow the public to understand the true impact of the Project. 6-30

Sincerely,

John A. Belcher

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RESPONSE TO COMMENT LETTER 6

Commenter: John A. Belcher, Law Offices of Johan A. Belcher
Date of Letter: July 1, 2019

Response to Comment 6-1: Comment provides introductory remarks noting that the law firm represents Save Our Mojave. This comment is noted.

Response to Comment 6-2: Comment states that Save Our Mojave has reviewed the Draft EIR. Comment also provides a brief description of the project. This comment is noted.

Response to Comment 6-3: Comment states that Save Our Mojave believes that the Project does not adequately mitigate impacts on the environment and local wildlife and does not adequately explore the cumulative impacts of the Project relative to other projects in the area. No specific examples are provided to support this assertion. Section 4.12, Biological Resources of the Draft EIR was devoted to disclosing impacts the Project's impacts on the potentially impacted wildlife including burrowing owl, California Black Rail, Yuma Ridgeway's Rail. Impacts to sensitive natural communities including Arrow Weed Thicket and Cattail Marsh Alliance were also discussed. Impacts to these biological resources were discussed on a project-level as well as on a cumulative basis.

Response to Comment 6-4: Comment quotes from CEQA Guidelines Section 15003(I) which requires a "good faith effort at full disclosure." The comment asserts that absent a complete environmental impact analysis of the effect on the local environmental and wildlife, the EIR is not a "good faith effort at full disclosure." No specific example is provided with regard the adequacy of the environmental analysis. The Draft EIR examined potential environmental impacts for 13 resources areas including Biological Resources. Refer also to Response to Comment 6-3 above.

Response to Comment 6-5: Comment states that the primary concern is for sensitive plant and animal species that occupy, or have high potential to occupy, the proposed Project Area. The comment identifies the following species: Burrowing Owl, California Black Rail, Yuma Ridgeway's Rail, Arrow Week Thicket, and Cattail Marshes Alliance. These species are discussed in detail throughout Section 4.12, Biological Resource of the Draft EIR. Page 4.12-27 acknowledges potential impacts to burrowing owl and provides mitigation measures (MM 4.12.1a thru 4.12.1e, pp. 4.12-29 thru 4.12-33) are identified to reduce impacts to burrowing owl and other avian species to less than significant levels. Page 4.12-33 discusses impacts to California Black Rail and Yuma Ridgeway's Rail. Mitigation measures MM 4.12.1a (pp. 4.12-29 and 4.12-30), MM 4.12.1b (p. 4.12-31), and MM 4.12.1d (pp. 4.12.32 and 4.12.33) would reduce impacts to these species to less than significant levels. Lastly, page 4.12-35 examines impacts to Arrow Week Thicket and Cattail Marshes Alliance within the boundaries of CUP #17-0033 and identifies mitigation measure MM 4.12.3 (p. 4.12-36) to reduce permanent direct impacts to these resources to less than significant levels.

Response to Comment 6-6: Comment asserts that long-term studies on burrowing owls in the area would need to be conducted in order to determine the impact of the Project and the impact of numerous surrounding solar projects. Commenter also states that previous studies are short-term and that preconstruction or construction surveys would not accurately represent ongoing, effects on the local burrowing owl population.

The focused burrowing owl surveys conducted between April 12, 2017 and September 28, 2017 were conducted in accordance with the guidelines outlined in Appendix D of the *Staff Report of*

Burrowing Owl Mitigation authored by the California Department of Fish and Game (CDFG 2012) (see Draft EIR, pp. 4.12-23 and 24). The surveys required by California Department of Fish and Wildlife (CDFW) are not conducted with the intent of providing information on the entire burrowing owl species population but to determine presence within the project site and to provide the framework for an impact analysis for those individuals present within the project site.

Per California Fish and Game Code (CFGC) 86, the CDFW definition of “take” includes hunting, pursuit, catch, capture, or kill, or attempt to do these things. The Project proposes to do none of these things and provides for measures to avoid unintended take (i.e., “kill”). CFGC 3503 states: “It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.” The Project provides measures that would ensure it complies fully with CFGC 3503 by protecting nests and eggs. Non-nesting burrows are not covered by this code section, as its intent is to address the protection of breeding biology of covered birds. CFGC 3503.5 states: “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.” Implementation of the Draft EIR Mitigation Measures MM 4.12.1a, MM 4.12.1b, and MM 4.12.1c (see Draft EIR pp 4.12-29 thru 4.12-32) would ensure that take, possession, or the destruction of nests or eggs of this species does not occur. Therefore, cumulative impacts from take of burrowing owls is not anticipated.

Response to Comment 6-7: Comment states that Western burrowing owls are at risk of going extinct in some areas of California with habitat degradation and fragmentation being the most pressing issues facing the species. As stated in the Draft EIR, burrowing owls are a California Species of Special Concern that has experienced declines in California and loss of individuals, destruction of occupied nests, and indirect impacts that result in either of these impacts are prohibited by federal and state law and considered a significant impact. The County concurs that the project has a potentially significant impact to burrowing owls and mitigation to reduce significant impacts to this species has been proposed through Draft EIR mitigation measures MM 4.12.1a (general construction-related avoidance and minimization measures), MM 4.12.1b (WEAP training, biological monitoring, and compliance), and through MM 4.12.1c (burrowing owl pre-construction surveys and avoidance/relocation plan).

Response to Comment 6-8: Comment provides a statement from the U.S. Fish and Wildlife Service *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States* Section 24 (2003) regarding threats to burrowing owls. Threats include habitat loss due to anthropogenic activities, reduction in abundances of burrowing mammals and contaminants. Section 4.12, Biological Resources of the Draft EIR provides an extensive discussion of impacts to burrowing owls resulting from the Project and on a cumulative basis. Mitigation is provided to reduce project-related impacts (see Mitigation Measure MM 4.12.1a, MM 4.12.1b, MM 4.12.1c, MM 4.12.1d and MM 4.12.1e on pages 4.12-19 thru 4.12-33).

Response to Comment 6-9: Comment states there are “almost no possible methods of mitigation” for burrowing owls due to their ground nesting. Commenter cites San Diego Zoo conservationists as affirming that current mitigation strategies have no proven record of success and asserts that further research is required into the best methods of mitigation for this species.

The California Department of Fish and Game *Staff Report of Burrowing Owl Mitigation* (2012) includes best management practices that serve as Mitigation Methods. These including: Avoiding; Take Avoidance (pre-construction) Surveys; Site Surveillance; Minimizing; Buffers; Burrow exclusion and closure; Translocation (Active relocation offsite>100 meters); Mitigating impacts; Artificial burrows; and Mitigation lands management plan. These methods are widely used to reduce impacts to burrowing owls throughout the state. The Draft EIR (pp. 4.12.29 – 4.12-32) includes a number of mitigation measures based on these best management practices that will serve to reduce impacts to burrowing owls associated with implementation of the Project. These include avoidance and minimization (MM 4.12.1a); environmental awareness training, biological monitoring and compliance (MM 4.12.1b); burrowing owls surveys and avoidance/relocation (MM 4.12.2c); pre-construction surveys and avoidance plan (MM 4.12.1d); and transmission line design (MM 4.12.1).

Response to Comment 6-10: Commenter states that burrowing owls rely on ground squirrels as a primary source of prey. Burrowing owls also rely on ground squirrel burrows for nesting and protection. Commenter states that the EIR does not discuss impacts to ground squirrel populations and that further surveys need to be done to better understand impacts to ground squirrel populations.

As stated in Response to Comment 6-6 above, burrowing owls and their breeding nests are protected by CFGC and significant impacts to this species are addressed by the California Environmental Quality Act (CEQA).

The commenter requested analysis of California ground squirrels based on the assertion that ground squirrels are a primary food source for burrowing owl and the main burrow constructor for burrowing owl. California ground squirrels are not a protected or sensitive species. Therefore, impacts to California ground squirrels are not required to be analyzed under CEQA specifically. California ground squirrels are not a primary prey item of burrowing owls. Numerous studies have shown that invertebrates make up the majority of prey items, followed by reptiles, small mammals (mouse-sized), and occasionally small birds (Bates 2006, Johnsgard 1988, John and Romanow 1993). It is true that ground squirrels and other fossorial mammals create burrows that burrowing owls modify and expand. However, California ground squirrels were not observed on site during field surveys and this may be due to the site's active farming production, which can negatively influence California ground squirrel populations through ground squirrel control policies. Therefore, indirect impacts to burrowing owls from impacts to California ground squirrels is not anticipated.

Response to Comment 6-11: The comment states that the EIR does not satisfactorily examine or mitigate the impact to nesting birds such as the California black rail and Yuma Ridgeway's tail. Direct impacts to these species would be mitigated through implementation of the following mitigation measures: MM 4.12.1a, which would limit vehicles and construction equipment to identified non-impact areas and would limit ingress and egress to established roads; MM 4.12.1b, would further ensure avoidance of impacts to California black rails and Yuma Ridgeway's rails; and MM 4.12.1d, which would result in identification of any California black rails and Yuma Ridgeway's rails within areas potentially impacted by construction of the Project, establishment of appropriate buffers, and avoidance of impacts to these species (see Draft EIR pp. 4.12-29 thru 41.12-33).

The comment states that there are two wetland communities (arrow weed thickets and cattail marshes alliance) within the Project Area; however, these communities were not observed to be supporting California black rail and/or Yuma Ridgeway's rail, as stated in the comment. As stated in the Draft EIR p. 4.12-18, California black rail and Yuma Ridgeway's rail have only a moderate potential to occur within the Project Area. Suitable habitat for these species is present within the on-site canals. However, the canals are narrow, routinely cleared by IID, and as a result are currently poorly vegetated and therefore do not provide high-quality habitat as compared to larger canals in the area. No California black rail or Yuma Ridgeway's rail were detected during surveys and there are no California Natural Diversity Database (CNDDB) or United States Fish and Wildlife Service (USFWS) occurrences found within the Project Area. The closest CNDDB occurrence record for the California black rail is approximately 8.5 miles north of the Project Area near the New River from 2001. The closest CNDDB occurrence records for Yuma Ridgeway's rail are from 2007 and 2014 and located in a marsh approximately 5 miles north of the Project Area.

All impacts to jurisdictional wetlands or riparian habitat would be mitigated through implementation of mitigation measure MM 4.12.3 (Draft EIR p. 4.12-36) and direct impacts to these species would be prevented through implementing nesting bird pre-construction surveys and avoidance plan as specified by mitigation measure MM 4.12.1d (Draft EIR p. 4.12-32 and 4.12-33) which would be conducted in these areas prior to the commencement of work.

Response to Comment 6-12: The Commenter states that more extensive studies are necessary to determine how often these species (i.e. California black rails and Yuma Ridgeway's rails) use the habitat in and around the Project Area and also determine the impact that has already occurred from surrounding operational solar projects.

The investigation of biological resources impacts conducted for the Project complies with CDFW protocols and accepted standards in the field. The County has determined that the effort is adequate for meeting its obligations under CEQA, and that further studies would not yield additional information relevant to the project's impacts on biological resources. As stated in sub-section 4.12.4 on pages 4.12-38 thru 4.12-41 of the Draft EIR, cumulative impacts to nesting birds would result in less than cumulatively considerable impacts with the mitigation measures proposed. Direct impacts to nesting birds would be avoided through implementation of mitigation measure MM 4.12.1d which would result in identification of any California black rails and Yuma Ridgeway's rails within areas potentially impacted by construction of the project, establishment of appropriate buffers, and avoidance of impacts to these species. Direct impacts to jurisdictional wetlands and riparian habitat (i.e. suitable habitat for California black rail and Yuma Ridgeway's rail) will be mitigated with implementation of mitigation measure MM 4.12.3, which requires compliance with federal and state agency permits that may include compensatory mitigation or habitat restoration.

Response to Comment 6-13: As stated above in Response to Comment 6-12, all impacts to jurisdictional wetlands and riparian habitat will be mitigated through implementation of mitigation measure MM 4.12.3, which requires obtaining and compliance with federal and state agency permits.

With regard to the analysis of avian fatality from solar arrays, as stated in Section 4.12, Biological Resources of the Draft EIR, the solar PV modules would be coated to be non-reflective and are designed to be highly absorptive of all light that strikes their glass surfaces. Although there is potential for some mortality, there is sufficient evidence — i.e., non-reflective design of the solar panels, the project's distance from large water bodies, the project's proximity to disturbed agricultural areas, and comparatively few documented avian deaths—that glare and pseudo-lake effect are not expected to result in significant impacts to migrating or local avian species.

Response to Comment 6-14: The comment asserts that the Project will result in significantly compromised air quality through the construction process and potentially once the Project is completed. The comment quotes from the Draft EIR regarding the Project's location in a "high wind corridor" subject to periodic strong westerly winds that create dust channels.

As shown in Table 4.4-7, Maximum Daily Construction Air Pollutant Emissions (page 4.4-17 of the DEIR) and Table 4.4-8, Maximum Daily Operational Air Pollutant Emissions (page 4.4-18 of the DEIR), no ICAPCD thresholds for criteria pollutants (including PM_{10} and $PM_{2.5}$) would be exceeded. If dust is generated, all feasible standard measures specified by the ICAPCD for construction equipment and fugitive PM_{10} control for construction activities should be implemented.

With regard to the text refenced in the comment, the following revision has been made for clarification under Impact 4.4.2 on pages 4.4-18 and 4.4-19 of the Draft EIR.

"All Project Components

As discussed under the Regulatory Framework, (National Ambient Air Quality Standards [NAAQS] and the California Ambient Air Quality Standards [CAAQS]) the Project Site is in non-attainment areas for NAAQS and CAAQS for ozone and particulate matter. The majority of regional PM_{10} and $PM_{2.5}$ emissions originate from dust stirred up by wind or by vehicle traffic on unpaved roads (ICAPCD 2009). The Project is located in an area defined by the ICAPCD's *High Wind Exceptional Fugitive Dust Mitigation Plan* as a "high wind corridor" that is subject to periodic strong westerly winds that create wind-dust channels. Thus ~~there~~, there is an increased potential for high winds to entrain fugitive dust during construction and operation of the Project (Blondell 2019). Other PM_{10} and $PM_{2.5}$ emissions originate from grinding operations, combustion sources such as motor vehicles, power plants, wood burning, forest fires, agricultural burning, and industrial processes. Ozone is not emitted directly but is a result of atmospheric activity on precursors. NO_X and ROG are known as the chief "precursors" of ozone. These compounds react in the presence of sunlight to produce ozone. Approximately 88 percent of NO_X and 40 percent of ROG regional emissions originate from on- and off-road vehicles (ICAPCD 2010). Other major sources include solvent evaporation and miscellaneous processes such as pesticide application. While the proposed Project would not exceed and ICAPCD threshold for criteria pollutants during either construction (see Table 4.4-7) or operations (see Table 4.4-8), ICAPCD Regulation VIII would be enforced in keeping with the mandatory construction dust control plan and operational dust control plan."

Response to Comment 6-15: The comment states that the EIR needs to expand on addressing the spike in greenhouse gas emissions (GHG) during the construction period. Annual GHG Emissions for the project in Year 2020 and 2030 are provided in Table 4.5-4 on page 4.5-12 of the Draft EIR. Total construction GHG emissions are 3,281 MT CO2E. However, amortized construction emissions are 109 MT CO2E. As noted in the analysis, the Project would result in a reduction of GHG emissions over time as renewable energy production is increased and fossil fuel electricity is reduced. The comment does not provide specifics details on regarding any perceived inadequacies in the analysis. However, this comment is noted for the decision-makers' consideration.

Response to Comment 6-16: The comment states that heavy equipment will produce unsafe levels of air pollutants that will have an impact on the surrounding community and wildlife during construction. The comment states that the impact of toxic air contaminants on wildlife and the ecosystem is ignored.

As discussed in Draft EIR Section 4.4, Air Quality, construction and reclamation of the Project would result in short-term diesel exhaust emissions from onsite heavy-duty equipment. Toxicity and cancer risk associated with exposure to diesel exhaust is a function of dosage and length of exposure (https://www.cancer.org/cancer/cancer-causes/diesel-exhaust-and-cancer.html) and studies on animal species have been confined to lab animals exposed to very high doses. Wildlife exposure to diesel particulates is not anticipated to increase substantially relative to exposure associated with existing agricultural uses on site because agricultural uses involve diesel-powered equipment and, further, because wildlife species disperse away from human activity. Additionally, because the Project will require a Stormwater Pollution Prevention Plan (SWPPP) to meet National Pollutant Discharge Elimination System (NPDES) regulations, the SWPPP must list Best Management Practices (BMPs) as stated in Section 4.11, Hydrology and Water Quality, of the Draft EIR. Dust control watering during construction of both the Full Build-out Scenario and the Phased CUP Scenario would be classified as having potential for discharge of non-storm water pollutants. Adequate BMPs and protections would be in place at all times which would reduce dust impacts. The BMPs implemented pursuant to the SWPPP are intended to protect biological resources, as well as sensitive receptors.

Response to Comment 6-17: Commenter states that wildlife, especially birds, are heavily impacted by increased noise pollution. Commenter asserts that the EIR does not adequately address the potential impacts of heightened noise pollution during the construction period and beyond.

Both construction and operational noise were addressed in the Draft EIR. Impact 4.8.1 on page 4.8-23 of the Draft EIR addresses Substantial Temporary or Permanent Noise Increase in Excess of Standards. The analysis on page 4.8-24 of the Draft EIR states that "…construction noise levels would attenuate to 58 dB(A) $L_{eq(8h)}$ at the nearest sensitive receptor." The analysis goes on to conclude that "construction noise levels would comply with 75 dB(A) $L_{eq(8h)}$ noise level limit established by County Noise Element." With regard to operational noise, page 4.8-26 of the Draft EIR states that "Noise levels would not exceed applicable daytime or nighttime property line noise level limits from the County General Plan Noise Element." Lastly, decommissioning/reclamation noise levels would be similar to construction noise levels which are less than significant.

Response to Comment 6-18: Comment states that the EIR indicates that several mitigation measures have been deemed necessary for the Project to avoid making a significant negative impact on the environment. Comment asserts that the language misguides the reader and downplays the significant risks inherent to the Project. No specific mitigation measures are identified. A summary of impacts and mitigation measures is provided in Table ES-1 of the Executive Summary of the Draft EIR. As the statement is generalized, it is not possible to respond specifically.

Response to Comment 6-19: Comment states that the EIR glosses over aggregate environmental impacts of the Project and misleads the reader through words such as "may" and "potentially." No specific examples are provided so it is not possible to respond to the comment.

Response to Comment 6-20: Comment states that the Project cannot be viewed independently from other existing and developing projects in the region and that the EIR needs to address the cumulative effects of the Project.

The Approach to the Cumulative Impact Analysis is established on page 3.0-2 of Chapter 3.0 of the Draft EIR. The EIR used a list approach for analyzing cumulative impacts per CEQA Guidelines Section 15130(b)(1). The cumulative list was compiled in consultation with the County of Imperial and is provided in Table 3.0-1 on pages 3.0-3 and 3.0-4 of the DEIR. A map of the cumulative projects is provided on page 3.0-6 of the Draft EIR.

Using the list, the Draft EIR includes an analysis of cumulative impacts where appropriate in each resource area of the document. The only exceptions are Section 4.5 Greenhouse Gases (which is cumulative by nature) and Section 4.14, Energy (which considers statewide energy use as well as project energy use and conservation). All other Sections (4.1 thru 4.4, 4.6 thru 4.13) in Chapter

4.0 include a discussion of cumulative impacts starting with a description of the cumulative setting.

Response to Comment 6-21: The comment quotes CEQA Guidelines Section 15355(b) which defines a cumulative impact. This comment is noted.

Response to Comment 6-22: the comment states that it would be a massive oversight for this Project to be allowed to move forward without fully analyzing its impact in relation to the overall impact of other projects in the region that are operational, currently in development, or in the planning stages.

As noted in Response to Comment 6-20, above, the Draft EIR does include a discussion of cumulative impacts for each resource area where appropriate. This comment is noted.

Response to Comment 6-23: Comment states that the analysis failed to address the neighboring project. Comment also states that the lead agency made no attempt to accurately describe cumulative conditions despite relevant data. This assertion is made without supporting evidence or identifying the referenced "relevant data.' To the contrary, the cumulative analysis captured surrounding cumulative projects effects (e.g. traffic) in the analysis for each resource area as appropriate. Refer also to Response to Comment 6-20, above.

Response to Comment 6-24: Comment states that it is not possible to determine the significance of an impact without actual data. Comment also states that data needs to include the on-going impact and effects of the surrounding projects as the only way to determine the true cumulative impact.

Again, an example of the "actual data" referenced is not provided by the Commenter. Without an example it is too speculative to assume what the commenter is referring to in this instance. With regard to "including the on-going impact", CEQA Guidelines Section 15130, Discussion of Cumulative Impacts, makes no reference to such impacts. Instead it focuses on the "projects incremental effect" and the "project's contribution to a significant cumulative impact." The analysis in the Draft EIR adhered to the approach identified in the Guidelines.

Response to Comment 6-25: Commenter cites case law (*Kings County Farm Bureau v. City of Hanford (1990)* regarding the analysis of cumulative impacts. The case dealt with groundwater and the absence of data. No substantive remarks regarding the adequacy of the environmental analysis are provided. This comment is noted.

Response to Comment 6-26: Commenter cites the case of communities for a *Better Environment v. California Resources Agency (2002)* as it applied to *Kings County Farm Bureau v. City of Hanford (1990).* The comment goes on to assert that the impacts of past, present and probable future projects must be combined rather than focusing on the ratio between the Project's impacts and the combined impacts of past, present and probable future projects. The analysis of cumulative impacts in the Draft EIR examined the incremental contribution to proposed, approved and reasonably foreseeable projects in the region. The cumulative analysis for each resource area (4.1 thru 4.4, 4.6 thru 4.13) in Chapter 4.0 also analyzed the project's contribution to cumulative impacts.

Response to Comment 6-27: The comment states that the discussion of cumulative impacts must use either the list approach or the summary approach when identifying "other projects" that add to the proposed project's incremental impacts. As noted, previously, the Draft EIR uses the list approach in the cumulative impact analysis. Refer to Response to Comment 6-20, above.

Response to Comment 6-28: The comment cites *Environmental Protection Information Center v. California Dept. of Forestry & Fire Protection (2008)* with regard to assessing past projects. Chapter 3.0, Introduction to the Environmental Analysis and Assumptions Used, of the Draft EIR included a cumulative list that identified proposed, approved and reasonably foreseeable projects. Several projects had been approved, constructed and operational (i.e. past). Cumulative impacts of the Project in combination with cumulative projects were considered in the Cumulative Impacts Discussion of each section of the Draft EIR.

Response to Comment 6-29: Commenter states that an analysis of the environmental impacts of existing solar projects was not included in the Draft EIR. The comment states that an analysis of existing negative environmental impacts from surrounding solar projects is absent from the EIR and asserts that this is essential to understanding the cumulative impact of this project.

The Draft EIR included a discussion of cumulative impacts for each resource are discussed in each section of the EIR. The cumulative list of projects was identified in Table 3.0-1 of Chapter 3.0 of the Draft EIR on pages 3.0-3 thru 3.0-4. As many impacts are mitigated on a project-by-project basis, cumulative impacts are often less than cumulatively considerable. Refer to the cumulative impacts discussion in each section of the Draft EIR.

Commenter asks the impact of adjacent solar projects on the local burrowing owl population. This would have been addressed as part of the environmental review process of each project (i.e. through mitigation measures and monitoring efforts).

Commenter also asks how many avian deaths can be attributed to adjacent solar projects. While operational monitoring and recording of avian deaths is frequently required as part of CUP conditions, the County is not consistently tracking avian deaths. The biological monitors during construction will be responsible for monitoring all biological activity including avian activity on site in conformance with state and federal law.

The Comment asks if adjacent solar projects have negatively impacted the air quality or hydrology. Again, the environmental review conducted for each project would have documented air quality and hydrology impacts. Air quality impacts of solar projects are largely limited to construction; once operational, they have an overall beneficial impact on air quality with proper pallatives/dust control in place. Likewise, each solar project must provide on-site retention to address hydrology changes. Invasive species must be addressed through a Pest Management Plan which is required of all solar projects in Imperial County.

Response to Comment 6-30: Commenter reiterates opposition to the project as proposed and asserts that a recirculated EIR is necessary based on comments provided. Refer to Response to Comments 6-2 thru 6-29.

LETTER 7

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY Gavin Newsom, Governor

DEPARTMENT OF TRANSPORTATION
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Making Conservation a California Way of Life.

July 1, 2019

11- IMP-98
PM 22.193
Drew Solar Plant
DEIR/SCH#201805103

Ms. Patricia Valenzuela
Planner IV
County of Imperial Planning and Development Services
801 Main Street
El Centro, CA 92243

Dear Ms. Valenzuela:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the Draft Environmental Impact Report (DEIR)(SCH# 201805103) for the Drew Solar Project located on State Route 98 (SR-98). The mission of Caltrans is to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability. The Local Development-Intergovernmental Review (LD-IGR) Program reviews land use projects and plans to ensure consistency with our mission and state planning priorities.

Caltrans has the following comments: 7-1

Traffic

1. New proposed driveway access on SR-98 will not be allowed since there are other reasonable alternatives access through Drew Road, Kubler Road, and Pulliam Road. If there is a need for another driveway access we recommend placing the driveway access on Pulliam Road, north of SR-98. 7-2
    a. Creating a new driveway access creates additional conflict points for motorists on our state highway that do not currently exist.
    b. Remove SR-98 access driveway from document and exhibits.

2. No open trenching will be allowed within highway right of way, per Encroachment Permit Manual Section 603.6. "Underground installations within highway right-of-way must be performed using a trenchless technology 7-3

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method (Bore & Jack, Horizontal Directional Drilling, Microtunneling, Pipe Bursting or Pipe Ramming)". 7-3 Con't

Right-of-Way

An encroachment permit will be required for any work within the Caltrans' Right-of-Way (R/W) prior to construction. As part of the encroachment permit process, the applicant must provide approved final environmental documents for this project, corresponding technical studies, and necessary regulatory and resource agency permits. Specifically, California Environmental Quality Act (CEQA) determination or exemption. The supporting documents must address all environmental impacts within the Caltrans' R/W and address any impacts from avoidance and/or mitigation measures. 7-4

We recommend that this project specifically identifies and assesses potential impacts caused by the project or impacts from mitigation efforts that occur within Caltrans R/W that includes impacts to the natural environment, infrastructure (highways/roadways/on- and off-ramps) and appurtenant features as lighting, signs and guardrails. 7-5

Right-of-Way Utilities

Drew Solar, LLC shall prepare and submit to Caltrans closure plans as part of the encroachment permit application. The plans shall require that closure or partial closure of SR-98 be limited to times as to create the least possible inconvenience to the traveling public and that signage be posted prior to the closure to alert drivers of the closure in accordance with Caltrans requirements. Traffic shall not be unreasonably delayed. The plan shall also outline suggested detours to use during the closures, traffic, including routes and signage. 7-6

The Highway Closure Plan, as part of the encroachment permit, should be submitted to Caltrans at least 30 days prior to initiating installation of the crossings. No work shall begin in Caltrans' Right of Way (R/W) until an encroachment permit is approved. 7-7

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Please see Chapter 600 of the Encroachment Permits Manual for requirements regarding utilities and state R/W:
http://www.dot.ca.gov/trafficops/ep/manual.html

Please see Chapter 17 of the Project Development Preparation Manual (PDPM) for requirements regarding utilities and state R/W:
https://dot.ca.gov/hq/oppd/pdpm/pdpmn.htm 7-8

If you have any questions, please contact Mark McCumsey, of the Caltrans Development Review Branch, at (619) 688-6802 or by e-mail sent to Mark.McCumsey@dot.ca.gov. 7-9

Sincerely,

MAURICE EATON, Branch Chief
Local Development and Intergovernmental Review Branch

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

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RESPONSE TO COMMENT LETTER 7

Commenter: **Maurice Eaton, Branch Chief, Local Development and Intergovernmental Review Branch, California Department of Transportation**

Date of Letter: **July 1, 2019**

Response to Comment 7-1: Comment provides introductory remarks explaining Caltrans' role in reviewing the Draft EIR. Specifically, the Local Development-Intergovernmental Review (LD-IGR) Program review land use projects and plans to ensure consistency with its mission and state planning priorities. The comment does not contain substantive remarks about the adequacy of the environmental analysis. No response is required. Caltrans comments are enumerated in comment 7-2 thru 7-9.

Response to Comment 7-2: The comment states that the proposed driveway access on State Route 98 will not be allowed citing creation of conflicts for motorists as well as the presence of alternative access to the site from Drew Road, Kubler Road and Pulliam Road. The Commenter recommends that the driveway access be placed on Pulliam Road north of SR 98 and requests that the driveway be removed from the EIR document and exhibits.

LOS Engineering revised the traffic patterns in response to this comment by analyzing a reconfigured access to the Project Site. Revisions to Section 4.3, Transportation are reflected in the Errata (Section 4.0) of this Final EIR.

Access Configuration #1 (Figure 4.3-11a of the Errata) responds to this comment by eliminating access along SR 98 for the SE ¼ Section of Drew Solar on the south as well as two access points along Kubler Road on the north of the Project site. Access Configuration #1 would place two access points along Pulliam Road on the east side of the Project site and two access points along Drew Road on the west side of the Project site. Two of driveways proposed along Drew Road are near SR 98 and one driveway is just north of Mt. Signal Drain No. 1. The northern-most driveway on Drew Road is for emergency access only. Access Configuration #1 creates two additional access points along Pulliam Road instead of one access point on SR 98 for the SE ¼ Section of Drew Solar, and adds two additional access points along Drew Road in lieu of two access points along Kubler Road for the NW ¼ Section and the west half of the NE ¼ Section of the Project. The restriction of travel on Kubler Road between Drew Road and Pulliam Road does not result in a significant amount of travel distance to access the Project.

The traffic distribution for Access Configuration #1 around the Project site was analyzed due to re-located driveways and the Applicant's proposed restriction of employees and deliveries from using Kubler Road between Pulliam Road and Drew Road. Access Configuration #1 traffic distribution is shown in Figure 4.3-4a of the Errata and the project trip assignment for Access Configuration #1 shown in Figure 4.3-5a of the Errata.

The Access Configuration #1 analysis includes the intersections and segments that have the revised distribution eliminating access along SR 98 as well as driveways along Kubler Road. The intersections and segments with revised volumes and LOS include:

1) Intersection of Kubler Road/Pulliam Road (intersection #4)
2) Intersection of SR 98/Drew Road (intersection #6)
3) Intersection of SR98/Pulliam Road (intersection #7)
4) Segment of Pulliam Road from Kubler Road to SR 98
5) Segment of SR 98 from Drew Road to Pulliam Road

The remaining study intersections and segments were not changed from the traffic analysis included in Section 4.3 Transportation of the Draft EIR. The study scenarios examined as part of the Access Configuration #1 analysis include:

1) Year 2017 Plus Project
2) Year 2017 Plus Project Plus Cumulative
3) Year 2019 Plus Project
4) Year 2019 Plus Project Plus Cumulative
5) Year 2027 Plus Project
6) Year 2027 Plus Project Plus Cumulative

<u>Year 2017 Scenario</u>

The Year 2017 Plus Project are shown in Figure 4.3-6a of the Errata and Year 2017 Plus Project Plus Cumulative volumes are shown in Figure 4.13-13A. The intersection LOS for Year 2017 Plus Project conditions are shown in Table 4.3-11a and Table 4.3-12a for segment operations (Errata). The intersection LOS for Year 2017 Plus Project Plus Cumulative conditions are shown in Table 4.3-28a and Table 4.3-29a for segment operations. LOS calculations are included in Attachment A of Attachment 1 of this Final EIR.

Under existing Year 2017 Plus Project and Year 2017 Plus Project Plus Cumulative, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

<u>Year 2019 Scenario</u>

The 2019 Plus Project volumes are shown in Figure 4.3-8a and Year 2019 Plus Project Plus Cumulative volumes are shown in Figure 4.3-14a. The intersection LOS for 2019 Plus Project conditions are shown in Table 4.3-17a and Table 4.3-18a for segment operations (Errata). The intersection LOS for year 2019 Plus Project Plus Cumulative conditions are shown in Table 4.3-31a and Table 4.3-32a for segment operations. LOS calculations are included in Attachment B of Attachment 1 of this Final EIR.

Under existing Year 2019 Plus Project and Year 2019 Plus Project Plus Cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

<u>Year 2027 Scenario</u>

The Year 2027 Plus Project volumes are shown in Figure 4.3-10a and Year 2027 Plus Project Plus Cumulative volumes are shown in Figure 4.3-15a. The intersection LOS for Year 2027 Plus Project conditions are shown in Table4.3-23a and Table 4.3-24a for segment operations. The intersection LOS for Year 2027 Plus Project Plus Cumulative conditions are shown in Table 4.3-34a and Table 4.3-35a for segment operations. LOS calculations are included in Attachment C of Attachment 1 of this Final EIR.

Under existing Year 2027 Plus Project and Year 2027 Plus Project Cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

In conclusion, the redistribution of traffic around the Project site due to the elimination of a driveway on SR 98 and shifting of the two project driveways on Kubler Road to Drew Road did not change the conclusions of the analysis in Section 4.3, Transportation of the Draft EIR. The Access Configuration #1 documented LOS B or better conditions with no significant project impacts as shown in the Errata of this Final EIR.

Response to Comment 7-3: The comment states that no open trenching will be allowed within highway right-of-way citing Encroachment Permit Manual Section 603.6. This comment does not address the adequacy of the environmental analysis in the EIR but is noted for the decision-makers' consideration.

Response to Comment 7-4: The comment states that an encroachment permit will be required for any work within Caltrans right-of-way prior to construction. A CEQA determination or exemption is required. The area of encroachment into Caltrans' right-of-way is analyzed as part of the proposed Project. The Project was determined to have potentially significant impacts which required preparation of an Environmental Impact Report. No impacts were identified specifically with regard to Caltrans right-of-way. The Drew Solar Project EIR shall be submitted to Caltrans to fulfill the requirements of the encroachment permit process.

Response to Comment 7-5: The comment recommends that the project identify and assess potential impacts caused by the project or impacts from mitigation efforts that occur within Caltrans' right-of-way. This comment does not address the adequacy of the environmental analysis in the EIR but is noted for the decision-makers' consideration.

Response to Comment 7-6: The comment states that Drew Solar, LLC shall prepare and submit to Caltrans closure plans as part of the encroachment permit application. The plan shall outline detours to use during road closures associated with project. This comment does not address the adequacy of the environmental analysis in the EIR but is noted for the decision-makers' consideration. The Applicant will be required to prepare a Highway Closure Plan prior to commencing construction.

Response to Comment 7-7: The comment states that the Highway Closure Plan should be submitted to Caltrans at least 30 days prior to initiation installation of the crossings. No work will be allowed to begin until an encroachment permit is approved. This comment does not address the adequacy of the environmental analysis in the EIR but is noted for the decision-makers' consideration.

Response to Comment 7-8: The comment provides website links for resource materials on Encroachment Permits Manual and the Project Development Preparation Manual. This comment is noted.

Response to Comment 7-9: The comment provides closing remarks and contact information. This comment is noted.

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LETTER 8

Stephan C. Volker
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10.631.01

July 1, 2019

VIA EMAIL
JimMinnick@co.imperial.ca.us

Jim Minnick, Director
Imperial County Planning and Development Services
801 Main Street
El Centro, CA 92243

Re: Comments of Farms for Farming, Danny Robinson, Robco Farms, Inc., Joe Tagg and West-Gro Farms, Inc. on the Draft Environmental Impact Report for the Drew Solar Project (SCH# 2018051036)

Dear Mr. Minnick:

On behalf of Farms for Farming, Danny Robinson, Robco Farms, Inc., Joe Tagg and West-Gro Farms, Inc. (collectively, "Farms for Farming"), and pursuant to the California Environmental Quality Act ("CEQA"), Public Resources Code ("PRC") section 21000 *et seq.*, we respectfully submit the following comments on the Drew Solar Project (the "Project"), and the draft environmental impact report ("DEIR") prepared thereon. Please include these comments in the public record for Imperial County's (the "County's") consideration and decision on Drew Solar, LLC's permitting applications for the Project. 8-1

The Project would industrialize approximately 763 acres of farmland – *all* of which is either prime farmland or farmland of statewide importance – with a 100-megwatt ("MW") solar photovoltaic ("PV") electrical generation facility, an (undefined) energy storage system, an on-site substation(s), and on-site switchyard(s), electrical gen-tie lines, inverters, pad-mounted transformers, new roads, fencing, retention basins, evaporation ponds, operations and maintenance buildings, and other infrastructure. Those industrial facilities would remain, and preclude agricultural use of the Project parcels, for at least 30 to 40 years. DEIR at 2.0-3. 8-2

Farms for Farming opposes this Project as an unnecessary industrialization of the County's irreplaceable farmland. The County has already allowed over *22,000 acres* of farmland to be converted to electrical generation and transmission uses, excluding the Drew Solar Project, the recently approved Laurel Cluster Solar Project, and other recent proposals. DEIR at 4.9-38. By continuing this industrial onslaught on Imperial County farmland, the County is threatening 8-3

Jim Minnick, Director
Imperial County Planning and Development Services
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the future viability of "the major economic industry in Imperial County since the 1900s" – agriculture. DEIR at 4.9-15. 8-3 Con

Farms for Farming urges the County to maintain the renewable energy overlay boundaries it set in October 2015, boundaries that *exclude* the proposed Project site. Farms for Farming encourages the County to analyze and adopt an alternative to the proposed Project that is located *within* the renewable energy overlay zone. The County should abide by its own policy prescriptions and not approve any further renewable energy developments outside the overlay zone, especially not projects, like the Project here, that (1) would destroy precious and productive farmland or "result in any [other] significant environmental impacts," and (2) would create an entirely new "renewable energy operation" rather than "expan[d] . . . and existing one." Imperial County General Plan, Renewable Energy and Transmission Element, Section IV(D), p. 35. The Project sites were omitted from the overlay zone for a reason - they are not the most suitable areas for renewable energy development. The County should not now modify the zone boundaries *ad hoc* to accommodate private development interests. 8-4

In further expression of these major concerns and others, Farms for Farming submit the following comments on the proposed Project and the DEIR prepared for it. 8-5

I. THE COUNTY MAY NOT APPROVE A CONDITIONAL USE THAT IS FORBIDDEN BY THE COUNTY GENERAL PLAN.

As demonstrated in Farms for Farming's June 18, 2018 scoping comments ("Scoping Comments"), the Project is inconsistent with the County General Plan, and thus its approval would violate the Planning and Zoning Law. "A permit action taken without compliance with the hierarchy of land use laws is *ultra vires* as to any defect implicated by the uses sought by the permit." *Neighborhood Action Group v. County of Calaveras* ("*Neighborhood*") (1984) 156 Cal.App.3d 1176, 1184. Land use permits are invalid where the approved project "conflicts with a [valid] general plan policy that is fundamental, mandatory, and clear." *Endangered Habitats League, Inc. v. County of Orange* ("*Endangered Habitats League*") (2005) 131 Cal.App.4th 777, 782; *FUTURE v. Board of Supervisors* ("*FUTURE*") (1998) 62 Cal.App.4th 1332, 1342 (invalidating county's project approvals because the project was "inconsisten[t] with [a] fundamental, mandatory and specific land use policy"). Because the proposed solar energy generation and transmission uses are specifically forbidden under the Imperial County General Plan, the County lacks authority to approve those uses in contravention of the General Plan. *Id.* 8-6

A. The Imperial County General Plan Forbids the Proposed Solar Energy Generation and Transmission Uses on Designated Agricultural Land.

The Imperial County General Plan's Land Use Element specifically *forbids* the proposed solar uses within the "Agriculture" plan designation that applies to the entire Project site. DEIR at 2.0-4 ("The Imperial County General Plan Land Use Element designates the Project site as 8-7

Jim Minnick, Director
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'Agriculture'"). The Land Use Element directs that lands designated as "Agriculture" may not be developed with uses that do not preserve and protect agricultural production and related activities.

The Land Use Element mandates that

> *[w]here [the Agriculture] designation is applied, agriculture shall be promoted as the principal and dominant use to which all other uses shall be subordinate. Where questions of land use compatibility arise, the burden of proof shall be on the non-agricultural use to clearly demonstrate that an existing or proposed use does not conflict with agricultural operations and will not result in the premature elimination of such agricultural operations.* No use should be permitted that would have a significant adverse effect on agricultural production, including food and fiber production, horticulture, floraculture, or animal husbandry. . . .

Imperial County General Plan, Land Use Element (Revised 2015), page 48 (emphasis added).

Here, the non-agricultural use has *not* met its "burden" to "clearly demonstrate" that it would "not conflict with agricultural operations and will not result in the premature elimination of such agricultural operations." *Id.* It is undisputed that the proposed industrial-scale solar facility uses would eliminate and prevent (for at least 30 or 40 years) all agricultural use on approximately 763 acres of prime farmland and farmland of statewide importance. DEIR at 4.9-32 ("direct conversion of approximately 762.8 acres"). As the California Department of Conservation has repeatedly determined, including in its June 1, 2018 comments on this Project, the "conversion of agricultural land represents a *permanent* reduction and *significant impact* to the State's agricultural land resources." DEIR at 1.0-14 (emphasis added). It matters not whether the Project site would be converted back to agricultural uses at the end of the Project life, pursuant to mitigation measure 4.9.1b. DEIR at 4.9-36 (mitigation measure text). And in any event, the site restoration plan is more wishful thinking than guaranteed return to farmland – the County cannot *force* the Project site landowners to farm the land again even if they discontinue industrial land uses on the site and restore the land to farming quality. 8-7 Con't

Furthermore, the Project could impede agricultural operations elsewhere in the County and reduce employment, income, sales and tax revenue. As former Imperial County Agricultural Commissioner Valenzuela noted in her February 25, 2011 comments on the DEIR for a similar solar project, "removal of any farmland out of production would have a *direct negative impact on employment, income, sales and tax revenue*." DEIR at Appendix A (Exhibit 3 to Scoping Comments). As these projects convert more and more agricultural land to non-agricultural uses, more and more agriculture-serving businesses will be forced to close. And as the quantity and quality of agriculture-serving businesses decreases in the County, more and more farmers will find it uneconomical or impractical to keep farming and sell, lease or use their lands for non-agriculture purposes. Evidencing this phenomenon is the conversion or planned conversion thus far of more than *22,000 acres* of County farmland into industrial-scale renewable energy 8-8

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Page 4

projects. DEIR at 4.9-38. As the DEIR acknowledges, "[s]everal factors have *significantly altered* the agricultural conditions in the County," including the "increase in utility scale solar development in the County" over the "past several years." DEIR at 4.9-15. 8-8 Con't

Because the proposed solar energy generation and transmission uses would eliminate the potential for farming on the Project sites and encourage farmland conversion elsewhere in the County, the Project is specifically forbidden by the General Plan. 8-9

B. The Imperial County General Plan Forbids the Proposed Solar Energy Generation and Transmission Uses outside of the Renewable Energy Overlay Zone.

The Imperial County General Plan also forbids the development and operation of renewable energy projects outside of the designated Renewable Energy Overlay Zone. The Renewable Energy and Transmission Element states that "Conditional Use Permit applications proposed for specific renewable energy projects not located in the RE Overlay Zone would not be allowed without an amendment to the RE Overlay Zone." Imperial County General Plan, Renewable Energy and Transmission Element (Revised 2015), page 34. 8-10

Here, the Project sites are located outside of the RE Overlay Zone. Drew Solar, LLC has applied for an amendment to both the Renewable Energy and Transmission Element and the Land Use Ordinance to "create an Island Overlay for the Project Site." DEIR at 2.0-2. But "Island Overlays" are only allowed for renewable energy projects that (1) "[c]onsist[] of the expansion of an existing renewable energy operation" – not the creation of a new one, and (2) "[w]ould not result in any significant environmental impacts." Imperial County General Plan, Renewable Energy and Transmission Element (Revised 2015), pages 34-35.

Neither condition can be met here. The Project is *not* an "expansion of an existing renewable energy operation;" it is an entirely new project. DEIR at 2.0-1. In addition, as discussed in Farms for Farming's Scoping Comments and again below, the Project would cause "significant environmental impacts."

C. The Proposed Project Contravenes the Imperial County General Plan Agricultural Element.

Objective 1.8 of the County General Plan Agricultural Element "[a]llow[s] conversion of agricultural land to non-agricultural uses including renewable energy *only* where a *clear* and *immediate need can be demonstrated*, based on economic benefits, population projections and *lack of other available land* (including land within incorporated cities) for such non-agricultural uses." Imperial County General Plan, Agricultural Element (Revised 2015), page 30 (emphasis added). "Such conversion shall also be *allowed only where such uses have been identified for* 8-11

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non-agricultural use in . . . the County General Plan, and are *supported by a study to show a lack of alternative sites*." *Id.* (emphasis added). 8-11 Con't

Here, as discussed, the County General Plan *forbids* the proposed non-agricultural uses on the Project parcels. Furthermore, in designating a renewable energy overlay zone, the County has already determined that alternative – and indeed, *preferable* – sites *do exist* for the proposed solar energy facilities. The DEIR purports to reject the lone alternative considered that would be located within the renewable energy overlay zone. DEIR at 5.0-3. But the *three-sentence* rejection of the "Salton Sea Alternative" is a far cry from the "*study*" required to "show a lack of alternative sites." Imperial County General Plan, Agricultural Element (Revised 2015), page 30 (emphasis added). If the land within the *designated renewable energy zone* is incapable of supporting renewable energy development, it makes a mockery of land use planning and casts significant doubt on the County's ability to determine the feasibility of alternatives for this Project. 8-12 8-13

II. THE COUNTY MUST COMPLY WITH CEQA BEFORE APPROVING THE PROJECT.

A. The DEIR Fails to Provide a Full and Accurate Project Description.

"An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193. In addition, "[t]he data in an EIR must not only be sufficient in quantity, it must be presented in a manner calculated to adequately inform the public and decision makers, who may not be previously familiar with the details of the project." *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* ("*Vineyard*") (2007) 40 Cal.4th 412, 431.

The DEIR fails to cure the Initial Study's failure to fully describe the project. For example, like the Initial Study, the DEIR fails to identify the type of energy storage system proposed for the Project. To the contrary, it basically says "all options are still on the table:" 8-14

> The storage components of the Project will utilize storage technologies that operate based upon the principles of potential including but not limited to compressed air or pumped storage, lithium (ion, oxygen, polymer, phosphate, sulphur), Nickel Metal Hydride, Nickel Cadmium, Lead Acid, antiperovskites or other batteries, including but not limited to solid state batteries that may be approved for commercial use within the United States of America, and flywheels.

DEIR at 2.0-14. CEQA requires more in the EIR. *Vineyard*, 40 Cal.4th at 434.

B. The DEIR Fails to Fully Analyze the Project's Impacts to Agriculture. 8-15

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The DEIR acknowledges that the Project would convert to non-agricultural uses the existing 763 acres of farmland on the Project sites. But it erroneously claims that the impacts would be only temporary and would be mitigated to a less-than-significant level "through the Permittee's commitment to a reclamation plan and mitigation measure MM 4.9.1b that requires the Permittee restore the site to agricultural use with a soil value equal to the pre-Project condition and back that commitment with financial security." DEIR at 4.9-36. As discussed, the site restoration plan is more wishful thinking than guaranteed return to farmland – the County cannot *force* the Project site landowners to farm the land again even if they discontinue industrial land uses on the site and restore the land to farming quality. Indeed, the DEIR recognizes that "if the facility continues to be economically viable, it could be operated for a longer period." DEIR at 2.0-33. And if the site is in fact re-used for the same or another industrial use after the currently proposed CUPs expire, the impacts of continued farmland conversion beyond the currently planned 30 to 40 years will likely go unstudied if they are not analyzed in the Project EIR. Why? Because even if the continued operation would be "subject to County approval and applicable CEQA review," that CEQA review may well use as its analytical baseline the Project's non-agricultural use, rather than the current agricultural use (especially if any new CUP application is submitted before the proposed CUP expires and before the land is "restored"). DEIR at 2.0-33. 8-15 Con't

The DEIR also fails to acknowledge how the Project would significantly *indirectly* and *cumulatively* affect agriculture *countywide*, by both inducing growth of renewable energy generation and transmission projects, and reducing the resources available to sustain remaining agricultural operations. As utility-scale energy projects convert more and more agricultural land to non-agricultural uses, more and more agriculture-serving businesses will be forced to close, due to both declining revenues and logistical problems. And as the quantity and quality of agriculture-serving businesses decrease in the County, more and more farmers will find it uneconomical or impractical to keep farming and be forced to sell, lease or use their lands for non-agriculture purposes. Those subsequent land sales and use conversions constitute a "physical changes caused in turn by the economic or social changes" that must be analyzed in the Project EIR. 14 Cal. Code Regs. [CEQA Guidelines ("Guidelines")] § 15131 (quote); *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1205 ("if the forecasted economic or social effects of a proposed project directly or indirectly will lead to adverse physical changes in the environment, then CEQA requires disclosure and analysis of these resulting physical impacts"); *California Clean Energy Committee v. City of Woodland* (2014) 225 Cal.App.4th 173, 188-189 (same). 8-16

One need look no further than the rapidly increasing density of solar and wind energy facilities in the County to see the significant impacts on the *physical environment* from these changing economic conditions and pressures. As the DEIR shows, over *22,000 acres* of County farmland have been or are planned to be converted to solar energy generation uses. DEIR at 4.9-38. And that "increase in utility scale solar development in the County" over the "past several years" has "*significantly altered* the agricultural conditions in the County." DEIR at 4.9-15.

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The County cannot continue to brush aside these growth-inducing and cumulatively massive impacts until the entire farmland acreage of the County is covered with solar panels. 8-16 Con't

C. The DEIR Fails to Fully Analyze the Project's Fire Impacts.

The DEIR fails to even begin to analyze the Project's numerous structural fire and wildfire risks. The DEIR acknowledges that the Project would involve the "installation and maintenance" of numerous known fire ignition sources, including "transmission lines, battery storage and PV modules." DEIR at 1.0-23. Yet rather than explain and quantify the fire ignition risks, the DEIR punts the analysis to a "Fire Prevention and Response Plan" to be prepared in the future. DEIR at 4.13-3. CEQA does not sanction deferred analysis. *See, e.g.*, Guidelines § 15126.4(a)(1)(B); *Endangered Habitats League v. County of Orange* (2005) 131 Cal.App.4th 777, 793-4 (mitigation may be deferred *only* where it includes specific performance criteria). 8-17

The DEIR also inexplicably concludes that the Project would not "[e]xpose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires" (DEIR at 1.0-21) despite the fact that the Project would be located in a "Moderate Fire Hazard Severity Zone." DEIR at 1.0-23. Nor does it explain how the Project would not increase that already "moderate" wildfire risk.

D. The DEIR Fails to Fully Analyze the Project's Greenhouse Gas Emission Impacts.

The DEIR, like the Initial Study, fails to analyze the Project's *life-cycle* greenhouse gas emissions. Without a lifecycle emissions analysis, the DEIR cannot support its assertion that "the project would result in a net total reduction" of greenhouse gas emissions in 2020. DEIR at 4.5-12. 8-18

E. The DEIR Fails to Fully Analyze the Project's Impacts on Birds.

The DEIR's analysis of the Project's impacts on birds is deficient for at least three reasons. First, the DEIR attempts to brush the "pseudo-lake" effect under the rug. The pseudo-lake effect occurs when solar projects' reflective panels resemble water from above, and attract birds – especially migratory birds – searching for water. Once tricked, the birds can – and often do – dive into the solar panels as if they were water. This "pseudo-lake effect" is suspected to be a primary cause of migratory bird trauma and death at the Desert Sunlight PV facility in Riverside County. PV panel collision is also estimated to kill an estimated 125 to 2,675 birds per year at the 250-MW California Valley Solar Ranch PV facility, or 0.5 to 10.70 annual bird deaths 8-19

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per MW of nameplate electric capacity.[1] Applying that same mortality rate here, this 100-MW Project would *kill between 47 and 994 birds per year*. Furthermore, these "impacts can be compounded when multiple developments are erected," requiring a cumulative impact analysis of bird-panel collision impacts that the DEIR omits. Exhibit 2 at 8. Rather than grapple with this serious impact or even mention the relevant studies on the pseudo-lake effect, the DEIR asserts that "the magnitude of this effect is unknown, since no comprehensive scientific studies have been conducted for this potential phenomenon." DEIR at 4.12-28. CEQA requires more. 8-19 Con't

Second, the DEIR fails to analyze the bird habitat loss the Project would cause. Studies of five U.S. PV facilities and one South African facility showed that bird species diversity was universally lower at the PV project sites than in the adjacent areas.[2] Similarly, a before-and-after study of a utility-scale PV facility in south-central California demonstrated that raptor abundance was higher before construction than after construction, "suggesting avoidance of the facility." Exhibit 3 at 416 (quote); Exhibit 2 at 8 (reporting the same study results). 8-20

Third, the DEIR fails to explain how the Project could comply with state and federal prohibitions on killing migratory birds. As the DEIR acknowledges, the federal Migratory Bird Treaty Act ("MBTA"), 16 U.S.C. section 703 *et seq.*, prohibits the killing of migratory birds without a permit. DEIR at 4.12-3. Section 3513 of California's Fish and Game Code likewise makes it "unlawful to take or possess any migratory nongame bird as designated in the [MBTA] or any part of such nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the [MBTA]." And most birds are considered migratory under the MBTA, including the burrowing owl and many other birds that use - or potentially use - the Project sites.[3] Yet the DEIR fails to discuss how the Project could – let alone would – comply with state and federal prohibitions on killing these species. The U.S. Fish 8-21

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[1] Walston Jr., L.J, K.E. Rollins, K.W. LaGory, K.P. Smith & S.A. Meyers, 2016, "A Preliminary Assessment of Avian Mortality at Utility-scale Solar Energy Facilities in the United States," *Renewable Energy* 92:405-414 (attached hereto as Exhibit 1). The 0.5-to-10.70 range of mortality rates is similar to the range found for a 96-MW PV facility in South Africa (1.51 to 8.50 bird deaths per MW of nameplate capacity). Visser, E., V. Perold, S. Ralston-Paton, A.C. Cardenal & P.G. Ryan, 2018, "Assessing the Impacts of a Utility-Scale Photovoltaic Solar Energy Facility on Birds in the Northern Cape, South Africa," *Renewable Energy*, article in press (attached hereto as Exhibit 2).
[2] For the South African study, see Exhibit 2 at 7. For the study of the U.S. facilities, see Smith, J.A. & J.F. Dwyer, 2016, "Avian Interactions with Renewable Energy Infrastructure: An Update," *The Condor* 118:411-423, 416 (attached here as Exhibit 3).
[3] The U.S. Fish and Wildlife Service's list of birds protected by the MBTA are listed in 50 Code of Federal Regulations Part 10.13, and are available online here: https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php

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and Wildlife Service's regulations only permit taking migratory birds for limited purposes, including taxidermy, scientific collection, and banding or marking, among other constrained purposes, none of which apply to the proposed Project use. 50 C.F.R. Part 21. 8-21 Con't

F. The DEIR Fails to Analyze a Full Range of Alternatives.

CEQA requires EIRs to "describe a range of reasonable alternatives to the project . . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." Guidelines § 15126.6(a). Alternatives that would lessen significant effects should be considered even if they "would impede to some degree the attainment of the project objectives, or be more costly." *Id.* § 15126.6(b). The range of alternatives considered must "foster informed decisionmaking and public participation." *Id.* § 15126.6(a). Alternatives may only be eliminated from "detailed consideration" when substantial evidence in the record shows that they either (1) "fail[] to meet most of the basic project objectives," (2) are "infeasibl[e]," or (3) do not "avoid significant environmental impacts." *Id.* § 15126.6(c).

Among other alternatives, the County must analyze offsite alternatives, particularly sites within the renewable energy overlay zone. The County General Plan prohibits the "conversion of agricultural land to non-agricultural uses including renewable energy" unless the sites have been "*identified for non-agricultural use in . . . the County General Plan*, and are *supported by a study to show a lack of alternative sites*." Imperial County General Plan, Agricultural Element (Revised 2015), page 30 (emphasis added). The DEIR purports to reject the lone alternative considered that would be located within the renewable energy overlay zone. DEIR at 5.0-3. But the *three-sentence* rejection of the "Salton Sea Alternative" is a far cry from the "*study*" required to "show a lack of alternative sites." Imperial County General Plan, Agricultural Element (Revised 2015), page 30 (emphasis added). The DEIR provides no evidentiary support for its bare assertion that "the corrosive and wet soil that was subject to liquefaction made the Project infeasible" at the Salton Sea location. DEIR at 5.0-3. CEQA requires more. 8-22

For each of these reasons, Farms for Farming opposes the Project as currently proposed, and requests that the EIR be recirculated after being corrected to analyze all of the impacts and alternatives discussed above. 8-23

Respectfully submitted,

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Attorney for Farms for Farming, *et al.*

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Attachments: Exhibit 1 - Walston Jr., L.J, K.E. Rollins, K.W. LaGory, K.P. Smith & S.A. Meyers, 2016, "A Preliminary Assessment of Avian Mortality at Utility-scale Solar Energy Facilities in the United States," *Renewable Energy* 92:405-414.

Exhibit 2 - Visser, E., V. Perold, S. Ralston-Paton, A.C. Cardenal & P.G. Ryan, 2018, "Assessing the Impacts of a Utility-Scale Photovoltaic Solar Energy Facility on Birds in the Northern Cape, South Africa," *Renewable Energy*, article in press. 8-24

Exhibit 3 - Smith, J.A. & J.F. Dwyer, 2016, "Avian Interactions with Renewable Energy Infrastructure: An Update," *The Condor* 118:411-423.

EXHIBIT 1

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A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States

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ABSTRACT

Despite the benefits of reduced toxic and carbon emissions and a perpetual energy resource, there is potential for negative environmental impacts resulting from utility-scale solar energy (USSE) development. Although USSE development may represent an avian mortality source, there is little knowledge regarding the magnitude of these impacts in the context of other avian mortality sources. In this study we present a first assessment of avian mortality at USSE facilities through a synthesis of available avian monitoring and mortality information at existing USSE facilities. Using this information, we contextualize USSE avian mortality relative to other forms of avian mortality at 2 spatial scales: a regional scale (confined to southern California) and a national scale. Systematic avian mortality information was available for three USSE facilities in the southern California region. We estimated annual USSE-related avian mortality to be between 16,200 and 59,400 birds in the southern California region, which was extrapolated to between 37,800 and 138,600 birds for all USSE facilities across the United States that are either installed or under construction. We also discuss issues related to avian–solar interactions that should be addressed in future research and monitoring programs.

1. Introduction

Renewable energy development has been increasing as an alternative to fossil-fuel based technologies, in large part to reduce toxic air emissions and CO_2-induced effects on climate [1,2]. According to the U.S. Energy Information Association [3], electric generation from renewables in the United States has increased by over 50% since 2004 and renewable energy sources currently provide approximately 14% of the nation's electricity. Solar energy-based technologies represent a rapidly developing renewable energy sector that has seen exponential growth in recent years [4,5]. For example, since 2013 alone, cumulative installations of photovoltaic (PV) solar energy technologies, including residential, commercial, and utility-scale installations, have more than doubled in the United States [6].

Utility-scale solar energy (USSE) projects generate electricity for delivery via the electric transmission grid and sale in the utility market. This differs from distributed solar energy systems which are designed for electric generation and utilization at local scales. According to the Solar Energy Industries Association (SEIA) [7], there currently are approximately 800 USSE projects (>1 MW [MW]) in the United States that are either in operations or under construction, representing approximately 14 GW (GW) of electric capacity. Based on solar insolation models developed by the National Renewable Energy Laboratory [8], the greatest solar resource potential in the United States occurs in the southwest within the six following states: Colorado, New Mexico, Utah, Arizona, Nevada, and California (Fig. 1). Indeed, most of the installed or planned utility-scale solar facilities in the United States (based on electric capacity and includes projects that are operating, under construction, and under development) are located within these six southwestern states (Fig. 2) [7].

There are two basic types of solar energy technologies employed at USSE installations in the United States [9]: photovoltaic (PV) and concentrating solar power (CSP). Photovoltaic systems use cells to convert sunlight to electric current, whereas CSP systems use reflective surfaces to concentrate sunlight to heat a receiver. That heat is subsequently converted to electricity using a thermoelectric power cycle. CSP systems typically include power tower systems

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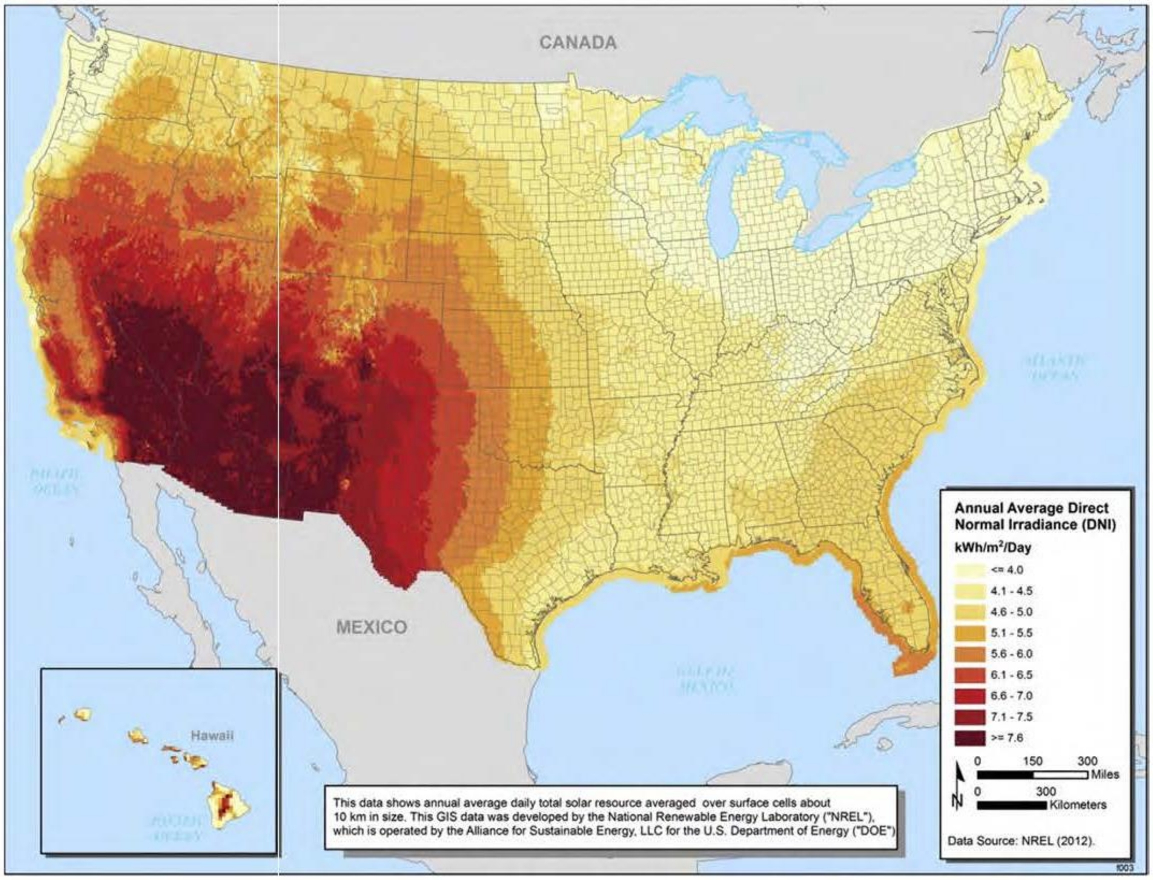

Fig. 1. Solar energy potential in the United States [8].

with heliostats (angled mirrors) and parabolic trough systems (parabolic mirrors). In the United States, most of the electricity produced by utility-scale solar energy projects through 2015 was generated using PV technologies [6].

Despite the benefits of reduced toxic and carbon emissions from a perpetual energy resource, there is potential for negative environmental impacts resulting from utility-scale solar development [9,10]. Utility-scale solar energy facilities in the United States require large spatial footprints (between 1.4 and 6.2 ha of land per MW of electric production) and are projected to require a total of 370,000 1,100,000 ha of land by 2030, mostly in the arid regions of the southwestern states [11]. These large scale developments and land-cover change associated with them may result in a variety of environmental impacts. Among the potential environmental impacts are ecological impacts to wildlife species and their habitats. Recent studies have suggested that utility-scale solar developments may represent a source of mortality for wildlife such as birds [12]. There are currently 2 known types of direct solar energy-related bird mortality [9,12,13]:

1. Collision-related mortality mortality resulting from the direct contact of the bird with a solar project structure(s). This type of mortality has been documented at solar projects of all technology types.
2. Solar flux-related mortality mortality resulting from the burning/singeing effects of exposure to concentrated sunlight. Mortality may result in several ways: (a) direct mortality; (b) singeing of flight feathers that cause loss of flight ability, leading to impact with other objects; or (c) impairment of flight capability to reduce the ability to forage or avoid predators, resulting in starvation or predation of the individual [12]. Solar flux-related mortality has been observed only at facilities employing power tower technologies.

The nature and magnitude of impacts to bird populations and communities is generally related to the following three primary project-specific factors [10,14]: location, size, and technology. Bird abundance and activity at local and regional scales varies by the distribution of habitat and other landscape features (e.g., elevation) in the environment [15 19]. Therefore, the location of a solar energy project relative to bird habitats, such as migration flyways, wetlands, and riparian vegetation, could influence avian mortality risk. The footprint size of the solar project is a direct measure of the amount of surface disturbance and human activity. Projects with larger footprints, therefore, may result in more avian fatalities than projects with smaller footprints. Lastly, different solar technologies and project designs may influence avian mortality risk. For example, project designs that utilize constructed cooling ponds, or

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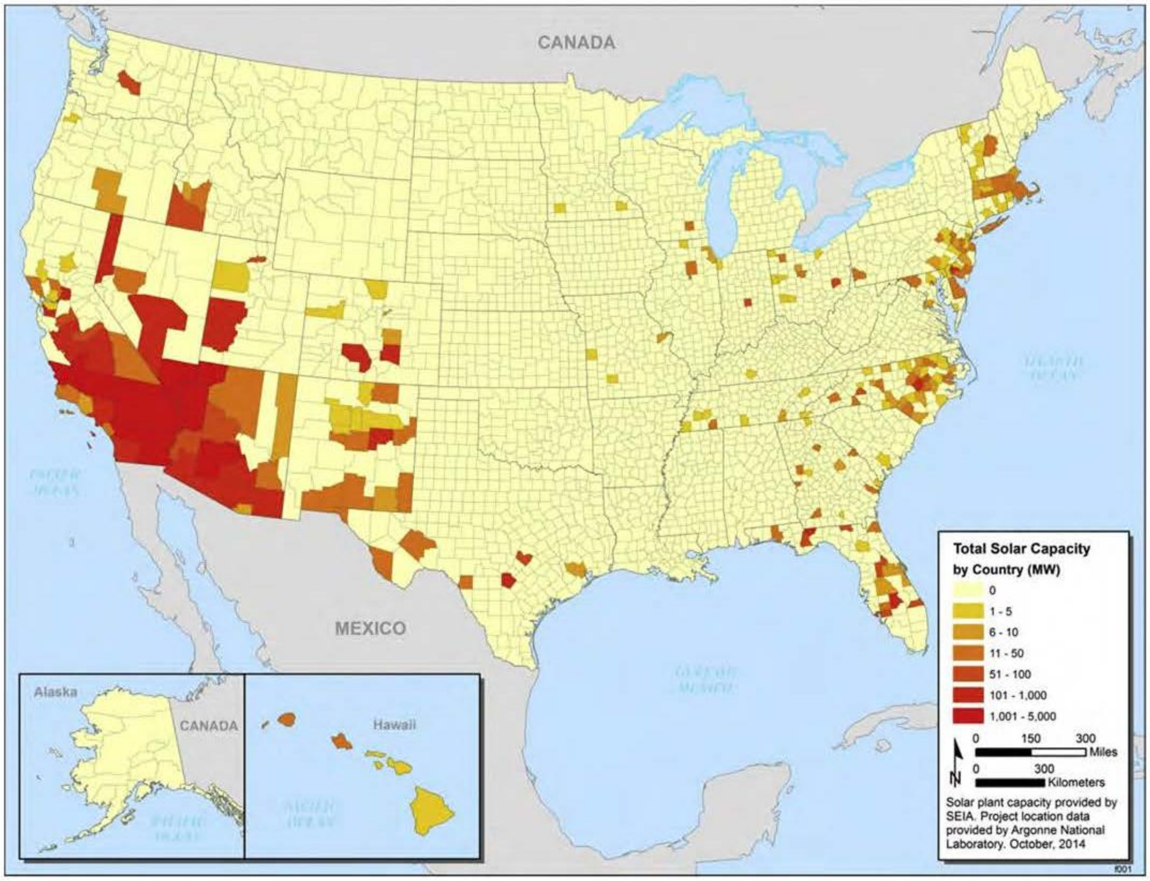

Fig. 2. Total solar energy production capacity (MW) by County [7].

solar collectors that reflect polarized sunlight in such a way so as to be perceived as waterbodies, may attract birds and their prey (e.g., insects), thereby increasing the risk of bird collisions with project structures [10,12,14,20]. To date, however, no empirical research has been conducted to evaluate the attraction of utility-scale solar facilities to migrating or foraging birds. Although collision-related impacts may occur at all types of solar energy technologies, the effects of solar flux on birds to date have been observed only at facilities employing power tower technologies [9,12,13].

One approach to understanding the impacts of utility-scale solar energy development on birds is through understanding mortality risk from solar energy development in the context of other industrial developments. Techniques to estimate avian mortality based on systematic monitoring methods have been previously employed for other sources of avian mortality (e.g., [21 24]). Despite the potential for avian mortality from solar energy development, however, there is currently little empirical data on avian mortality at solar facilities (but see McCrary et al. [13]). However, as more data resulting from avian monitoring at solar energy facilities become available, a systematic assessment of available data can provide a better understanding of avian fatality risk at utility-scale solar energy developments.

The objectives of this study were to 1) synthesize currently-available information regarding avian mortality at utility-scale solar facilities; 2) contextualize avian mortality at utility-scale solar facilities relative to other human sources of avian mortality; and 3) discuss issues related to avian solar interactions that need to be addressed in future research and monitoring designs.

2. Methods

2.1. Study area

Despite efforts to collect avian solar data at USSE facilities throughout the United States (see RESULTS), our comprehensive search for available avian fatality information at USSE facilities revealed that information was primarily only available within the region of southern California. For this reason, we defined our study area as the area that encompassed approximately 148,000 km^2 within the 10 southern-most counties of California (Fig. 3). This region was chosen for the amount of current and planned utility-scale solar energy development and availability of project-specific information on avian fatalities. Nearly 50% of utility-scale solar developments either under construction or in operation in the

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Fig. 3. Utility-scale solar facilities with available avian fatality data and major wind projects within the Southern California study area.

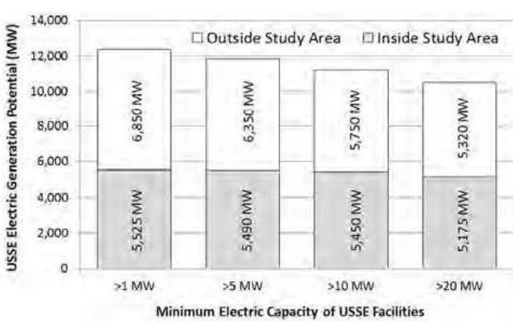

Fig. 4. Utility-Scale Solar Energy (USSE) electric generation potential in the Southern California Study Area and within the United States by minimum name plate electric capacity category.

United States are located in this region (Figs. 2 and 4) [7]. In addition, all currently-available information on avian mortality at U.S. utility-scale solar energy facilities are associated with only those projects occurring in this region (see Results).

2.2. Literature review

We conducted a review of available information on avian monitoring and mortality at utility-scale solar energy facilities by obtaining project-specific information from publicly-available online sources, such as the California Energy Commission (CEC; http://www.energy.ca.gov/). We conducted a comprehensive online search of the open literature on Web of Science (https://webofknowledge.com/) and Google Scholar (http://scholar.google.com/) using search terms "solar energy" and a combination of "bird", "deaths", "fatality", "mortality", "monitoring", "avian mortality", and "avian monitoring". We also contacted and requested avian mortality information from solar energy developers and

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industry representatives operating in the United States and internationally.

Only studies at solar facilities in which avian fatalities were recorded from systematic surveys were considered in this study. Systematic data include fatalities observed during the course of survey efforts designed to characterize avian mortality at the project. Other fatality observations, such as incidental fatality data, were not part of focused systematic searches for carcasses and therefore could not be used to estimate project-specific mortality rates.

2.3. Mortality rate estimation

A standard metric commonly used for assessing avian mortality at energy production facilities is the mortality rate estimated as the total number of bird deaths per unit of energy production (e.g., bird deaths per MW per year) [24,25]. Our primary focus was to standardize avian mortality rates to the name plate capacity of utility energy developments to enable more direct comparison to other energy-related mortality sources such as wind energy. However, we also calculated mortality rates by the amount of electricity produced at each facility assuming a 30% capacity factor (the approximate capacity factor observed during the first year of operations at the Ivanpah Solar Electric Generating System). Using these metrics, a regional avian mortality rate was estimated for utility-scale solar projects in the study area (Fig. 3).

It is important that mortality estimates be adjusted to account for biases in scavenging and ability of searchers to detect carcasses [28–30]. Searcher efficiency is a metric to quantify the ability of searchers to detect carcasses. It typically refers to the percentage of carcasses observed by searchers relative to a known number of carcasses. Factors such as bird size and the presence of obstructions such as vegetation and structures may influence searcher efficiency [28,30]. The carcass persistence rate is a metric to quantify the amount of time (usually days) that a carcass is available to be observed before it is scavenged by predators. Factors such as bird size and local predator densities may influence carcass persistence estimates [28–30]. We ensured that all studies used in avian mortality rate estimates included mathematical approaches to account for predation and searcher efficiency biases (e.g., [30,31]. For those studies that did not consider predation and searcher efficiency biases in mortality rate estimation, we applied adjustments for those biases based on average predation and searcher efficiency rates observed at nearby solar and wind energy projects in the region (see supplemental information).

Avian mortality at some USSE facilities was recorded as separate mortality rates for fatalities known to be attributable to the facility (e.g., observable collision trauma or singed feathers) and unknown fatalities in which carcasses found on the project site showed no observable project-associated cause of death. The total avian mortality rate was calculated as a range representing the minimum (based on carcasses with a known cause of death attributable to the facility) and the maximum (based on the sum of birds with known and unknown causes of death). It is important to identify and distinguish between these two types of mortality estimates because birds with an unknown cause of death may have died due to natural causes (i.e., predation or disease) and may not be attributed to the solar facility. Following this, we used information provided by SEIA [7] to determine the total name plate electric capacity of all current and planned USSE facilities in the study region. We multiplied total USSE electric capacity with estimated USSE mortality rates to calculate total annual USSE-related avian mortality. We also used the regional USSE mortality rate to estimate USSE-related avian mortality across all USSE facilities that were in operations or under construction in the United States [7]. We used the regional USSE mortality rate to extrapolate USSE-related mortalities at a national scale because USSE developments in the southern California study region represented nearly 50% of all USSE developments in the United States (Fig. 4).

2.4. Contextualizing solar avian mortality

To our knowledge, this study is the first systematic synthesis of avian mortality at USSE facilities. There are no previous efforts to systematically contextualize solar–avian mortalities to other avian mortality sources. There have been several efforts to assess avian mortality associated with other renewable energy developments such as wind energy [23,24] and non-energy sources such as road mortality [32], collisions with buildings and other structures such as communication towers [21,32–34], and cat predation [35]. We reviewed these avian monitoring and mortality studies to estimate mortality rates from energy and non-energy sources that could be comparable to USSE-related mortalities. The mortality sources chosen for comparison include (1) wind energy development, (2) fossil fuel energy development, (3) collisions with communication towers, (4) road mortality, and (5) building collisions. We used mortality rate estimates from these sources to contextualize avian mortality at two geographic scales: within the southern California study region and across the United States.

2.4.1. Wind energy development

Recent assessments of avian mortality at wind energy facilities across the United States have been reported by Loss et al. [36] and Smallwood et al. [23]. To assess avian mortality associated with wind energy developments in the southern California study region, the locations of wind energy facilities and associated electric generation capacity within the study region were obtained using turbine locations mapped by the U.S. Geological Survey (USGS) through July 2013 [37]. We searched available literature for systematic avian monitoring and mortality studies that provided statistically-based adjusted mortality estimates at these wind energy facilities in the region. Using these studies, we calculated a capacity-weighted average mortality rate (number of birds/MW/year) across the wind energy projects in the region and determined the total electric energy production of the mapped wind energy facilities in the region to estimate total annual avian mortality associated with wind energy developments in the southern California region. We used estimates provided by Loss et al. [36] and Smallwood [23] to estimate avian mortalities at wind facilities across the United States.

2.4.2. Fossil fuel energy development

Sovacool [25] estimated avian mortality from fossil fuel power plants across the United States as a result of collision with infrastructure, electrocutions, pollution and contamination, and climate change. In addition, Sovacool [25] estimated climate change-induced avian mortality (in terms of habitat loss and changes in migration) predicted to be the result of fossil fuel power plant operations. We obtained data on the number and electric capacity of fossil fuel power plants in the southern California region from the California Energy Commission Almanac of Power Plants (http://energyalmanac.ca.gov/powerplants/). We applied the fossil fuel mortality estimate from Sovacool [25] to calculate a regional annual mortality estimate resulting from fossil fuel power plants. We also used the mortalities calculated by Sovacool [25] as an estimate of avian mortalities associated with fossil fuel power plants across the United States.

2.4.3. Collisions with communication towers

Longcore et al. [33] conducted a systematic review of avian mortality at communication towers in an effort to estimate avian mortality resulting from collisions with communication towers and associated structures (e.g., guy wires) across North America. Mortality estimates were calculated within Bird Conservation Regions (BCR) and aggregated to represent an overall mortality estimate across North America. Longcore et al. [33] estimated over 6 million bird mortalities resulting from collisions with communication towers across North America. To estimate annual avian mortality associated with collisions with communication towers in the study region, we applied the mortality estimates within the BCRs reported by Longcore et al. [33] proportional to the distribution of BCRs in this study's region.

2.4.4. Road mortality

The avian impacts of roadways, including direct collision mortality and indirect effects such as habitat fragmentation, have been a concern among scientists for many years [32,38,39]. Knowledge about avian fatality estimates associated with roadways in the United States comes from the works of Banks [40] and Erickson et al. [32]. In a synthesis of existing fatality information, Banks [40] found that avian mortality along roadways in the United States ranged from 2.7 to 96.2 bird deaths per mile of roadway (4.3–153.9 bird deaths per km). Based on an analysis of all roadways in the United States, Erickson et al. [32] estimated total avian mortality associated with vehicle traffic along roadways in the United States between 89 million and 340 million birds per year. In a more recent study in Canada, Bishop and Brogan [41], found that, after accounting for scavenging, total estimated road mortality was 21.6 bird deaths per mile of roadway (34.6 bird deaths per km). We obtained roadway GIS data from the U.S. Census Bureau [42] to estimate the amount of paved roadways in the study region. We used this estimate to calculate avian road mortality within the range of mortality rates reported by Banks [40] and Bishop and Brogan [41].

2.4.5. Building collisions

Loss et al. [34] provided a systematic review and estimate of avian mortality associated with building collisions in the United States. Reviewing published literature and unpublished data, Loss et al. [34] estimated avian mortality at buildings of three different classes: residential structures, low-rise buildings (1–3 stories high), and high-rise buildings ($\geq$4 stories tall). Estimated mortality in each building class was calculated by multiplying data-derived mortality probabilities by the estimated number of buildings in the United States. Based on this approach, Loss et al. [34] calculated annual bird mortality at building structures across the United States to be between 365 million and 988 million birds. For purposes of establishing context in this study, avian mortality at buildings was only calculated for residences in the study region because information on residential structures were readily available from the U.S. Census Bureau housing unit statistics [43] and information provided by individual county assessor's offices. The calculation of avian mortalities resulting from collisions with residential structures, therefore, represents a minimum building collision mortality estimate for the region and is used solely for contextualization purposes. Loss et al. [34] calculated the 95% CI of annual bird mortality at residences to be between 1.3 and 3.1 birds per residence across the United States (median: 2.1 birds). We obtained data on the number of residential structures within the southern California region from the U.S. Census Bureau American Housing Survey [43] and individual county assessor's offices and applied the building collision-related mortality estimates provided by Loss et al. [34] to calculate a regional annual mortality estimate resulting from bird collisions with residential structures.

3. Results

3.1. Avian mortality at USSE facilities

A summary of all USSE facilities in the United States with available avian monitoring and mortality information is provided in the Supplemental Information. We identified 3 USSE facilities in the United States at which avian fatality data have been systematically collected and suitable for mortality rate estimation (Table 1). These three USSE facilities occur in the southern California study region: California Solar One (CSO), California Valley Solar Ranch (CVSR), and Ivanpah Solar Electric Generating System (ISEGS) (Fig. 3). The CSO facility was a CSP power tower project with a name plate electrical capacity of 10 MW that was decommissioned in 1987. Systematic surveys on CSO's 7.3 ha (18 acre) project area were conducted over the course of one year between 1982 and 1983 by McCrary et al. [13]. These survey results were used to calculate a site-wide avian mortality estimate for the facility (see Supplemental Information for more details on avian mortality estimation). The CVSR facility is an operational PV project with a name plate electrical capacity of 250 MW. Annual systematic surveys on CVSR's 1902 ha (4700 acre) project area were used to calculate site-wide avian mortality estimates [44]. The ISEGS facility is an operational CSP power tower project with a name plate electrical capacity of 377 MW. Annual systematic surveys on ISEG's 1457 ha (3600 acre) project area were used to calculate site-wide avian mortality estimates [45].

Avian mortality estimates at each of the three USSE facilities were adjusted to account for scavenger and searcher efficiency biases. These adjustments were included in the mortality estimates determined for CVSR and ISEGS [44,45]. However, McCrary et al. [13] did not present an adjusted mortality rate for CSO. To calculate an adjusted mortality rate for CSO, we used average estimates of carcass persistence and searcher efficiency from nearby studies using the formula developed by Shoenfeld [31]. In addition, separate mortality rates were calculated at CVSR and ISEGS for those carcasses with a cause of death that could be attributed to known site-related factors (e.g., collision trauma) as well as those carcasses found on site that did not show observable site-related causes of death [44,45]. These separate estimates were used to compute the total potential site-wide mortality rate (which is the sum of the known and unknown mortality rates). At CSO, McCrary et al. [13] attributed 100% of the fatalities to a project-related cause of death. At the CSO facility; therefore, the mortality rate for carcasses with unknown causes of death was assumed to be zero (Table 1). See the Supplemental Information for more information on data collection and mortality rate estimation at each of these facilities.

There was considerable variability in mortality rates for carcasses with known project-related causes of death at USSE facilities (ranging between 0.50 and 10.24 birds/MW/year) (0.23 and 3.90 birds/GWh/year) (Table 1). However, incorporating mortality of carcasses with no observable project-related cause of death resulted in less variable total potential mortality rates across USSE facilities (ranging between 9.30 and 10.70 birds/MW/year) (3.55 and 4.08 birds/GWh/year). Calculating the capacity-weighted average mortality rate of known USSE-related mortalities and total potential mortality rate results in a range of 2.7–9.9 birds/MW/year (1.06–3.78 birds/GWh/year) (Table 1). This range represents the uncertainty in including fatalities with no observable USSE-related cause of death to the total mortality estimate. Presumably, some carcasses found on site that showed no signs of USSE-attributable cause of death would actually be associated with other causes (e.g., natural background mortality, predation, disease, etc.). Based on SEIA [7], there is a total name plate electric capacity of 6 GW for current and planned USSE facilities in the study region. Applying

Table 1
Avian mortality estimates from systematic surveys at utility-scale solar energy (USSE) facilities.

Project name	Technology type and MW (in Parentheses)[a]	Mortality rate for known USSE-related fatalities[b]	Mortality rate for unknown USSE-related fatalities[c]	Total mortality rate for known and unknown USSE-related fatalities[d]	Source of mortality estimate[e]
California Solar One	CSP – Power tower (10)	10.24 (3.90)	0 (0)	10.24 (3.90)	McCrary et al. [13]; See also Supplemental Information
California Valley Solar Ranch	PV (250)	0.50 (0.23)	10.20 (3.89)	10.70 (4.08)	H.T. Harvey & Associates [44]
Ivanpah	CSP – Power tower (377)	3.96 (1.53)	5.34 (2.05)	9.30 (3.55)	H.T. Harvey & Associates [45]
Capacity-weighted average mortality rate (birds/MW/year)		**2.7 (1.06)**	**7.3 (2.79)**	**9.9 (3.78)**	

[a] CSP = Concentrating Solar Power; PV = Photovoltaic.
[b] Mortality rate for fatalities known to be attributable to the facility (e.g., observable collision trauma or singed feathers). Mortality rate represents the annual number of estimated bird deaths per megawatt of name plate electric capacity. Values in parentheses represent the annual mortality rate estimated by the amount of electricity produced in gigawatt hours (GWh), assuming a 30% capacity factor.
[c] Mortality rate for carcasses found on the project site of unknown cause (e.g., show no observable USSE-associated cause of death). Mortality rate represents the annual number of estimated bird deaths per megawatt of name plate electric capacity. Values in parentheses represent the annual mortality rate estimated by the amount of electricity produced in gigawatt hours (GWh), assuming a 30% capacity factor.
[d] Total mortality rate includes the mortality rate calculated for carcasses found at USSE facilities with known and unknown causes of death (i.e., sum of known and unknown mortality rates). Mortality rate represents the annual number of estimated bird deaths per megawatt of name plate electric capacity. Values in parentheses represent the annual mortality rate estimated by the amount of electricity produced in gigawatt hours (GWh), assuming a 30% capacity factor.
[e] Refer to Supplemental Information for summary of data collection and mortality estimation at each solar energy facility.

the range of USSE capacity-weighted average mortality rates to the total USSE electric generation potential for the region, we estimate between 16,200 and 59,400 avian fatalities per year from USSE facilities within the southern California study region. Across all USSE facilities in operation or under construction in the United States (approximately 14 GW name plate electric capacity), between 37,800 and 138,600 bird deaths are estimated each year associated with USSE developments (Table 2).

3.2. Contextualizing avian mortality to other sources

Based on turbine locations mapped by the USGS through July 2013 [37], we calculated 4402 MW of total electric energy production of wind energy facilities in the study region. Of the wind energy facilities known to occur in the region, avian mortality data were available for 5 facilities (Table 3). These projects contain a wide range of avian mortality estimates (0.55–38.62 mortalities/MW), most likely due to changes in turbine technology over time. Taking a capacity-weighted average mortality rate across projects in the region results in an estimate of 6.71 bird deaths/MW/year. In addition, based on Smallwood's [23] national mortality estimate of 573,093 birds across a total installed wind energy capacity of 51,630 MW in the United States (as of 2012), we estimated a national avian mortality rate of 11.10 birds/MW. Applying this range of annual wind-related mortality rates (6.71–11.10 birds/MW) to the total electric generation potential for wind energy facilities in the study region results in an estimate of 29,537–48,862 bird mortalities per year among wind energy facilities in the region (Table 2).

Sovacool [25] estimated approximately 14.5 million birds die annually across the United States as a result of fossil fuel power plant operations, at a rate of approximately 74.2 birds/MW/year of nameplate electrical generation. Based on information obtained from the California Energy Commission, the total electric capacity rating of fossil fuel power plants in the study region was approximately 48,000 MW. Combining this electricity production capacity with the fossil fuel mortality estimate from Sovacool [25] (74.2 birds/MW/year) results in a regional mortality estimate of 3,561,600 birds associated with fossil fuel power plants (Table 2).

The following BCRs occur in the study region [33]: Sonoran and Mojave Deserts (57%), Coastal California (42%), and Sierra Nevada (1%). Based on avian mortality estimates from Longcore et al. [33] at communication towers in the United States and adjusting for the percentage of BCRs occurring in the region, we estimated avian mortality resulting from collision with communication towers in the study region to be 70,552 birds per year (Table 2).

Based on roadway GIS data obtained from the U.S. Census Bureau [42], there are approximately 167,700 miles of paved roadways in the study region. Banks [40] and Bishop and Brogan [41] estimated avian road mortality to range from 2.7 to 96.2 bird deaths/mile. Multiplying that range by the number of paved miles in the

Table 2
Estimated annual avian mortality from various sources in the Southern California Region and United States.

Mortality source	Southern California region	United States
Utility-scale solar energy (USSE) developments	16,200–59,400	37,800–138,600[a]
Wind energy developments	29,537–48,862	140,000–573,000[b]
Fossil fuel power plants	3,561,600	14.5 million[c]
Communication towers	70,552	4.5–6.8 million[d]
Roadway vehicles	>453,000[e]	89–340 million[f]
Buildings and windows	>7,800,000[g]	365–988 million[h]

[a] Based on approximately 14 GW total name plate capacity of utility-scale solar facilities in operations or under construction across the United States [7].
[b] Sources: Loss et al. [36], Smallwood [23], Erickson et al. [24].
[c] Source: Sovacool [25].
[d] Sources: Erickson et al. (2005), Longcore et al. [33].
[e] Represents a minimum estimate using only estimated mortality for paved roadways in the southern California study region.
[f] Source: Loss et al. [49].
[g] Represents a minimum estimate using only estimated mortality for residential structures in the southern California study region.
[h] Source: Loss et al. [34].

Table 3
Avian mortality estimates at wind energy facilities within the Southern California study Region[a].

Project name	Location	Electric generation capacity (MW)	Estimated mortality rate (per MW per year)	Source of mortality estimate
Alite Wind Energy Facility	Kern County, CA	24	0.55	Chatfield et al. [50]
Dillon Wind Energy Facility	Riverside, CA	45	4.71	Chatfield et al. [51]
Tehachapi Wind Resource Area (West Ridge)	Kern County, CA	11.88	38.62	Smallwood [23]
Tehachapi Wind Resource Area (Middle Ridge)	Kern County, CA	19.56	5.67	Smallwood [23]
Tehachapi Wind Resource Area (East Slope)	Kern County, CA	30.24	2.72	Smallwood [23]
Capacity-weighted average mortality rate within the study region			**6.71**	
Estimated average mortality rate for wind energy projects in the United States [23]			**11.10**[b]	

[a] Mortality estimates are based on studies that calculated avian mortality for all birds (e.g., passerines and raptors).
[b] National estimate calculated by Smallwood [23] based on estimated total mortality of 573,093 birds at installed wind energy capacity of 51,630 MW.

region results in 452,790–16,132,740 bird deaths/year due to road mortality in the study region (Table 2).

Based on data provided by the U.S. Census Bureau American Housing Survey [43] and information provided by each of the county assessor's offices, there are approximately 6,000,000 residential structures in the southern California study region. Applying the residential 95% confidence interval (CI) of the avian mortality estimate calculated by Loss et al. [34] results in an estimated 95% CI of 7,800,000 to 18,200,000 bird fatalities per year in the study region resulting from collisions with residential structures. The lower 95% CI mortality estimate of 10,500,000 birds represents a lower-bound estimate intended only for comparison purposes in this study (Table 2). Additional avian fatalities associated with collision with low-rise and high-rise buildings that were not evaluated in this study would contribute to total avian mortality associated with building collisions in the study area.

4. Discussion

To our knowledge, this is the first systematic assessment and contextualization of avian mortality at USSE facilities in the United States. Like all industrial developments, USSE developments have the potential to impact birds and bird communities in a number of ways, including direct fatality as a result of collision with USSE infrastructure or solar flux-related injuries. The studies reviewed in this article revealed that avian fatalities occur at USSE facilities employing both CSP and PV technologies. Systematic data collection and science-based methodologies to estimate adjusted mortalities to account for bias factors (e.g., predation, searcher efficiency, etc.) are important to understand avian impacts of USSE developments in the context of other human activities. The studies at the three USSE facilities from which systematically-derived avian mortality estimates could be calculated were all located in a region of southern California currently experiencing an accelerated rate of USSE development. According to SEIA [7], this region accounts for nearly 80% of all USSE developments in the state of California and nearly 50% of all USSE developments in the United States (Fig. 3).

Our evaluation of existing avian mortality information at USSE facilities provided a multi-scalar contextualization of USSE-related avian mortality in relation to other human activities at a regional and national scale. At both spatial scales, we found that avian mortalities at USSE facilities were considerably lower than most other human activities (Table 2). Within the southern California study region, avian mortalities at USSE facilities were within the range of mortalities estimated for utility-scale wind energy facilities. Estimated across the United States, however, avian mortality was greater at wind energy facilities, presumably due to the greater amount of wind energy development in other parts of the country. Total electric capacity of installed wind energy facilities in the United States was nearly 69 GW by the end of 2014 (>48,000 turbines; [46]), as opposed to total electric capacity of installed USSE facilities of approximately 14 GW by the end of 2015 [7].

Although USSE-related avian mortality was estimated to be orders of magnitude less than estimated mortality from other human activities across the United States (except wind energy development; Table 2), the number of avian fatalities at solar facilities may increase in future years as more solar facilities are constructed. The amount of planned future USSE development in the United States is nearly 4 times the current installed electric capacity [7]. Based on the current USSE avian mortality rates examined in this study, full build-out of the nearly 48 GW of potential future USSE developments may account for as many as 480,000 bird deaths annually in the United States. However, avian activity and abundance varies regionally [26,27,47] and may result in regional variation in avian mortality risk to human activities [25,27]. Because of this variation, additional systematic monitoring of avian fatality from various geographic regions where USSE projects are being developed would be needed to better understand overall avian mortality at USSE facilities across the United States.

Our preliminary assessment identified several opportunities to improve consistency in avian monitoring and data collection efforts at existing USSE facilities. For example, not all USSE facilities in the United States operate with an existing avian monitoring and reporting protocol, nor is there consistency in the survey design and reporting among the facilities that do implement such protocols. Only three USSE facilities were reported to have systematic avian fatality information that could be used to estimate project-specific avian mortality, and all of these facilities were located in southern California. Even among these facilities, there were differences in survey design and analytical approaches. For example, methods to estimate mortality based on carcasses with observable USSE-related cause of death separately from all other carcasses with unknown cause of death were developed at two of the three USSE facilities [44,45]. Moving forward, several data needs and recommendations can be made to improve understanding of avian fatality issues at USSE facilities:

1 There is a basic need to better understand the causal factors that contribute to fatalities, such as siting considerations, the potential for avian attraction to USSE facilities (e.g., the "lake effect" hypothesis), and project design (e.g., whether evaporative cooling ponds are used).
2 There is a need for more standardized, consistent, and science-based avian monitoring protocols to improve comparability of

the data being collected. Standardized monitoring methodologies will improve the scientific certainty of conclusions about avian mortality.

3 As efforts get under way to improve the quality of avian mortality data collected from USSE facilities, researchers should focus on (a) uncertainties related to avian risks; (b) population-level impacts to migratory birds; (c) development of more effective inventory and monitoring techniques; and (d) developing appropriate and cost-effective mitigation measures and best management practices to reduce mortality risk.

While our study provides a preliminary assessment of avian mortality at USSE facilities, it could serve as a reference for future study as more avian monitoring is conducted at USSE facilities. There still remains uncertainty in the population-level impacts of USSE avian mortality. Despite this uncertainty, available information suggests that USSE-related avian mortality is considerably lower than mortality from other human activities. However, USSE facilities may still contribute to the cumulative effects of all avian mortality risk factors (including all other energy developments, vehicle and building collisions, etc.). Additional study is needed to understand the combined influence of all avian mortality risk factors, including USSE-related mortality, on avian populations.

Over time, it is possible for mortality rates to change, or even decrease, as the USSE industry works to address avian–solar issues through more environmentally-conscious siting decisions and the implementation of more effective minimization and mitigation measures. In fact, cost effective mitigation measures have already been identified to reduce mortality risk. For example, Walston et al. [48] reported that measures to alter the standby positioning of heliostats at USSE facilities employing power tower technologies could significantly reduce the amount of heat flux around the tower receiver and thus reduce flux-related mortality risk at CSP facilities. Additional studies to identify optimal project siting locations that avoid major avian migratory routes, stopover sites, and important habitats will also work to reduce regional mortality risk. These activities hold promise for the future of solar energy industry to become a low cost and low conflict source of electricity.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.renene.2016.02.041.

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EXHIBIT 2

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Assessing the impacts of a utility-scale photovoltaic solar energy facility on birds in the Northern Cape, South Africa

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ABSTRACT

Solar energy is a promising alternative to reduce South Africa's dependency on electricity generation from fossil fuels, since the country has one of the world's most favourable solar energy regimes. Utility-scale solar energy developments can impact bird communities through habitat loss and collision mortality, but there are few studies of the impacts of utility-scale photovoltaic (PV) facilities on birds. This study reports how one of South Africa's largest PV facilities (96 MW, 180 ha) has altered bird communities and assesses the risk of avian collision mortality. Bird species richness and density within the PV facility (38 species, 1.80 ± 0.50 birds ha ^{1}) tended to be lower than the boundary zone (50 species, 2.63 ± 0.86 birds ha ^{1}) and adjacent untransformed land (47 species, 2.57 ± 0.86 birds ha ^{1}). Only eight fatalities were detected during 3 months of surveys of the solar field for bird carcasses and other signs of collisions. The extrapolated mortality for the facility was 435 (95% CI 133–805) birds per year (4.5 bird fatalities MW ^{1} yr ^{1}; 95% CI, 1.5–8.5). No threatened species were impacted by the PV facility, but further data are required to better understand the risk of PV solar energy developments on birds.

1. Introduction

South Africa is one of the most carbon-intensive countries in the world [1], ranking among the poorest performers in terms of emissions level, development of emissions, and efficiency [2]. In terms of the Copenhagen Accord, South Africa pledged to reduce carbon emissions 34% below the business-as-usual trajectory by 2020, and 42% by 2025 [3]. Accordingly, a target of 17 800 MW (Megawatt) of new generation capacity from renewable sources was set for 2030 [4]. Solar energy is seen as a key facet of this process [5]; [6].

South Africa has one of the highest potential solar energy regimes in the world, making it ideal for PV-based solar energy generation [3]; [5]. The Northern Cape Province, which has the most favourable radiation levels, has attracted most utility-scale photovoltaic (PV) and all of the concentrated solar power (CSP) projects approved to date [7]; [5]. Technological advancements and cost reductions have resulted in PV now contributing more than a third of South Africa's renewable energy capacity [5]. The rapid development of PV facilities raises concerns about the potential impacts on bird populations, especially as the scope and magnitude of these impacts remain poorly understood [8]; [9]; [10]; [11].

Utility-scale solar PV facilities require *ca* 2 5 ha MW ^{1} [11], and thus occupy large areas where there is often the complete removal of vegetation [9,12]. It is this tendency to destroy, degrade or fragment large areas of natural habitat that has stimulated most concern to date [9], especially when threatened birds or those with restricted ranges and habitat requirements are displaced. Recent findings at PV facilities in North America suggest that collision mortality impacts may also be significant [13]; [14]. The "lake-effect" hypothesis suggests that waterbirds mistake large expanses of solar arrays for water bodies, colliding with the infrastructure as they attempt to land. This could either result in direct mortality or leave individuals injured or stranded, rendering them vulnerable to predators [14]. Glare and polarised light may also attract insects, resulting in aggregations of insectivorous birds, further increasing collision risks [9,15,16]. There have been no studies to substantiate or refute these hypotheses to date [9,14,17], but the lack of evidence

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may reflect the paucity of monitoring effort more than an absence of collision risk. Only one study that systematically monitored avian fatalities at a utility-scale PV facility has been published in the primary literature. Walston et al. [17] used data collected at a 250 MW PV facility (California Valley Solar Ranch) in the USA over one year (August 2012–August 2013) by Harvey & Associates [13]. Weekly searches of 20% of the facility found 368 fatalities, but this estimate was not adjusted for searcher efficiency or scavenger removal, and included casualties on the fence-line and powerlines, as well as in the solar array.

Unlike some components generally associated with solar facilities e.g. power lines [18–20], there are no clear patterns in the types of birds affected by solar panels. Most peer-reviewed publications only discuss the potential impacts, with little supporting empirical evidence [8]; [9,11]. Empirical research following systematic, repeatable and standardised sampling protocols to assess the impacts of PV facilities on birds is essential to inform biodiversity management and monitoring guidelines. This study reports how the development of a large PV facility has affected bird communities in the semi-arid Northern Cape, South Africa, and provides the first estimates of collision risks for birds at a PV facility in this region. It improves our knowledge of the impacts of utility-scale PV facilities and assesses whether mitigation measures are warranted to ensure a sustainable industry roll-out across southern Africa.

2. Methods

2.1. Study site

The study was conducted at the 96 MW Jasper PV facility (28° 18′ S 23° 22′ E), which has a footprint of 180 ha *ca* 30 km east of Postmasburg in South Africa's Northern Cape Province. The facility is adjacent to the 75 MW Lesedi PV project. Jasper contains 325 360 fixed-tilt solar panels, facing north at a 20° angle. The top of each panel is 1.86 m off the ground and successive rows are spaced 3.11 m apart. The facility is surrounded by a narrow cleared area with a perimeter track inside a 2-m high double fence that consists of an outer ribbon mesh and inner electric fence. Waste water containing chemicals from the panel cleaning process is disposed of in a 20 × 20 m evaporation pond next to the administration block. Outside the fenced area, a 50–150 m wide buffer zone, which remained largely untransformed during the construction process, extends around the facility and is fenced off from the remainder of the farm by a standard 1.2-m high livestock fence. The north edge of the facility has a 1000 m^2 switchyard with a 5-km long 132 kV transmission line linking to the national power grid. The facility was commissioned in 2014, and after construction, regrowth of grass and low groundcover was promoted between the solar arrays.

The facility lies within the Eastern Kalahari Bushveld bioregion of the Savanna Biome and consists of open savanna grassland scattered with dense bushes and occasional trees [21]. There are no rivers in the immediate area, apart from a seasonal stream south-west of the site. The surrounding land is used for cattle and horse grazing, and there are several watering points for livestock. An estimated 187 bird species could occur within the study area, of which six are red-listed and 53 are endemic/near-endemic to southern Africa [22]; [23].

2.2. Changes in bird communities

Standard line transect sampling procedures [24] were used to estimate bird densities in three areas: the solar facility, its boundary (including the perimeter fence, evaporation pond, and buffer zone), and the adjacent untransformed landscape. Elevated vantage points were included in each transect within the facility to improve visibility between the solar panels. All birds seen or heard were identified using binoculars or by call and the perpendicular distance between observer and bird was estimated. Surveys were conducted by one observer throughout the study, took place within 4 h of sunrise when bird activity was highest, and on relatively calm days. The sequence of observations was randomised among sites to ensure different starting points for each survey [24].

2.3. Collision mortality

At the start of the study, the entire facility was searched to remove old bird carcasses. Thereafter regular mortality surveys were conducted for three months, from September to December 2015. Carcass searches took place by walking between rows of solar panels, checking beneath the solar panel units (SPUs) and the surfaces of the panels for any signs of collision. In addition to carcasses, evidence of collision was inferred from: (1) smudge marks (e.g. blood or dust imprints) and feathers on the panels, or (2) feather spots consisting of ten or more feathers of any type in an area <3 m^2, or at least two wing flight feathers or five tail feathers within 5 m of each other. The solar field was divided into three sample areas, with effort distributed evenly over the subset of panels selected for routine sampling. To limit the loss of carcasses to scavengers [25,26], one set of solar arrays in each area (28880–31160 SPUs, representing 9–10% of each sample area) was searched every 4 days for the first six weeks and every 7 days thereafter, whereas the second set (24920–32760 SPUs; 8–10% of the total area) was surveyed every 14 days. Total coverage was close to 30% per search-interval category.

Bird mortalities arising from other infrastructure associated with the solar facility were also monitored. The evaporation pond and substation was checked every 4 days. The perimeter fence was subdivided into 3 sections, with 55% (4.03 km) checked every 4 days, 9% (0.65 km) every 7 days, and 36% (2.60 km) every 14 days. Searches were conducted by driving slowly (<10 km h^{-1}) along the track just inside the fence, or on foot where the track diverged from the fence. The transmission line linking the solar facility to the national grid was surveyed monthly by two searchers on foot, following a meandering transect underneath the lines and surveying for fatalities within approximately 10–15 m of the power line [27].

2.4. Searcher efficiency trials

Searcher efficiency trials were conducted to quantify the probability of carcass detection among the SPUs [17,28]. In contrast to wind-energy fatalities, injuries or fatalities were unlikely to result in dismemberment [29], so the trials used intact carcasses. Bird carcasses (n = 30), which had been stored frozen and marked with small plastic leg rings to distinguish them from natural mortalities [30], were deployed in what were thought to be likely spots on, adjacent to, or underneath panels throughout a defined area in the solar field. This area was then searched by independent observers using the standardised survey procedure for carcass detection, recording the location and identification of carcasses [31]. Immediately after each trial, undetected carcasses were retrieved to confirm that they had not been removed by scavengers. Detection probabilities were estimated in relation to two covariates: location relative to the SPUs (adjacent or underneath) and bird size (small [<100 g], medium [100–1000 g] or large [>1000 g]; Appendix A).

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2.5. Carcass persistence trials

Carcass persistence trials estimated the probability that a carcass would be detectable by observers searching at fixed search intervals (Walston et al., 2015; [25]. Only the influence of carcass size was considered; seasonal and inter-annual variation in persistence rates were not considered due to the relatively short study period [29]. Over the course of the study, 45 bird carcasses (30 small, 10 medium and 5 large) were placed throughout the facility among the SPUs and along the perimeter fence (Appendix A). At most five carcasses were placed every 1–2 weeks to avoid scavenger swamping [29,30]. All carcasses were marked with a plastic leg band and handled with latex gloves to reduce the risk of leaving scent traces which may be used as cues by potential scavengers [31,32]. Carcasses were checked until they disappeared or deteriorated to a point where they would no longer be detected as a fatality. They were visited daily for the first 5 days, every other day from day 7–15 and every seven days thereafter until 4 weeks after deployment. The state of carcasses was categorised as: (1) intact, (2) scavenged [carcass dismembered, or flesh removed], (3) feather spot, or (4) removed [not enough remains to be considered a fatality]. A subset of carcasses was monitored using Ltl-5310 ACORN motion-triggered cameras to identify the main scavengers in the study area.

2.6. Data analyses

Distance 6.2 was used to generate density estimates (birds·ha^{-1}) for the most abundant species and the entire community. Suitable truncation points were determined and the distance data were grouped into intervals (0–20 m, 21–50 m, 51–100 m, 101–200 m, over 200 m). Models were fitted and assessed using Akaike's Information Criterion [33]. A Welch's *t*-test was used with R 3.2.2 to assess differences in bird density. Correspondence Analysis (CA) was used to assess variation in bird community composition among sample areas by plotting the species and sample area scores (e.g. Ref. [34]. The 23 most abundant species were selected to analyse the degree of avoidance. Each species i relative frequency at the facility γi (Lf) was compared to its frequency at the untransformed landscape γi (Lu) with the use of chi-square goodness-of-fit tests or Fisher exact tests (expected numbers lower than 5) with a Bonferroni correction (e.g. Ref. [34]. Individual species frequencies γi, were defined as the ratio of species i's abundance to the total number of birds. Scores located close to the $y = x$ line indicated indifference, while overrepresented species at the facility would be above the line and underrepresented species under the line. Species were allocated to one of four habitat groups (shrub/woodland species, open country/grassland species, aerial insectivores and generalists; Table 1) based on their preferred habitat from Hockey et al. [35].

The estimated number of birds killed by collisions was extrapolated from the observed collision data, correcting for detection biases and carcass persistence (e.g. Refs. [36,37]. For any solar array i, the 3 month study period was divided into S_i consecutive intervals of length l_{ij}, representing the total number of intervals and days per solar array. The total number of fatalities (F_{ij}) at the ith solar array in the jth interval was grouped by carcass size and search-interval category (4, 7, and 14 days), for which the probability of detection was the same for all carcasses in the set. Fatalities were calculated as the number of carcasses observed (c_{ijk}) over the probability of detection (g_{ijk}), calculated as the product of the probability of a carcass being observed (p) and the probability of a carcass persisting (r), and was applied to all birds found at the end of interval length l. Searcher efficiency was estimated as the proportion of carcasses found by searchers, analysed per size class and carcass location. Carcass persistence was estimated as the proportion of carcasses remaining after a given search interval category. Fatality rates were reported per GWh and MW, and 95% confidence intervals around the estimates were obtained by bootstrapping the mortality data in Excel (n = 1000 replicates). Chi-squared

Table 1
The 23 most abundant bird species counted during 50 transect counts (5 replicates for each of the 5 transects per sample area) indicating total counts and density estimates (birds·ha^{-1}) for species recorded within the solar facility and untransformed landscape (n.s. = not significant).

Common name	Scientific name	PV facility		Untransformed land		Density
		Count	Density	Count	Density	p-value
Shrub/woodland species						
Black-chested prinia	*Prinia flavicans*	0	–	29	0.58 ± 0.42	<0.001
Chestnut-vented tit-babbler	*Sylvia subcaeruleum*	0	–	21	0.99 ± 0.35	<0.001
Violet-eared waxbill	*Granatina granatinus*	0	–	21	0.62 ± 0.98	<0.001
Kalahari scrub-robin	*Cercotrichas paena*	0	–	18	0.80 ± 0.54	<0.001
Karoo scrub-robin	*Cercotrichas coryphaeus*	0	–	10	0.29 ± 0.55	n.s.
African red-eyed bulbul	*Pycnonotus nigricans*	7	–	25	0.37 ± 0.27	n.s.
Open country/grassland						
Eastern clapper lark	*Mirafra fasciolata*	7	–	20	0.78 ± 0.82	n.s.
Desert cisticola	*Cisticola aridulus*	24	1.27 ± 1.21	19	0.5 ± 0.31	n.s.
Ant-eating chat	*Myrmecocichla formicivora*	15	0.19 ± 0.41	18	0.4 ± 0.86	n.s.
Spike-heeled lark	*Chersomanes albofasciata*	15	0.44 ± 0.64	5	0.38 ± 0.65	n.s.
Plain-backed pipit	*Anthus leucophrys*	11	0.31 ± 0.59	2	–	n.s.
Aerial species						
Alpine swift	*Tachymarptis melba*	4	0.19 ± 0.41	6	–	n.s.
Rock martin	*Ptyonoprogne fuligula*	11	0.17 ± 0.42	0	–	<0.001
Greater-striped swallow	*Cecropsis cucullata*	10	0.49 ± 0.59	16	0.42 ± 0.36	n.s.
Generalist species						
Cape turtle dove	*Streptopelia capicola*	12	–	23	0.55 ± 0.97	n.s.
Familiar chat	*Cercomela familiaris*	32	1.54 ± 1.09	11	–	<0.001
Chat flycatcher	*Bradornis infuscatus*	5	0.26 ± 0.34	2	–	n.s.
Fiscal flycatcher	*Sigelus silens*	14	0.25 ± 0.56	10	0.36 ± 0.32	n.s.
Fawn-coloured lark	*Calendulauda africanoides*	16	0.56 ± 0.39	24	0.94 ± 0.66	n.s.
Cape bunting	*Emberiza capensis*	4	0.28 ± 0.79	0	–	n.s.
Cape sparrow	*Passer melanurus*	28	0.38 ± 0.38	6	–	<0.001
Black-throated canary	*Crithagra atrogularis*	12	0.52 ± 0.59	5	–	n.s.
Yellow canary	*Crithagra flaviventris*	59	0.50 ± 0.62	56	0.93 ± 0.66	n.s.

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goodness-of-fit tests were conducted in R version 3.2.2, with $\alpha = 0.05$.

3. Results

3.1. Changes in bird communities

Fifty-three bird species (Fig. 1, Appendix B) were recorded during 75 transect counts (5 replicates for each of the 5 transects per sample area), of which 22 were endemic or near-endemic to southern Africa but none was globally or nationally threatened [22]. Species richness (38 species) and average density of birds (1.80 ± 0.50 birds·ha $^{-1}$) at the PV facility tended to be lower than the boundary (50 species, 2.63 ± 0.86 birds·ha $^{-1}$) and adjacent untransformed landscape (47 species, 2.57 ± 0.86 birds·ha $^{-1}$), although the difference in density was only marginally significant ($t = -2.21$, $df = 6$, $P = 0.06$). Of the 23 most abundant bird species, six were typical of shrub/woodland, five of open country/grassland, three were aerial insectivores, and nine were generalists (Table 1). The first axis of the CA, which explained 96% of variation in bird abundance, clearly differentiated the solar facility community from the adjacent untransformed landscape community (Fig. 1). All six shrub/woodland species were under-represented at the PV facility (Fig. 2), with five being absent from the facility (Table 1). Among the five open country/grassland species, three (eastern clapper larks *Mirafra fasciolata*, plain-backed pipits *Anthus leucophrys* and ant-eating chats *Myrmecocichla formicivora*) were over-represented in the facility (Fig. 2), but none of their densities differed significantly (Table 1). Most generalist species were represented equally in the facility and adjacent land, but familiar chats *Cercomela familiaris* and Cape sparrows *Passer melanurus* were more abundant inside the facility than in adjacent vegetation (Fig. 2, Table 1). Of the three aerial species, rock martins *Ptyonoprogne fuligula* were more common over the facility (Table 1).

Most birds visited the facility to forage (e.g. fiscal flycatchers *Sigelus silens* and chat flycatchers *Bradornis infuscatus* used the solar panels as foraging perches), while some species used the SPUs for shade and shelter (e.g. Orange River francolins *Scleroptila levaillantoides* foraged under the SPUs). Some granivores visited the evaporation pond to drink (e.g. yellow canaries *Crithagra flaviventris* and Cape sparrows), while Cape wagtails *Motacilla capensis* foraged around the pond. Five species were found nesting on the solar panel supports: Cape sparrows ($n = 2$), and one nest each of familiar chat, African red-eyed bulbul *Pycnonotus nigricans*, laughing dove *Streptopelia senegalensis*, and Cape wagtail.

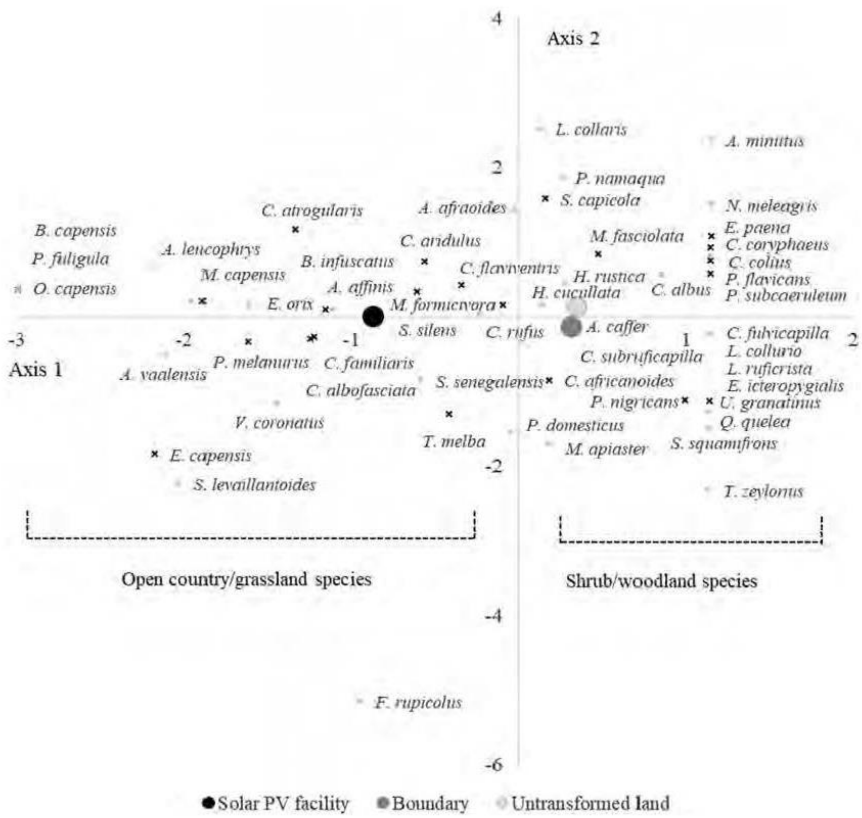

Fig. 1. Biplot of the first two axes of the Correspondence Analysis (CA) representing the 53 bird species distributed over the solar facility, boundary, and untransformed landscape at the Jasper PV solar facility in the Northern Cape, South Africa. Crosses represent the 23 most abundant species within and around the development footprint, which were retained for further analysis.

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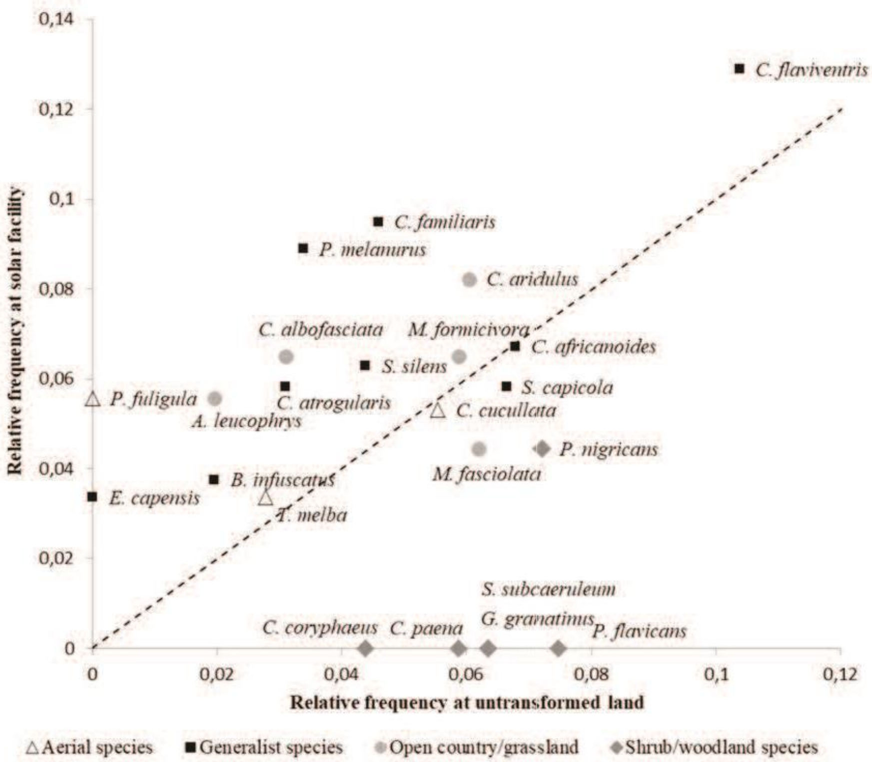

Fig. 2. Comparing relative frequencies between the PV facility and untransformed landscape for 23 most abundant species, grouped according to habitat dependencies (aerial, generalists, open country/grassland and shrub/woodland species).

3.2. Collision mortality

The initial clearance surveys detected three fatalities among the SPUs and perimeter fence. Thereafter, eight fatalities of six bird species were recorded (Table 2); seven among the SPUs (0.003 birds·ha ^{1}·month ^{1}) and one Orange River francolin at the fence-line (0.002 birds·km ^{1}·month ^{1}). Most fatalities were inferred from feather spots. No fresh carcasses or evidence of damaged or imprinted solar panels that might have suggested collision were recorded, making it impossible to infer cause of death. Most fatalities (7 of 8) were located under the SPUs, suggesting that either the birds did not collide with the upper surfaces of the panels, or they were moved by scavengers after collision. The fence-line fatality of an Orange River francolin resulted when the bird was trapped between the inner and outer fence. Three red-crested korhaans *Lophotis ruficrista*, another large-bodied bird, were unable to escape from between the two fences without the help of facility personnel. Two rock monitor lizards *Varanus albigularis* also were rescued from between the two fences. Only one fatality was detected on other infrastructure: a crowned lapwing *Vanellus coronatus* dead on the approach road, probably hit be a vehicle. No collision or electrocution mortalities were found under the transmission line linking the facility to the national grid.

3.3. Searcher efficiency trials

Overall 74% of trial carcasses were detected by observers, with both carcass size ($\chi^2 = 19.75$, df = 2, $P < 0.001$) and location relative to the SPUs ($\chi^2 = 9.26$, df = 1, $P < 0.001$) influencing the probability of detection. Large birds (100%) and medium-sized birds (90%) were

Table 2
Summary of bird fatalities detected during 3 months of avian mortality surveys at the PV facility in the Northern Cape, South Africa. Fatalities recorded during the initial clearance surveys are in brackets compared to the fatalities found during the regular surveys.

Size class	Common name	Scientific name	SPUs	Fence
Small (<100 g)	Fiscal flycatcher	*Sigelus silens*	2 (1)	
	Red-eyed bulbul	*Pycnonotus nigricans*		0 (1)
	Eastern clapper lark	*Mirafra apiata*	1 (0)	
Medium-large (>100 g)	Orange River francolin	*Scleroptila levaillantoides*	3 (1)	1 (0)
	Speckled pigeon	*Columba guinea*	1 (0)	
Total			7 (2)	1 (1)

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more likely to be detected than small birds (60%), as were birds under the SPUs, where there was less vegetation than between the SPUs (Table 3).

3.4. Carcass persistence trials

Overall, 20% of bird carcasses disappeared within 24 h of placement, 36% after one week, and 53% after 4 weeks (Fig. 3). Large carcasses were more likely to persist than small carcasses ($\chi^2 = 8.14$, df = 1, $P < 0.01$). Only 30% of small bird carcasses were still detectable after 4 weeks, compared to 80% of medium-large carcasses, although both size classes were mainly represented by feather spots (Fig. 3). Medium-sized carcasses were reduced to large feather spots, usually after being moved under the SPUs. Large carcasses were mostly reduced to scattered bones and feathers. Feathers typically remained within 5 m of the placement location. Camera traps revealed that small carcasses were generally removed whole by scavengers, including African polecats *Ictonyx striatus* (n = 4), yellow mongooses *Cynictis penicillata* (n = 3) and feral cats *Felis catus* (n = 2). Avian scavengers typically left the remains in situ and included Orange River francolins (n = 2) and pied crows *Corvus albus* (n = 1). Scavenging by birds and yellow mongooses occurred during the day, whereas polecats and feral cats were active at night.

Table 3
Results of the searcher efficiency trials by size class and location relative to the Solar Panel Units (SPUs) at the PV facility.

Size class	Adjacent to SPUs	Underneath SPUs	Total
Small (<100 g)	38/66 (58%)	10/14 (71%)	48/80 (60%)
Medium (100–1000 g)	14/17 (82%)	22/23 (96%)	36/40 (90%)
Large (>1000 g)	5/5 (100%)	13/13 (100%)	18/18 (100%)
Total	57/88 (65%)	45/50 (90%)	102/138 (74%)

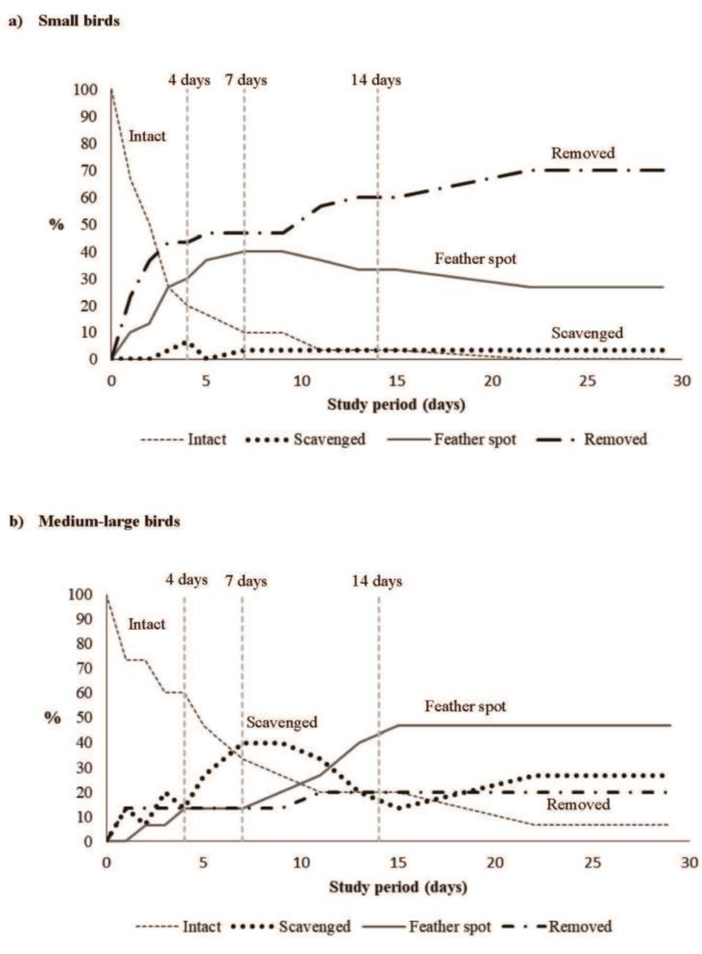

Fig. 3. Percentage of (a) small (<100 g, n = 30) and (b) medium-large (>100 g, n = 15) bird carcasses still detectable at increasing intervals after deployment at the Jasper PV solar facility in the Northern Cape, South Africa. The vertical dashed lines represent the search intervals used in this study and indicate the respective level of carcass persistence.

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3.5. Fatality estimation

Extrapolated bird mortality within the solar field at the Jasper PV facility was 435 birds·yr $^{-1}$ (95% CI 133–805) over 323 920 solar panels, which is 2.42 fatalities·GWh $^{-1}$ (0.74–4.47) over 180 GWh $^{-1}$, and 4.53 fatalities·MW $^{-1}$ (1.51–8.50) over 96 MW (Table 4). The broad confidence intervals result from the small number of birds detected. The mortality estimate is likely conservative because detection probabilities were based on intact birds, and probably decrease for older carcasses and feather spots. Too few fatalities were detected for the associated infrastructure (perimeter fence, evaporation pond, power lines and substation), to allow fatality estimates to be extrapolated.

4. Discussion

4.1. Changes in bird communities

The distribution of birds is determined by the distribution and abundance of resources. The development of the PV solar facility cleared a large area of arid savanna and replaced it with short grassland with a dense cover of solar panels. Such changes are detrimental to some bird species and beneficial to others. Both bird species richness and density was lower at the PV facility than the surrounding area, as is typical of studies at other PV facilities [12]; [13]. Species composition also differed to some extent, largely reflecting the loss of shrub/woodland species. However, none of the species affected were threatened or rare, so overall the facility has had little impact on this bird community. Several open country/grassland bird species were more frequently encountered within the facility, while other species showed no adverse impact, perhaps due to their ability to adapt to habitat disturbance and modification [35,38]. The facility might supplement and/or complement habitat resources such as foraging, hunting, and nesting sites [39]. This can be due to microclimatic changes initiated by the PV canopies [40], creating new microhabitats due to additional shading and regrowth of native vegetation as well as providing additional perching and nesting sites.

4.2. Collision mortality

While any bird flying over the solar facility, or using it extensively, is at risk of collision, the extent thereof likely depends on biological, topographical, meteorological and technical factors [9,18,27,36]. Although only a few birds were found dead at the facility, most of the affected species were overrepresented compared to adjacent habitats, and thus were species attracted to the facility. As has been reported at other solar facilities, resident species and passerines accounted for most of the avian mortality [17], presumably because they are the most abundant birds. However, the most frequently affected species, the Orange River francolin, is a relatively uncommon species; it is a larger bird that might be particularly at risk of collision mortality if panicked by a predator while feeding under the solar arrays. These results indicate that, similar to studies in the wind-energy industry, the level of bird use and behaviour at the site are important factors to consider when assessing potential risk at solar facilities [41]; [42].

Consistent with previous monitoring programmes [14,17], most fatalities were inferred from feather spots, making it difficult to determine the cause of death. There was no evidence that birds were responding to polarised light [12]. Studies on window collisions [43,44] suggest that collision mortality could be reduced by fitting solar panels with contrasting bands and/or spatial gaps [16] to increase panel visibility and reduce the likelihood of birds perceiving the solar field as a water body (lake effect) [14,16,45]. However, contrasting bands might reduce energy output [16,45] and thus increase the area required to generate power. More information on the severity and cause of fatalities is required before such mitigation measures can be recommended with confidence.

Large-bodied birds and monitor lizards were trapped between the ribbon mesh and electric fence. This is a site-specific problem linked to the double fence design; few fence-related fatalities have been reported at solar facilities with single-fence designs (e.g. Ref. [46]. No fatalities were documented among the power lines, substation, or evaporation pond, most likely due to the scarcity of large-bodied birds, and/or the short study period. Bird flight diverters can be used to increase the visibility of powerlines erected at facilities [19]. Such devices can reduce powerline collisions by 50–80% [19], although their efficacy varies among bird groups (e.g. Ref. [47]. Jenkins et al. [19] suggest that devices should be at least 20 cm long and spaced every 5–10 m along earth wires or conductors.

Another potential method to reduce collision risk is to reduce attractiveness of PV facilities is by clearing vegetation between panels to decrease the availability of food and nesting sites [14]. However, this might have other ecological consequences as vegetation removal exacerbates habitat loss, which is perhaps the most significant threat to biodiversity from solar energy facilities [11,48]. Our bird community studies suggest that it is better to provide a beneficial environment for at least some bird species, but it would be better to locate PV facilities in areas with low biodiversity value, away from sensitive or important bird habitats [7,11,49].

The lack of standardisation in data collection protocols, reporting units, and bias correction provides sparse and inconsistent

Table 4
Variables used per size class, search interval, and sample area to calculate the overall annual bird fatalities at the Jasper PV solar facility in the Northern Cape, South Africa. This includes number detected (c), searcher efficiency (p), carcass persistence (r), and detection probability (g).

Infrastructure	Size	Search interval (days)	Area covered (%)	Duration (days)	c (%)	p (%)	r (%)	g (%)
SPUs	Small	4	28	31	1	71	57	40
		7	28	52	1	71	53	38
		14	27	45	1	71	40	28
	Medium/large	4	28	31	2	98	87	85
		7	28	52	1	98	87	85
		14	27	45	1	98	80	78
Perimeter fence and evaporation pond	Small	4	100	31	0	–	–	–
		7	100	52	0	–	–	–
		14	100	45	0	–	–	–
	Medium/large	4	100	31	1	98	87	85
		7	100	52	0	–	–	–
		14	100	45	0	–	–	–
Total					8			

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avian-fatality data records for solar facilities [14,17,25]. Comparing avian mortality rates among PV facilities is complicated by sampling at different geographic scales and temporal periods. In order to fully understand the risk of collision mortality among solar facilities and other sources of electricity generation, fatality estimates need to be calculated through standardised protocols in order to account for potential biases and provide meaningful comparisons through estimates per GWh or MW [17,25,50]. The extrapolated estimate of 2.42 fatalities·GWh $^{-1}$ may be an overestimate because some feather spots may not have represented a fatality, and some fatalities might not have resulted from the facility (i.e. occurred due to other causes). Conversely, observer bias estimates likely are optimistic, because only fresh carcasses were searched for, and observers knew they were being tested, likely increasing their vigilance relative to routine monitoring searches. The short study period could not account for seasonal and inter-annual variation, which could affect carcass monitoring, bird activity levels, and collision risk/mortality. Therefore, there is a need to collate and analyse data across spatial and temporal scales to produce robust and comparable results for the compilation of appropriate mitigation protocols to alleviate any adverse effects on species of concern and their habitats [17,31].

4.3. Monitoring challenges

Challenges to monitoring bird mortalities included differences in carcass detection in relation to bird size and location. Smaller carcasses adjacent to the SPUs were more difficult to detect due to denser vegetation cover and the panels obscuring ground visibility. The persistence trials indicated that carcass removal rates were greatest in the first week, and that small bird carcasses were removed faster because they are more easily carried away by the relatively small scavengers that could access the facility. Larger predators such as black-backed jackals *Canis mesomelas* or caracal *Caracal caracal*, which could carry off larger bird carcasses, were prevented from accessing the site by the fence. Our results highlight the need for including bird size in searcher efficiency and carcass persistence trials. The rapid removal of small carcasses suggests that there is little value in sampling at intervals of two weeks or more for these species, whereas larger species might be detected for longer. To ensure robust results, we recommend searching at least weekly during post-construction monitoring. However, persistence rates may vary between sites and should be adapted accordingly.

4.4. Recommendations for future research

We recommend using Before-After Control-Impact (BACI) study designs to assess how utility-scale PV developments impact bird communities during pre-construction through to the operational phase. A study in California found that raptor abundance was higher pre-construction than post-construction, suggesting that raptors avoid facilities once they are operational [51]. Investigating the underlying mechanisms (e.g. food availability, habitat availability, noise disturbance) that drive indirect effects on bird populations at pre-construction stage [51], can inform post-construction management and future developments. We recommend that future studies include seasonal and/or wet-dry sampling to assess temporal and spatial variation in bird fatalities. Future studies should also assess if solar facilities attract invertebrates, potentially influencing community assemblages with cascading ecological repercussions [14]. Further research is also required to assess the impact that different vegetation management strategies have on bird communities. Comparisons of collision impact mortality rates between different solar energy technologies (e.g. fixed-tilt versus single-axis tracker mounting) also are needed. The advantages and disadvantages of these technologies, including the risk for bird collisions, can be used to inform the design of future PV facilities. Lastly, it is essential to assess the cumulative impacts of utility-scale PV developments within a region. Although the impacts of a single facility might be relatively trivial, the environmental impacts can be compounded when multiple developments are erected, with unknown consequences on birds in the surrounding region [52].

5. Conclusions

The rapid expansion of utility-scale solar facilities across southern Africa raises concerns about cumulative impacts. The Northern Cape Province, which is the preferred area for utility-scale solar energy facility development, hosts a range of specialist, endemic and range-restricted species, including some of conservation concern [7,53–56]. However, continued reliance on fossil-fuel consumption may result in global costs to bird populations that outweigh any effects of the industry. The apparent negative impacts of PV facilities should not hamper efforts aimed at reconciling increases in renewable energy generation with biodiversity conservation. Like other energy sources, the impact of PV facilities on birds is likely to differ on a case-by-case basis [9]. PV facilities replacing previously degraded lands can play an important role in promoting biodiversity [39], while the opposite is generally the case with developments in pristine or near-pristine habitats.

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Appendix A. List of bird species by size class and number used in the searcher efficiency and carcass persistence trials at the Jasper PV facility in the Northern Cape, South Africa.

Size class	Bird species (mass g)	Searcher efficiency	Carcass persistence
Small (<100 g)			
	Lark-like bunting *Emberiza impetuani* (17 g)	2	0
	Yellow canary *Crithagra flaviventris*[1] (17 g)	1	1
	Southern red bishop *Euplectes orix*[2] (24 g)	4	4
	Fawn-coloured lark *Calendulauda africanoides* (25 g)	3	3
	House sparrow *Passer domesticus* (28 g)	0	5
	Namaqua dove *Oena capensis* (38 g)	5	5
	White-browed sparrow-weaver *Plocepasser mahali* (47 g)	1	0
	Common quail *Coturnix coturnix* (95 g)	0	12
Medium (100–1000 g)			
	Blacksmith lapwing *Vanellus armatus* (165 g)	2	2
	Crowned lapwing *Vanellus coronatus* (185 g)	1	1
	Green pigeon *Treron calvus* (230 g)	4	5
	Feral pigeon *Columba livia* (385 g)	3	2
	Large (>1000 g)		
	Hadeda ibis *Bostrychia hagedash* (1250 g)	4	5

[1] adult male.
[2] one breeding plumage male and three females/eclipse males.

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Appendix B. List of bird species recorded at the Jasper PV facility, boundary, and untransformed land in the Northern Cape, South Africa (√ = recorded).

Common name	Scientific name	Solar facility	Boundary	Untransformed land
African red-eyed bulbul	*Pycnonotus nigricans*	✓	✓	✓
Alpine swift	*Tachymarptis melba*	✓	✓	✓
Ant-eating chat	*Myrmecocichla formicivora*	✓	✓	✓
Barn swallow	*Hirundo rustica*	✓	✓	✓
Black-chested prinia	*Prinia flavicans*		✓	✓
Black-throated canary	*Crithagra atrogularis*	✓	✓	✓
Bokmakierie	*Telophorus zeylonus*		✓	✓
Buffy pipit	*Anthus vaalensis*	✓	✓	✓
Burchell's courser	*Cursorius rufus*	✓	✓	✓
Cape bunting	*Emberiza capensis*	✓	✓	
Cape penduline-tit	*Anthoscopus minutus*		✓	✓
Cape sparrow	*Passer melanurus*	✓	✓	✓
Cape turtle dove	*Streptopelia capicola*	✓	✓	✓
Cape wagtail	*Motacilla capensis*	✓	✓	✓
Chat flycatcher	*Bradornis infuscatus*	✓	✓	✓
Chestnut-vented tit-babbler	*Sylvia subcaeruleum*		✓	✓
Common southern fiscal	*Lanius collaris*	✓	✓	✓
Crowned lapwing	*Vanellus coronatus*	✓	✓	✓
Desert cisticola	*Cisticola aridulus*	✓	✓	✓
Eastern clapper lark	*Mirafra fasciolata*	✓	✓	✓
European bee-eater	*Merops apiaster*	✓	✓	✓
Familiar chat	*Cercomela familiaris*	✓	✓	✓
Fawn-coloured lark	*Calendulauda africanoides*	✓	✓	✓
Fiscal flycatcher	*Sigelus silens*	✓	✓	✓
Greater-striped swallow	*Cecropsis cucullata*	✓	✓	✓
Grey-backed cisticola	*Cisticola subruficapilla*	✓	✓	✓
Helmeted guineafowl	*Numida meleagris*		✓	✓
House sparrow	*Passer domesticus*	✓	✓	✓
Kalahari scrub-robin	*Cercotrichas paena*		✓	✓
Karoo scrub-robin	*Cercotrichas coryphaeus*		✓	✓
Laughing dove	*Streptopelia senegalensis*	✓	✓	✓
Little swift	*Apus affinis*	✓	✓	✓
Namaqua dove	*Oena capensis*	✓		
Namaqua sandgrouse	*Pterocles namaqua*	✓	✓	✓
Neddicky	*Cisticola fulvicapilla*		✓	✓
Northern black korhaan	*Afrotis afraoides*	✓	✓	✓
Orange river francolin	*Scleroptila gutturalis*	✓	✓	
Pied crow	*Corvus albus*	✓	✓	✓
Plain-backed pipit	*Anthus leucophrys*	✓	✓	✓
Red-backed shrike	*Lanius collurio*		✓	✓
Red-billed quelea	*Quelea quelea*		✓	✓
Red-crested korhaan	*Lophotis ruficrista*		✓	✓
Rock kestrel	*Falco rupicolus*	✓	✓	
Rock martin	*Ptyonoprogne fuligula*	✓		
Scaly-feathered finch	*Sporopipes squamifrons*		✓	✓
Southern red bishop	*Euplectes orix*	✓	✓	✓
Spike-heeled lark	*Chersomanes albofasciata*	✓	✓	✓
Spotted thick-knee	*Burhinus capensis*	✓		
Violet-eared waxbill	*Granatina granatinus*		✓	✓
White-backed mousebird	*Colius colius*		✓	✓
White-rumped swift	*Apus caffer*	✓	✓	✓
Yellow canary	*Crithagra flaviventris*	✓	✓	✓
Yellow-bellied eremomela	*Eremomela icteropygialis*		✓	✓

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EXHIBIT 3

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REVIEW

Avian interactions with renewable energy infrastructure: An update

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ABSTRACT

Energy infrastructure is widespread worldwide. Renewable energy technologies, which are expanding their footprint on the landscape and their contribution to energy availability, represent a different kind of infrastructure from extractive energy technologies. Although renewable energy sources may offer a 'greener alternative' to traditional extractive energy sources, mounting evidence suggests that renewable energy infrastructure, and the transmission lines needed to convey energy from renewable energy facilities to users, may impact birds. Peer-reviewed literature historically has focused on the direct effects of electrocution and, to a lesser extent, collisions with overhead power systems, and on avian collisions at wind energy facilities, with less consideration of indirect effects or other energy sectors. Here, we review studies that have examined direct and indirect effects on birds at utility-scale onshore wind- and solar-energy facilities, including their associated transmission lines. Although both direct and indirect effects appear site-, species-, and infrastructure-specific, generalities across energy sectors are apparent. For example, large-bodied species with high wing loading and relatively low maneuverability appear to be especially susceptible to direct effects of tall structures, and the risk of collision is likely greater when structures are placed perpendicular to flight paths or in areas of high use. Given that all infrastructure types result in direct loss or fragmentation of habitat and may affect the distribution of predators, indirect effects mediated by these mechanisms may be pervasive across energy facilities. When considered together, the direct and indirect effects of renewable energy facilities, and the transmission lines serving these facilities, are likely cumulative. Ultimately, cross-facility and cross-taxon meta-analyses will be necessary to fully understand the cumulative impacts of energy infrastructure on birds. Siting these facilities in a way that minimizes avian impacts will require an expanded understanding of how birds perceive facilities and the mechanisms underlying direct and indirect effects.

Keywords: avian, direct effects, indirect effects, mitigation, power line, solar, wind

Actualización de las interacciones entre aves y las estructuras de energía renovable

RESUMEN

La infraestructura energética está ampliamente distribuida en todo el mundo. Las tecnologías de energía renovable están expandiendo su huella en el paisaje y su contribución a la disponibilidad de energía, y representan un tipo diferente de infraestructura a la de las tecnologías extractivas de energía. Aunque las fuentes de energía renovable ofrecen una "alternativa más verde" en comparación con las fuentes tradicionales de extracción de energía, existe bastante evidencia que sugiere que la infraestructura de energía renovable y las líneas de transmisión necesarias para transportar la energía hacia los usuarios podrían afectar a las aves. La literatura científica tradicionalmente se ha enfocado en los efectos directos de la electrocución y, en menor medida, en las colisiones con los sistemas aéreos de energía y con las estructuras de energía eólica. En cambio, ha habido escasa consideración de sus efectos indirectos y de otros sectores energéticos. En este trabajo revisamos estudios que investigaron los efectos directos e indirectos sobre las aves a la escala de instalaciones terrestres de energía eólica y solar, incluyendo sus líneas de transmisión. Aunque los efectos directos e indirectos parecen ser específicos para cada sitio, especie y tipo de energía, existen generalidades evidentes entre diferentes sectores energéticos. Por ejemplo, las especies de mayor tamaño, con alta carga alar y maniobrabilidad relativamente baja parecen ser especialmente susceptibles a los efectos directos de las estructuras altas, y el riesgo de colisión probablemente es mayor cuando las estructuras se ubican perpendiculares al sentido del vuelo o en áreas con alto uso. Dado que todos los tipos de infraestructura resultan en la pérdida directa del hábitat o en su fragmentación y podrían afectar la distribución de los depredadores, los efectos indirectos mediados por estos mecanismos pueden ser comunes entre diferentes instalaciones energéticas. Cuando se consideran en conjunto, los efectos directos e indirectos en las instalaciones de energía renovable y en las líneas de transmisión asociadas probablemente son acumulativos. Finalmente, será necesario hacer meta análisis a través de varios tipos de instalaciones y taxones para entender completamente los impactos acumulativos de la infraestructura energética sobre las aves. La localización de estas instalaciones de forma que minimice el impacto sobre las aves requerirá un mayor entendimiento acerca de cómo las aves perciben las instalaciones y de los mecanismos que subyacen a los efectos directos e indirectos.

Palabras clave: aves, efectos directos, efectos indirectos, eólico, líneas de energía, mitigación, solar

Concerns regarding the depletion of fossil fuels, global climate change, and energy security have triggered rapid growth in the use of renewable energy technologies. For example, in the United States (U.S.), wind energy capacity increased by ~140% from 25,000 megawatts (MW) in 2008 to >61,000 MW in 2013 (American Wind Energy Association 2014). Collectively, ~13% of U.S. electricity generated in 2014 was derived from renewable energy sources (e.g., biomass [1.7%], geothermal [0.4%], hydroelectric [6.0%], solar [0.4%], and wind [4.4%]; U.S. Energy Information Administration 2015a). Continued growth of the wind energy sector is predicted to meet the U.S.'s wind energy target of 20% of all energy used by 2030 (U.S. Department of Energy 2008). Although government targets are centered on wind energy, the expansion of other renewable energy sectors also is expected (U.S. Energy Information Administration 2015b). In particular, projections suggest that the solar energy sector could meet 14% of electricity demands in the contiguous U.S. by 2030 and 27% by 2050 (U.S. Department of Energy 2012).

Renewable energy as a 'greener alternative' to the combustion of fossil fuels offers important environmental benefits over traditional energy sources, such as reductions in greenhouse gas emissions (Panwar et al. 2011). Yet, increasing evidence of direct and indirect effects has raised concerns regarding the potential impacts of renewable energy infrastructure on birds. Avian collisions with wind turbines (i.e. direct effects) are well documented and have received the most attention to date (e.g., Smallwood and Thelander 2008, Loss et al. 2013, Morinha et al. 2014). In comparison, studies of the direct effects of other types of renewable energy infrastructure on birds have been limited (but see McCrary et al. 1986, Lovich and Ennen 2011). Further, relatively few studies have considered the potential for indirect effects on avian behavior, spatial ecology, or demographics resulting from increased disturbance, changes in trophic interactions, or changes in habitat availability and connectivity (reviewed by Drewitt and Langston 2006, Zwart et al. 2016a). Renewable energy infrastructure often is accompanied by the construction of new transmission lines to connect renewable energy facilities to the existing power line network. Thus, the direct and indirect effects of multiple infrastructure types at renewable energy facilities need to be considered to identify the cumulative effects of a national (and global) transition from extractive to renewable energy production.

Of the studies that have assessed interactions between renewable energy infrastructure and birds, many have primarily targeted specific management crises, often focusing on species of conservation concern (e.g., Greater Sage-Grouse [*Centrocercus urophasianus*]: LeBeau et al. 2014; Greater Prairie-Chicken [*Tympanuchus cupido*]: Smith et al. 2016) in areas targeted for development (e.g., the Great Plains of North America; Harrison 2015, Whalen 2015, Winder et al. 2015). Thus, studies have been necessarily limited and inconsistent in the focal species addressed, experimental design, and study site. As a consequence, developing general siting guidelines and mitigation strategies for new facilities remains challenging. Given the projected increase in renewable energy infrastructure throughout the U.S. (U.S. Department of Energy 2008, U.S. Energy Information Administration 2015b), it is critical that we develop a more comprehensive understanding of the effects of renewable energy infrastructure on birds so that informed siting guidelines can be developed and implemented.

Here, we review recent studies of the direct and indirect effects on birds from utility-scale onshore wind- and solar-energy facilities and their accompanying transmission lines. We focused on these energy sectors because of their projected increase in the U.S. (U.S. Department of Energy 2008, U.S. Energy Information Administration 2015b). Our goals were to: (1) provide an up-to-date and consolidated summary of direct and indirect impacts of utility-scale onshore wind- and solar-energy infrastructure and associated power lines on birds based on peer-reviewed literature; (2) use our findings to inform siting guidelines; and (3) highlight important knowledge gaps and areas for future research.

KNOWN IMPACTS OF UTILITY-SCALE ONSHORE WIND- AND SOLAR-ENERGY INFRASTRUCTURE ON BIRDS

To summarize the impacts of utility-scale renewable energy infrastructure, we conducted a literature review to identify studies that empirically tested the effects of energy infrastructure on birds (i.e. not commentaries or predictive studies). We did so by using combinations of the following search terms in Web of Science (formerly ISI Web of Knowledge; Thomson Reuters, Philadelphia, Pennsylvania, USA): avian, bird, collision, conservation, electrocution, photovoltaic cell, renewable energy infrastructure, solar energy, transmission power line, wind energy, wind farm, and wind resource area.

Onshore Wind Energy

Direct effects. The direct effects of wind energy development on birds have received considerable attention (e.g., Smallwood and Thelander 2008, Loss et al. 2013, Erickson et al. 2014). Collisions between birds and onshore wind turbines result in impact trauma, which can result directly in death or render birds more susceptible to predation. Collisions have been documented for a wide range of taxa, including ducks (Johnson et al. 2002), grouse (Zeiler and Grünschachner-Berger 2009), raptors (De Lucas et al. 2008), and songbirds (Morinha et al. 2014). Of specific concern are fatalities of species of conservation concern (e.g., Western Burrowing Owl [*Athene cunicularia hypugaea*]; Smallwood et al. 2007) and species with small populations, delayed maturity, long lifespans, and low reproductive rates, for which even a few mortalities can have population-level effects (e.g., Golden Eagle [*Aquila chrysaetos*]: Lovich 2015; White-tailed Eagle [*Haliaeetus albicilla*]: Dahl et al. 2012). While the number of birds affected is uncertain (Pagel et al. 2013), estimates adjusted for searcher detection and scavenger removal suggest that between 140,000 and 328,000 birds are killed annually by collisions with turbines at wind energy facilities in the contiguous U.S. (Loss et al. 2013). For songbirds in particular, fatalities at wind energy facilities in the U.S. and Canada are estimated to be between 134,000 and 230,000 annually (Erickson et al. 2014). Avian collisions with turbines also have been documented outside the U.S. (e.g., Australia: Hull et al. 2013; Canada: Zimmerling et al. 2013; Japan: Kitano and Shiraki 2013; South Africa: Doty and Martin 2013; Western Europe: Everaert and Stienen 2007, De Lucas et al. 2012, Morinha et al. 2014), suggesting that the direct effects of wind energy facilities are of concern globally.

Intuitively, mortality rates at wind energy facilities should be related to avian abundance (Carrete et al. 2012), but a more complex suite of site-specific factors may be important (De Lucas et al. 2008, Marques et al. 2014). For example, habitats or prey that promote foraging at wind energy facilities are likely to increase collision rates (Barrios and Rodríguez 2004, Smallwood et al. 2007). Collisions may also increase when turbines are sited on landscape features, including cliffs and steep slopes, that are regularly used by hunting or migrating birds (e.g., Black Kite [*Milvus migrans*]; Kitano and Shiraki 2013). Weather may further increase collision risk when visibility around turbines is reduced (Kerlinger et al. 2010). For species that exploit thermals, the risk of collision may increase during weather that forces birds to gain lift from topographical features near wind turbines (Barrios and Rodríguez 2004, De Lucas et al. 2008). Collisions during migration may be particularly important because they have the potential to indirectly affect breeding populations far beyond the wind energy facility. Because most conservation efforts in North America are focused on breeding habitat, migration mortality can be a cryptic and often unrecognized effect of wind turbines.

Collision rates can additionally be affected by the design features of wind turbines. For example, collision rates between Western Burrowing Owls and wind turbines were highest at vertical axis towers, lower at tubular towers, and lowest at lattice towers, corresponding with a decline in the ability to see through the infrastructure type (Smallwood et al. 2007). Conversely, mortality rates of Eurasian Kestrels (*Falco tinnunculus*) and Eurasian Griffons (*Gyps fulvus*) were equivalent between tubular and lattice towers at a wind energy facility in the Straits of Gibraltar (Barrios and Rodríguez 2004). As turbine height increases, species that rely on lift for flight may become more susceptible to collisions (e.g., Eurasian Griffons; De Lucas et al. 2008), as may species that typically fly at higher altitudes (Loss et al. 2013). Turbine rotor diameter may also increase mortality rates through increasing the area within which birds are at risk (Loss et al. 2013; but see Barclay et al. 2007). For species attracted to artificial light sources (e.g., nocturnal migrants; Gauthreaux and Belser 2006), the use of steady-burning lights at facilities may increase mortality rates (Kerlinger et al. 2010). However, the use of flashing red lights at wind energy facilities, as recommended by the Federal Aviation Association, does not appear to influence collision rates between infrastructure and nocturnal migrants (Kerlinger et al. 2010). Fatalities may also increase when turbines are positioned perpendicularly to regular flight paths of birds; 90–95% of tern (*Sterna* spp.) fatalities at a wind energy facility in Belgium resulted from collisions with turbines positioned in a line perpendicular to their flight path between the breeding colony and feeding grounds (Everaert and Stienen 2007). Similarly, wind energy facilities sited along migration pathways may result in more migrant birds being killed than resident birds (Johnson et al. 2002).

Direct mortality also varies by species. Species that forage on the ground are less likely to collide with turbines compared with species that use aerial foraging (Hull et al. 2013). Similarly, aerial foragers that forage within rotor-swept areas and that appear to focus more on prey than on turbine blades are more susceptible to direct mortality than those that exercise caution around turbines (e.g., American Kestrel [*Falco sparverius*] vs. Northern Harrier [*Circus cyaneus*]; Smallwood et al. 2009). Also at risk are species that frequently engage with conspecifics during aerial territorial conflicts (e.g., Golden Eagle; Smallwood and Thelander 2008, Smallwood et al. 2009). Collision risk may be further elevated for species with visual fields that may prohibit them from detecting structures (e.g., wind turbines) directly ahead of them (e.g., vultures in the genus *Gyps*; Martin 2011, Martin et al. 2012), or for large species with weak-powered flight and high wing loading that rely on thermals for lift and thus have relatively low maneuverability in flight (e.g., Eurasian Griffon; De Lucas et al. 2008). Vulnerability to turbine collisions may also vary within species for which sex-specific behaviors result in one sex spending more time within rotor-swept areas. For example, heightened foraging activity of male terns during egg-laying and incubation at a wind energy facility in Belgium resulted in male-biased mortality (Stienen et al. 2008). Similarly, song flights performed by male Sky Larks (*Alauda arvensis*) during the breeding season at a wind energy facility in Portugal increased collision risk, resulting in male-biased mortality (Morinha et al. 2014).

Indirect effects. To date, most studies of indirect effects have focused on the displacement of birds from wind energy facilities. Displacement, typically measured via telemetry or point counts, has been documented for a wide range of taxa including geese (Larsen and Madsen 2000), ducks (Loesch et al. 2013), raptors (Pearce-Higgins et al. 2009, Garvin et al. 2011), grouse (Pearce-Higgins et al. 2012), shorebirds (Pearce-Higgins et al. 2009, 2012, Niemuth et al. 2013), and songbirds (Pearce-Higgins et al. 2009, Stevens et al. 2013). While the mechanisms driving displacement are poorly understood, loss or degradation of habitat may be important, especially for habitat specialists (e.g., Le Conte's Sparrow [*Ammodramus leconteii*]; Stevens et al. 2013), and may be compounded for species that are sensitive to turbine noise, construction noise, or tall structures (e.g., geese: Larsen and Madsen 2000; raptors: Garvin et al. 2011, Johnston et al. 2014). The latter may be especially relevant in open areas (e.g., grasslands), where species may be sensitive to tall structures, including wind turbines and power poles (e.g., prairie grouse; Hovick et al. 2014). While some species appear sensitive to wind energy development, evidence for the displacement of other species is either minimal or site-specific (e.g., Sky Lark: Devereux et al. 2008; Savannah Sparrow [*Passerculus sandwichensis*]: Stevens et al. 2013; Montagu's Harrier [*Circus pygargus*]: Hernández-Pliego et al. 2015; Eastern Meadowlark [*Sturnella magna*]: Hale et al. 2014), and some species may even be attracted to wind energy facilities (e.g., Killdeer [*Charadrius vociferus*]; Shaffer and Buhl 2016). Moreover, sensitivity to wind energy development may not always be reflected through changes in spatial ecology, but instead through other behaviors (e.g., lekking; Smith et al. 2016). Birds that avoid wind energy facilities during and immediately following construction may fail to show avoidance behavior thereafter (Madsen and Boertmann 2008, Pearce-Higgins et al. 2012), perhaps minimizing long-term effects in those species. Alternatively, some species may exhibit a delayed response to wind energy facilities, tolerating disturbance immediately following construction, but avoiding the site thereafter (e.g., Grasshopper Sparrow [*Ammodramus savannarum*]; Shaffer and Buhl 2016).

Wind energy facilities may also indirectly affect breeding performance. For example, distance to a turbine negatively affected nest survival of Greater Sage-Grouse (LeBeau et al. 2014), but had little effect on nest survival of Red-winged Blackbirds (*Agelaius phoeniceus*; Gillespie and Dinsmore 2014), Greater Prairie-Chickens (McNew et al. 2014, Harrison 2015), and McCown's Longspurs (*Rhynchophanes mccownii*; Mahoney and Chalfoun 2016). In contrast, Scissor-tailed Flycatchers (*Tyrannus forficatus*) nesting in sites close to a 75-turbine wind energy facility in Texas had higher nest survival compared with their counterparts nesting in sites farther away (Rubenstahl et al. 2012). Similarly, Hatchett et al. (2013) documented higher nest success for Dickcissels (*Spiza americana*) nesting near, compared with far from, a wind energy facility in Texas. However, the authors stressed that habitat configuration across the study site, not proximity to turbines, may have underpinned their results.

Wind energy development may also influence adult survival, but, again, effects are likely to be site- and species-specific. For example, annual survival of female Greater Prairie-Chickens increased postconstruction compared with preconstruction of a wind energy facility in Kansas (Winder et al. 2014). In contrast, distance to a turbine did not affect the survival of female Greater Prairie-Chickens breeding along a 25-km gradient at a wind energy facility in Nebraska (J. A. Smith personal observation). Similarly, the survival of female Greater Sage-Grouse breeding in the vicinity of a wind energy facility in Wyoming was unaffected by distance to a turbine (LeBeau et al. 2014).

Despite continuing efforts to assess the indirect effects of wind energy development on birds, the underlying mechanisms are seldom evaluated. For species targeted by brood parasites, a reduction in parasitism rates at wind energy facilities may increase nest success; Blue-gray Gnatcatchers (*Polioptila caerulea*) nesting close to a wind energy facility in Texas had a lower probability of nest parasitism by Brown-headed Cowbirds (*Molothrus ater*) and, subsequently, higher nest success than birds farther away. While it remains unclear why parasitism rates were lower at the wind energy facility, disturbance at the site may have impeded the ability of Brown-headed Cowbirds to detect nests (Bennett et al. 2014).

Changes in predator abundance may be key to understanding the indirect effects of wind energy development on measures of breeding success and adult survival (Rubenstahl et al. 2012, LeBeau et al. 2014, Winder et al. 2014). For example, avoidance of wind energy facilities by raptors (Pearce-Higgins et al. 2009, Garvin et al. 2011), or by mammalian predators due to increased disturbance associated with human activity (Gese et al. 1989, Gehrt et al. 2009), may reduce predation risk at sites close to wind energy facilities, consequently increasing survival. Alternatively, the presence of carcasses under wind turbines due to collision-induced mortalities may attract mammalian predators (Smallwood et al. 2010, Rogers et al. 2014), whose presence will, in turn, decrease survival. Despite these expectations, to our knowledge only one study has evaluated predation risk as a possible mechanism underlying survival by simultaneously assessing occupancy of predators and survival of Greater Prairie-Chickens. Site occupancy of avian predators in the vicinity of a wind energy facility in Nebraska was significantly lower within, compared with 2 km beyond, the wind energy facility (J. A. Smith personal observation). In contrast, mammalian predator site occupancy was unaffected. Although no effect was found on the survival of Greater Prairie-Chickens, the study provides evidence of an ecological mechanism that could have important implications for a wide range of species at risk from wind energy development.

The mechanisms underlying displacement or changes in the spatial ecology of birds at wind energy facilities are often discussed, but rarely evaluated. Given that prey species may avoid areas of high predation risk (reviewed by Lima 1998), changes in predator abundance at wind energy facilities (e.g., abundance of raptors; Pearce-Higgins et al. 2009) may be important for elucidating displacement behavior. Similarly, the presence of tall structures (i.e. wind turbines, power poles) at wind energy facilities that provide perches for avian predators may increase perceived predation risk, resulting in avoidance of those sites by potential prey species (e.g., Stevens et al. 2013). Alternatively, species associated with disturbed ground or gravel substrates may be attracted to wind energy facilities through increased opportunities for foraging or nesting (e.g., Killdeer; Shaffer and Buhl 2016), as has been observed at disturbance sites with relatively small footprints associated with other energy sectors (e.g., oil and natural gas developments; Gilbert and Chalfoun 2011, Ludlow et al. 2015). Wind turbines may also create barriers, causing birds to alter their flight patterns to avoid those areas (Drewitt and Langston 2006).

Increasing evidence suggests that birds may be sensitive to anthropogenic noise, and that noise from traffic, roads, aircraft, and energy infrastructure could disrupt acoustic communication through masking (Ortega 2012). In response to anthropogenic noise, birds may alter the characteristics of their vocalizations to compensate for masking (e.g., Hu and Cardoso 2010, Francis et al. 2012), or they may show behavioral avoidance (Bayne et al. 2008, Blickley et al. 2012, McClure et al. 2013). Recent research suggests that low-frequency noise produced by wind turbines may disrupt acoustic communication, causing birds to modify their vocalization characteristics (Whalen 2015, Zwart et al. 2016b). These results suggest that noise associated with wind energy development may disturb birds and could act as a mechanism driving indirect effects (e.g., lekking behavior; Smith et al. 2016). However, the likelihood of noise as an intermediary mechanism is likely to be species-specific, depending on the extent of masking (Rheindt 2003).

Solar Energy

Direct effects. Because solar energy development can occur in areas of high endemism (e.g., the deserts of the southwestern U.S.), the potential impacts on bird populations are substantial (Lovich and Ennen 2011). Yet, to our knowledge, only 1 peer-reviewed study of direct impacts exists: McCrary et al. (1986) concluded that the risk of collision with infrastructure at a solar energy facility in the Mojave Desert, California, was low after documenting 70 mortalities of 26 bird species over a 40-week period. The facility consisted of mirrors (heliostats) that concentrated solar energy onto a centrally located tower where liquid was converted to steam to generate electricity (hereafter 'solar tower'). More recent preliminary evaluations across 3 different solar energy facilities in southern California suggest that direct impacts are greater than previously thought (Kagan et al. 2014), and that installation design also affects risk. Kagan et al. (2014) considered 3 quite different installations: solar towers; photovoltaic cells that convert solar energy directly into electricity; and parabolic troughs consisting of mirrors that reflect solar energy onto a receiver tube within the trough which transports heated fluid to generate electricity. Opportunistic collection of carcasses at the 3 facilities suggested that mortality rates were higher at solar towers compared with parabolic troughs or photovoltaic cells. However, given the lack of information regarding fatalities at solar energy facilities, conclusive estimates of mortalities associated with solar energy facilities cannot be established (Loss et al. 2015).

Two main causes of death have been identified across solar energy facilities: impact trauma and exposure to concentrated solar energy (heat) at solar tower facilities (hereafter, 'solar flux'; Kagan et al. 2014). In common with other anthropogenic structures, all types of solar energy facilities may result in deaths of birds through impact trauma; solar flux trauma is unique to solar tower facilities. By damaging feathers (sometimes severely) when birds fly through areas of concentrated heat near the tower, solar flux can hinder a bird's ability to fly, induce shock, and damage soft tissue (Kagan et al. 2014). By impairing flight, solar flux trauma may increase the risk of direct collision with infrastructure or the ground, or may reduce a bird's ability to forage or evade predators.

Carcasses from a wide range of taxa have been identified at solar energy facilities (e.g., ducks, wading birds, raptors, rails, shorebirds, and songbirds; McCrary et al. 1986, Kagan et al. 2014). The mortality of an individual of the federally endangered subspecies of Ridgway's Rail (*Rallus obsoletus yumanensis*) suggests that solar energy facilities may have important consequences for species of conservation concern. While it appears that many species may be at risk, relatively high numbers of waterbird carcasses at photovoltaic cell facilities suggest that waterbirds may be particularly at risk where infrastructure (i.e. photovoltaic cells) reflects polarized light, giving the impression of water (Horváth et al. 2009, 2010). The water retention ponds needed at solar tower facilities may exacerbate risk by attracting birds to solar energy facilities, especially in arid landscapes (McCrary et al. 1986, Kagan et al. 2014). Insects that are apparently attracted to solar tower facilities may underlie the large number of aerial insectivores affected by solar flux (Hováth et al. 2010, Kagan et al. 2014), emphasizing the complex ecological processes that may contribute to risks to birds. While the mechanisms underlying mortality events are sometimes unclear, evidence indicating that solar energy facilities could be ecological traps (Schlaepfer et al. 2002) has begun to accrue.

Indirect effects. To our knowledge, only 1 peer-reviewed study has evaluated the indirect effects of solar energy development on birds. DeVault et al. (2014) demonstrated that solar photovoltaic facilities could potentially alter bird communities: In 5 locations across the U.S., species diversity was lower at photovoltaic array sites than in adjacent grasslands (37 vs. 46 species, respectively). In contrast, bird densities at the same photovoltaic array sites were more than twice those of adjacent grasslands. Observations during the study suggested that shade and the provision of perches increased bird use of the photovoltaic array sites. However, the results were species specific, with some small songbird species (e.g., American Robin [*Turdus migratorius*]) more abundant at photovoltaic facilities compared with adjacent grasslands used for habitat comparisons, but corvids and raptors less abundant. Similarly, raptor abundance was higher preconstruction compared with postconstruction of a utility-scale solar energy facility in south-central California, suggesting avoidance of the facility. In comparison, ravens and icterids increased in abundance during construction, possibly as a result of increased foraging opportunities at disturbed sites (J. Smith personal communication).

Similarly to the effects of wind energy development and other onshore energy development (e.g., oil and natural gas development; Kalyn Bogard and Davis 2014, Bayne et al. 2016), the potential indirect effects of solar energy facilities on birds are likely site-specific. For example, given that the footprint and configuration of solar energy facilities vary with the technology used (e.g., photovoltaic facilities are typically larger than solar tower sites; Hernandez et al. 2014a), indirect effects mediated through habitat loss or barrier effects are likely dependent on site-specific infrastructure (Hernandez et al. 2014b). Solar energy facilities may also disrupt local hydrology through groundwater extraction or channelization, which could reduce both food and habitat availability for birds (Grippo et al. 2015). Such effects are likely amplified at sites where footprints are large and at facilities that consume large volumes of groundwater (e.g., parabolic troughs and solar towers; Hernandez et al. 2014b, Grippo et al. 2015). The potential for contaminant runoff to indirectly affect birds also may be elevated at sites with large footprints (Grippo et al. 2015). Variation in other disturbances (e.g., vehicular traffic, construction noise, and operations) among sites could also contribute to site-specific variation in indirect effects (Lovich and Ennen 2011); we encourage further exploration of these factors.

Power Lines

Renewable energy facilities often require the construction of new transmission lines to deliver the energy produced at the facility to the existing power line network. These permanent connections may include many kilometers of lines supported by towers 30–35 m tall, and can traverse habitats beyond the line of sight from either the renewable energy facility or from a center of energy consumption. This is particularly true after ideal siting locations close to existing lines have been developed; subsequently constructed renewable energy facilities can be increasingly distant from the existing transmission line network, requiring increasingly longer connections. Transmission lines are associated with collision mortalities of flying birds (Rogers et al. 2014, Lobermeier et al. 2015; but see Luzenski et al. 2016), but renewable energy connections can be overlooked when investigating direct and indirect effects of renewable energy facilities.

Direct effects. Avian interactions with transmission lines appear to affect populations primarily through direct mortality, although indirect effects of habitat fragmentation have been hypothesized. Direct collision mortality is an ongoing concern in many areas of the U.S. (Yee 2008, Sporer et al. 2013, Luzenski et al. 2016). Collisions are most often associated with aquatic habitats, where species with high wing loading, high flight speeds, and poor maneuverability are common (Shaw et al. 2010, Quinn et al. 2011, Barrientos et al. 2012). Large, heavy-bodied species such as swans, pelicans, herons, and cranes are generally thought to be more susceptible to transmission line collisions than smaller, more maneuverable species (APLIC 2012). Nocturnal migrants have not been well studied, but also may be susceptible, particularly within migration corridors (Rogers et al. 2014), and especially in light of their susceptibility to collision with other types of tall anthropogenic structures (Drewitt and Langston 2008, Kerlinger et al. 2010, Gehring et al. 2011). Relatively small duck and grouse species are also vulnerable to collision because of their high flight speed, low altitude, and flocking flight, in which the view of upcoming obstacles is obscured by leading birds (APLIC 1994, Bevanger and Brøseth 2004). Transmission lines bisecting daily movement corridors, such as those located between roosting and foraging sites, have been most associated with avian collisions (Bevanger and Brøseth 2004, Stehn and Wassenich 2008, APLIC 2012), with risk exacerbated during low light, fog, and other inclement weather conditions (Savereno et al. 1996, APLIC 2012, Hüppop and Hilgerloh 2012). Transmission lines are typically constructed with relatively thin overhead shield wires at the top, and thicker energized conductors below. Birds appear to see energized conductors and adjust flight altitudes upward to avoid them, subsequently colliding with smaller, less visible overhead shield wires (Murphy et al. 2009, Ventana Wildlife Society 2009, Martin and Shaw 2010). Collision risk may be further exacerbated for species with narrower fields of view (Martin and Shaw 2010), but this remains an important research gap because to date it has been thoroughly studied only in Kori Bustards (*Ardeotis kori*), Blue Cranes (*Grus paradisea*), and White Storks (*Ciconia ciconia*), which are large, collision-prone species. Collision risk may be mitigated in migrating raptors, which tend to fly diurnally during good weather (Ligouri 2005) and appear to detect and avoid transmission lines, even those located in major migration corridors (Luzenski et al. 2016).

Indirect effects. The indirect effects of transmission lines are not well studied. Of the existing studies that have addressed indirect effects, most have considered grouse (Lammers et al. 2007, Coates et al. 2008, Coates and Delehanty 2010) or desert tortoises (*Gopherus agassizii*; Boarman 2003, Berry et al. 2013), species of conservation concern potentially preyed upon by corvids and raptors using utility structures as hunting perches. As power lines have proliferated, at least some corvid species appear to have expanded their breeding ranges (Jerzak 2001, Marzluff and Neatherlin 2006, Dwyer et al. 2013a) or increased their breeding densities (Coates et al. 2014) through utilizing power poles for nesting (Fleischer et al. 2008, Howe et al. 2014, Dwyer et al. 2015), possibly leading to indirect effects on their prey. Recent research suggests that avoidance by reindeer (*Rangifer tarandus*) may be linked to their ability to detect ultraviolet (UV) light emitted by transmission lines (Tyler et al. 2014). At least some birds also see in the UV spectrum (Lind et al. 2014), but the potential implications of this for indirect effects have not been thoroughly investigated.

SYNTHESIS AND SITING GUIDELINES

Our review summarizes existing studies of direct and indirect effects of energy infrastructure associated with 2 expanding energy sectors (onshore wind and solar), and indicates ongoing concern about the transmission lines connecting these facilities to existing electric transmission lines. This overview demonstrates that both the magnitude and the mechanisms of direct and indirect effects of renewable energy infrastructure and the associated power lines on birds are site- and species-specific (e.g., Villegas-Patraca et al. 2012, DeVault et al. 2014, Bayne et al. 2016). However, while we have provided comprehensive coverage of existing peer-reviewed literature, we stress that existing gray literature, much of which is held by private energy companies, would likely shed additional light on the direct and indirect effects of renewable energy infrastructures. Thus, increased public availability of privately funded data is urgently needed (Loss 2016).

Despite highlighting the prevalence of both site- and species-specific effects, some generalities can be drawn from our review. Large-bodied species with weakly powered flight, high wing loading, and relatively low maneuverability appear to be especially susceptible to the direct effects of tall structures at energy facilities (e.g., wind turbines and power poles). This is of concern, given that the sensitivity of such species at the population level is likely high because of delayed maturity and low reproductive rates (Dahl et al. 2012, Lovich 2015, Loss 2016). The effects of placement appear to be important across all energy infrastructure types considered in this review; infrastructure that bisects regular daily or migratory flight paths (e.g., turbine lines, transmission lines) may disproportionately affect birds compared with structures sited outside regular flight paths. The placement of infrastructure in habitat with few natural tall perches (deserts, grasslands, sagebrush steppe) may be more disruptive to the overall ecology of an area than the placement of infrastructure in habitat previously characterized by natural tall structures (forests), but further research is needed to explore these expectations. Given that all infrastructure results in direct habitat loss, indirect effects that act through the loss or fragmentation of habitat are likely to occur across all energy sectors. Similarly, given the potential for energy infrastructure and power lines to affect the distribution of predators, predation may be an important mechanism underlying indirect effects across energy facilities.

When considered together, the direct and indirect effects at renewable energy facilities and the transmission lines serving those facilities are likely cumulative and could be synergistic, especially when facilities are poorly sited (e.g., in areas of high bird abundance, in regular flight paths, or where facilities could act as ecological traps). However, the magnitude of direct effects is likely far less for energy facilities compared with other anthropogenic mortality sources in the U.S. (e.g., cats, buildings, communication towers, and automobiles; Loss et al. 2015), and the indirect effects of wind energy facilities may be less than those of traditional energy infrastructure

(Hovick et al. 2014). Nevertheless, the potential for additional effects of other infrastructure at energy facilities could further increase direct and indirect effects within an energy facility's footprint (e.g., roads: Benítez-López et al. 2010; maintenance buildings: Loss et al. 2014).

A critical end-goal for research in this field is to integrate research findings into mitigation strategies and to inform siting guidelines. Given the site- and species-specific nature of the effects of the energy infrastructure reviewed here, siting guidelines should be carefully developed in the context of vulnerable species within a particular geographic area. However, some key generalities have emerged that should be considered during siting decisions. We suggest the following: (1) Avoiding areas of high bird use (e.g., regularly used flight paths, migration corridors, and aggregation areas); (2) Avoiding areas inhabited by sensitive species or those of conservation concern; (3) Avoiding topographical features that promote foraging or that are used by migrating birds for uplift (e.g., the tops of slopes; Kitano and Shiraki 2013); (4) Avoiding areas of high biodiversity, endemism, and ecological sensitivity; (5) Developing conservation buffers for vulnerable species based on thresholds determined through empirical research; (6) Carefully selecting or modifying infrastructure to minimize collision risk or indirect effects (e.g., by the use of flashing red lights and ground devices, or by employing efficient technology that uses less space; Kerlinger et al. 2010, Martin 2012); and (7) Curtailing turbine operation under certain conditions (e.g., fog in the presence of sensitive species).

We also encourage the use of predictive models to gauge likely impacts at sites (e.g., Shaw et al. 2010, Dwyer et al. 2013b), and encourage the development and use of spatially explicit sensitivity maps that incorporate the distribution of bird populations, key flight paths, habitats, and risk factors (e.g., Bright et al. 2008, Dwyer et al. 2016, Pearse et al. 2016).

CONSIDERATIONS FOR FUTURE RESEARCH

The expected trajectory of the renewable energy sector (both in size and in technological advances) will expand the geographic area and, thus, habitats impacted by development. Much research to date has focused on wind energy development in grassland habitats in the Great Plains (e.g., LeBeau et al. 2014, Harrison 2015, Winder et al. 2015) and, to a lesser extent, solar energy development in the deserts of the southwestern U.S. (McCrary et al. 1986, Kagan et al. 2014). However, interactions between renewable energy infrastructure and birds are likely different among habitats (e.g., grasslands vs. woodlands), and thus continued habitat-specific research is needed. Because the effects of energy infrastructure on birds may vary with stage of operation (e.g., during construction, immediately following construction, and >1 yr postconstruction; Madsen and Boertmann 2008, Pearce-Higgins et al. 2012, Shaffer and Buhl 2016), such studies should be conducted over an extended period (e.g., 5, 10, or 15 yr). Studies that enable researchers to separate the effects of different infrastructure at facilities (e.g., roads, buildings, and wind turbines) are also encouraged. Given that wind energy infrastructure is also associated with bat collisions (e.g., Doty and Martin 2013), future research should seek to integrate avian and bat monitoring to identify cumulative effects.

Understanding the mechanisms that underlie the indirect effects of energy infrastructure on birds is essential if we are to establish conservation strategies that minimize potential impacts. While efforts have been made to address these concerns (Whalen 2015, J. A. Smith personal observation), the mechanistic drivers of effects are likely to vary with infrastructure type and across sites. Therefore, we encourage researchers to adopt mechanistic approaches in future studies of indirect effects by designing studies to reveal important mechanisms. Mechanisms could include, but are not limited to, changes in predation risk, food availability, and habitat availability, and avoidance of physical structures, lights, and UV light. Given that anthropogenic noise may disturb birds (Slabbekoorn and Ripmeester 2007, Blickley et al. 2012), we suggest that studies of energy development and avian interactions consider the role that infrastructure noise plays in driving indirect effects. Studies of solar facilities should explore the mechanisms resulting in avian concentrations at photovoltaic arrays (e.g., polarized light; Hováth et al. 2009).

Given that siting guidelines are often concerned with threshold distances (i.e. the distances from energy facilities at which effects on target species become negligible), we stress the relevance of using a gradient approach in studies of avian and energy infrastructure interactions. For example, by evaluating impacts on target populations at various distances from energy facilities, threshold distances can be identified and used to develop biologically meaningful conservation buffers. Such approaches have proven valuable in studies of disturbance associated with roads, urban areas, and oil and gas development (e.g., Reijnen et al. 1997, Laurance 2004, Palomino et al. 2007), and should be integrated into studies of renewable energy infrastructure (e.g., Winder et al. 2014, Harrison 2015, Whalen 2015). By centering buffers on sensitive habitat patches or populations, areas where development should be avoided can be delineated. However, we note that the effects of energy infrastructure may not always be detected via a gradient approach. Instead, the intensity of development (e.g., density of wind turbines) may be more informative (Mahoney and Chalfoun 2016). When possible, we also encourage implementation of a Before-After-

Control-Impact (BACI) study design that allows comparison of preconstruction, postconstruction, and control data, or, better still, an Impact-Gradient-Design (IGD) study design that incorporates the properties of both a gradient approach and a BACI study design. When preconstruction data is not available, control sites away from the focal energy facility should be considered. Researchers should also consider the specific biology (e.g., spatial ecology, life-history strategy) of the focal species, or focal populations, to sample suitable control sites.

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RESPONSE TO COMMENT LETTER 8

Commenter: Stephen Volker, Law Offices of Stephen C. Volker on behalf of Farms for Farming
Date of Letter: July 1, 2019

Response to Comment 8-1: The comment provides introductory remarks regarding submission of comments on the Drew Solar Project. The comments are submitted on behalf of Danny Robinson, Robcom Farms, Inc., Joe Tagg and West-Gro Farms, Inc. (collectively, "Farms for Farming"). This comment is noted.

Response to Comment 8-2: The comment provides a brief description of the project. This comment is noted.

Response to Comment 8-3: The comment expresses opposition to the project stating that the County has already allowed over 22,000 acres of farmland to be converted to electrical generation and transmission uses. This comment does not address the adequacy of the environmental analysis in the EIR but is noted for the decision-makers' consideration.

Response to Comment 8-4: The comment states that Farms for Farming urges the County to maintain renewable energy overlay boundaries established in October 2015. The commenter encourages that County to analyze and adopt an alternative to the proposed Project located within the renewable energy overlay zone.

Creation of an "Island" Overlay in the Renewable Energy (RE) Overly Zone is allowed with a Conditional Use Permit. The language of Section 91701.01 of Chapter 1 of Title 9, Land Use Code "RE" Energy Renewable Overlay Zone regarding creation of an "Island" Overlay was recently amended. Creation of an "Island Overlay" is permissible via an amendment to the RE Overlay Zone to allow for development of a future renewable energy project that is located adjacent to or within one quarter (1/4) mile of an existing operating solar facility. Three conditions must be met to allow for the amendment: The project is located adjacent (sharing a common boundary) to an existing transmission source; the project consists of the expansion of an existing renewable energy operation; and the project would not result in any significant environmental impacts (91701.01).

The proposed Project shares a common boundary to an existing transmission source (i.e. the existing Drew Switchyard). An objective of the Project is to locate the facility along an existing transmission system which has available capacity to deliver electricity to major load centers in California and to utilize existing infrastructure (switchyards, transmission lines, roads, and water sources). In addition, the Project is surrounded on two sides by the existing Centinela Solar project. Construction of the Drew Solar Project represents expansion of existing solar development. Potentially significant impacts of the Project identified in the EIR were all addressed with feasible mitigation that would reduce impacts to less than significant levels.

Response to Comment 8-5: The comment refers to major concerns (as previously iterated in Response to Comment 8-3 and 8-4) and notes that the following comments (8-6 and following) are submitted. This comment is noted.

Response to Comment 8-6: The comment states that the Project is inconsistent with the County General Plan and that approval of the Project would violate Planning and Zoning Law. It also states that "Land use permits are invalid where the approved project 'conflicts with a [valid] general plan policy that is fundamental, mandatory, and clear'."

The proposed solar generation and transmission uses are consistent with the County General Plan and are conditionally permitted uses under the County's Land Use Ordinance. As stated on page 4.2-29 of the Draft EIR:

> "All of the Solar Field Site Parcels are currently designated "Agriculture" on the General Plan Land Use Map and zoned A-2, A-2-R, or A-3. Per Sections 90508.02 and 90509.02 (Uses Permitted with a Conditional Use Permit) of Division 5 of Title 9 of the Imperial County Land Use Ordinance, development of the Solar Field Site Parcels with a 'solar energy electrical generator' and 'solar energy plants' are an allowed use subject to a CUP."

This comment also refers to the court ruling in *Neighborhood Action Group v. County of Calaveras* (1984) 156 Cal.App.3d 1176, 1184. In that case, Calaveras County approved a CUP for a proposed project, but the county did not have a valid general plan (i.e., the court found the general plan did not comply with State law). In turn, this invalidated Calaveras County's issuance of a CUP for the proposed project. These circumstances do not apply to Imperial County's proposed issuance of a CUP for the Drew Solar Project. Unlike in *Neighborhood*, Imperial County's General Plan meets State requirements and is legally valid. As such, no defect exists that would affect the County's authority to issue a CUP for the proposed Drew Solar Project, consistent with the underlying zoning designation (i.e., A-2, A-2-R, or A-3) for the Solar Field Site Parcels.

One of the court's primary considerations in the *Neighborhood* case was whether the County of Calaveras had the authority to issue a CUP if it had failed to adopt a general plan containing elements required by State law that were relevant to the uses authorized by the permit. The County of Imperial's General Plan Land Use Element recognizes solar energy as being consistent with the County's overall goals and energy policies. The County of Imperial's General Plan Land Use Element also recognizes other allowable renewable energy types such as wind-driven electrical generation, geothermal, and bio-mass energy. In addition, the County of Imperial's General Plan recognizes facilities for the transmission of electrical energy.

As summarized in the Goals and Objectives of the Renewable Energy and Transmission Element of the Imperial County General Plan (Goal 1), Supports the safe and orderly development of renewable energy while providing for the protection of environmental resources. When evaluating the consistency of the Project with this goal, Table 4.2-1, Imperial County General Plan on page 4.3-11 of the Draft EIR states in part "…The County has chosen to concentrate solar development in the Project vicinity. The Project Area is currently disturbed agricultural land that will be temporarily converted to a solar energy generating system, then reclaimed to pre-Project conditions at the end of the operational life of the Project. If allowed, the Project also proposes co-locating one of the Gen-Tie lines with the existing Centinela Solar Gen-Tie facilities. Compliance with the County's land use planning documents and ordinances, shared use and co-location of one of the Gen-Tie lines would support orderly development while preserving undisturbed lands. The proposed Project is consistent with this goal…"

Pursuant to Section 90508.02 of the County's Land Use Ordinance, the following are permitted uses in the A-2 and A-2-R zone subject to approval of a CUP: Electrical substations in an electrical transmission system (500 kv/230 kv/161 kv); Facilities for the transmission of electrical energy (100-200 kv); Major facilities relating to the generation and transmission of electrical energy, provided such facilities are not, under State or Federal law, to be approved exclusively by an agency or agencies of the State and/or Federal governments and provided that such facilities shall be approved subsequent to coordination and review with the Imperial Irrigation District for electrical matters; Resource extraction and energy development; and Solar Energy Electrical Generators.

Pursuant to Section 90509.02 of the County's Land Use Ordinance, the following are permitted uses in the A-3 zone subject to approval of a CUP: Major facilities relating to the generation and transmission of electrical energy, provided such facilities are not, under State or Federal law, to be approved exclusively by an agency or agencies of the State and/or Federal governments and provided that such facilities shall be approved subsequent to coordination and review with the Imperial Irrigation District for electrical matters; and Solar energy plants.

Based on the goals and objectives of the General Plan and relevant provisions of the County's Land Use Ordinance, with the approval of all Project entitlements, the proposed Project would be an allowable use within the existing land use and zoning designations for parcels comprising the Project site. The Project would also promote Imperial County's renewable energy policies. Thus, the comment's contra-interpretation notwithstanding, the General Plan does not "forbid" solar projects on Agriculture-designated lands.

Response to Comment 8-7: The commenter states that the Imperial County General Plan "forbids the proposed solar uses within the 'Agriculture' plan designation that applies to the entire Project site." The comment includes a quote from the Land Use Element regarding the "Agriculture" designation. The commenter asserts that the non-agricultural use has not met its "burden" to "clearly demonstrate" that it would "not conflict with agricultural operations and will not result in the premature elimination of such agricultural operations."

Inherent in the comment's conclusion is an interpretation of the General Plan goals, policies, and objectives that prohibits, in all instances, non-agricultural related uses on lands designated for agriculture.

Generally, "because policies in a general plan reflect a range of competing interests, the governmental agency must be allowed to weigh and balance the plan's policies when applying them, and [the agency] has broad discretion to construe its policies in light of the plan's purpose." *Pfeiffer v. City of Sunnyvale City Council* (2011) 200 Cal.App.4th 1552. "An action, program, or project is consistent with the general plan if, considering all its aspects, it will further the objectives and policies of the general plan and not obstruct their attainment. State law does not require perfect conformity between a proposed project and the applicable general plan ... [because] it is nearly impossible for a project to be in perfect conformity with each and every policy set forth in the applicable plan ... It is enough that the proposed project will be compatible with the objectives, policies, general land uses and programs specified in the applicable plan." *Id*. (internal quotations and citations omitted). Thus, the County has the authority to interpret the meaning of its General Plan and determine whether the proposed project is consistent.

The County's General Plan includes a variety of goals, policies, and objectives that are implicated by the proposed Project and must, in some instances, be balanced against each other. The General Plan thus cautions against its Goals and Policies being interpreted as doctrine:

> Imperial County's Goals and Objectives are intended to serve as long-term principles and policy statements representing ideals which have been determined by the citizens as being desirable and deserving of community time and resources to achieve. The Goals and Objectives, therefore, are important guidelines for agricultural land use decision making. It is recognized, however, that other social, economic, environmental, and legal considerations are involved in land use decisions and that these Goals and Objectives, and those of other General Plan

> Elements, should be used as guidelines but not doctrines. (General Plan Agricultural Element, page 29 [Section III.A Preface].)

Turning to specific policies implicated by the proposed Project, the County General Plan actively promotes both alternative energy and opportunities for economic growth. For example, Goal 1 of the Renewable Energy and Transmission Element provides that the County "Support the safe and orderly development of renewable energy while providing for the protection of environmental resources." Concerning impacts to agricultural lands and biological resources from alternative energy projects, Goal 2 of the Renewable Energy and Transmission Element states that the County will attempt to "Encourage development of electrical transmission lines along routes which minimize potential environmental effects." This would be accomplished through implementation of the following objectives, among others:

- **Objective 2.1:** To the extent practicable, maximize utilization of IID's transmission capacity in existing easements or rights-of-way. Encourage the location of all major transmission lines within designated corridors, easements, and rights-of-way.
- **Objective 2.2:** Where practicable and cost-effective, design transmission lines to minimize impacts on agricultural, natural, and cultural resources, urban areas, military operation areas, and recreational activities.

Consistent with these objectives, the proposed Project has been designed to lessen impacts on agricultural lands and biological resources by co-locating one of the Gen-Tie lines with the existing Centinela Solar Gen-Tie facilities.

The Project proposes co-location of one of the two proposed Gen-Tie lines with the existing Centinela Solar Gen-Tie line infrastructure, connecting all the Solar Field Site Parcels and the Energy Storage Component to the existing Drew Switchyard located directly south across SR 98. This co-location would allow the Project to maximize use of existing utility right-of-way and avoid impacts to additional agricultural land and biological resources. Further, by connecting to the California Electrical Grid through the existing Drew Switchyard, no new transmission lines or other infrastructure would be required to transport Project-generated energy to SDG&E's IV Substation

In addition to the goals and objectives in the Renewable Energy and Transmission Element promoting alternative energy in the County, the General Plan also recognizes the need for the County to promote diverse economic uses. For example, Goal 2 of the Land Use Element states that the County should "[d]iversify employment and economic opportunities in the County while preserving agricultural activity," and Goal 3, Objective 3.2 of the Land Use Element recognizes the need to "[p]reserve agricultural and natural resources *while promoting diverse economic growth* through sound land use planning." (General Plan, Land Use Element, page 37.) Thus, while there is no question that promoting and preserving agricultural uses is an important part of the County's vision, it is by no means the *sole* policy, goal, or objective of the County General Plan, thus requiring the County's decision-makers to balance various interests when making land use decisions.

The Imperial County General Plan contemplates the use of agricultural lands for other uses, and specifically provides that the evaluation and approval of those uses will occur through the implementation of zoning and the conditional use permit (CUP) review process. Specifically, the Land Use Element provides that "[e]lectrical and other energy generating facilities are heavy industrial uses, except, hydroelectric, and renewable energy facilities may be regulated differently than other types of power plants by implementing zoning including the RE Overlay Zone and Conditional Use Permit process." (General Plan Land Use Element, page 46.) Further, the Land

Use Compatibility Matrix in the General Plan provides that industrial uses are conditionally compatible on lands zoned A-2, A-2-R and A-3 with a CUP (General Plan, Land Use Element, Table 4, page 64.). Thus, pursuant to the General Plan, with the approval of a CUP, the proposed Project would be an allowable use within the existing land use and zoning designations for the site.

Further, while the Land Use Element provides that agriculture is the principal and dominant use for agriculture-designated lands, it expressly allows non-agricultural uses on agricultural land provided the project proponent demonstrates that the non-agricultural use (1) "does not conflict with agricultural operations and will not result in the premature elimination of such agricultural operations" and (2) meets the requirement that "no use should be permitted which would have a significant adverse effect on agricultural production." (General Plan Land Use Element, page 48 [Section IV.C.I].)

Objective 1.8 of the Agricultural Resources Element addresses allowance for the conversion of agricultural land to non-agricultural uses where a "clear and immediate need" can be demonstrated (General Plan Agricultural Resources Element, page 30). The analysis of consistency with the Imperial County General Plan on page 4.9-8 of the Draft EIR states "The proposed Project involves the temporary conversion of agricultural land to a solar energy generation facility which is an allowed use on land designated as Agriculture with approval of a CUP. The clear and immediate need for the proposed Project is described in Section 2.1.2 of the Project Description. For example, the proposed Project would provide a new source of renewable energy to assist the State of California in achieving and exceeding the RPS while also expanding the renewable energy sector in the County's economy. The Project would assist with meeting existing demand as well as future electricity demand associated with planned population growth in the County and State. Further, the energy storage component portion of the Project would increase stability of energy supply….the Project site is located in an area where similar solar energy facilities are clustered and have been approved by the County."

The County has established a permitting process which ensures that the potential effects of using Agriculture-designated lands for solar projects are thoroughly considered. Sections 90508.01, 90508.02, 90509.01 and 90509.02 of the County's Land Use Ordinance identify the permitted and conditional uses within the A-2, A-2-R and A-3 zoning designation. The Project site is zoned A-2, a designation that requires a CUP for solar energy facilities (Draft EIR, page 2.0-36.) The discretionary nature of a CUP process also triggers review under CEQA.

To the extent the Drew Solar Project will prevent the site from being used for agricultural production over the 30 to 40-year operational life of the Project, the Draft EIR identified mitigation measures that will limit the Project's effect on agricultural production. These measures include options to:

- Procure Agricultural Conservation Easements on a 1 to 1 basis (for non-prime farmland) or a 2 to 1 basis (for prime farmland) on land of equal size, of equal quality of farmland, outside the path of development;
- Pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 20% of the fair market value (for non-prime farmland) or 30% (for prime farmland) per acre for the total acres of proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis;
- Voluntarily enter into an enforceable Public Benefit Agreement or Development Agreement that includes an Agricultural Benefit Fee payment; or

- Revise the CUP Application/Site Plan to avoid Prime Farmland. (Draft EIR, page 4.9-34 – 4.9-36 [mitigation measure MM 4.9.1a].)

Thus, while the proposed Project will cause the Project site to be unavailable for agricultural production for the life of the Project, this temporary loss is mitigated to less than significant by the above mitigation measures, which ensure that opportunities for active agriculture production in the County will continue to be available, supported, and promoted.

Based on the above, the County would be within its discretion to determine that the proposed Project is consistent with the various policies, goals, and objectives of the Imperial County General Plan promoting alternative energy and economic diversity.

Response to Comment 8-8: The comment states that the proposed Project "could impede agricultural operations elsewhere in the County and reduce employment, income, sales and tax revenue."

The Draft EIR considered the fiscal and economic impacts of the proposed Project in Chapter 6.0 Other CEQA Considerations based on the independent analysis of the economic, employment and fiscal impacts of the Project,[1] prepared by Development Management Group, Inc. As discussed on pages 6.0-1 and 6.0-2 of the Draft EIR, "The economic impact of the Drew Solar Project to the Imperial County region was calculated to be approximately $109.14 million over the Project's 30-year life (inclusive of both project construction and operations). By comparison, the estimated economic impact of the current use of the solar field site parcels (field/grass crops and produce) over the same 30-year period was calculated to be $80.34 million. Thus, the proposed Project would result in $28.8 million more for the Imperial County region compared to the existing agricultural uses (DMG 2019)."

The comment letter cites to a February 25, 2011 letter from Imperial County Agricultural Commissioner Connie Valenzuela submitted as a comment letter on another solar project. The letter stated that "removal of any farmland out of production would have a direct negative impact on employment, income, sales and tax revenue."

As noted in the Draft EIR on page 6.0-1, Development Management Group, Inc., "calculated that the Drew Solar Project will generate approximately $3.36 million in net local (county) tax revenue over the 30-year life of the project. This is derived from an estimated $1.31 million in sales tax revenue and $2.05 in net property tax revenue (DMG 2019). The estimated cost to the County to provide appropriate services and related employment to the Project is approximately $2.56 million thus generating a projected surplus to the County of Imperial of approximately $802,000 over the 30-year life of the project (subject to acceptance of the recommendations provided within the report). Note that this amount is based solely on the tax laws currently in place and does not include any amounts that may be received by the County under a Public Benefit Agreement or similar arrangement (DMG 2019)."

As to the commenter's assertion that conversion of agricultural land to non-agricultural uses, forcing more and more agriculture-serving business to close, CEQA Guidelines section 15131 provides that economic and social impacts need not be analyzed in an EIR. As stated by the court in *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1205, if substantial evidence in the record demonstrates that "the forecasted economic or social effects

[1] "Drew Solar, LLC, Imperial County California Projects, Economic Impact Analysis (EIA); Employment (Jobs) Impact Analysis (JIA); Fiscal Impact Analysis (FIA) Statement of Potential for Urban Decay" completed for Imperial County. Final Report of Findings. February 21, 2019 by Development Management Group, Inc., 41-625 Eclectic Street, Suite D-2, Palm Desert, CA 92260.

of a proposed project directly or indirectly will lead to adverse physical changes in the environment, then CEQA requires disclosure and analysis of the resulting physical impacts."

As stated in the Draft EIR, the Project site accounts for only 0.144 percent of the County's Farmland of Statewide Importance (Draft EIR page 4.9-40). Likewise, "During construction and operation, the Full Build-out Scenario, inclusive of all CUP areas, would contribute approximately 3.3 percent (763 acres ÷ 23,020 acres x 100) of the total temporary agricultural land conversion associated with cumulative solar projects on a County-wide basis." (Draft EIR page 4.9-40). Given the relatively small amount of agricultural land impacted by the proposed Project individually, or in combination with other projects, the County would be well within its discretion to conclude that approval of the proposed Project will not have a significant adverse effect on agricultural operations elsewhere in the County. Further, page 27 of the independent analysis of the economic, employment and fiscal impacts of the Project prepared by Development Management Group, Inc. states that "We have further determined that the development of the Drew Solar, LLC WILL NOT cause physical blight (urban decay) because the facility is a stand-alone and will have its own contracts based on power purchase demand, meaning that there is not another commercial scale energy facility that will cease to operate as a result of the Drew Solar, LLC."

Response to Comment 8-9: The comment states that because the solar energy generation transmission uses would eliminate the potential farming on the Project sites and encourage conversion of farmland elsewhere in the County, the Project is specifically forbidden by the General Plan. No supporting evidence is provided regarding the assertion that the Project would encourage conversion of farmland elsewhere in the County. Refer to Response to Comment 8-7 and 8-8.

Response to Comment 8-10: The comment states that the Imperial County General Plan forbids development and operation of renewable energy projects outside of the designated Renewable Energy Overlay Zone. The comment goes on to note that Conditional Use Permit applications proposed for specific renewable energy projects not located in the RE Overlay Zone would require an amendment to the RE Overlay Zone. While the Project has applied for an amendment to create an "Island" Overlay, the commenter states that the Project does not meet the prescribed conditions. Refer to Response to Comment 8-4.

The first condition is the expansion of an existing renewable energy operation. As noted in the Draft EIR, the Project is surrounded on two sides by the existing Centinela Solar project and is adjacent to the existing Drew Switchyard. Because the proposed Project is adjacent to the existing Centinela Solar project it would expand an existing industrial solar use.

The second condition is concerning significant environmental impacts brought about by the project. The Draft EIR for the Project addressed all potentially significant impacts with feasible mitigation measures that would reduce impacts to less than significant levels. A Mitigation Monitoring and Reporting Program would be adopted as part of Project approvals to ensure that the mitigations measures are enforced.

Response to Comment 8-11: The comment cites Objective 1.8 of the County General Plan Agricultural Element regarding the conditions under which conversion of agricultural land to non-agricultural uses is allowed. The Project's consistency with this objective is discussed in Table 4.9-1 of Section 4.9, Agricultural Resources on page 4.9-7 of the Draft EIR. The text states "The proposed Project involves the temporary conversion of agricultural land to a solar energy generation facility which is an allowed use on land designated as Agriculture with approval of a CUP. The clear and immediate need for the proposed Project is described in Section 2.1.2 of the Project Description. For example, the proposed Project would provide a new source of renewable energy to assist the

State of California in achieving and exceeding the RPS while also expanding the renewable energy sector in the County's economy. The Project would assist with meeting existing demand as well as future electricity demand associated with planned population growth in the County and State. Further, the energy storage component portion of the Project would increase stability of energy supply. As noted above, the Project site is located in an area where similar solar energy facilities are clustered and have been approved by the County. Other off-site alternatives were also considered but rejected as infeasible."

Response to Comment 8-12: The comment reiterates that the County General Plan forbids non-agricultural uses on the Project parcels. This comment has been previously addressed. Refer to Response to Comment 8-7.

Response to Comment 8-13: The comment states that preferable sites for placement of solar energy facilities exist within the Renewable Energy Overlay Zone and asserts insufficient reasons are provided to reject the alternative that was located within the Renewable Energy Overlay Zone. The commenter states that a study should be prepared to show a lack of alternative sites. The commenter also notes that a study is required to show a lack of alternative sites in order to support the Draft EIR's position.

The County has not previously analyzed a preferred site for the Drew Solar Project. The County limits the number of times the General Plan may be amended each year to three amendments. If the County has not approved three amendments for the year, the County may amend the Renewable Energy Overlay Zone to add specific renewable energy facilities requested by the Applicant, assuming the findings required by the General Plan are made.

The commenter also asserts that the Draft EIR's analysis of alternative sites is inadequate to satisfy the General Plan's requirement for a study to show a lack of alternative sites within the Renewable Energy Overlay Zone. Objective 1.8 of the Agricultural Element of the County General Plan allows "conversion of agricultural land to non-agricultural uses including renewable energy only where a clear and immediate need can be demonstrated, based on economic benefits, population projections and lack of other available land (including land within incorporated cities) for such non-agricultural uses. Such conversion shall also be allowed only where such uses have been identified for non-agricultural use in a city general plan or the County General Plan, and are supported by a study to show a lack of alternative sites." Objective 1.8 does not impose any particular requirements for a study evidencing a lack of alternative sites.

The County dedicated approximately 25 pages of the Draft EIR in Chapter 5.0 to a discussion of alternative sites. As discussed in Draft EIR Chapter 5.0, the Applicant evaluated multiple alternative sites within the existing Renewable Energy Overlay Zone, including the Centinela State Prison Land Alternative and sites within the exposed playa of the Salton Sea.

The Centinela State Prison Land Alternative is the only available site within the Renewable Energy Overlay Zone with an available and readily accessible interconnection to the California Independent System Operator (CAISO)-operated transmission system. CAISO is a balancing authority that manages the supply and demand of electricity for the majority of electricity consumers in California. The Applicant's efforts to obtain an agreement with the California Department of General Services to lease the Centinela State Prison Land for the purpose of renewable energy development were unsuccessful. Accordingly, the Centinela State Prison Land Alternative was eliminated from further consideration on feasibility grounds.

As discussed above, a site located within the exposed playa of the Salton Sea lacks a readily available and accessible connection to the existing CAISO electricity transmission grid and thus failed to meet key project objectives, including providing renewable generation to utilities and consumers, leveraging existing transmission infrastructure, and minimizing environmental impacts by collocating renewable generation and existing transmission facilities. Additionally, the Salton Sea site was eliminated from further consideration due to considerations of technical feasibility. As discussed in the Renewable Energy and Transmission Element of the Imperial County General Plan, the Salton Sea area is underlain at shallow depths by thermal water of sufficient temperature for direct heat application. Portions of the Salton Sea playa are also characterized by hypersaline brines. The Imperial County General Plan recognizes the Salton Sea as having significant potential for the development of geothermal electrical generating facilities, which are considered to be a source of renewable generation under the California Renewable Portfolio Standard. However, the soils and geologic conditions of the Salton Sea playa pose specific technical challenges for photovoltaic generating facilities and inhibit attainment of other project objectives, such as providing an additional source of solar generation and maximizing the County's solar resource potential, relative to the Drew Solar Project site.

As discussed on Draft EIR page 5.0-3, the Salton Sea site was characterized by the presence of corrosive and wet soil that is subject to liquefaction. Photovoltaic facilities require regular maintenance, including panel-washing, to ensure sustained production of solar generation. Due to the high-salinity of the Salton Sea playa soils, wind-blown salts accumulate on steel frames which corrodes the steel and reduces its structural integrity and the salts on the panels reduce sunlight transmissivity. Dust control measures, such as coagulants are only good if there is no traffic to break through the soil crust. However, as discussed above, photovoltaic panels require regular maintenance via maintenance vehicles. Additionally, most of the playa does not support equipment loads due to a shallow water table and saturated soils.

The EIR's analysis and conclusions regarding the availability of alternative sites satisfy the General Plan's documentation requirements. With respect to the remaining factors identified in Objective 1.8, the public benefits to be derived from the project are listed in Draft EIR, Chapter 1.0 Section 1.4.2 (page 1.0-5 and 1.0-6); the clear and immediate need for renewable energy projects, such as the Drew Solar Project, is set forth in Section I(C) of the Renewable Energy and Transmission Element of the County General Plan; while not specifically required by the General Plan, a project-specific statement of need is provided in Section 1.4 of Chapter 1.0 on page 1.0-5 of the Draft EIR; and the economic benefits of the Drew Solar Project are discussed in Chapter 6.0 of the Draft EIR, which incorporates the conclusions of a 2019 study on the fiscal and economic impacts of the Project prepared by Development Management Group, Inc.

Response to Comment 8-14: The comment asserts that the Initial Study did not fully describe the project, specifically with regard to the type of energy storage proposed for the Project. CEQA Guidelines Section 15124 identify the required contents of a Project Description including "precise location and boundaries; a statement of objectives; a general description of the project's technical, economic and environmental characteristics."

Energy storage is described on page 2.0-14 of the Draft EIR. As technologies rapidly change, applicants often do not identify a specific type of energy storage until later in the construction process. The Draft EIR does due diligence by providing a discussion of the range of technologies available that could be used. Sufficient detail is provided and disclosed for the decision-makers and for assessing potential impacts.

Response to Comment 8-15: The commenter disagrees with the Draft EIR's position that conversion of the Project parcels from agricultural land to non-agricultural land is temporary and that it would be mitigated through committing to a reclamation plan and complying with mitigation requiring that the soil value be restored equal to the pre-Project condition.

As noted on pages 2.0-32 and 2.0-33 of the Errata of the Final EIR, "The Project is processing a Development Agreement with Imperial County to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Thereafter, the CUPs are valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. The proposed Project is expected to operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP). At the end of its useful life, the Applicant proposes to decommission the Project and reclaim the area associated with surface disturbance. Given that decommissioning occurs at the end of the Project life and construction occurs at the beginning of the Project and must occur within the first 10 years, no project-related construction is anticipated to occur at the same time as decommissioning. Roads that benefit agricultural activities would be left in place."

Page 2.0-37 of the Draft EIR also identifies a Reclamation/Decommissioning Plan as one of the Project's various entitlements. The County of Imperial requires the applicant to bond for this Plan to ensure that the provisions of the Plan are implemented at the time end of the Project's operational life.

Response to Comment 8-16: The comment states that the Draft EIR fails to acknowledge how the project would significantly indirectly and cumulative affect agriculture countywide by both inducing growth of renewable energy generation and transmission projects and reducing the resources available to sustain remaining agricultural operations.

The Project's impacts on agriculture were addressed in Section 4.9, Agricultural Resources of the Draft EIR. Specifically, page 4.9-40 notes that the Project site accounts for only 0.144 percent of the County's Farmland of Statewide Importance and that full buildout of the Project would contribute approximately 3.3 percent (763 acres ÷ 23,020 acres x 100) of the total temporary agricultural land conversion associated with cumulative solar projects on a County-wide basis. Refer to Response to Comment 8-7, above.

The commenter also asserts that the proliferation of solar projects will force agriculture-serving businesses to close. The economic, employment and fiscal impacts of the Project were thoroughly vetted in the independent analysis prepared by Development Management Group, Inc. Refer to Response to Comment 8-8.

Response to Comment 8-17: The commenter contends that the Draft EIR does not analyze the Project's "numerous structural and wildland fire risks." Chapter 1.0 of the Draft EIR (page 1.0-21) acknowledges that the Project site is not characterized as an urban/wildland interface. According to the Imperial County Natural Hazard Disclosure (Fire) Map prepared by the California Department of Forestry and Fire Protection (CDF 2000), the Project site does not fall into an area characterized as either: (1) a wildland area that may contain substantial forest fire risk and hazard; or (2) a very high fire hazard severity zone.

In addition, Section 4.10, Hazards and Hazardous Materials, discusses Non-Wildland/Operational fire hazard as it relates to the Project (see Draft EIR page 4.10-17). In addition, page 4.10-27 acknowledges that while the specific battery technology has not been identified, all battery storage facilities would be required to comply with local, state and federal regulations regarding operation....During operation, batteries would be housed in buildings or storage containers with proper temperature monitoring and fire suppression systems." The Project would also prepare a Fire Prevention and Response Plan based on the final technology selected to address potential for fire at the Project site.

Response to Comment 8-18: The comment states that the Draft EIR failed to analyze the Project's 'life-cycle' greenhouse gas emissions and that without an lifecycle emissions analysis, the Draft EIR cannot support the assertion that "the project would result in a net total reduction" of greenhouse gas emissions in 2020.

Contrary to the comment's assertions, CEQA does not require the type of "life-cycle" analysis sought by the comment. Public Resources Code section 21151 provides that, in preparing an EIR, "any significant effect on the environment shall be limited to substantial, or potentially substantial, adverse *changes in physical condition which exists within the area* as defined by in Section 21060.5." (Emphasis added). Public Resources Code section 21060.5 refers to such "area" as "the physical conditions which exist *within the area which will be affected by the proposed project* . . . ." (Emphasis added). The California Supreme Court interpreted these sections as requiring analysis of the local effects of a proposed project, and not requiring a life-cycle analysis of products that are the subject of a proposed project. (*Save the Plastic Bag Coalition v. City of Manhattan Beach* (20 11) 52 Cal .4th 155.) CEQA only requires analysis of impacts that are directly or indirectly attributable to the project under consideration. (CEQA Guidelines, Section 15064(d).) "Life-cycle" emissions would refer to emissions beyond those that could be considered indirect effects of a project as that term is defined in CEQA Guidelines section 15358. Thus, the Draft EIR did not need to calculate the life-cycle GHG emissions associated with project construction or those "embedded" in the various components of the proposed Project, including the PV panels.

As discussed above, CEQA does not require that the Draft EIR consider life-cycle GHG emissions. (*Laurel Heights Improvement Assn. v. University of Cal.* (1988) 47 Cal.3d 376, 415 ["[a] project opponent or reviewing court can always imagine some additional study or analysis that might provide helpful information. It is not for them to design the EIR. That further study... might be helpful does not make it necessary."].)

Response to Comment 8-19: The comment states that the Draft EIR attempts to brush the "pseudo-lake" effect under the rug noting that PV collisions are responsible for a high degree of avian mortality. The Draft EIR does acknowledged the "pseudo-lake" effect on pages 4.12-28 and 4.12-29, noting that the solar PV modules would be coated to be non-reflective and are designed to be highly absorptive of all light that strikes their glass surfaces. Although there is potential for some mortality, based on the evidence available—non-reflective design of the solar panels, distance from large water bodies, proximity to agricultural areas, typical migration patterns, comparatively few documented deaths—glare and pseudo-lake effect are not expected to result in significant impacts to migrating or local avian species. Please refer to response to comment 6-13, which is incorporated here by reference.

Response to Comment 8-20: The comment states that the Draft EIR fails to analyze the bird habitat loss that the Project would cause. Since the project area is 90% active agricultural lands, which is not considered a sensitive biological resource by CDFW and does not provide high quality habitat for species, impacts to this land cover would not be considered significant under CEQA. Therefore, no compensatory mitigation is required for habitat impacts associated with the temporary conversion of agricultural lands. Mitigation is required for impacts to jurisdictional resources and would be implemented through measure MM 4.12.3, which requires obtaining and compliance with federal and state agency permits.

The study mentioned in the comment, *Avian interactions with renewable energy infrastructure: An update*, discusses projects that use CSP solar energy technology (i.e. mirrors that reflect and concentrate solar energy), not the PV module technology, which would be coated to be non-reflective and are designed to be highly absorptive of all light that strikes their glass surfaces, that the proposed project would be installing. The study also compares solar facilities that occur adjacent to grasslands, which provide native unmanaged (i.e., not tilled or harvested) habitat for birds. The proposed project is within and surrounded by active agricultural lands and there are solar facilities operating to the east and south of the project area. Therefore, a comparison between the proposed project, which is highly disturbed and practically devoid of native habitats, and the study mentioned in the comment is not reasonable.

Response to Comment 8-21: The comment states that the Draft EIR fails to explain how the Project could comply with state and federal prohibitions on killing migratory birds. The mitigation measures that are recommended in the Draft EIR fully protect migratory bird nests and eggs, consistent with the Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code (CFGC). Implementation of the Draft EIR measures MM 4.12.1a (general construction-related avoidance and minimization measures), MM 4.12.1b (WEAP training, biological monitoring, and compliance), MM 4.12.1c (burrowing owl pre-construction surveys and avoidance/relocation plan), and MM 4.12.1d (nesting bird pre-construction surveys and avoidance plan) ensure that take, possession, and the destruction of the nests or eggs of any migratory bird species does not occur. Therefore, impacts to migratory birds, including burrowing owls, is not anticipated. Notably, the MBTA is interpreted to apply only to actions that have "take" as their purpose. The discussion of the Migratory Bird Treaty Act in on page 4.12-3 of the Draft EIR has been revised to include the following text following the first paragraph:

"**<u>Migratory Bird Treaty Act</u>**

The Migratory Bird Treaty Act (MBTA) implements international treaties between the United States and other nations that protect migratory birds, (including their parts, eggs, and nests) from killing, hunting, pursuing, capturing, selling, and shipping unless expressly authorized or permitted. Generally, the list of species protected under the MBTA includes those where evidence of natural occurrence in the United States or its territories exists, and the documentation of such records has been recognized by the American Ornithologists Union or other competent scientific authorities. Species not protected under the MBTA include those whose occurrences in the United States are strictly the result of intentional human introduction.

<u>"The MBTA prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the MBTA, "take" is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so (16 U.S.C. 703 et seq.). In December 2017, Department of Interior Principal Deputy Solicitor Jorjani issued a memorandum (M-37050) interpreting the MBTA, as follows:</u>

<u>"Interpreting the MBTA to apply to incidental or accidental actions hangs the sword of Damocles over a host of otherwise lawful and productive actions, threatening up to six months in jail and a $15,000 penalty for each and every bird injured or killed. As Justice Marshall warned, "the value of a sword of Damocles is that it hangs—not that it drops." Indeed, the mere threat of prosecution inhibits otherwise lawful conduct. For the reasons explained below, this Memorandum finds that, consistent with the text, history, and purpose of the MBTA, the statute's prohibition on pursuing, hunting, taking, capturing,</u>

killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs."

The Project's purpose is not to take migratory birds, but to construct and operate renewable energy generation and storage facilities, and for the reasons discussed above, take of migratory birds, including burrowing owls, is not anticipated.

Response to Comment 8-22: CEQA Guidelines Section 15126.6(a) requires an EIR to describe a reasonable range of alternatives, consistent with the legal standard set forth in the comment. CEQA vests the lead agency with significant discretion when it comes to identifying a reasonable range of alternatives to study in an EIR, and permits the lead agency to reject proposed alternatives from more detailed analysis provided the process used to select the alternatives is briefly discussed in the EIR and the decision is supported by evidence in the record. (CEQA Guidelines, Section 15126.6, subd. (c); *Tracy First v. City of Tracy* (2009) 177 Cal.App.4th 912.) An alternative may be rejected from detailed analysis in an EIR if it fails to reduce or avoid the project's significant environmental effects, does not implement the basic project objectives, is not potentially feasible, or is facially unreasonable. (CEQA Guidelines, Section 15126.6, subd. (c); *Tracy First*, *supra*, 177 Cal.App.4th 912; see also *Mann v. Community Redevelopment Agency* (1991) 233 Cal.App.3d 1143; *Del Mar Terrace Conservancy, Inc. v. City Council* (1991) 10 Cal.App.4th 712.) These criteria are not exhaustive, however, and other appropriate factors may be considered as well. (*Residents Ad Hoc Stadium Committee v. Board of Trustees* (1979) 89 Cal.App.3d 274.)

The Salton Sea Alternative was rejected from further consideration due to the presence of corrosive and wet soil that is subject to liquefaction.

In terms of selecting alternatives from a narrow range for detailed consideration, CEQA Guidelines Section 15126.6, subdivision (a) provides that alternatives selected for consideration in an EIR should "avoid or substantially lessen any of the significant effects of the project . . . ." While a distributed generation alternative may lessen some of the proposed Project's less than significant environmental effects, it would not "avoid or substantially reduce" any significant effects, and the slight reductions in impacts that might be achieved by a distributed generation alternative did not warrant carrying the alternative forward, especially in light of some of the detriments to such an alternative.

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STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Gavin Newsom
Governor

Kate Gordon
Director

Letter 9

July 2, 2019

RECEIVED
JUL 08 2019
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

Diana Robinson
Imperial County
801 Main Street
El Centro, CA 92243

Subject: Drew Solar Project
SCH#: 2018051036

Dear Diana Robinson:

The State Clearinghouse submitted the above named EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on 7/1/2019, and the comments from the responding agency (ies) is (are) available on the CEQA database for your retrieval and use. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

9-1

Check the CEQA database for submitted comments for use in preparing your final environmental document: https://ceqanet.opr.ca.gov/2018051036/2 . Should you need more information or clarification of the comments, **we recommend that you contact the commenting agency directly**.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan
Director, State Clearinghouse

cc: Resources Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL 1-916-445-0613 state.clearinghouse@opr.ca.gov www.opr.ca.gov

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RESPONSE TO COMMENT LETTER 9

Commenter: Scott Morgan, Director, State Clearinghouse, Governor's Office of Planning & Research
Date of Letter: July 2, 2019

Response to Comment 9-1: Comment acknowledges that the State Clearinghouse has submitted the EIR to selected state agencies for review. Contact information is provided. No response is necessary.

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LETTER 10

ADMINISTRATION / TRAINING
1078 Dogwood Road
Heber, CA 92249

Administration
Phone: (442) 265-6000
Fax: (760) 482-2427

Training
Phone: (442) 265-6011

IMPERIAL COUNTY
CRASH RESCUE
FIRE

OPERATIONS/PREVENTION
2514 La Brucherie Road
Imperial, CA 92251

Operations
Phone: (442) 265-3000
Fax: (760) 355-1482

Prevention
Phone: (442) 265-3020

RECEIVED
AUG 15 2019
IMPERIAL COUNTY
PLANNING & DEVELOPMENT SERVICES

August 15, 2019

RE: Conditional Use Permit #17-0031
Drew Solar, LLC Project

Imperial County Fire Department would like to thank you for the chance to review and comment on the Drew Solar Conditional Use Permit #17-0031

Imperial County Fire Department has the following comments and/or requirements for CUP #17-0031. 10-1

Site Specific Conditions S-10 Public Services:

7.

b. Permittee shall pay an annual fee of $20 per acre per year during the post construction, operational phase of the Project to address the Imperial County Fire/OES expenses for service calls within the Project's Utility/Transmission area. Said fee will be paid to the Fire department to cover on-going maintenance and operations costs to created by the project.

d. Fiscal Impacts will remain open until meeting with the department head(s) and developer(s), which may include but not limited to: Capital purchases which may be required to assist in servicing this project: costs for services during construction and life of the project: and training.

Imperial County Fire Department would like to request a change to S-10 conditions number 7 section b. and d. to read the following. 10-2

7.

b. Permittee shall pay an annual fee of $20 per acre per year (based on developed acreage defined in the Building Permit) during the post-construction, operational phase of the Project to address the Imperial County Fire/OES expenses for service calls within the Project's Utility/Transmission area. Said fee will be paid to the Fire Department to cover on-going maintenance and operations cost created the project. A $100 per acre (base on developed acreage defined in the Building Permit is to be paid be the Permittee for Fire/OES capital purchases prior to issuance of the initial building permit.

d. Fiscal Impacts will remain open in regard to solar generation and battery (energy) storage until meeting with the department head(s) and Developer(s), which may include but not limited to: Capital purchases which may be required to assist in

An Equal Opportunity / Affirmative Action Employer

servicing this project; cost for services during construction and life of the project; and training. Fiscal Impact negotiations will take place prior to issuance of the initial building permit 10-2 con't

If you have any questions, please contact the Imperial County Fire Prevention Bureau at 442-265-3020 or 442-265-3021. 10-3

Sincerely
Andrew Loper
Lieutenant/Fire Prevention Specialist
Imperial County Fire Department
Fire Prevention Bureau

Robert Malek
Deputy Fire Marshal
Imperial County Fire Department
Fire Prevention Bureau

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RESPONSE TO COMMENT LETTER 10

Commenter: **Andrew Loper, Lieutenant/Fire Prevention Specialist; Robert Malek, Deputy Fire Chief; Imperial County Fire Department, Fire Prevention Bureau**
Date of Letter: **August 15, 2019**

Response to Comment 10-1: Comment provides introductory remarks regarding review of the Conditional Use Permit. This letter does not address the adequacy of the Draft EIR but instead is limited to revisions to CUP #17-0031, Condition S-10.

Response to Comment 10-2: Comment requests a change to CUP #17-0031 Condition S-10, items b and d. Specifically, the following text is added to item b regarding the per acre fee for Fire/OES capital purchases and to item d regarding the fiscal impact negotiations:

"b. Permittee shall pay an annual fee of $20 per acre per year (based on developed acreage defined in the Building Permit) during the post-construction, operational phase of the Project to address the Imperial County Fire/OES expenses for service calls within the Project's Utility/Transmission area. Said fee will be paid to the Fire Department to cover on-going maintenance and operations cost created <u>by</u> the project. <u>A $100 per acre fee (based on developed acreage defined in the Building Permit) is to be paid be the Permittee for Fire/OES capital purchases prior to issuance of the initial building permit.</u>

d. Fiscal Impacts will remain open <u>in regard to solar generation and battery (energy) storage</u> until meeting with the department head(s) and developer(s), which may include but not limited to: Capital purchases which may be required to assist in servicing this project: costs for services during construction and life of the project: and training. <u>Fiscal Impact negotiations will take place prior to issuance of the initial building permit.</u>"

Response to Comment 10-3: Comment provides contact information if there are questions on the requested revisions. No response is necessary.

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LETTER 11

Public Works works for the Public

ICDPW

COUNTY OF IMPERIAL

DEPARTMENT OF PUBLIC WORKS

155 S. 11th Street
El Centro, CA
92243

Tel: (442) 265-1818
Fax: (442) 265-1858

Follow Us:

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https://twitter.com/CountyDpw/

September 9, 2019

Jim Minnick
Director of Planning & Development Services
Imperial County Planning & Development Services
901 W Main Street
El Centro, CA 92243

Re: Drew Solar – Revised Access Points

Dear Mr. Minnick,

Public Works is in receipt of Drew Solar's revised access configuration memorandums from LOS Engineering dated August 12, 2019 (Alt Access 1 & 2), which included primary and secondary access from State Route 98 to Drew Road and Pulliam Road, and excluded access from Kubler Road. As part of the project the developer proposes to restrict the project's use of Kubler Road during construction. 11-1

To facilitate construction traffic using only SR98, Drew and Pulliam Roads the developer shall be required to provide a Traffic Management Plan (TMP) by a licensed traffic engineer that is approved by Caltrans and the County of imperial. The TMP shall designate temporary traffic control measures which include but are not limited to the following: construction signage, electronic message and directional boards, flagmen, paying for public service announcements, etc. 11-2

In addition the project shall provide fair share costs for future road maintenance for the County roads it intends to use during construction which are split between the six (6) individual CUPs that make up the overall project. The table below shows the fair-share areas 11-3

CUP App #	Description
17-0031	½ mile of Drew Road from SR-98 to Mt. Signal Drain No. 1.
17-0032	½ mile of Pulliam Road from SR-98 to Carr Drain.
17-0033	½ mile of Pulliam Road from Carr Drain to Kubler Road.
17-0034	½ mile of Drew Road from Mt. Signal Drain No. 1 to Kubler Road.
17-0035	½ mile of Drew Road from SR-98 to Mt. Signal Drain No. 1, unless condition has already been satisfied as part of CUP 17-0031.
18-0001	½ mile of Drew Road from SR-98 to Mt. Signal Drain No. 1, unless condition has already been satisfied as part of CUP 17-0031 or CUP 17-0035.

The fair shares shall be calculated to include 100% of shoulder work, grinding 1" of asphalt and finally 2" overlays for the public roadways mentioned above. Unit costs for the fair-share shall be determined by the Road Commissioner. 11-4

Sincerely, 11-5

John Gay

John A. Gay, P.E.
Director of Public Works
County of Imperial

cc: Patricia Valenzuela, Planner IV
Michael Abraham, Assistant Planning & Development Director

RESPONSE TO COMMENT LETTER 11

Commenter: John A. Gay, P.E., Director of Public Works, County of Imperial
Date of Letter: September 9, 2019

Response to Comment 11-1: Comment states that Imperial County Public Works has received the Applicant's revised access configuration memorandums. The memorandums include primary and secondary access from State Route 98 to Drew Road and Pulliam Road and eliminated access along Kubler Road. Access off of Kubler Road is proposed to be restricted during construction.

The details of the memorandums have been incorporated as errata to Section 4.3, Transportation. This section is included in the Errata of this Final EIR. The memorandums are included as Attachment 1 and 2 to this Final EIR.

Response to Comment 11-2: Comment states that a Traffic Management Plan by a licensed traffic engineer must be prepared by the Applicant. The TMP is needed to facilitate construction traffic using SR 98, Drew Road and Pulliam Road. The TMP must be approved by Caltrans and the County of Imperial. The commenter states that the TMP shall designate temporary traffic control measures and provides several examples.

No significant impacts to LOS would occur along any of the roadway segments or at the intersections in the Project study area as demonstrated by the revisions to Section 4.3 Transportation resulting from the two proposed access configurations (refer to Errata of this Final EIR and Attachments 1 and 2). The requirement of a TMP should be required as a Condition of Approval.

Response to Comment 11-3: Comment identifies fair share costs for future road maintenance of County roads to be used during construction. Segments of roadways associated with each of the six CUPs are identified. These segments have been incorporated as errata into migration measures MM 4.3.5g through MM 4.3.5k of Section 4.3, Transportation. Refer to the Errata of this Final EIR.

Response to Comment 11-4: Comment provides specific details of how fair share is to be calculated. This information has been incorporated into mitigation measures MM 4.3.5g through MM 4.3.5k of Section 4.3 Transportation. Refer to the Errata of this Final EIR.

Response to Comment 11-5: Comment is the commenter's name and title. No response is necessary.

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CHAPTER 4.0

ERRATA

4.1 INTRODUCTION

This Errata has been prepared in response to additional information that became available subsequent to publication of the Draft EIR for the Drew Solar Project (proposed Project) which was circulated for a 50-day public review period in compliance with Public Resources Code 21091 from May 10 through July 1, 2019.

The minor modifications to the text of the Draft EIR detailed below reflect clarifications that do not constitute significant new information and do not change any of the impact conclusions of the Draft EIR. These minor modifications do not constitute changes to the Project or environmental setting nor would they result in any new significant environmental impacts. In addition, these minor revisions to the text, as described below, would not cause a substantial increase in the severity of any environmental impacts. Rather, these changes merely clarify portions of the text. Amended text is identified by page number. Clarifications to the draft EIR text are shown with underline and text removed from the draft EIR is shown with ~~strikethrough~~.

4.2 CHANGES AND EDITS TO THE DRAFT EIR

The following changes and edits represent revisions to information included in the Draft EIR based upon: (1) additional or revised information required to prepare a response to a specific comment; (2) updated information required due to the passage of time; and/or (3) typographical errors. Given the minor changes associated with the document, the information added to the EIR does not meet the requirements for recirculation pursuant to Section 150885.5 of the State CEQA Guidelines.

A brief description of what the change or edit is provided as well as a reference to where the change or edit occurs in the document (page number, paragraph, sentence, table, etc). Changes to the portion of text are included in quotes (“”).

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“TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

Page ES-2 of the Draft EIR, last bullet describing the Development Agreement has been revised as follows to clarify the length of the CUP:

- “A Development Agreement between the County and the Applicant to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement, the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

CHAPTER 1.0, INTRODUCTION

Page 1.0-2, the bullet describing the Development Agreement has been revised as follows to clarify the length of the CUP and to add the Water Supply Assessment:

- "A Development Agreement between the County and the Applicant to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement, the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."
- A Water Supply Assessment has been prepared as required by Senate Bill 610 demonstrating whether project water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses."

Page 1.0-2, the paragraph under 1.8.1 Notice of Preparation has been revised as follows:

"The Notice of Preparation (NOP) for the Drew Solar Project EIR was issued by the Imperial County Department of Planning and Development Services on May 17, 2018. ~~Seven~~ Eight letters were received in response to the NOP from various agencies and individuals."

CHAPTER 2.0, PROJECT DESCRIPTION

Page 2.0-2 of the Draft EIR, the third full paragraph has been revised as follows:

"The ICPDS Department received the following applications submitted by the Applicant dated December ~~28~~ 29, 2017, January ~~8~~ 9, 2018, July 5, 2018, July 31, 2018, August 28, 2018, January 22, 2019."

Page 2.0-2 of the Draft EIR, the third bullet describing the Development Agreement has been revised as follows to clarify the length of the CUP:

- "A Development Agreement between the County and the Applicant to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement, the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

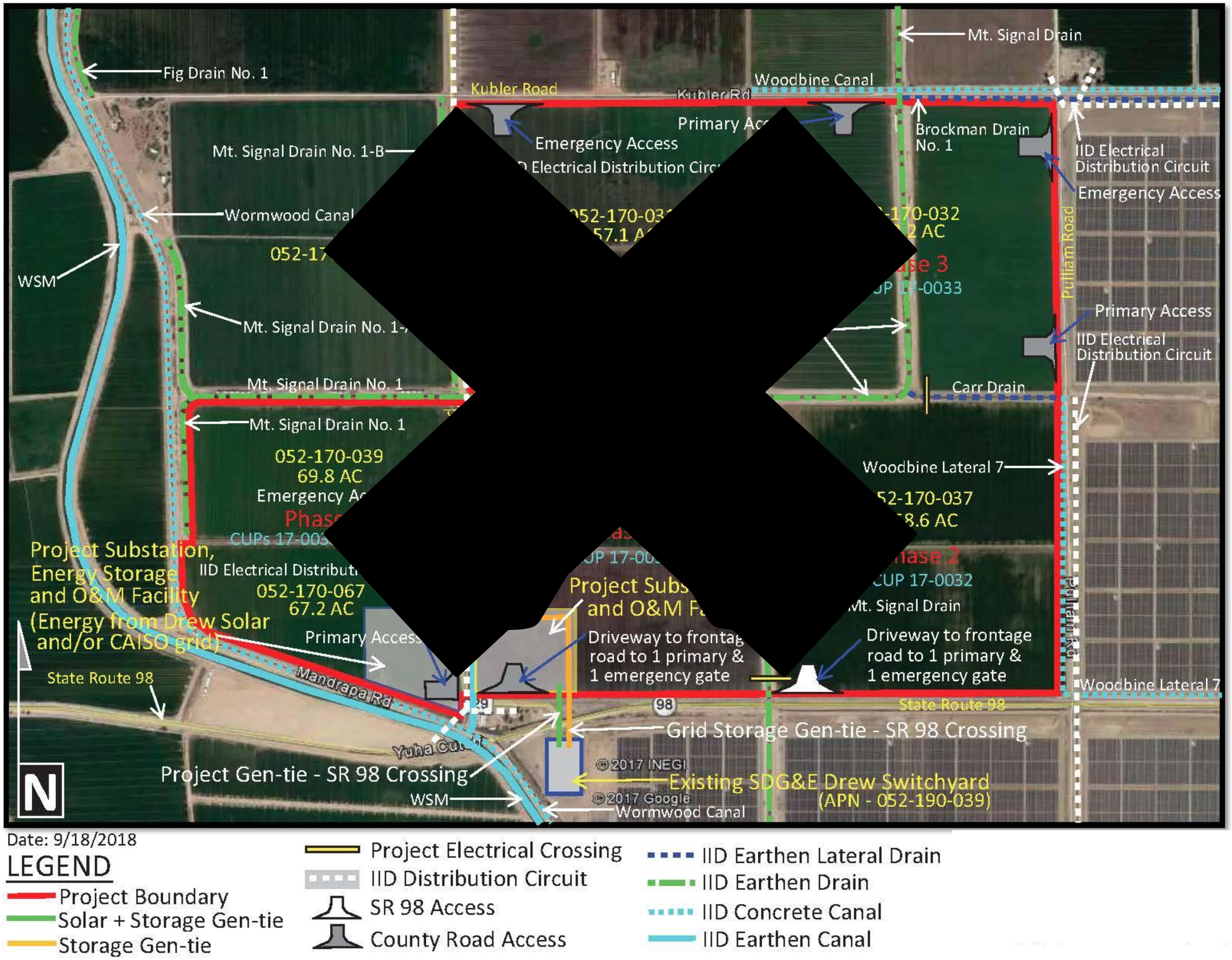
Page 2.0-4 of the Draft EIR has been revised to acknowledge that two access configurations are proposed;

> "**Figure 2.0-1** depicts the regional location of the Project. **Figure 2.0-2** shows the Project site and surrounding area. **Figure 2.0-3** is a conceptual phasing ~~configuration~~ plan of the Project for each of the two proposed access configurations. **Figure 2.0-4** is a site plan showing the layout of the Project and its various components."

Page 2.0-5 of the Draft EIR, the second paragraph under Table 2.0-1 has been revised as follows to clarify the length of the CUP:

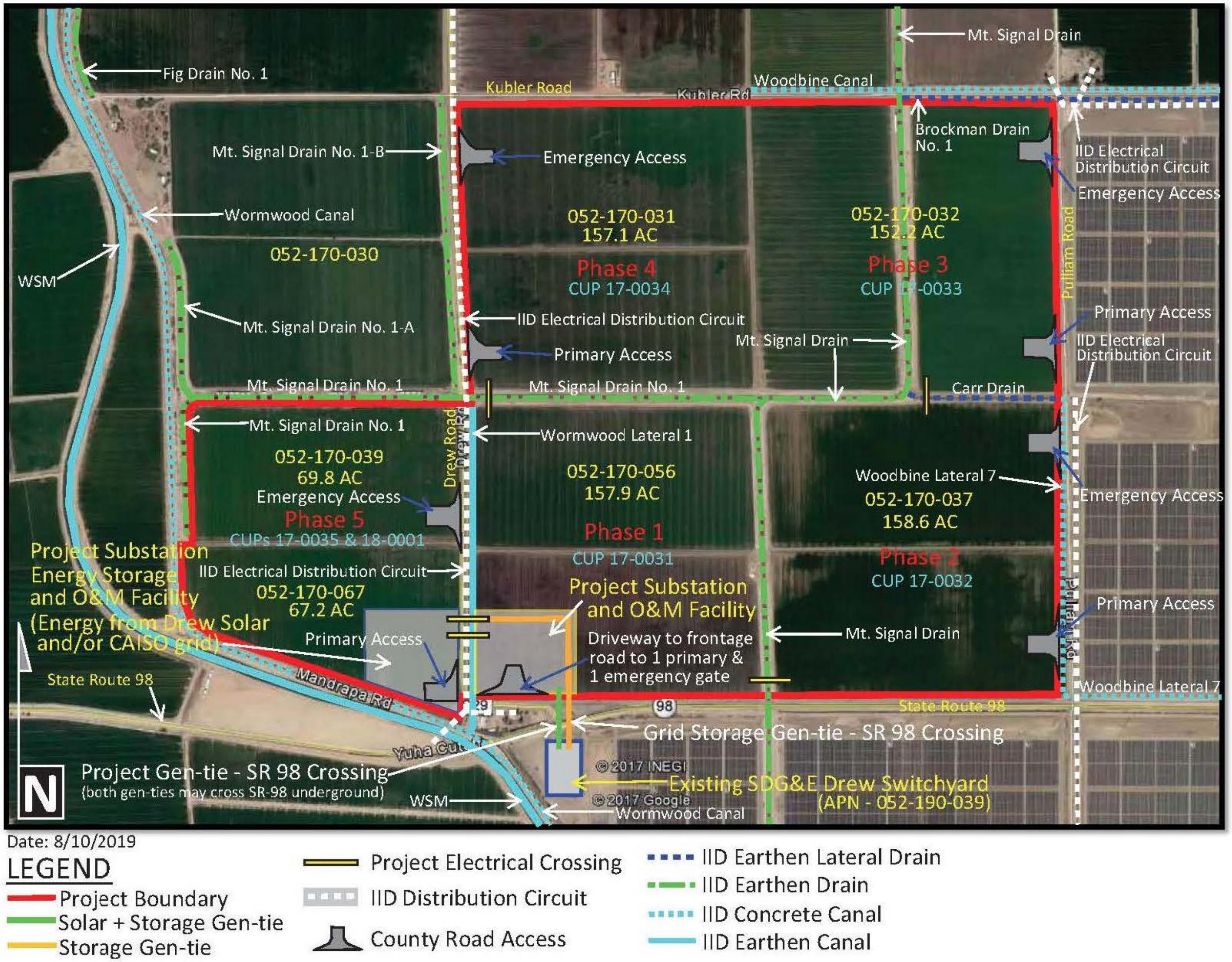
> "The Development Agreement would enable the CUPs to be valid for a total of ~~40~~ 30 years with commencement of construction starting any time within 10 years of CUP approval. Pursuant to the terms of the Development Agreement, the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP). At the end of the useful life of the Project, the solar facility would be decommissioned and reclaimed to its original condition."

Page 2.0-9 of the Draft EIR has been revised to replace Figure 2.0-3, Project Phasing Plan with two figures showing each of the proposed access configurations: Figure 2.0-3A Project Phasing Plan – Access Configuration #1 and on Page 2.0-10 Figure 2.0-3B Project Phasing Plan Access Configuration #2.



<u>*Source: Drew Solar 2019.*</u>

~~**FIGURE 2.0-3**~~
~~**PROJECT PHASING MAP**~~



Source: Drew Solar 2019.

FIGURE 2.0-3A
PROJECT PHASING PLAN - ACCESS CONFIGURATION #1

County of Imperial
May 2019

Drew Solar Project
Draft EIR

2.0-9

Source: Drew Solar 2019.

FIGURE 2.0-3B
PROJECT PHASING PLAN - ACCESS CONFIGURATION #2

Page 2.0-32 and 2.0-33, the first two paragraphs of "F. Decommissioning and Reclamation Plans," has been revised as follows to clarify the length of the CUP:

"F. Decommissioning and Reclamation Plans

The Project is processing a Development Agreement with Imperial County to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Thereafter, the CUPs are valid for the remaining period of ~~40~~ <u>30</u> years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. The proposed Project is expected to operate for up to 40 years <u>(10 years from Development Agreement plus 30 years for the CUP).</u> At the end of its useful life, the Applicant proposes to decommission the Project and reclaim the area associated with surface disturbance. Given that decommissioning occurs at the end of the Project life and construction occurs at the beginning of the Project and must occur within the first 10 years, no project-related construction is anticipated to occur at the same time as decommissioning. Roads that benefit agricultural activities would be left in place.

The planned operational life of the facility is approximately 40 years <u>(10 years from Development Agreement plus 30 years for the CUP).</u> However, if the facility continues to be economically viable, it could be operated for a longer period subject to County approval and applicable CEQA review. The Project Reclamation Plan that will be implemented at the end of the Project's life, and will adhere to Imperial County's decommissioning/reclamation requirements, including, but not limited to:"

Page 2.0-36 of the Draft EIR, the following revision has been made to the discussion of "General Plan Amendment" to reflect amendments to the Section 91701.01 of Chapter 1 of Title 9, Land Use Code.

<u>"General Plan Amendment</u>

The proposed Project will require approval of a General Plan Amendment (GPA) (17-0006) to the Imperial County General Plan for amendment of the Renewable Energy & Transmission Element to create an Island Overlay for the Project Site. <u>Creation of an "Island Overlay" is permissible via an amendment to the RE Overlay Zone to allow for development of a future renewable energy project that is located adjacent to or within one quarter (1/4) mile of an existing operating solar facility. Three conditions must be met to allow for the amendment: the project must be located adjacent (sharing a common boundary) to an existing transmission source; the project is adjacent to or within one-quarter (1/4) of a mile of an existing operating solar facility; and the project would not result in any significant environmental impacts.</u> The Project shares a common boundary to an existing transmission source (i.e. the existing Drew Switchyard) and is adjacent to the existing Centinela Solar Project. <u>No significant impacts that cannot be mitigated would occur as a result of implementing the Project."</u>

Page 2.0-36 of the Draft EIR, the following revision has been made to the discussion of the Development Agreement:

<u>"Development Agreement</u>

- The Project is processing a Development Agreement with Imperial County to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. <u>Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid</u>

> for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30-years for CUP). ~~Thereafter, the CUPs are valid for the remaining period of 40 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved~~."

CHAPTER 3.0, INTRODUCTION TO THE ANALYSIS AND ASSUMPTIONS USED

No revisions.

CHAPTER 4.0, ENVIRONMENTAL ANALYSIS

No revisions.

SECTION 4.1, AESTHETICS

No revisions.

SECTION 4.2, LAND USE

Page 4.2-3 of the Draft EIR, Table 4.2-1, analysis of Goal 2, the text has been modified as follows to clarify the length of the CUP:

> "The Project is processing a Development Agreement with Imperial County to enable and control a Phased CUP of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. ~~Thereafter, the CUPs are valid for the remaining period of 40 30 years from the date of the CUP approval~~. Pursuant to the terms of the Development Agreement, the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP). ~~The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved.~~ The Development Agreement provides for Community Benefit payments to be paid to the County. Therefore, the proposed Project is consistent with this goal for both the Full Build-out Scenario and the Phased CUP Scenario."

Page 4.2-9 of the Draft EIR, Table 4.2-1, analysis of Goal 1, the text has been revised as follows to clarify the length of the CUP:

> "As a solar generating energy system, the proposed Project would protect environmental resources through the production of approximately 100 MW of renewable energy that would otherwise be generated by non-renewable fossil fuels. Further, the Project is located on active agricultural land, and would be required to reclaim the acreage to pre-Project conditions at the end of each CUP or 40 years (10 years from Development Agreement plus 30 years for the CUP). whichever is later. The DEIR recommends mitigation measures to reduce and avoid the Project's impacts, which are incorporated here by reference. Therefore, the proposed Project is consistent with this goal for both the Full Build-out Scenario and the Phased CUP Scenario."

Page 4.2-25 of the Draft EIR, Table 4.2-2, second bullet, the language describing creation of an "Island Overlay" has been revised as follows:

- "Island" Overlay: An amendment may be made to allow for development of future renewable energy project that is ~~not~~ located adjacent to or within one quarter (1/4) mile of an ~~the~~ existing ~~RE Overlay Zone~~ operating solar facility.
  - Is located adjacent (sharing a common boundary) to an existing transmission source
  - Consists of the expansion of an existing renewable energy operation
  - Would not result in any significant environmental impacts (91701.01)."

SECTION 4.3, TRANSPORTATION

Section 4.3 Transportation is included in this Errata in it entirety on the following pages to reflect the addition of two access configurations which resulted in changes throughout the section, but no new or significant impacts.

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4.3 TRANSPORTATION

This section discusses the transportation, circulation and access impacts that would occur in association with implementation of the proposed Project. Impacts may occur from introduction of construction-related traffic on local roads, physical changes to roads, and access points created to allow entry and exit from each CUP. Information contained in this section is summarized from the *Drew Solar Farm County of Imperial (SR 98 at Drew Road) Draft Traffic Impact Analysis* prepared by LOS Engineering, Inc. (LOS 2018). This document is provided on the attached CD of Technical Appendices as **Appendix C** of this EIR. In addition, revisions to the analysis were made based on the "Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment" (LOS 2019a) and the "Drew Solar Alternative Access #2 with one SR-98 access and no access on Kubler" (LOS 2019b). These memos are included as **Attachment 1** and **Attachment 2** to the Final EIR.

This section of this EIR focuses on traffic impacts from construction and operation of the proposed Project. The construction phase will have the highest number of workers and greatest amount of traffic while the operations phase will have approximately 10 full-time personnel and generate very few trips. This volume of traffic is not representative of the number of workers and traffic generated during construction as the greatest amount of traffic will be generated by the highest concentration of workers in late 2019 (for the near-term scenario) with an average of 250 workers per day during construction, not operations. Therefore, the higher and more conservative construction trip generation was used to determine potential Project impacts. Decommissioning would occur in approximately 40 years (30 years plus one 10-year extension to the CUP, if approved). Accordingly, decommissioning traffic is too speculative for evaluation but is discussed on a qualitative level.

4.3.1 Regulatory Framework

A. State

California Department of Transportation

The State of California Department of Transportation (Caltrans) is responsible for the design, construction, maintenance, and operation of the California State Highway System. Caltrans is also responsible for portions of the Interstate Highway System within the state's boundaries. Caltrans has jurisdiction over state highway right-of-way (ROW) and has the authority to issue permits for work and encroachments (temporary or permanent) in these areas. Likewise, Caltrans is involved in review of traffic control plans, stoppage of traffic for placement of aerial lines, and installation or removal of overhead conductors crossing a highway. The Project proposes to construct a 230-kV Gen-Tie. These segment of the Gen-Tie crossing the Caltrans right-of-way over SR 98 into the existing Drew Switchyard parcel would be approximately 400 feet in length and would be either overhead or underground. These gen-ties and the Project's proposed SR 98 driveway would require an encroachment permit from Caltrans to encroach into the SR 98 right-of-way.

B. Local

Imperial County General Plan Circulation and Scenic Highways Element

The Circulation and Scenic Highways Element (Imperial County 2008a) is included as part of the Imperial County General Plan pursuant to requirements of law and policies of federal, state, and regional agencies. The purpose of the Element is to provide a comprehensive document which contains the latest information about the transportation needs of the County and the various modes available to meet these needs and to facilitate regional transportation coordination. This Element is also intended to provide a plan to accommodate a pattern of concentrated and coordinated growth providing both regional and local linkage systems between unique communities and the County's neighboring metropolitan regions.

4.3 TRANSPORTATION

Additionally, the purpose of this Element is to provide a means of protecting and enhancing scenic resources within both rural and urban scenic highway corridors.

Table 4.3-1 analyzes the consistency of the proposed Project with the applicable Goal and objectives relating to land use in the County of Imperial General Plan. While this EIR analyzes the Project's consistency with the General Plan pursuant to California Environmental Quality Act (CEQA) Guidelines section 15125(d), the Imperial County Board of Supervisors ultimately determines consistency with the General Plan.

TABLE 4.3-1
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

General Plan Goal and Objectives	Consistent with General Plan?	Analysis
CIRCULATION AND SCENIC HIGHWAYS ELEMENT		
Safe, Convenient, and Efficient Transportation System		
Goal 1 The County will provide and require an integrated transportation system for the safe and efficient movement of people and goods within and through the County of Imperial with minimum disruption to the environment.	Yes	The proposed Project would rely primarily on County roadways for transport of workers and materials. Mitigation measures MM 4.5.3a thru MM 4.5.3h would minimize impacts to County roads and require that roads damaged by Project-related traffic be repaired. Therefore, the proposed Project is consistent with this goal under both the Full Build-out Scenario and Phased CUP Scenario.
Objective 1.1 Maintain and improve the existing road and highway network, while providing for future expansion and improvement based on travel demand and the development of alternative travel modes.	Yes	As noted in the analysis of Goal 1, mitigation measures 4.5.3a thru MM 4.5.3h would minimize impacts to roads and address roadway damage resulting from construction-related traffic. This is consistent with the County's objective to maintain roadways. Therefore, the proposed Project is consistent with this objective under both the Full Build-out Scenario and Phased CUP Scenario.
Objective 1.2 Require a traffic analysis for any new development which may have a significant impact on County roads. A traffic analysis may not be necessary in every situation, such as when the size or location of the project will not have a significant impact upon and generate only a small amount of traffic. Also, certain types of projects, due to the trip generation characteristics, may add virtually no traffic during peak periods. These	Yes	A Draft Traffic Impact Analysis was prepared for the proposed Project by LOS Engineering, Inc. The analysis examined four scenarios (Year 2017, 2019, 2027, and 2060) to account for the possibility that the Project may be built in phases. Therefore, the proposed Project is consistent with this objective under both the Full Build-out Scenario and Phased CUP Scenario.

TABLE 4.3-1
IMPERIAL COUNTY GENERAL PLAN CONSISTENCY ANALYSIS

General Plan Goal and Objectives	Consistent with General Plan?	Analysis
types of projects may be exempt from the traffic analysis requirements. Whether a particular project qualifies for any exemption will be determined by the Department of Public Works Road Commissioner.		
Objective 1.12 Review new development proposals to ensure that the proposed development provides adequate parking and would not increase traffic on existing roadways and intersection to a level of service (LOS) worse than "C" without providing appropriate mitigations to existing infrastructure. This can include fair share contributions on the part of developers to mitigate traffic impacts caused by such proposed developments.	Yes	The Draft Traffic Impact Analysis examined impacts to intersections, roadway State Route segment and freeway segment level of service (LOS) within the Project study area. The proposed Project would not result in any intersection, roadway segment or freeway segment operating below LOS C under any scenario (Year 2017, 2019, 2027, and 2060). Parking for Project-related vehicles will be provided on-site during construction. Parking for Project-related vehicles will be provided on site during construction. The parking lot may move to adjacent CUPs as new CUPs are constructed. Each O&M building would have its own parking lot with approximately 25 parking spaces (refer to Figure 2.0-11 in Chapter 2.0). Therefore, the proposed Project is consistent with this objective and no mitigation is required under both the Full Build-out Scenario and Phased CUP Scenario..

4.3.2 ENVIRONMENTAL SETTING

Information contained in this section is summarized from the *Drew Solar Farm County of Imperial (SR 98 at Drew Road) Draft Traffic Impact Analysis* prepared by LOS Engineering, Inc. (LOS 2018). The Draft Traffic Impact Analysis is included on the attached CD of Technical Appendices as **Appendix C** of this EIR.

A. EXISTING CIRCULATION NETWORK

The existing roadway system and classifications are described below. The classifications are based on the Imperial County's Circulation Element and valid as of the date (May 27, 2018) of the Project's Notice of Preparation of the EIR. Excerpts are included in Appendix G of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.

4.3 TRANSPORTATION

Brockman Road between McCabe Road and Kubler Road has a classification of Major Collector in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

Forrester Road between I-8 and McCabe Road has a classification of Prime Arterial in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

Interstate 8 (I-8) between Drew Road and Imperial Avenue is constructed as a 4-lane divided interstate highway with 2 lanes in each direction.

Kubler Road between Pulliam Road and Brockman Road has a classification of Minor Collector in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

McCabe Road between Brockman Road and Forrester Road has a classification of Major Collector in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

Pulliam Road between Kubler Road and Brockman Road has a classification of Minor Collector in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

State Route (SR 98) between Drew Road and Clark Road has a classification of State Highway in the Circulation Element. This roadway is currently constructed as a 2-lane undivided roadway.

The existing roadway conditions are shown in **Figure 4.3-1**.

Level of Service

Intersection LOS

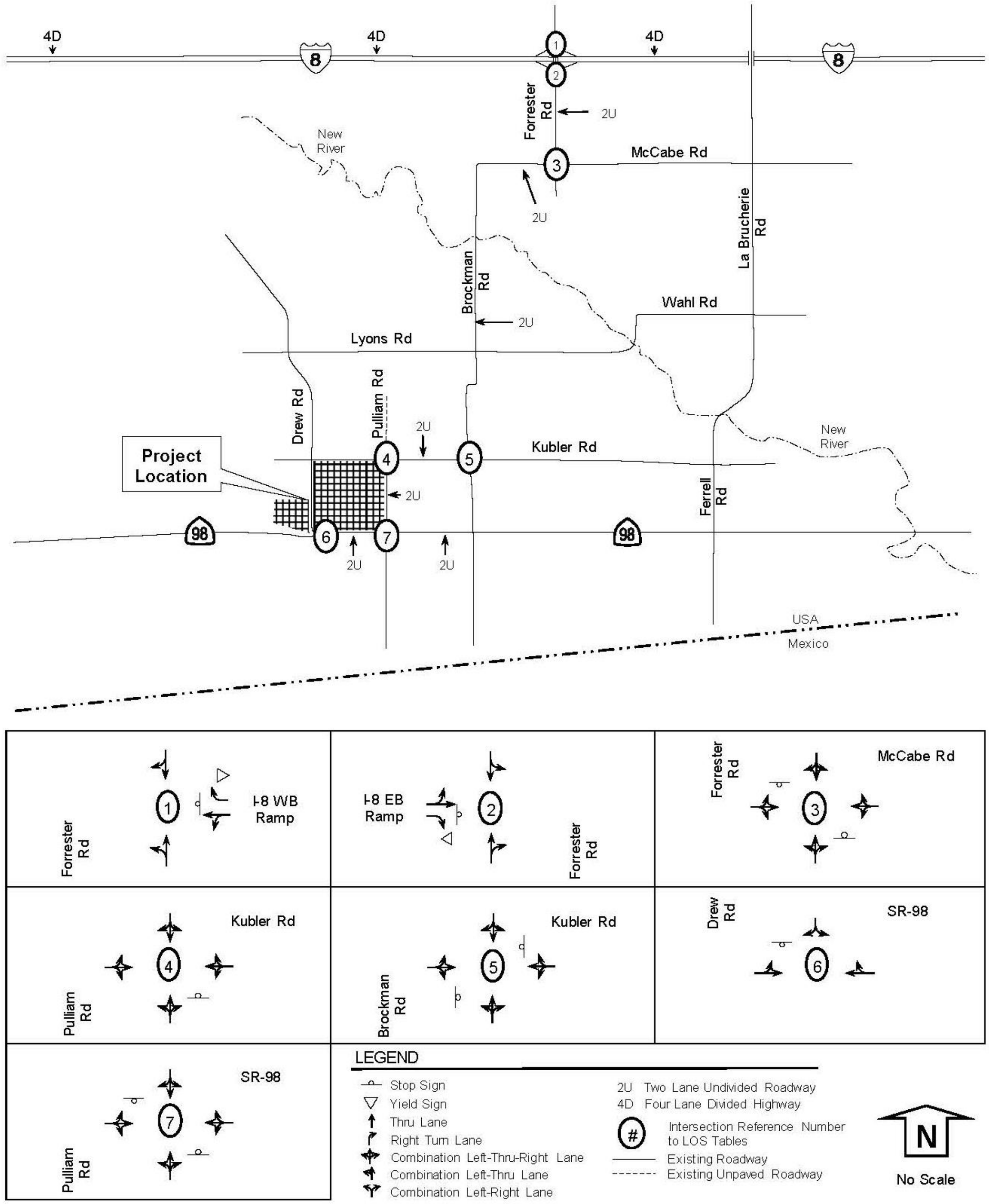
The operating conditions of the study intersections are measured using the Highway Capacity Manual (HCM) LOS designations ranging from A through F. LOS A represents the best operating condition and LOS F denotes the worst operating condition. LOS worsens from A to F based on delay in seconds at the intersection. **Table 4.3-2** shows the delays for each LOS associated with un-signalized and signalized intersections. The individual LOS criteria for each roadway component are described below.

TABLE 4.3-2
UN-SIGNALIZED AND SIGNALIZED INTERSECTION LEVEL OF SERVICE (HCM 2000)

Level of Service	Un-Signalized (RWSC and AWSC) Control Delay (seconds/vehicle)	Signalized Control Delay (seconds/vehicle)
A	0-10	0-10
B	> 10-15	> 10-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	> 50	> 80

Source: LOS 2018. TWSC: Two-Way Stop Control.
AWSC: All-Way Stop Control.

According to the California Department of Transportation's (Caltrans) *Guide for the Preparation of Traffic Impact Studies,* December 2002 ("Caltrans Guide"), the accepted methodology for un- signalized intersections is that contained in the most current edition of the HCM (excerpts included in Appendix B of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR). Therefore, all of the study interchanges with un-signalized intersections were analyzed using the most currently used edition of the HCM.



Source: LOS 2018.

FIGURE 4.3-1
EXISTING ROADWAY CONDITIONS

4.3 TRANSPORTATION

Roadway and State Route Segment LOS

The roadway and State Route segments were analyzed based on the functional classification of the roadway using the Imperial County Standard Street Classification capacity lookup table (copy included in Appendix C of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR). The capacity for SR 98 in the project vicinity is based on a "Local Collector" as noted in the Imperial County *Circulation and Scenic Highways Element* dated January 29, 2008 ("Circulation Element"). **Table 4.3-3** summarizes the roadway segment capacity and LOS standards used to analyze roadway segments.

TABLE 4.3-3
ROADWAY SEGMENT DAILY CAPACITY AND LOS (IMPERIAL COUNTY)

Circulation Element Road Classification	Cross Section	LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	154/210	<30,000	<42,000	<60,000	<70,000	<80,000
Prime Arterial	106/136	<22,200	<37,000	<44,600	<50,000	<57,000
Minor Arterial	82/102	<14,800	<24,700	<29,600	<33,400	<37,000
Major Collector (Collector)	64/84	<13,700	<22,800	<27,400	<30,800	<34,200
Minor Collector (Local Collector)	40/70	<1,900	<4,100	<7,100	<10,900	<16,200
Local County (Residential)	40/60	*	*	<1,500	*	*
Local County (Residential Cul-de-Sac or Loop Street)	40/60	*	*	<200	*	*
Major Industrial Collector – (Industrial)	76/96	<5,000	<10,000	<14,000	<17,000	<20,000
Industrial Local	44/64	<2,500	<5,000	<7,000	<8,500	<10,000

Source: LOS 2018, from Imperial County Department of Planning and Development Services Circulation and Scenic Highways Element January 29, 2008.
*Notes: *Level of service is not applied to residential streets because the primary purpose of residential streets is to serve abutting lots, rather than carry through traffic. Level of service normally applies to roads carrying through traffic between major trip generators and attractors.*

Freeway Segment LOS

The freeway segments, covering Interstate 8, were analyzed based on a multi-lane highway LOS criteria using a Volume to Capacity (V/C) ratio as outlined in the HCM. The V/C ratio is the ratio of traffic to the roadway capacity that provides a measure of how much roadway capacity is being used. The methodology accepted by Caltrans for the analysis of freeway sections is to use the most current edition of the HCM as noted on page 5 of the Caltrans Guide. **Table 4.3-4** summarizes the freeway LOS operations based on Caltrans' *Guide for the Preparation of Traffic Impact Studies* V/C ratios. (Excerpts from Caltrans' *Guide for the Preparation of Traffic Impact Studies* are included in Appendix D of the Draft Traffic Impact Analysis [**Appendix C** of this EIR].)

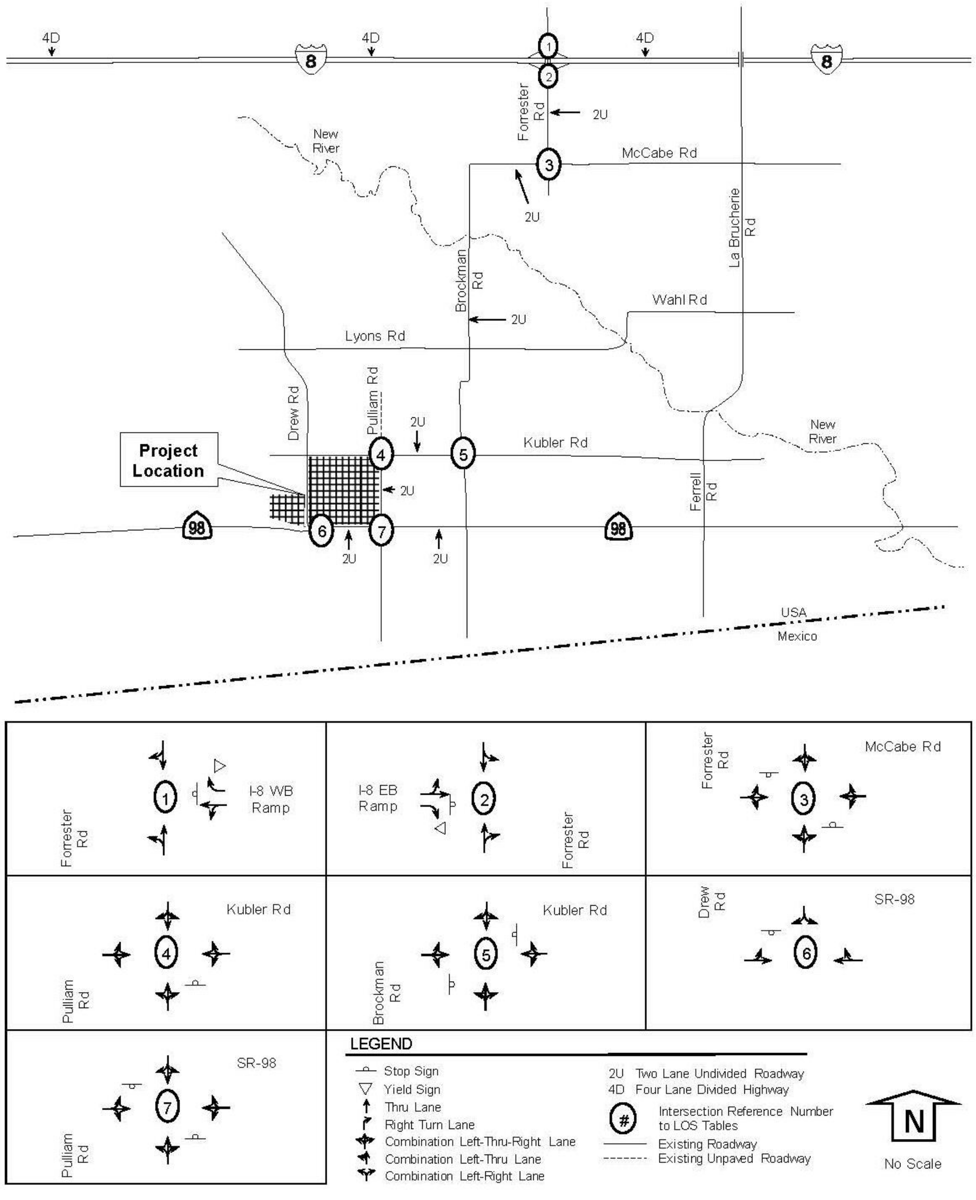
TABLE 4.3-4
FREEWAY LEVEL OF SERVICE

Measure of Effectiveness	LOS A	LOS B	LOS C	LOS D	LOS E
Max Volume/Capacity Ratio (V/C)	0.30	0.50	0.71	0.89	1.00

Source: LOS 2018 from Caltrans' Guide for the Preparation of Traffic Impact Studies, December 2002.

B. EXISTING CONDITIONS

Existing AM, PM, and daily volumes are shown on **Figure 4.3-2**. Count data are included in Appendix H of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR. The intersection, segment, and freeway LOS are shown in **Tables 4.3-5**, **4.3-6**, and **4.3-7** respectively. Intersections LOS calculations are included in Appendix I of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.



Source: LOS 2018.

FIGURE 4.3-2
EXISTING TRAFFIC VOLUMES

4.3 TRANSPORTATION

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TABLE 4.3-5
EXISTING INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Year 2017 Delay[2]	Year 2017 LOS[3]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM PM	9.7 9.6	A A
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM PM	11.1 13.6	B B
3) Forrester Road at McCabe Road (U)	Minor Leg	AM PM	9.5 9.5	A A
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM PM	8.6 8.6	A A
5) Brockman Road and Kubler Road (U)	Minor Leg	AM PM	8.9 9.0	A A
6) Drew Road at SR 98 (U)	Minor Leg	AM PM	8.7 8.9	A A
7) Pulliam Road at SR 98 (U)	Minor Leg	AM PM	9.0 8.6	A A

Source: LOS 2018.
[1] Intersection Control – (S) Signalized, (U) Unsignalized.
[2] Delay – HCM Average Control Delay in seconds.
[3] LOS: Level of Service Minor Leg; approach LOS of minor/lessor roadway.
All: combined LOS for all approaches.

TABLE 4.3-6
EXISTING ROADWAY AND STATE ROUTE LOS

Intersection & (Control)[1]	Classification (as built)	Year 2017 Daily Volumes	# of Lanes	LOS C Capacity	V/C	LOS
Brockman Road McCabe Road to Kubler Road	Major (2U)	497	2	7,100	0.07	A
Forrester Road I-8 to McCabe Road	Prime (2U)	1,977	2	7,100	0.28	B
Kubler Road Brockman Road to Ferrell Road	Minor (2U)	65	2	7,100	0.01	A
McCabe Road Brockman Road to Forrester Road	Major (2U)	738	2	7,100	0.10	A
Pulliam Road Kubler Road to SR 98	Minor (2U)	29	2	7,100	0.00	A
SR 98						
Drew Road to Pulliam Road	State Highway (2U)	2,090	2	7,100	0.29	B
Pulliam Road to Brockman Road	State Highway (2U)	2,090	2	7,100	0.29	B

Source: LOS 2018. Classification based on January 29, 2018 Circulation and Scenic Highways Element.
2U= 2 lane undivided roadway.
Daily volume is a 24-hour volume. LOS: Level of Service.
LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.

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TABLE 4.3-7
EXISTING FREEWAY LOS

Freeway Segment Forecasted	I-8 Dunaway Road to Drew Road				I-8 Forrester Road to Imperial Avenue			
Year 2017 ADT	14,000				17,200			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor [2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor [3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor [4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,032	1,131	1,299	1,321	1,318	1,446	1,661	1.689
Volume to Capacity	0.220	0.241	0.276	0.281	0.281	0.308	0.353	0.359
LOS	A	A	A	A	A	A	A	A

Source: LOS 2018.
Notes:
[1] Capacity of 2,350 pcphpl from Caltrans' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2015 report), which is the percentage of AADT in both directions.
[3] Latest D factor from Caltrans (based on 2015 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report).

Under existing conditions, the study intersections, roadways, State Route and freeway were calculated to operate at LOS B or better.

C. STUDY AREA CRITERIA

The study area is determined based on the County of Imperial Department of Public Works *Traffic Study and Report Policy* dated March 12, 2007, revised June 29, 2007 and approved by the Board of Supervisors of the County of Imperial on August 7, 2007 ("Traffic Study and Report Policy"). "Any project that has the potential to degrade an existing road section, an existing signalized intersection, or an existing unsignalized intersection to below the existing level of service or to cause it to be lower than a level of service (LOS) "C" during any peak hour, using the HCM Methods of analysis on any individual, existing traffic movement" (Traffic Study and Report Policy, 4-5). The Project study area was determined based on similar solar projects in the same general area. Two configurations (Access Configuration #1 and Access Configuration #2) were analyzed based on different driveway access points to the Project site. Access Configuration #1 identifies access points from the east along Pulliam Road and the west along Drew Road with no access from Kubler Road on the north or SR 98 on the south. Access Configuration #1 identifies one access along SR 98 as well as four access points along Drew Road and two along Pulliam Road. The following intersections ~~and Project driveway on SR 98~~ were analyzed as part of this study:

Access Configuration #1 (refer to **Figure 4.3-11a**)

1) Forrester Road/I-8 WB Ramp (un-signalized)
2) Forrester Road/I-8 EB Ramp (un-signalized)
3) Forrester Road/McCabe Road (un-signalized)
4) Kubler Road/Pulliam Road (un-signalized)
5) Kubler Road/Brockman Road (un-signalized)
6) SR 98/Drew Road (un-signalized)
7) SR 98/Pulliam Road (un-signalized)
8) ~~SR 98/West Project Driveway (currently does not exist)~~

Access Configuration #2 (refer to **Figure 4.3-11b**)

1) Forrester Road/I-8 WB Ramp (un-signalized)
2) Forrester Road/I-8 EB Ramp (un-signalized)
3) Forrester Road/McCabe Road (un-signalized)
4) Kubler Road/Pulliam Road (un-signalized)
5) Kubler Road/Brockman Road (un-signalized)
6) SR 98/Drew Road (un-signalized)
7) SR 98/Pulliam Road (un-signalized)
8) SR 98/Proposed Project Driveway

Along with the following roadway and State Route segments:

1) Brockman Road from McCabe Road to Kubler Road
2) Forrester Road from I-8 to McCabe Road
3) Kubler Road from Pulliam Road to Brockman Road
4) McCabe Road from Brockman Road to Forrester Road
5) Pulliam Road from Kubler Road to SR 98
6) SR 98 between Drew Road and Pulliam Road
7) SR 98 between Pulliam Road and Brockman Road

And, the following Freeway (also referred to as Interstate) segments:

1) I-8 between Dunaway Road and Drew Road
2) I-8 between Forrester Road and Imperial Avenue

D. EXISTING (YEAR 2017) TRAFFIC VOLUMES AND LOS ANALYSIS

Intersection Volumes

Existing peak hour intersection volumes (with count dates) were collected from 6:00 AM to 8:00 AM and from 4:00 PM to 6:00 PM for Draft Traffic Analysis:

1) Forrester Road/I-8 WB Ramp (Tuesday 11/4/2017)
2) Forrester Road/I-8 EB Ramp (Tuesday 11/4/2017)
3) Forrester Road/McCabe Road (Tuesday 11/4/2017)

4) Kubler Road/Pulliam Road (Tuesday 11/4/2017)
5) Kubler Road/Brockman Road (Tuesday 11/4/2017)
6) SR 98/Drew Road (Tuesday 11/4/2017)
7) SR 98/Pulliam Road (Tuesday 11/4/2017)
8) SR 98/West Project Driveway (currently does not exist)

Twenty-four hours of data were collected for the following roadway segments:

1) Brockman Road from McCabe Road to Kubler Road (Tuesday 11/4/2017)
2) Forrester Road from I-8 to McCabe Road (Tuesday 11/4/2017)
3) Kubler Road from Pulliam Road to Brockman Road (Tuesday 11/4/2017)
4) McCabe Road from Brockman Road to Forrester Road (Tuesday 11/4/2017)
5) Pulliam Road from Kubler Road to SR 98 (Tuesday 11/4/2017)

In addition, the data was obtained from Caltrans for the Freeway (Interstate) and State Route segments below. Please note that the latest available Caltrans data from 2016 was factored up to a year 2017 volume using a 1.8% annual growth factor (details provided under item "F. Methodology for Analysis", below).

1) I-8 between Dunaway Road and Drew Road
2) I-8 between Forrester Road and Imperial Avenue
3) SR 98 between Drew Road and Pulliam Road
4) SR 98 between Pulliam Road and Brockman Road

E. SCENARIOS

The number of scenarios to be analyzed is based on the methodology outlined in the County's Traffic Study and Report Policy. Excerpts from the Traffic Study and Report Policy showing the scenario criteria are included in Appendix A of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR. Based on the aforementioned methodology source and to account for the possibility that the project may be phased, the following scenarios were analyzed. <u>The scenarios marked with an asterisk ("*") were analyzed for each of the two access configurations</u>:

1) Existing 2017 Conditions
2) Existing 2017 + Project Conditions<u>*</u>
3) Existing 2017 + Project + Cumulative Conditions<u>*</u>
4) Near-Term Year 2019 Conditions
5) Near-Term Year 2019 + Project Conditions<u>*</u>
6) Near-Term Year 2019 + Project + Cumulative Conditions<u>*</u>
7) Long-Term Year 2027 Conditions
8) Long-Term Year 2027 + Project Conditions<u>*</u>
9) Long-Term Year 2027 + Project + Cumulative Conditions<u>*</u>
10) Horizon Year 2060 Conditions

Note that there is no separate analysis of phased construction of the Project because such phasing is captured within the bookend analysis provided by near- and long-term project forecasts.

<u>Near-Term Year 2019 Conditions</u>

This section documents Near-Term Year 2019 conditions when the project is anticipated to be at the peak of construction activities. The Year 2019 background volumes are based on increasing the existing Year 2017 volumes by an annual growth rate. The following documents and data were reviewed to determine a growth rate:

4.3 TRANSPORTATION

1) The California Economic Forecast *California County-Level Economic Forecast 2015-2040*, dated September 2015 documents an average annual growth factor of 1.8 percent from 2015 to 2020 for Imperial County.
2) The U.S. Census Bureau population data from year 2010 to year 2016 for Imperial County was used to calculate~~in~~ an average growth factor of 0.6 percent.

For the purpose of the Draft Traffic Impact Analysis, the more conservative average growth rate of **1.8 percent** was selected for the annual population growth rate. Excerpts from the California Economic Forecast and Census data are included in Appendix O of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR. Year 2019 traffic data was factored up from existing data through the application of a 1.8% annual growth rate (3.6% total).

Long-Term Year 2027 Conditions

This section documents Long-Term Year 2027 conditions in case the entire Project (in 18 months) is constructed at the end of the period when construction must commence per the CUP. The Year 2027 background volumes are based on increasing the existing year 2017 volumes by an annual growth rate of 1.8% (19.5% total due to compounding growth) as described under the Near-Term Year 2019 Conditions.

F. METHODOLOGY FOR ANALYSIS

The following describes the methodology used for the various aspects of the traffic analysis. The Draft Traffic Impact Analysis included traffic generated for all components of the Project but does not differentiate traffic specifically associated with each component. The analysis below is therefore inclusive of the Solar Energy Generation Component, Energy Storage Component and Drew Switchyard and Gen-Tie Component.

Intersections

The HCM operations analysis using LOS evaluation criteria were employed in the Draft Traffic Impact Analysis. The operating conditions of the Project study area intersections were measured using the HCM LOS designations ranging from A through F. LOS A represents the best operating condition and LOS F denotes the worst operating condition. LOS worsens from A to F based on delay in seconds at the intersection (refer to **Table 4.3-2**, above).

Roadway and Segments

The roadway and State Route segments were analyzed based on the functional classification of the roadway using the Imperial County Standard Street Classification capacity lookup table (refer to in Appendix C of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR). The capacity for State Route 98 in the project vicinity is based on a "Local Collector" as noted in the Imperial County Circulation and Scenic Highways Element dated January 29, 2008 ("Circulation Element"). The roadway segment capacity and LOS standards used to analyze roadway segments are summarized in **Table 4.3-3**, above.

Freeway Segments

The freeway segments, covering Interstate 8, were analyzed based on a multi-lane highway LOS criteria using a Volume to Capacity (V/C) ratio as outlined in the HCM. The V/C ratio is the ratio of traffic to the roadway capacity that provides a measure of how much roadway capacity is being used. The methodology accepted by Caltrans for the analysis of freeway sections is to use the most current edition of the HCM as noted on page 5 of the Caltrans Guide. The freeway LOS operations are based on the Caltrans Guide V/C ratios summarized below in **Table 4.3-4**. Relevant excerpts from the Caltrans Guide are included in Appendix D of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.

4.3 TRANSPORTATION

G. Project Trip Generation

The project trip generation consists of a construction phase, an operations phase and a decommissioning/reclamation phase. The construction phase will have the highest number of trips followed by an operations phase with significantly fewer trips. This section describes the construction and operations trip generation. Traffic details for the project are included in Appendix J of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.

The Project may be constructed at one time taking approximately 18 months or it may be completed over a ten-year period. Under the development agreement, the Conditional Use Permit (CUP) will be valid for ~~40~~ 30 years with up to 10 years to commence construction. The Project could operate up to 40 years (30 years plus one 10-year extension to the CUP, if approved). If construction is to commence immediately after approvals, the Project could have the highest concentration of workers in Year 2019. If delayed due to market forces, the Project could have the highest concentration of construction workers in Year 2027. The project may also be phased (e.g., 20 MW constructed at a time or 1/5 of the overall Project) that would result in a lower concentration of construction workers and less trip generation. However, to be conservative, the entire Project (100 MW) was analyzed under Year 2019 and Year 2027 conditions assuming an 18-month construction period.

Construction Trip Generation

Construction of the Project includes site preparation, foundation construction, delivery of equipment and supplies, erection of major equipment and structures, installation of control systems, and start-up/testing. These construction activities are expected to require approximately 18 months.

According to the Applicant, the construction workforce may reach the highest concentration in late 2019 (for the near-term scenario) with an average of 250 workers per day (refer to Table 2.0-5 in Chapter 2.0, Project Description). Based on the Applicant's experience, about 75% of the workers follow a 4 day at 10 hours per day (4-10 shift) schedule, about 25% follow a 5 day at 8 hours per day (5-8 shift) schedule, and roughly 25% of the workers carpool. The workers also have different start and end times between the 4-10 and 5-8 shift schedules. The 4-10 shift workers typically arrive around 6:00 a.m. and depart around 5:00 p.m. while the 8-5 shift workers typically arrive around 7 a.m. and depart around 4:00 p.m.

Deliveries of equipment and supplies are anticipated to average about 10 daily truck trips per day. The HCM adjustment for heavy vehicles, such as trucks is through the application of a Passenger Car Equivalent (PCE) factor. Applying a PCE factor of 3 to the 10 daily truck trips, the PCE is 60 ADT with 6:00 a.m. peak hour trips (3 inbound and 3 outbound) and 6 p.m. peak hour trips (3 inbound and 3 outbound).

This analysis is based on the higher concentration (75%) of 4-10 shift workers that arrive between 6:00 a.m. and 7:00 a.m. and depart sometime between 5:00 p.m. and 6:00 p.m. **Table 4.3-8** summarizes the combined worker and construction truck traffic is calculated at 436 ADT with 147 a.m. peak hour trips (144 inbound and 3 outbound) and 147 p.m. peak hour trips (3 inbound and 144 outbound).

Table 4.3-8
Project Construction Trip Generation

Proposed Construction-Related Traffic	ADT	6:00 AM		7:00 AM		4:00 PM		5:00 PM	
		IN	OUT	IN	OUT	IN	OUT	IN	OUT
Construction Workers on 4 to 10 Shift (75% of 350)[1]	282	141	0	0	0	0	0	0	141
Construction Workers on 5 to 8 Shift (25% of 350)[2]	94	0	0	47	0	0	47	0	0
Equipment and Construction Trucks (with PCE)[3]	60	3	3	3	3	3	3	3	3
Total Traffic During Peak Construction Period	436	144	3	50	3	3	50	3	144
Daily and Higher Peak Hour Used for Analysis	436	144	3					3	144

4.3 TRANSPORTATION

Source: LOS 2014.
Notes: [1]Applicant estimates the 4 days at 10 hrs/day (4-10s) shift to include about 188 workers (75% of the total 250 peak work force) with about 25% carpooling (47) and riding with the 75% (141), thus the inbound is 141 trips and the ADT is 282.
[2]Applicant estimates the 5 days at 8 hrs/day (5-8) shift to include about 62 workers (25% of the total 250 peak work force) with about 25% carpooling (15) and riding with the 75% (47), thus the inbound is 47 and the ADT is 94.
[3] Approx. 10 daily trucks with a Passenger Car Equivalent (PCE) factor of 3 applied to each truck equals 60 ADT (10 trucks x 2 x 3 PCE = 60 ADT) that are anticipated to have a frequency of about 1 in and 1 out per hour for a peak period volume of 6 (with PCE).

Construction Trip Distribution and Assignment

The Applicant estimates that approximately 80% of the labor pool for the construction workforce is anticipated to come from a combination of existing residents and workers that will temporarily reside within Imperial County ("Local Workforce"). The Local Workforce is anticipated to travel from Calipatria, Westmorland, Brawley, Imperial, El Centro, Holtville, and Calexico. The distribution of the construction workforce by cities/communities was based on the concentration of populations per the Census 2010 from the U.S. Census Bureau (U.S. Census Bureau 2010). **Table 4.3-9** shows the percentage of local construction workforce by city/community and county.

TABLE 4.3-9
CONSTRUCTION WORKFORCE SOURCES BASED ON CENSUS 2010 POPULATIONS (80 PERCENT LOCAL)

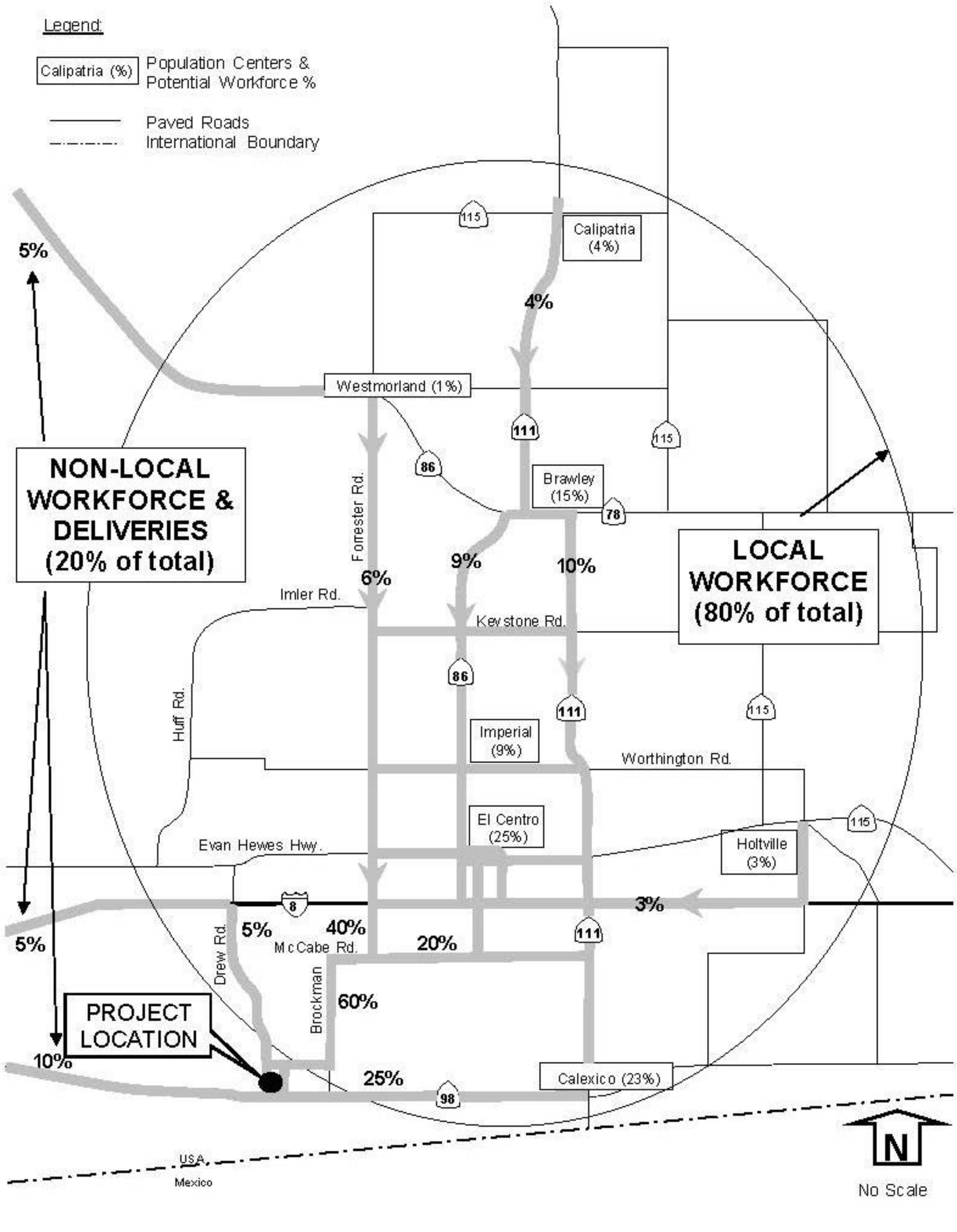
80 Percent Local Workforce	2010 Census Population	Percentage of Total	Percentage of Construction Employees (60% From Within Imperial County)
Calipatria	7,705	5%	4%
Westmorland	2,225	2%	1%
Brawley	24,953	18%	15%
Imperial	14,758	11%	9%
El Centro	42,598	31%	25%
Holtville	5,939	4%	3%
Calexico	38,572	28%	23%
Total	136,750	100%	80%

Source: LOS 2018. Population data from U.S. Census Bureau (http://2010.census.gov/2010census).

The remaining construction workforce and deliveries will come from outside Imperial County ("Non-Local Workforce") and is estimated to be from San Diego County (15%) and Riverside County (5%). **Figure 4.3-3** is based on the aforementioned Census information, the regional construction distribution. The local distribution accounted for the project driveway throughout the project site. **Figure 4.3-4a and Figure 4.3-4b** shows the local area distribution for Access Configuration #1 and Access Configuration #2, respectively. **Figure 4.3-5a and Figure 3.-5b** shows the peak (Year 2019) construction trip assignment based on the aforementioned distribution for Access Configuration #1 and Access Configuration #2, respectively.

Project Operations and Maintenance Trip Generation

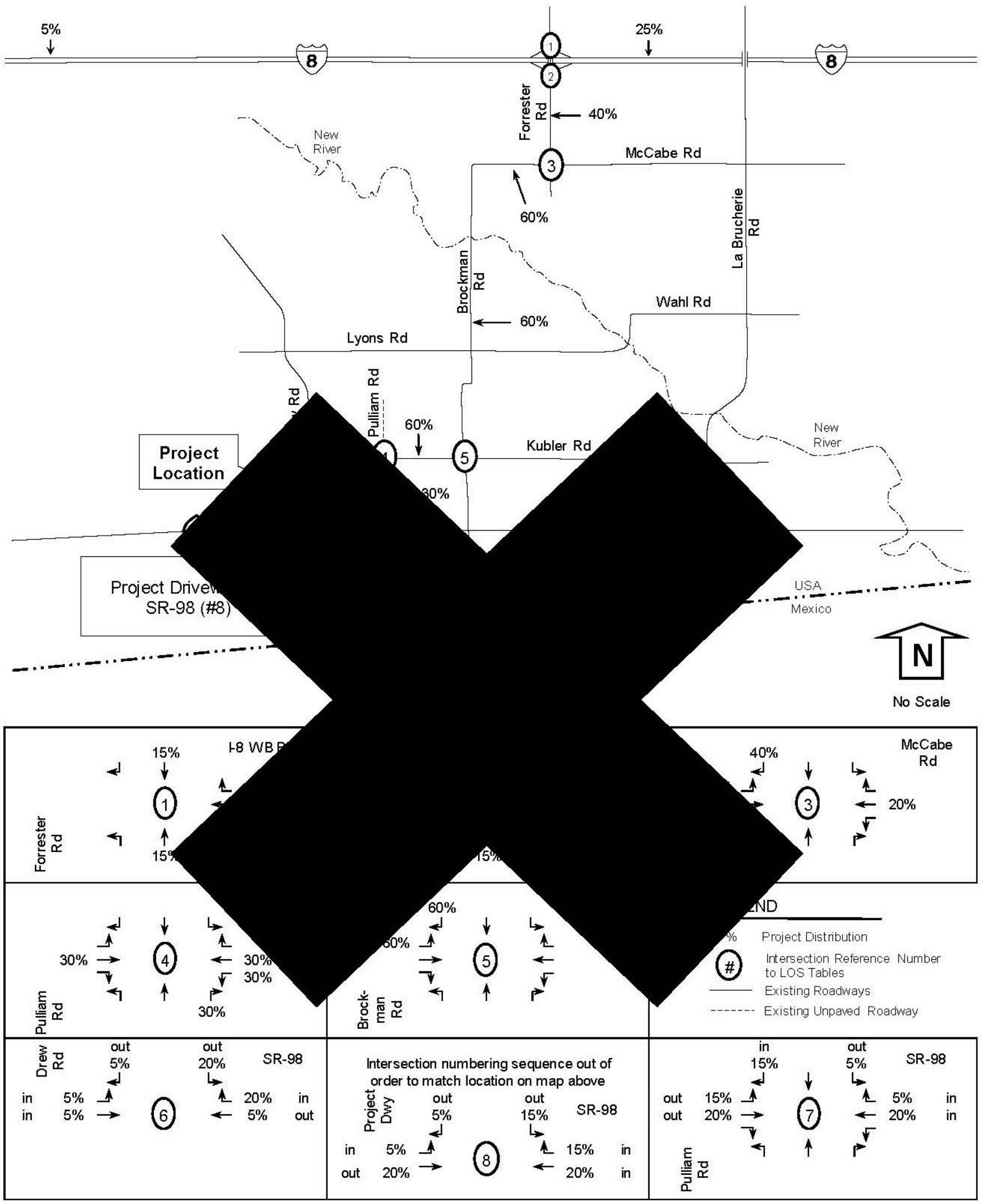
According to the Applicant, the operations phase is expected to generate approximately 4 to 10 trips per day from maintenance and security personnel. Based on this information, the operations and maintenance personnel are estimated to generate up to 20 ADT with approximately 2 AM and 2 PM peak hour trips. Therefore, the higher and more conservative construction trip generation is used to determine potential project impacts.



Source: LOS 2018.

FIGURE 4.3-3
REGIONAL CONSTRUCTION DISTRIBUTION

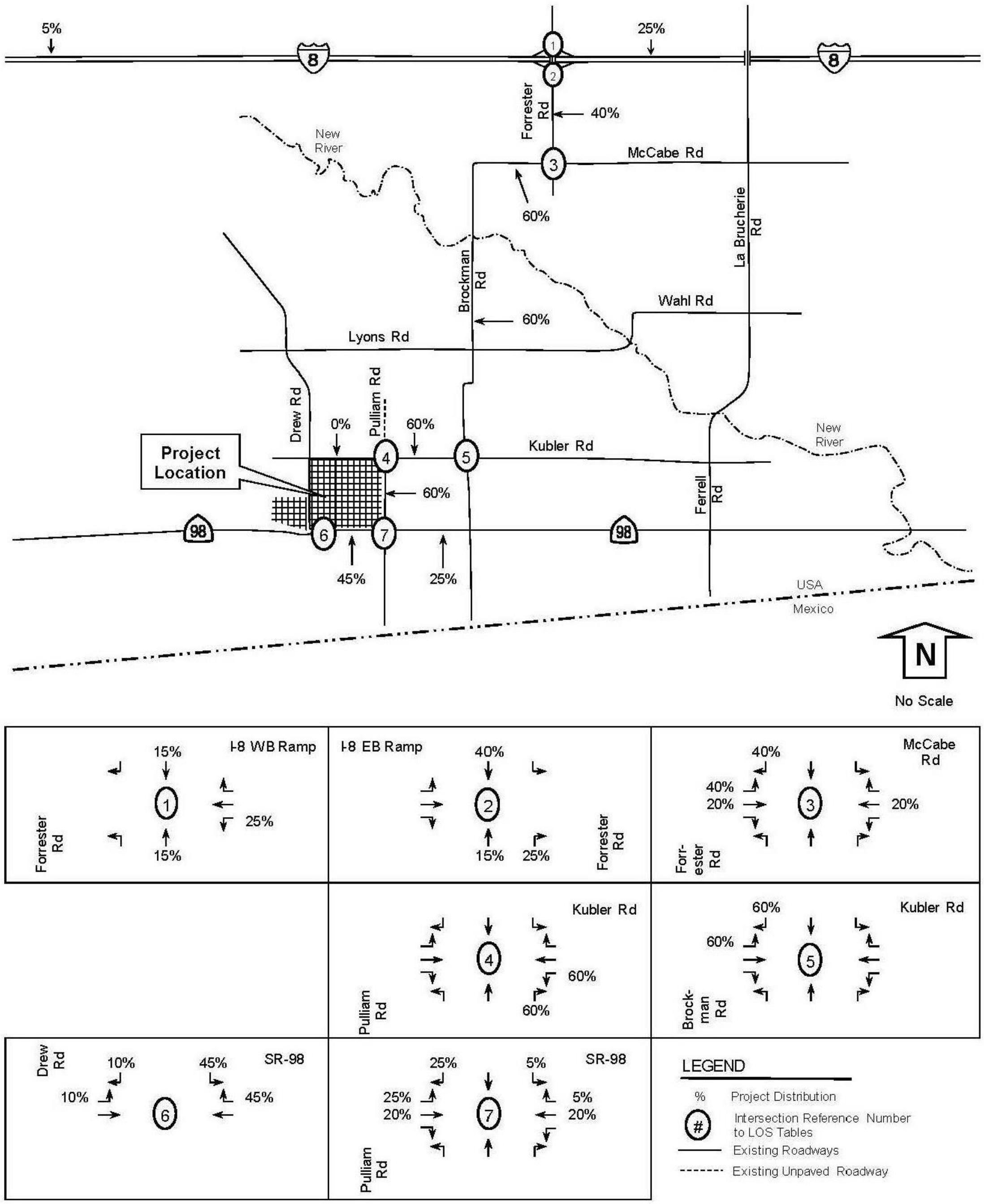
4.3 TRANSPORTATION



~~Source: LOS 2018.~~

~~FIGURE 4.3-4~~
~~LOCAL PROJECT CONSTRUCTION DISTRIBUTION~~

4.3 TRANSPORTATION

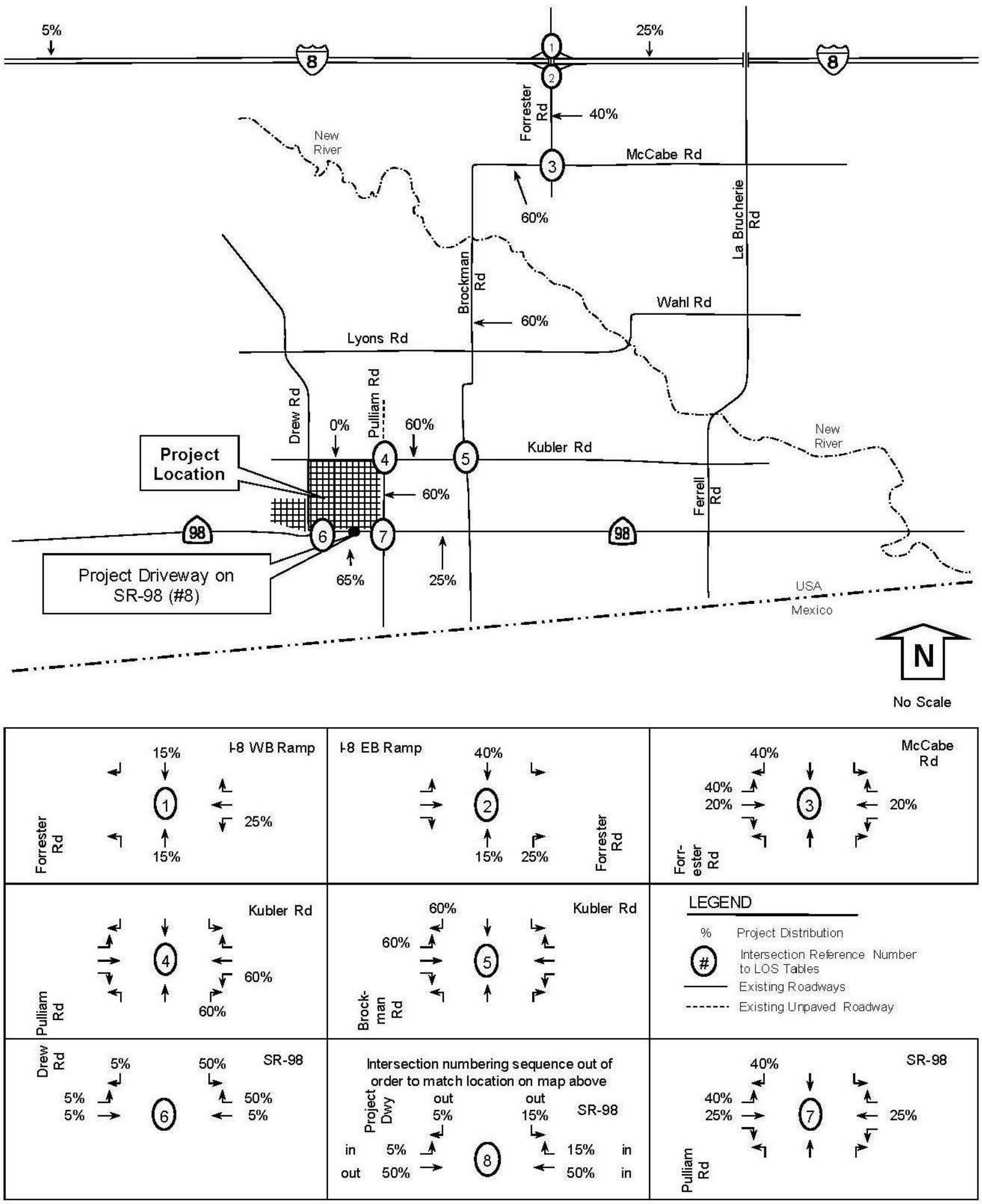


Source: LOS 2019a.

FIGURE 4.3-4A

ACCESS CONFIGURATION #1 - PROJECT DISTRIBUTION IMMEDIATELY AROUND PROJECT SITE

4.3 TRANSPORTATION



Source: LOS 2019b.

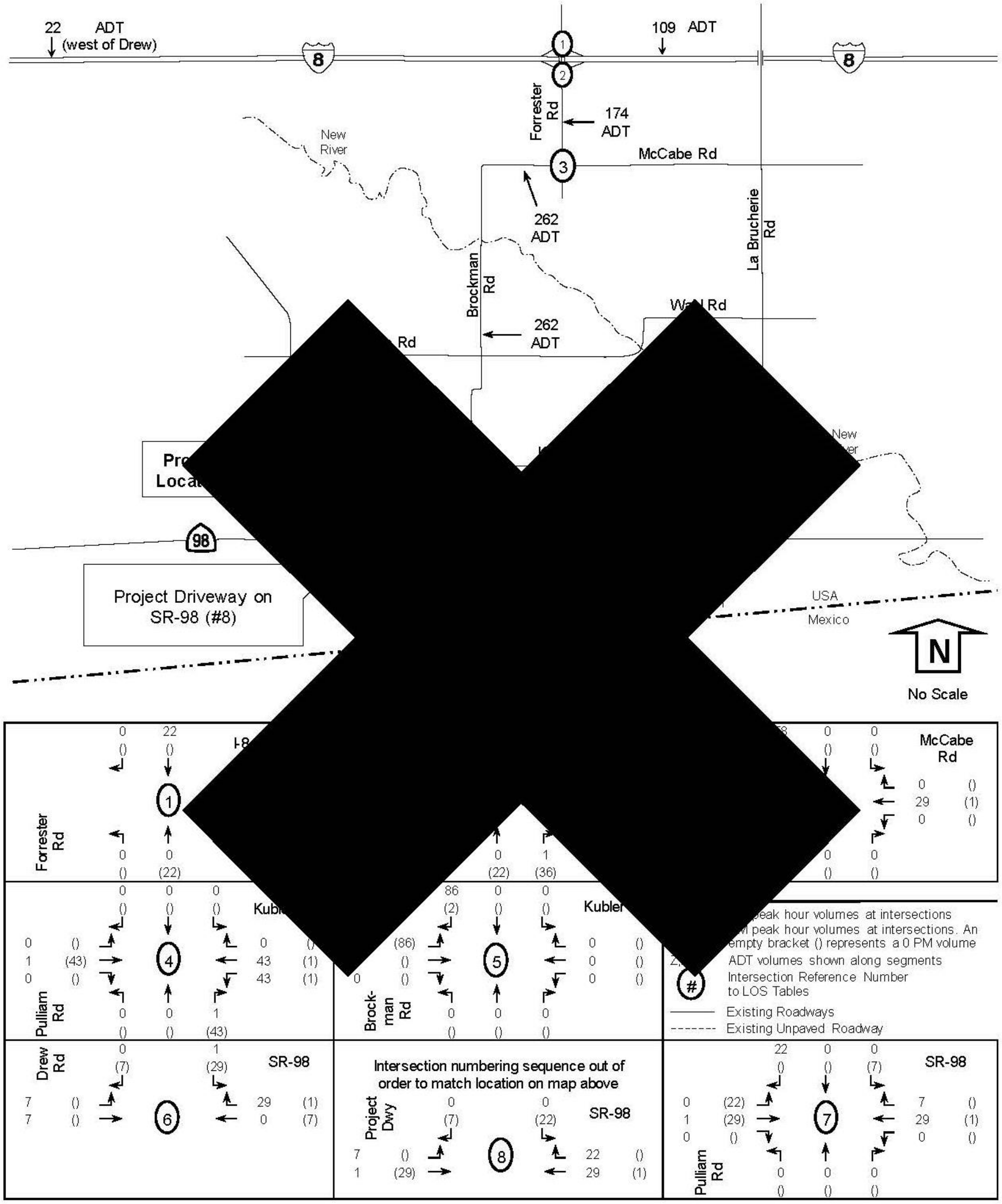
FIGURE 4.3-4B

ACCESS CONFIGURATION #2 - PROJECT DISTRIBUTION IMMEDIATELY AROUND PROJECT SITE

County of Imperial
May 2019

Drew Solar Project
Final EIR

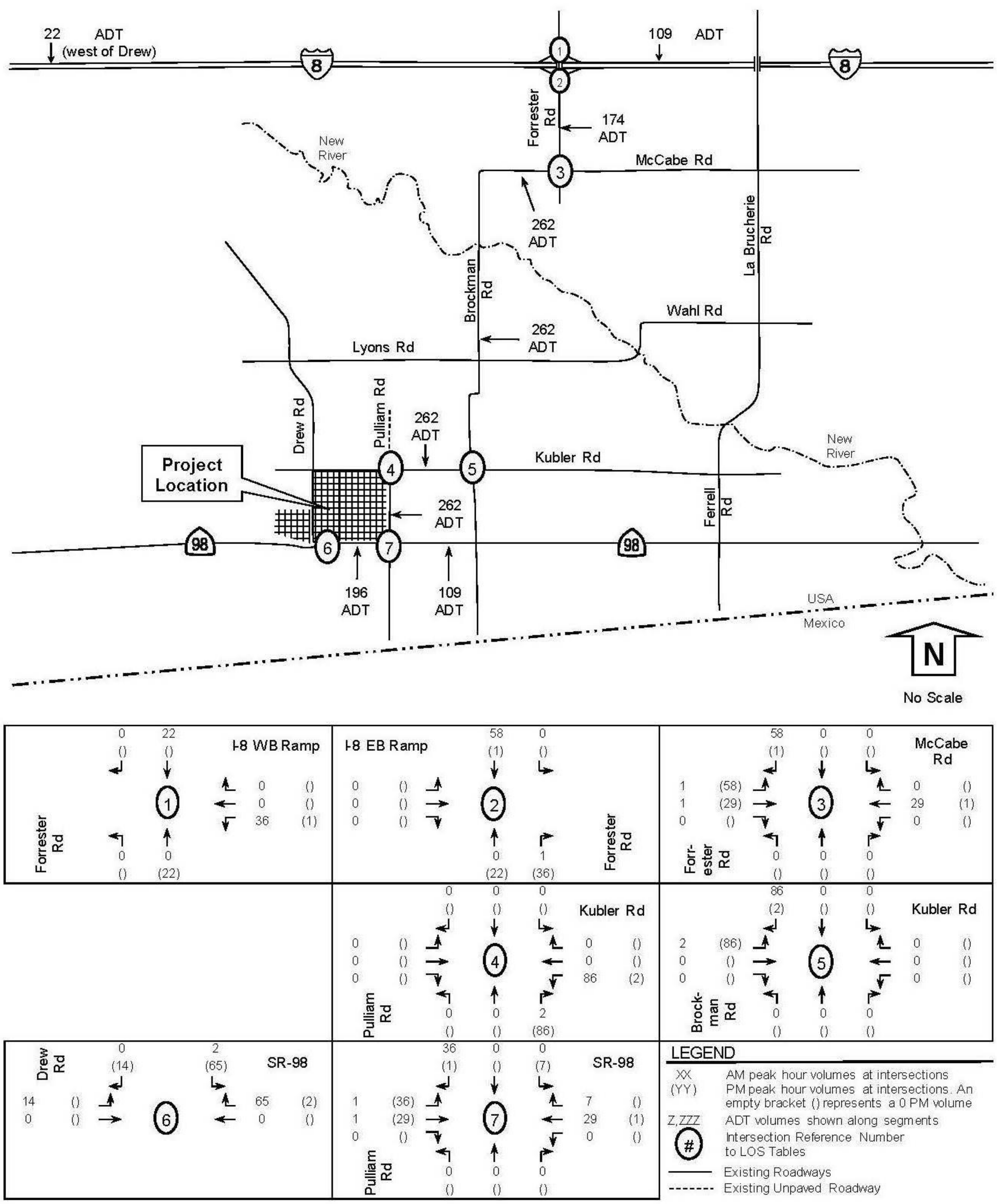
4.3-20



~~*Source: LOS 2018.*~~

~~**FIGURE 4.3-5**~~
~~**PROJECT CONSTRUCTION TRAFFIC**~~

4.3 TRANSPORTATION



Source: LOS 2019a.

FIGURE 4.3-5A

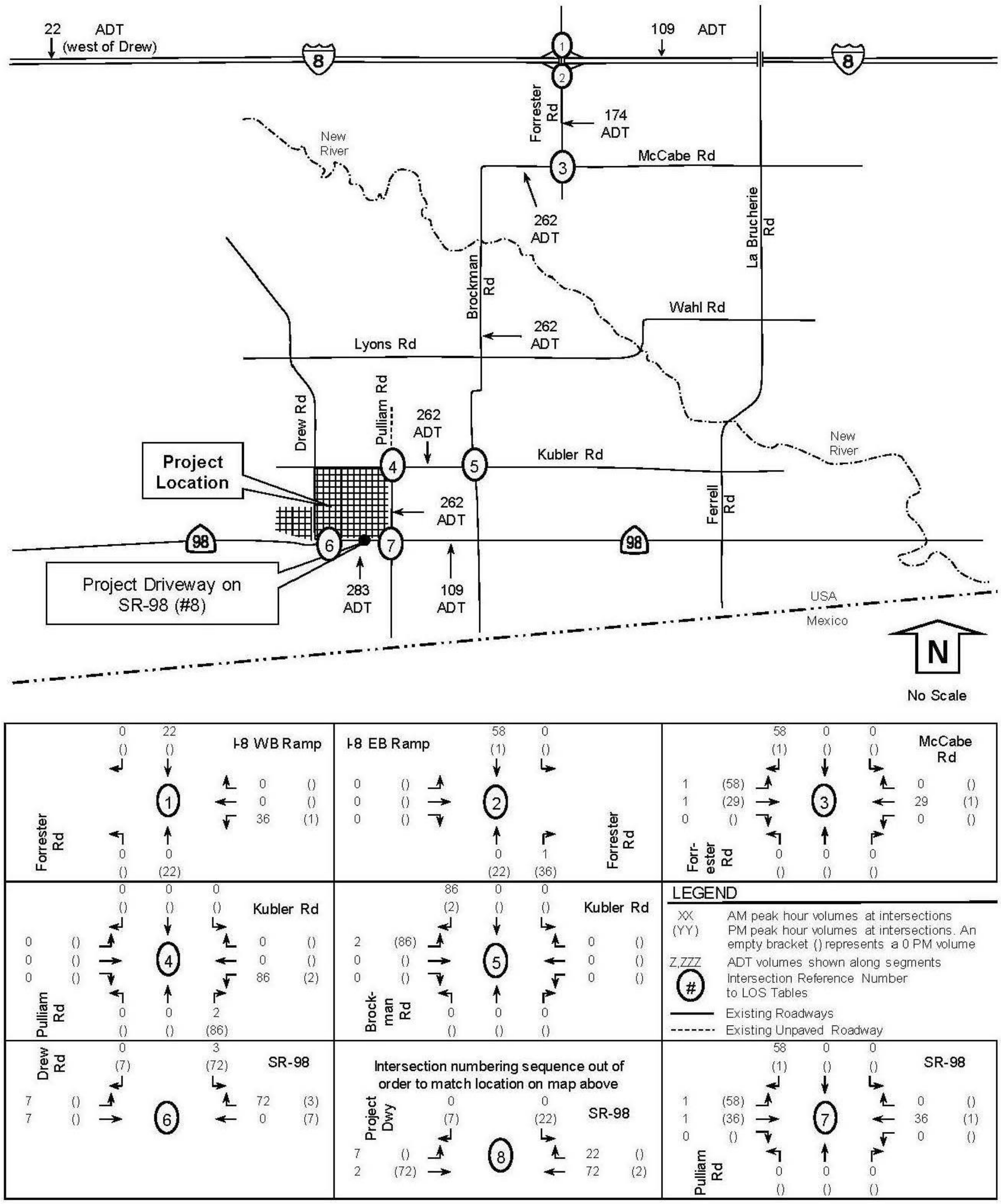
ACCESS CONFIGURATION #1 - REVISED PROJECT ASSIGNMENT IMMEDIATELY AROUND PROJECT SITE

County of Imperial
May 2019

Drew Solar Project
Final EIR

4.3-22

4.3 TRANSPORTATION



Source: LOS 2019b.

FIGURE 4.3-5B

ACCESS CONFIGURATION #2 - REVISED PROJECT ASSIGNMENT IMMEDIATELY AROUND PROJECT SITE

4.3 TRANSPORTATION

4.3.3 IMPACTS AND MITIGATION MEASURES

A. STANDARDS OF SIGNIFICANCE

The CEQA significance criteria listed below were used to determine if the proposed Project would result in impacts to transportation and circulation. These criteria are the same as the significance criteria for Transportation/Traffic listed in the CEQA Environmental Checklist, Appendix G of the 2018 CEQA Guidelines. Under CEQA, the proposed Project would have a significant impact on transportation and circulation if it would:

a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.

b) Conflict or be inconsistent with CEQA Guidelines §15064.3 subdivision (b).

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

d) Result in inadequate emergency access.

The significance criteria for traffic impacts are based on the Imperial County Planning & Development Services Department LOS standard as outlined in the "Circulation Element". "The County's goal for an acceptable traffic service standard on an Average Daily Traffic (ADT) basis and during AM and PM peak periods for all County-Maintained Roads shall be LOS C for all street segment links and intersections." Circulation Element, 55. Excerpts from the *Circulation and Scenic Highways Element* are included in Appendix E of this EIR. The determination of direct or cumulative traffic impacts is defined by the significance criteria outlined in **Table 4.3-10**, which was obtained from several EIRs for projects located in Imperial County. Copies of traffic significance criteria from these project EIRs are included in Appendix F of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.

TABLE 4.3-10
SIGNIFICANCE CRITERIA

Existing	Existing With Project	Existing With Project With Cumulative Projects	Impact Type
Intersections			
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS D or worse	NA	Direct
LOS D	LOS D and adds 2.0 seconds or more of delay	LOS D or worse	Cumulative
LOS D	LOS E or F	NA	Direct
LOS E	LOS F	NA	Direct
LOS F	LOS F and delay increases by $\geq$ 10.0 seconds	LOS F	Direct
Any LOS	Project does not degrade LOS and adds < 2.0 seconds of delay	Any LOS	None
Any LOS	Project does not degrade LOS but adds 2.0 to 9.9 seconds of delay	LOS E or worse	Cumulative
Segments			
LOS C or better	LOS C or better	LOS C or better	None
LOS C or better	LOS C or better and V/C > 0.02	LOS D or worse	Cumulative
LOS C or better	LOS D or worse	NA	Direct[1]

TABLE 4.3-10
SIGNIFICANCE CRITERIA

Existing	Existing With Project	Existing With Project With Cumulative Projects	Impact Type
LOS D	LOS D and V/C > 0.02	LOS D or worse	Cumulative
LOS D	LOS E or F	NA	Direct
LOS E	LOS F	NA	Direct
LOS F	LOS F and V/C increases by >0.09	LOS F	Direct
Any LOS	LOS E or worse & V/C 0.02 to 0.09	LOS E or worse	Cumulative
Any LOS	LOS E or worse & V/C < 0.02	Any LOS	None

Source: LOS 2018. LOS = Level of Service. NA = Not Applicable.
Notes: [1] Exception: post-project segment operation is LOS D and intersections along segment are LOS D or better resulting in no significant impact.

B. ISSUES SCOPED OUT AS PART OF THE INITIAL STUDY

None of the CEQA Appendix G significance criteria were scoped out as part of the Initial Study.

C. METHODOLOGY

The methodology for analysis has been previously described as it was also pertinent to the discussion of existing traffic conditions. Please refer to subsection 4.3.2 Environmental Setting, item E, "Methodology for Analysis." Horizon Year 2060 methodology associated with decommissioning is described below.

Horizon Year 60

The Year 2060 was selected as the Horizon Year because it is 40 years past the earliest estimate (Year 2019 construction peak with completion about a year later or 2020) of when the project may be constructed and decommissioned. Under the Development Agreement, the CUP will be valid for ~~40~~ 30 years with up to 10 years to commence construction. The Project could operate up to 40 years (30 years plus one 10-year extension to the CUP, if approved). At the conclusion of the CUP term (estimated at Year 2059), the Project entitlements require the Applicant to decommission/reclaim the site and restore it to agricultural uses in accordance with a Reclamation Plan. The Reclamation Plan is anticipated to generate traffic on the roads in the vicinity of the Project from trucks removing solar panels and other infrastructure from the site after the ~~40~~ 30-year CUP life. The CUP could operate up to 40 years if one 10-year extension to the CUP is approved. The traffic would also include the workers who travel to and from the Project site to perform the work.

After careful consideration of various methodologies for evaluating such traffic impacts, it is not possible to accurately forecast the traffic impacts for the following reasons:

1) There have been no solar projects decommissioned in Imperial County yet to provide a reference point for potential traffic impacts;

2) The near-term construction work force is based on the concentration of populations per the 2010 Census. The source and location of a Horizon Year 2060 construction work force cannot be estimated in the same manner; therefore, it would require speculation to determine where the construction work force would originate and the number of workers from the local area (i.e. Imperial Valley) vs. the regional area (i.e. Los Angeles, San Diego, or Arizona);

3) Other solar projects on the cumulative project list in the vicinity may or may not be undergoing decommissioning phase activities at the same time. Many of these other solar projects have a 10-year extension option and it is not possible to estimate how many would exercise the option.

4.3 TRANSPORTATION

Accordingly, only a guess could be made to as to when the other cumulative projects would initiate decommissioning and thus would add traffic to the horizon year background conditions;

4) The horizon year traffic model for Imperial County does not have horizon year volumes for the study area roadways around the Project site nor does the traffic model have data for decommissioning scenarios; and

5) The California Economic Forecast *California County-Level Economic Forecast 2015-2040*, dated September 2015 does not forecast beyond 2040.

Therefore, after a thorough investigation for reliable data having used best efforts to obtain and disclose all the information reasonably available regarding traffic in the decommissioning phase, the only conclusion that can be drawn decommissioning traffic is simply too speculative for evaluation.

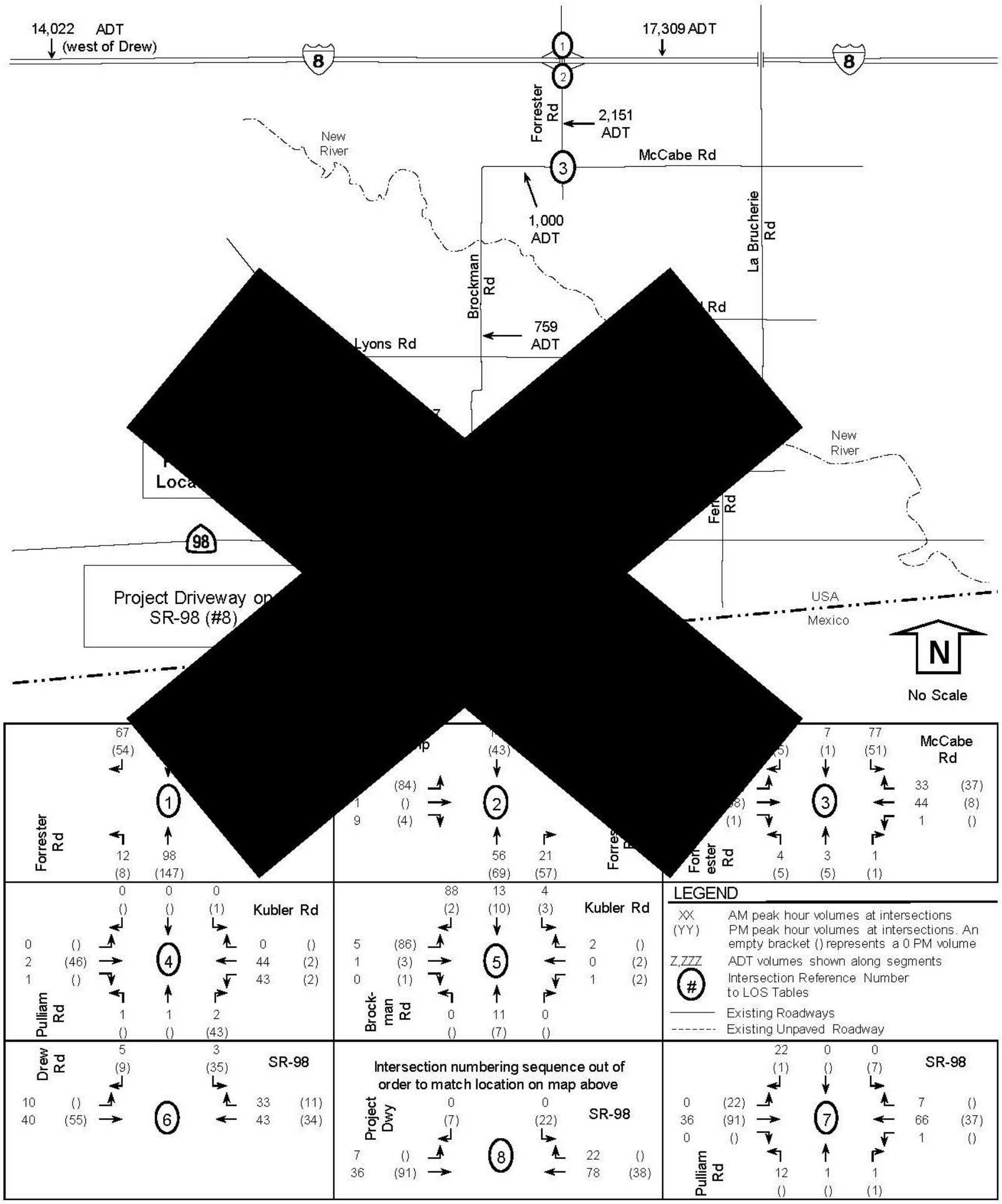
D. PROJECT IMPACTS AND MITIGATION MEASURES

Conflict with Applicable Plan – Existing Year 2017 Plus Project Construction Conditions

Impact 4.3.1 Implementation of the proposed Project would add traffic to existing traffic volumes on Project study area intersections, roadway segments and freeway segments during (Year 2017) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** for (Year 2017) with Project construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Existing (Year 2017) With Project Construction Conditions

This section documents the addition of construction traffic onto (Year 2017) conditions to analyze scenario if the Project was constructed immediately over 18 months. **Figure 4.3-6a** shows (Year 2017) With Project Construction traffic volumes for Access Configuration #1. **Figure 4.3-6b** shows (Year 2017) With Project Construction traffic volumes for Access Configuration #2. Intersection, segment, and freeway LOS are discussed below.



~~Source: LOS 2018.~~

~~FIGURE 4.3-6~~

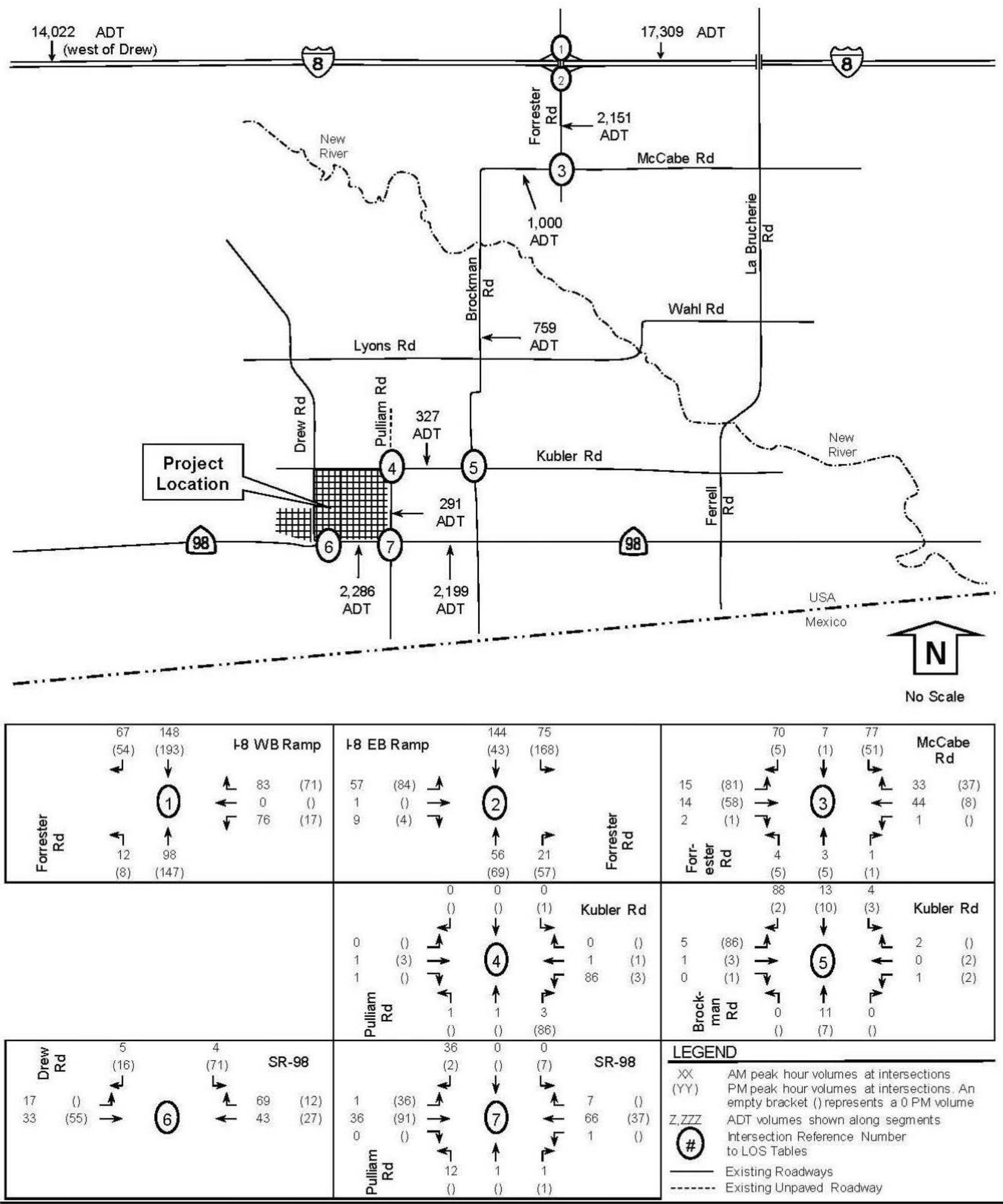
~~EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION VOLUMES~~

County of Imperial
May 2019

Drew Solar Project
Final EIR

4.3-27

4.3 TRANSPORTATION



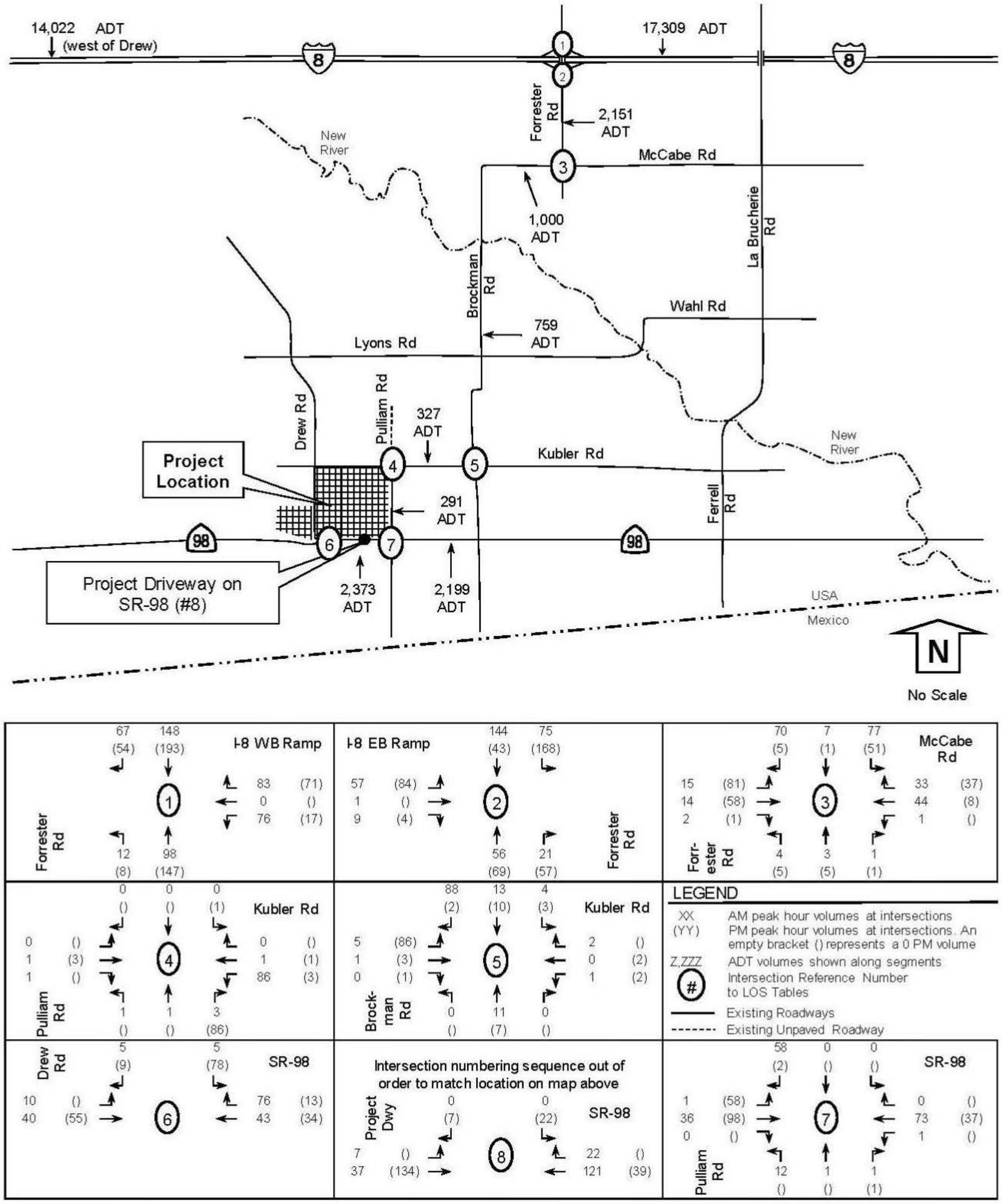
Source: LOS 2019.

FIGURE 4.3-6A
ACCESS CONFIGURATION #1 - EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION VOLUMES

County of Imperial
May 2019

Drew Solar Project
Draft EIR

4.3-28



Source: LOS 2019.

FIGURE 4.3-6B
ACCESS CONFIGURATION #2 - EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION VOLUMES

4.3 TRANSPORTATION

Intersection LOS

Table 4.3-11a summarizes intersection LOS for Access Configuration #1. (Intersection LOS calculations are included in Appendix M of the Draft Traffic Impact Analysis [**Appendix C** of this EIR and Attachment A of the "Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment" Memo and **Attachment 1** of the Final EIR]).

TABLE 4.3-11A
ACCESS CONFIGURATION #1
EXISTING (YEAR 2017) WITHOUT AND WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Existing (Year 2017)		Existing (Year 2017) With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB (U)	Minor Leg	AM	9.7	A	10.2	B	0.5	None
		PM	9.6	A	9.8	A	0.2	None
2) Forrester Road at I-8 EB (U)	Minor Leg	AM	11.1	B	11.6	B	0.5	None
		PM	13.6	B	14.7	B	1.1	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	9.5	A	9.9	A	0.4	None
		PM	9.5	A	11.0	B	1.5	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A	~~9.0~~ 9.1	A	~~0.4~~ 0.5	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	8.9	A	9.1	A	0.2	None
		PM	9.0	A	9.1	A	0.1	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	~~8.9~~ 9.0	A	~~0.2~~ 0.3	None
		PM	8.9	A	~~9.1~~ 9.3	A	~~0.2~~ 0.4	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.0	A	~~9.4~~ 9.5	A	~~0.4~~ 0.5	None
		PM	8.6	A	~~8.8~~ 9.7	A	~~0.2~~ 1.1	None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM	DNE	A	1.2	A	NA	None
		PM	DNE	A	9.2	A	NA	None

Source: LOS ~~2018~~ 2019a.
Notes:
[1] Intersection Control - (S) Signalized, (U) Unsignalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative. DNE: Does not Exist. NA: Not Applicable.

Table 4.3-11b summarizes intersection LOS for Access Configuration #1. (Intersection LOS calculations are included in Appendix M of the Draft Traffic Impact Analysis [**Appendix C** of this EIR] and Attachment A of the "Drew Solar Alternative Access #2 with One SR-98 Access And No Access on Kubler" Memo and **Attachment 2** of the Final EIR]).

TABLE 4.3-11B
ACCESS CONFIGURATION #2
EXISTING (YEAR 2017) WITHOUT AND WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Existing (Year 2017)		Existing (Year 2017) With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB (U)	Minor Leg	AM	9.7	A	10.2	B	0.5	None
		PM	9.6	A	9.8	A	0.6	None
2) Forrester Road at I-8 EB (U)	Minor Leg	AM	11.1	B	11.6	B	0.5	None
		PM	13.6	B	14.7	B	1.1	None

TABLE 4.3-11B
ACCESS CONFIGURATION #2
EXISTING (YEAR 2017) WITHOUT AND WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	Existing (Year 2017)		Existing (Year 2017) With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
3) Forrester Road at McCabe Road (U)	Minor Leg	AM PM	9.5 9.5	A A	9.9 11.0	A B	0.4 1.5	None None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM PM	8.6 8.6	A A	9.1 9.2	A A	0.5 0.6	None None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM PM	8.9 9.0	A A	9.1 9.1	A A	0.2 0.1	None None
6) Drew Rad at SR 98 (U)	Minor Leg	AM PM	8.7 8.9	A A	9.1 9.4	A A	0.4 0.5	None None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM PM	9.0 8.6	A A	9.7 8.8	A A	0.7 0.2	None None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM PM	DNE DNE	N/A N/A	1.2 9.4	A A	NA NA	None None

Source: LOS ~~2018~~ 2019a.
Notes: [1] Intersection Control - (S) Signalized, (U) Unsignalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative. DNE: Does not Exist. NA: Not Applicable.

Under existing (Year 2017) With Project Construction Conditions, all Project study area intersections were calculated to operate at LOS B or better above the County's LOS C threshold. As shown, only two intersections would experience a decline from LOS A to LOS B. This would occur for the intersection of Forrester Road and westbound I-8 during the AM Peak Hour and for the intersection of Forrester Road and McCabe Road in the PM Peak Hour. No significant impacts to Project study area intersections were calculated due to the addition of construction traffic to existing traffic. Moreover, the increases in traffic resulting from construction of the proposed Project would not exceed LOS standards. Therefore, **less than significant** impacts to Project study area intersections would result under Existing (Year 2017) With Project Construction Conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-12a summarizes roadway segment LOS for Existing (Year 2017) With Project conditions for Access Configuration #1. **Table 4.3-12b** summarizes roadway segment LOS for Existing (Year 2017) With Project conditions for Access Configuration #2. As shown, only one change in LOS would occur along the segment of Forrester Road which would decrease from LOS A to B. All other segments would all operate above LOS C (at LOS A or LOS B). Therefore, **less than significant** impacts to Project study area roadway and state route segments would result under Existing (Year 2017) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Freeway Segment LOS

Table 4.3-13 summarizes freeway segment LOS. Under existing (Year 2017) With Project Conditions, the freeway segments were calculated to operate above LOS C (at LOS A and LOS B). I-8 from Drew Road to Forrester Road would continue to operate at LOS A in the AM and PM peak hour in both directions (eastbound and westbound). I-8 from Forrester Road to Imperial Avenue would continue to operate at LOS A during the AM and PM peak hour

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in the eastbound direction and LOS B in the PM peak hour in the westbound direction and the PM peak hour eastbound direction. Moreover, the increases in traffic resulting from Project construction would not exceed V/C ratios or LOS standards. Therefore, **less than significant** impacts to Project study area freeway segments would occur under Existing (Year 2017) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Overall, under Existing (Year 2017) Plus Project Conditions, the Project study intersections, roadway, State Route and freeway segments were calculated to operate at LOS B or better for both Access Configuration #1 and Access Configuration #2. Thus, **less than significant** impacts were calculated with the addition of Project construction traffic to existing traffic volumes under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.

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TABLE 4.3-12A
ACCESS CONFIGURATION #1
EXISTING (YEAR 2017) WITHOUT AND WITH PROJECT CONSTRUCTION ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2017) Without				Project	(Year 2017) With Project					
		Daily Volume	LOS C Capacity	V/C	LOS	Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Significant Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	497	7,100	0.07	A	262	759	7,100	0.11	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	1,977	7,100	0.28	B	174	2,151	7,100	0.30	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	65	7,100	0.01	A	262	327	7,100	0.05	A	0.04	None
McCabe Road												
Forrester Road to LaBrucherie Road	Major (2U)	738	7,100	0.10	A	262	1,000	7,100	0.14	A	0.04	None
Pulliam Road												
Kubler Road to SR 98	Minor (2U)	29	7,100	0.00	A	~~131~~ 262	~~160~~ 291	7,100	~~0.02~~ 0.04	A	~~0.02~~ 0.04	None
SR 98												
Drew Road to Pulliam Road	State Highway (2U)	2,090	7,100	0.29	B	~~153~~ 196	~~2,243~~ 2,286	7,100	~~0.31~~ 0.32	B	~~0.02~~ 0.03	None
Pulliam Road to Brockman Road	State Highway (2U)	2,090	7,100	0.29	B	109	2,199	7,100	0.32	B	0.02	None

Source: LOS ~~2018~~ 2019a.
Notes: Classification based on January ~~4~~ 29, ~~2018~~ 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

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Table 4.3-12b
Access Configuration #5
Existing (Year 2017) Without and With Project Construction Roadway and State Route Segment LOS

Roadway Segment	Classification (as built)	(Year 2017) Without Daily Volume	LOS C Capacity	V/C	LOS	Project Daily Volume	(Year 2017) With Project Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Significant Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	497	7,100	0.07	A	262	759	7,100	0.11	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	1,977	7,100	0.28	B	174	2,151	7,100	0.30	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	65	7,100	0.01	A	262	327	7,100	0.05	A	0.04	None
McCabe Road												
Forrester Road to LaBrucherie Road	Major (2U)	738	7,100	0.10	A	262	1,000	7,100	0.14	A	0.04	None
Pulliam Road												
Kubler Road to SR 98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	0.04	None
SR 98												
Drew Road to Pulliam Road	State Highway (2U)	2,090	7,100	0.29	B	283	2,373	7,100	0.33	B	0.04	None
Pulliam Road to Brockman Road	State Highway (2U)	2,090	7,100	0.29	B	109	2,199	7,100	0.32	B	0.02	None

Source: LOS 2019b.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

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TABLE 4.3-13
EXISTING (YEAR 2017) WITHOUT AND WITH PROJECT CONSTRUCTION FREEWAY SEGMENT LOS

Freeway Segment	I-8 Drew Road to Forrester Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2017) Without								
ADT	14,000				17,200			
Peak Hour	AM		PM		AM		PM	
Directions	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,032	1,131	1,299	1,321	1,318	1,446	1,666	1,689
V/C	0.220	0.241	0.276	0.218	0.281	0.308	0.353	0.359
LOS	A	A	A	A	A	B	B	B
Peak Project Hour Volume	7	0	0	7	01	36	36	1
Year2017 Plus Project								
Peak Hour Volume	1,039	1,131	1,299	1,328	1,319	1,482	1,697	1,690
V/C	0.221	0.241	0.276	0.283	0.281	0.315	0.361	0.360
LOS	A	A	A	A	A	B	B	B
Increase in V/C	0.001	0.000	0.000	0.001	0.000	0.008	0.008	0.000
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from Caltrans' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.
[3] Latest D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report). Impact? = Direct, Cumulative, or None.

Conflict with Applicable Plan– Near-Term (Year 2019) With Project

Impact 4.3.2 Implementation of the proposed Project would add traffic to existing traffic volumes on the Project study area intersections, roadway segments and freeway segments during Near-Term (Year 2019) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** under Near-Term (Year 2019) with Project Conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Year volumes for the construction peak period were calculated by increasing existing volumes for year 2017 by 1.8% annually (3.6% total) as shown in **Figure 4.3-7**. Intersection, roadway, State Route and freeway segment LOS are shown in **Table 4.3-14, Table 4.3-15** and **Table 4.3-16**.

Intersection LOS

Table 4.3-14 summarizes intersection LOS. (Intersection LOS calculations are included in Appendix M of the Draft Traffic Impact Analysis [**Appendix C** of this EIR]).

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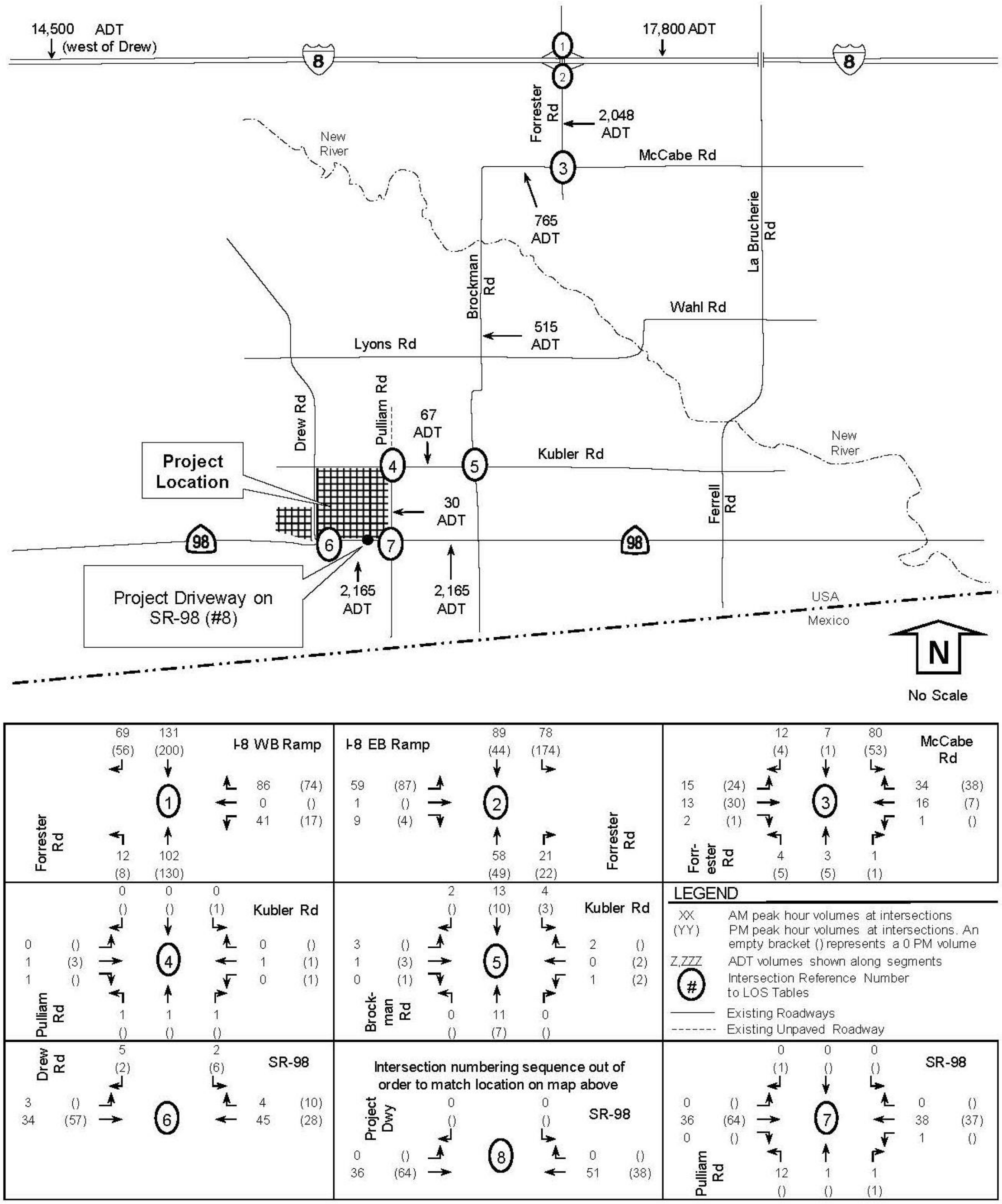

Source: LOS 2018.

FIGURE 4.3-7
NEAR-TERM (YEAR 2019) TRAFFIC VOLUMES

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TABLE 4.3-14
NEAR-TERM (YEAR 2019) INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2019) Delay[2]	(Year 2019) LOS[3]
Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	9.7	A
		PM	9.7	A
Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	11.1	B
		PM	14.3	B
Forrester Road at McCabe Road (U)	Minor Leg	AM	9.6	A
		PM	9.6	A
Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A
		PM	8.6	A
Brockman Road at Kubler Road (U)	Minor Leg	AM	8.9	A
		PM	8.9	A
Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A
		PM	8.9	A
Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A
		PM	8.6	A

Source: LOS 2018.
Notes: [1] Intersection Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway.
All: combined LOS for all approaches.

Under Near-Term (Year 2019) Conditions, the Project study area intersections were calculated to operate at LOS B or better. All intersections are operating below the LOS C standard with **less than significant impacts** under Near-Term (Year 2019) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-15 summarizes roadway segment LOS for Near-Term (Year 2019) conditions. As shown, all segments would operate above LOS C. Specifically, all segments would operate at LOS A with the exception of the segment of Forrester Road from I-8 to McCabe Road and both segments along SR 98 (Drew Road to Pulliam Road and Pulliam Road to Brockman Road) which would all operate at LOS B. Because, all roadway segments would operate above the LOS C standard, **less than significant impacts** would occur under Near-Term (Year 2019) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

TABLE 4.3-15
NEAR-TERM (YEAR 2019) ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	Year 2019				
		Daily Volume	# of Lanes	LOS C Capacity	V/C	LOS
Brockman Road						
McCabe Road to Kubler Road	Major (2U)	515	2	7,100	0.07	A
Forrester Road						
I-8 to McCabe Road	Prime (2U)	2,048	2	7,100	0.29	B
Kubler Road						
Brockman Road to Ferrell Road	Minor (2U)	67	2	7,100	0.01	A
McCabe Road						
Forrester Road to LaBrucherie Road	Major (2U)	765	2	7,100	0.11	A
Pulliam Road						
Kubler Road to SR 98	Minor (2U)	30	2	7,100	0.00	A
SR 98						
Drew Road to Pulliam Road	State Highway (2U)	2,165	2	7,100	0.30	B
Pulliam Road to Brockman Road	State Highway (2U)	2,165	2	7,100	0.30	B

Source: LOS 2018.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.

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Freeway Segment LOS

Table 4.3-16 summarizes Near-Term (Year 2019) freeway segment LOS. As shown, the freeway segments were calculated to operate above LOS C. I-8 from Drew Road to Forrester Road would operate at LOS B in the PM peak hour in the westbound direction. Likewise, the segment of I-8 from Forrester Road to Imperial Avenue would operation at LOS B in both the AM and PM peak hour in the westbound direction. All other freeway segments would operate at LOS A during both the AM and PM peak Hours in both the eastbound and westbound directions. Because, all freeway segments would operate above the LOS C standard, **less than significant impacts** would occur under Near-Term (Year 2019) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

TABLE 4.3-16
NEAR-TERM (YEAR 2019) FREEWAY SEGMENT LOS

Freeway Segment	I-8 Drew Road to Forrester Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2019)								
ADT	14,500				17,800			
Peak Hour	AM		PM		AM		PM	
Directions	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,069	1,172	1,346	1,369	1,364	1,496	1,718	1,748
V/C	0.227	0.249	0.286	0.291	0.290	0.318	0.366	0.372
LOS	A	A	A	A	A	B	B	B

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2015 report), which is the percentage of Annual Average Day Traffic (AADT) in both directions.
[3] Latest D factor from Caltrans (based on 2015 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report).

Under Near-Term (Year 2019) conditions, the Project study area intersections, roadways, State Route and freeway segments were calculated to operate at LOS B or better.

Near-Term (Year 2019) With Project Construction Conditions

This section discusses the addition of Project construction traffic in combination with Near-Term (Year 2019) conditions for the anticipated construction peak. **Figure 4.3-8a** depicts Near-Term (Year 2019) With Project Construction traffic volumes for Access Configuration #1. **Figure 4.3-8b** depicts Near-Term (Year 2019) With Project Construction traffic volumes for Access Configuration #2. Intersection, roadway, State Route and freeway segment LOS for Access Configuration 1 are shown in **Table 4.3-17a**, and **Table 4.3-18a.** Intersection, roadway, State Route and freeway segment LOS for Access Configuration #2 are shown in **Table 4.3-17b** and **Table 4.3-18b.** ~~and~~ **Table 4.3-19** summarizes Near-Term (Year 2019) Without and with Project Construction Freeway Segment LOS. (Intersection LOS calculations are included in Appendix Q of the Draft Traffic Impact Analysis [**Appendix C** of this EIR]).

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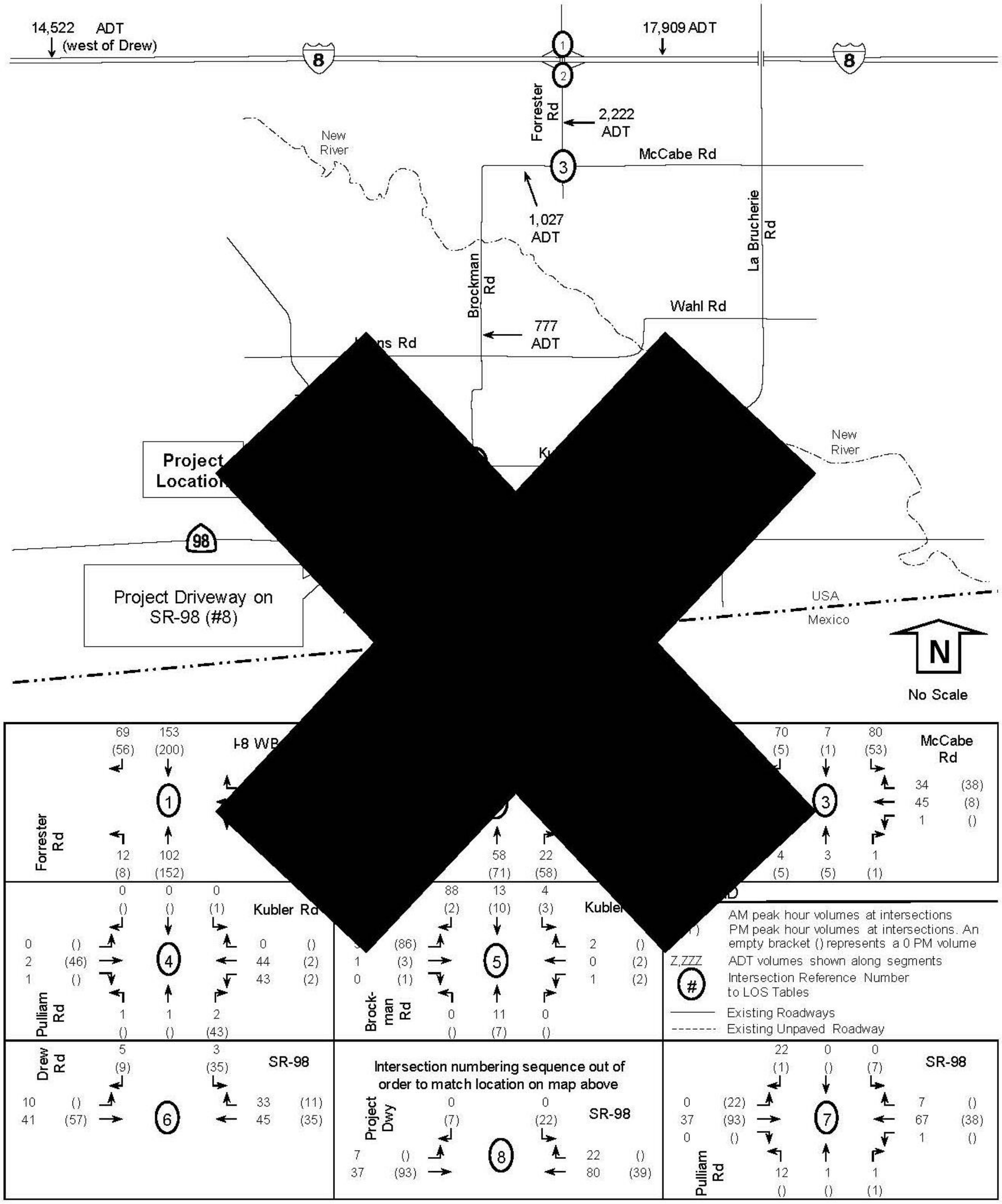

~~Source: LOS 2018.~~

~~**FIGURE 4.3-8**~~
~~**NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION VOLUMES**~~

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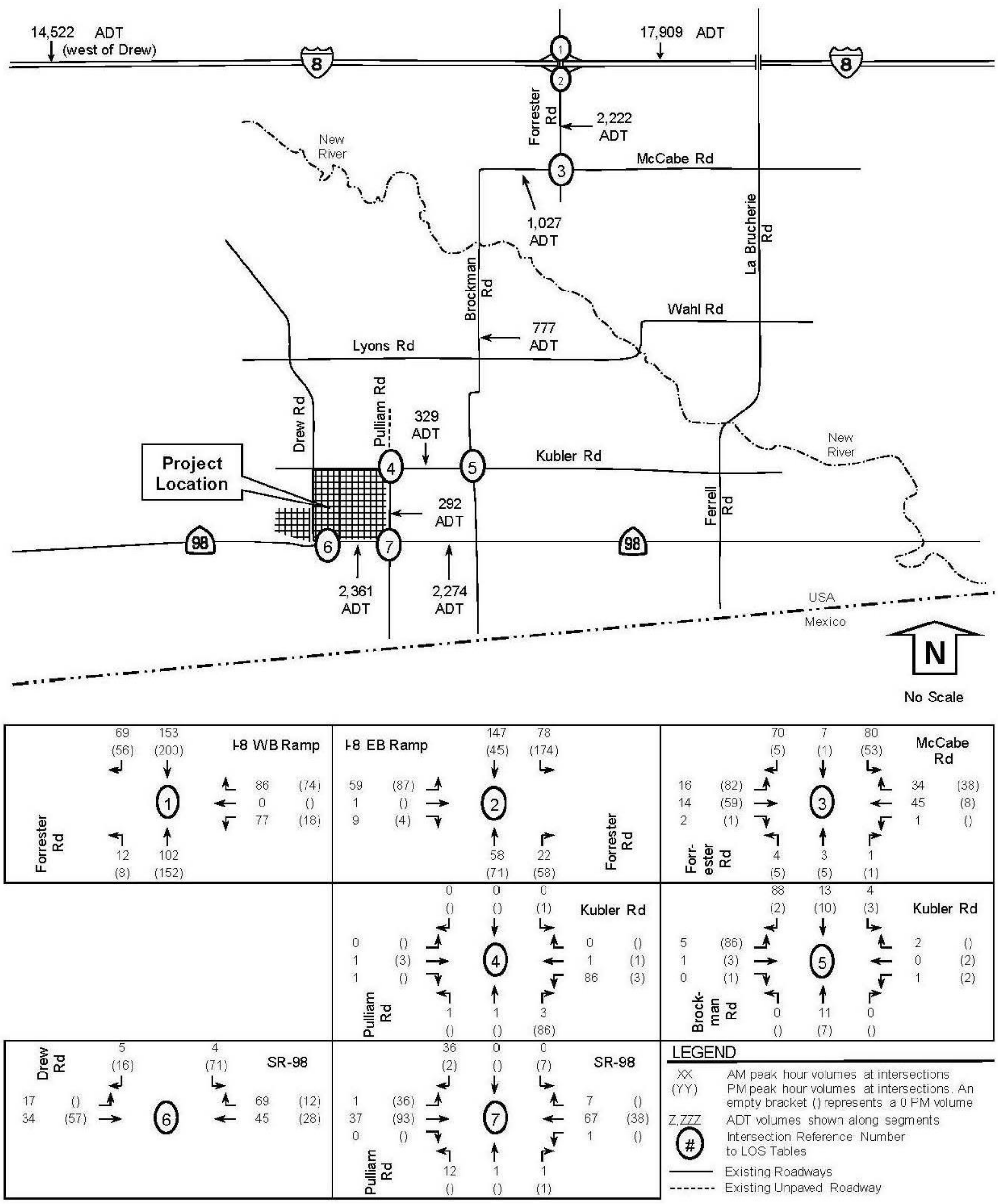

Source: LOS 2019a.

FIGURE 4.3-8A
ACCESS CONFIGURATION #1 - NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION VOLUMES

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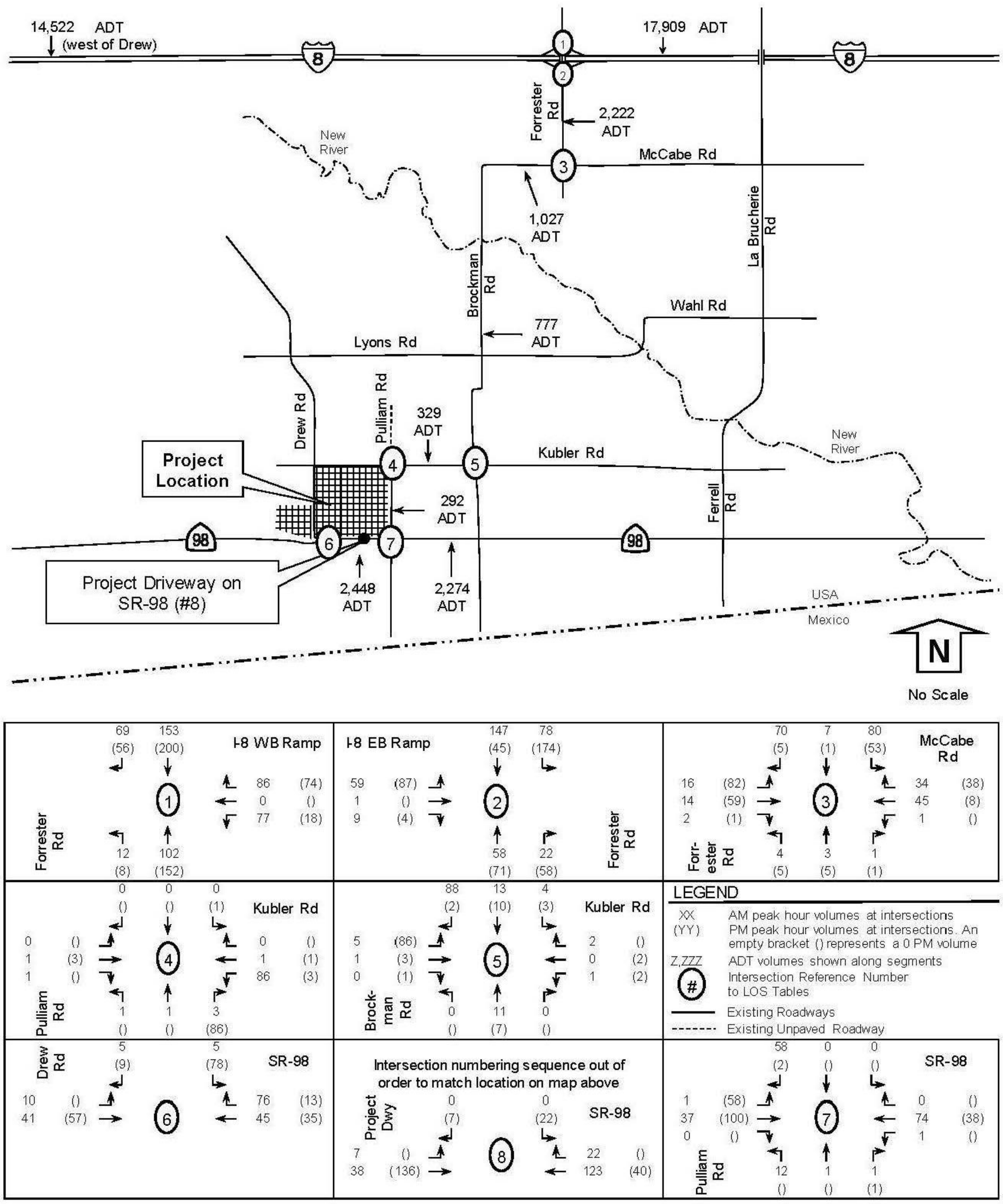

Source: LOS 2019b.

FIGURE 4.3-8B

ACCESS CONFIGURATION #2 - NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION VOLUMES

Intersection LOS

Table 4.3-17a summarizes Near-Term (Year 2016) intersection LOS compared to Near-Term (Year 2019) With Project construction traffic for Access Configuration #1. (Intersection LOS calculations are included in Appendix M of the Draft Traffic Impact Analysis [**Appendix C** of this EIR]).

TABLE 4.3-17A
ACCESS CONFIGURATION #1
NEAR-TERM (YEAR 2019) WITHOUT AND WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2019) Delay[2]	(Year 2019) LOS[3]	(Year 2019) With Project Delay[2]	(Year 2019) With Project LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	9.7	A	10.2	B	0.5	None
		PM	9.7	A	9.9	A	0.2	None
2) Forrester Road at I-8 EB Ramp(U)	Minor Leg	AM	11.1	B	11.8	B	0.7	None
		PM	14.3	B	15.2	C	0.9	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	8.6	A	9.9	A	0.3	None
		PM	8.6	A	11.0	B	1.4	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	~~8.9~~ 8.6	A	~~9.0~~ 9.1	A	~~0.4~~ 0.5	None
		PM	~~8.9~~ 8.6	A	9.2	A	0.6	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	8.7	A	9.1	A	0.2	None
		PM	8.9	A	9.1	A	0.2	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	~~9.1~~ 8.7	A	~~8.9~~ 9.1	A	~~0.2~~ 0.4	None
		PM	~~8.6~~ 8.9	A	~~9.1~~ 9.4	A	~~0.2~~ 0.5	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	~~DNE~~ 9.1	A	~~9.4~~ 9.6	A	~~0.3~~ 0.5	None
		PM	~~DNE~~ 8.6	A	~~8.8~~ 9.7	A	~~0.2~~ 1.1	None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM	DNE	NA	1.2	A	NA	None
		PM	DNE	NA	9.2	A	NA	None

Source: LOS ~~2018~~ 2019a. DNE: Does Not Exist NA: Not Applicable.
Notes: [1] Intersection Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from Project.
[5] Type of impact: none, direct, or cumulative.

Table 4.3-17b summarizes Near-Term (Year 2016) intersection LOS compared to Near-Term (Year 2019) With Project construction traffic for Access Configuration #2.

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TABLE 4.3-17B
ACCESS CONFIGURATION #2
NEAR-TERM (YEAR 2019) WITHOUT AND WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2019) Delay[2]	(Year 2019) LOS[3]	(Year 2019) With Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	9.7	A	10.2	B	0.5	None
		PM	9.7	A	9.9	A	0.2	None
2) Forrester Road at I-8 EB Ramp(U)	Minor Leg	AM	11.1	B	11.8	B	0.7	None
		PM	14.3	B	15.2	C	0.9	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	8.6	A	9.9	A	0.3	None
		PM	8.6	A	11.0	B	1.4	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A	9.1	A	0.5	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	8.7	A	9.1	A	0.2	None
		PM	8.9	A	9.1	A	0.2	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	9.1	A	0.4	None
		PM	8.9	A	9.5	A	0.6	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A	9.8	A	0.7	None
		PM	8.6	A	8.8	A	0.2	None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM	DNE	NA	1.2	A	NA	None
		PM	DNE	NA	9.4	A	NA	None

Source: LOS 2019a. DNE: Does Not Exist NA: Not Applicable.
Notes: [1] Intersection Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from Project.
[5] Type of impact: none, direct, or cumulative.

As shown, under Near-Term (Year 2019) With Project Conditions, all Project study area intersections are calculated to operate at LOS B or better with one exception. The intersection of Forrester Road at the I-8 eastbound ramp would operate at LOS C in the PM peak hour with project traffic would decline from LOS A to LOS B: Forrester Road at I-8 westbound in the AM Peak Hour and Forrester Road at McCabe Road in the PM Peak hour. No significant impacts to Project study area intersections were calculated due to the addition of Project construction traffic to existing traffic under Near-Term (Year 2019) conditions. Moreover, the increases in traffic resulting from construction of the proposed Project would not exceed LOS standards. Therefore, **less than significant** impacts to Project study area intersections would result under Near-Term (Year 2019) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-18a summarizes roadway and State Route segment LOS for Near-Term (Year 2019) With and Without Project Construction for Access Configuration #1. **Table 4.3-18b** summarizes roadway and State Route segment LOS for Near-Term (Year 2019) With and Without Project Construction for Access Configuration #2. As shown, all segments would continue to operate above LOS C (at LOS A or LOS B). No change in LOS would occur for any segment with the addition of Near-Term (Year 2019) Project construction traffic. Therefore, **less than significant** impacts to Project study area roadway segments would result under Near-Term (Year 2019) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

4.3 TRANSPORTATION

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TABLE 4.3-18A
ACCESS CONFIGURATION #1
NEAR-TERM (YEAR 2019) WITHOUT AND WITH PROJECT CONSTRUCTION ROADWAY AND STATE ROUTE SEGMENT LOS

Segment	Classification (as built)	Daily Volume	LOS C Capacity	V/C	LOS	Project Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	515	7,100	0.07	A	262	777	7,100	0.11	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	2,048	7,100	0.29	B	174	2,222	7,100	0.31	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	67	7,100	0.01	A	262	329	7,100	0.05	A	0.04	None
McCabe Road												
Brockman Road to Forrester Road	Major (2U)	765	7,100	0.11	A	262	1,027	7,100	0.14	A	0.04	None
Pulliam Road												
Kubler Road to SR 98	Minor (2U)	30	7,100	0.00	A	~~131~~ 262	~~161~~ 292	7,100	~~0.02~~ 0.04	A	~~0.02~~ 0.04	None
SR 98												
Drew Road to Pulliam Road	State Highway (2U)	2,165	7,100	0.30	B	~~153~~ 196	~~2,318~~ 2,361	7,100	0.33	B	~~0.02~~ 0.03	None
Pulliam Road to Brockman Road	State Highway (2U)	2,165	7,100	0.30	B	109	2,274	7,100	0.32	B	0.02	None

Source: LOS ~~2018~~ 2019a.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

4.3 TRANSPORTATION

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TABLE 4.3-18B
ACCESS CONFIGURATION #2
NEAR-TERM (YEAR 2019) WITHOUT AND WITH PROJECT CONSTRUCTION ROADWAY AND STATE ROUTE SEGMENT LOS

Segment	Classification (as built)	Daily Volume	LOS C Capacity	V/C	LOS	Project Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	515	7,100	0.07	A	262	777	7,100	0.11	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	2,048	7,100	0.29	B	174	2,222	7,100	0.31	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	67	7,100	0.01	A	262	329	7,100	0.05	A	0.04	None
McCabe Road												
Brockman Road to Forrester Road	Major (2U)	765	7,100	0.11	A	262	1,027	7,100	0.14	A	0.04	None
Pulliam Road												
Kubler Road to SR 98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	0.04	None
SR 98												
Drew Road to Pulliam Road	State Highway (2U)	2,165	7,100	0.30	B	283	2,448	7,100	0.34	B	0.04	None
Pulliam Road to Brockman Road	State Highway (2U)	2,165	7,100	0.30	B	109	2,274	7,100	0.32	B	0.02	None

Source: LOS 2019b.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

4.3 TRANSPORTATION

Freeway Segment LOS

Table 4.3-19 summarizes freeway segment LOS under Near-Term (Year 2019) With and Without Project Construction. As shown, both freeway segments were calculated to operate above LOS C (at LOS A and LOS B). I-8 from Dunaway Road to Drew Road would continue to operate at LOS A in the AM and PM Peak Hour in both directions (eastbound and westbound); I-8 from Forrester Road to Imperial Avenue would continue to operate at LOS A during the AM and PM peak hour in the eastbound direction and LOS B in the AM and PM peak hour in the westbound direction and the AM Peak Hour in the westbound direction. None of the increases in traffic resulting from Project construction would exceed V/C ratios or LOS standards. Therefore, **less than significant** impacts to Project study area freeway segments would occur under Near-Term (Year 2019) With Project Construction under both the Full Build-Out Scenario and Phased CUP Scenario.

TABLE 4.3-19
NEAR-TERM (YEAR 2019) WITHOUT AND WITH PROJECT CONSTRUCTION FREEWAY SEGMENT LOS

Freeway Segment	I-8 Dunaway Road to Drew Road				I-8 Forrester Road to Imperial Avenue			
Forecasted Near-Term (Year 2019) Without Project								
ADT	14,500				17,800			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,069	1,172	1,346	1,369	1,364	1,496	1,718	1,748
V/C	0.227	0.249	0.286	0.291	0.290	0.318	0.366	0.372
LOS	A	A	A	A	A	B	B	B
Project Peak Hour Volume	7	0	0	7	1	36	36	1
Near-Term (Year 2019) With Project								
Peak Hour Volume	1,076	1,172	1,346	1,376	1,365	1,532	1,754	1,749
V/C	0.229	0.249	0.286	0.293	0.291	0.326	0.373	0.372
LOS	A	A	A	A	A	B	B	B
Increase in V/C	0.001	0.000	0.000	0.001	0.000	.0008	0.008	0.000
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from Caltrans' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.
[3] Latest D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2017 report).
Impact? = Direct, Cumulative, or None.

Overall, under Near-Term (Year 2019) With and Without Project, the Project study area intersections, roadway, State Route and freeway segments were calculated to operate at LOS C or better <u>for both Access Configuration #1 and Access Configuration #2</u>.. Thus, **less than significant** impacts were calculated with the addition of Project construction traffic to existing traffic volumes under Near-Term (Year 2019) With Project construction under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.

Conflict with Applicable Plan – Long-Term (Year 2027) Conditions

Impact 4.3.3 Implementation of the proposed Project would add traffic to existing traffic volumes on Project study area intersections, roadway segments and freeway segments during Long-Term (Year 2019) Project construction. The additional traffic would not result in an exceedance of LOS C. Therefore, conflicts with the Imperial County General Plan Circulation and Scenic Highways Element are considered **less than significant** under Mid-Term (Year 2027) With Project conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Long-Term (Year 2027)

This discussion addresses Long-Term Year 2027 conditions if the entire Project (in 18 months) is constructed at the end of the period when construction must commence per the CUP. The Year 2027 background volumes are based on increasing the existing year 2017 volumes by an annual growth rate of 1.8% (19.5% total due to compounding growth) as described in the Near-Term Year 2019 Conditions' Section. Year 2027 traffic volumes are shown in **Figure 4.3-9**. Intersection, roadway, State Route and freeway segment LOS are shown in **Tables 4.3-20, Table 4.3-21** and **Table 4.3-22~~5~~**. Intersection LOS calculations are included in Appendix S of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR.

Intersection LOS

Table 4.3-20 summarizes Long-Term (Year 2027) intersection LOS. (Intersection LOS calculations are included in Appendix S of the Draft Traffic Impact Analysis [**Appendix C** of this EIR]).

TABLE 4.3-20
LONG-TERM (YEAR 2027) INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2027) Delay[2]	LOS[3]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	10.0	B
		PM	10.0	B
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	11.8	B
		PM	16.4	C
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	9.8	A
		PM	9.7	A
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A
		PM	8.6	A
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	8.9	A
		PM	9.0	A
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A
		PM	9.0	A
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A
		PM	8.7	A

Source: LOS 2018. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
Notes: [1] Intersection Control – (S) Signalized, (U) Un-signalized. [2] Delay – HCM Average Control Delay in seconds. [3] LOS: Level of Service.

4.3 TRANSPORTATION

Under Long-Term (Year 2027) Conditions, the Project study area intersections were calculated to operate at LOS C or better. One intersection (Forrester Road at I-8, eastbound ramp) would operate at LOS C in the PM peak hour. This same intersection operates at LOS B in the AM Peak hour. One intersection (Forrester Road at I-8, westbound ramp) operates at LOS B in both the AM and PM peak hours while all others will operate at LOS A. All of the intersections will operate with **less than significant impacts** to LOS under Long-Term (Year 2019) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

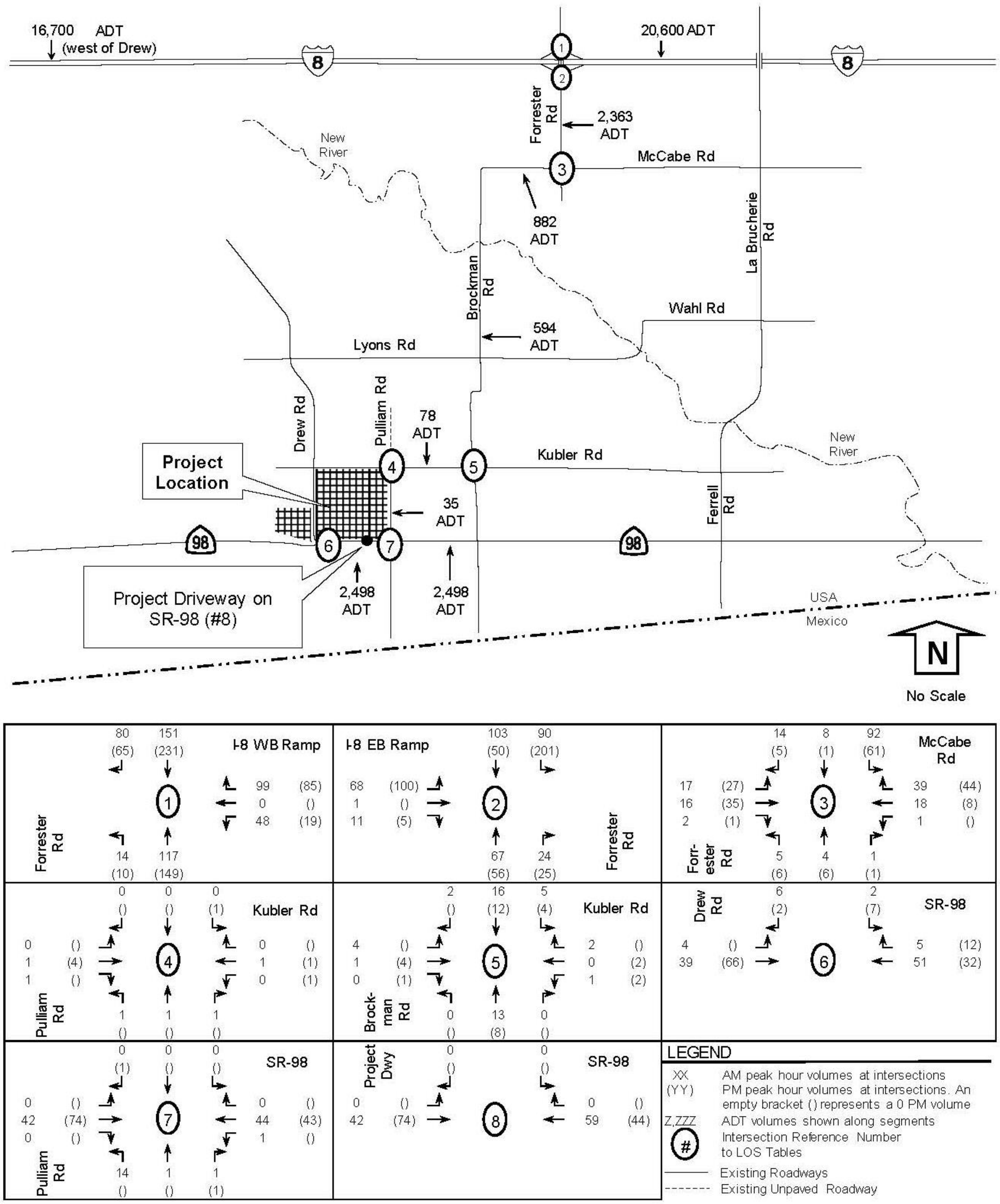
Table 4.3-21 summarizes roadway segment LOS for Long-Term (Year 2027) conditions. As shown, all segments would operate above LOS C (at LOS A or LOS B). Specifically, all segments would operate at LOS A with the exception of the segment along Forrester Road from I-8 to McCabe Road and both segments of SR 98 which would all operate at LOS B. Because, all roadway and State Route segments would operate above the LOS C standard, **less than significant impacts** would occur under Long-Term (Year 2027) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

TABLE 4.3-21
LONG-TERM (YEAR 2027) ROADWAY AND STATE ROUTE SEGMENT LOS

Segment	Classification (as built)	Daily Volume	# of Lanes	LOS C Capacity	V/C	LOS
Brockman Road						
McCabe Road to Kubler Road	Major (2U)	594	2	7,100	0.08	A
Forrester Road						
I-8 to McCabe Road	Prime (2U)	2,363	2	7,100	0.33	B
Kubler Road						
Brockman Road to Ferrell Road	Minor (2U)	78	2	7,100	0.01	A
McCabe Road						
Brockman Road to Forrester Road	Major (2U)	882	2	7,100	0.12	A
Pulliam Road						
Kubler Road to SR 98	Minor (2U)	35	2	7,100	0.00	A
SR 98						
Drew Road to Pulliam Road	State Highway (2U)	2,498	2	7,100	0.35	B
Pulliam Road to Brockman Road	State Highway (2U)	2,498	2	7,100	0.35	B

Source: LOS 2018.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway.
Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.

4.3 TRANSPORTATION



Source: LOS 2018.

FIGURE 4.3-9
LONG-TERM (YEAR 2027) TRAFFIC VOLUMES

County of Imperial
May 2019

Drew Solar Project
Draft EIR

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4.3 TRANSPORTATION

Freeway Segment LOS

Table 4.3-22 summarizes Long-Term (Year 2027) freeway segment LOS. As shown, the freeway segments were calculated to operate above LOS C (LOS A or LOS B). I-8 from Drew Road to Forrester Road would operate at LOS B in the PM peak hour in both the eastbound and westbound direction. Likewise, I-8 from Forrester Road to Imperial Avenue would operation at LOS B in both the AM and PM peak hour in both the eastbound and the westbound direction. The segment of I-8 from Dunaway Road to Drew Road would operate at LOS A. Because, all freeway segments would operate above the LOS C standard, **less than significant impacts** would occur under Long-Term (Year 2027) conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

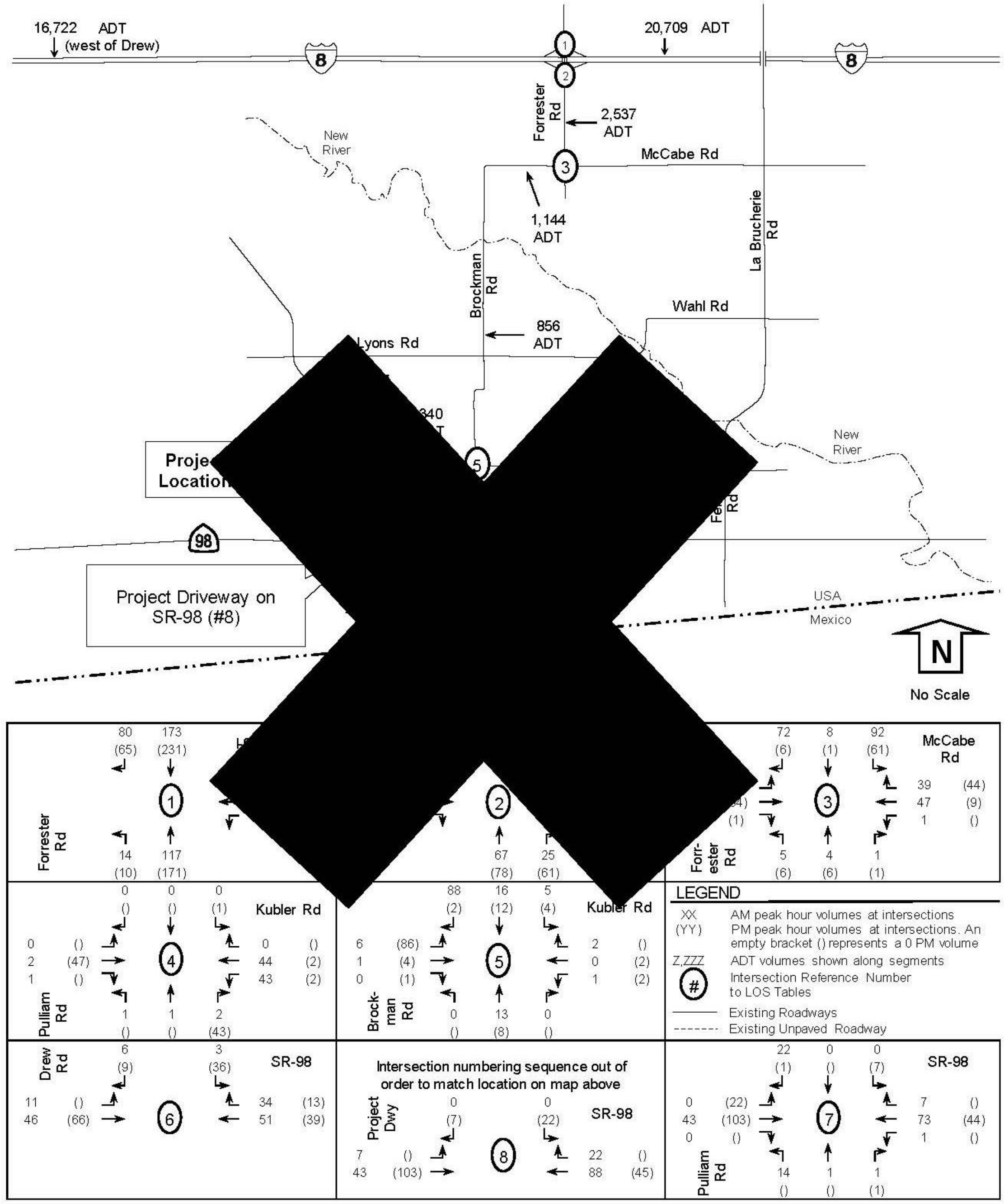
TABLE 4.3-22
LONG-TERM (YEAR 2027) FREEWAY SEGMENT LOS

Freeway Segment	I-8 Dunaway Road to Drew Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2027)								
ADT	16,700				20,600			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,231	1,349	1,550	1,1576	1,579	1,731	1,989	2,022
V/C	0.262	0.287	0.330	0.335	0.336	0.368	0.412	0.430
LOS	A	A	B	B	B	B	B	B

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.
[3] D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.
[2] Truck factor from Caltrans (based on 2015 report).
Impact? = Direct, Cumulative, or None.

Long-Term (Year 2027) With Project Construction Conditions

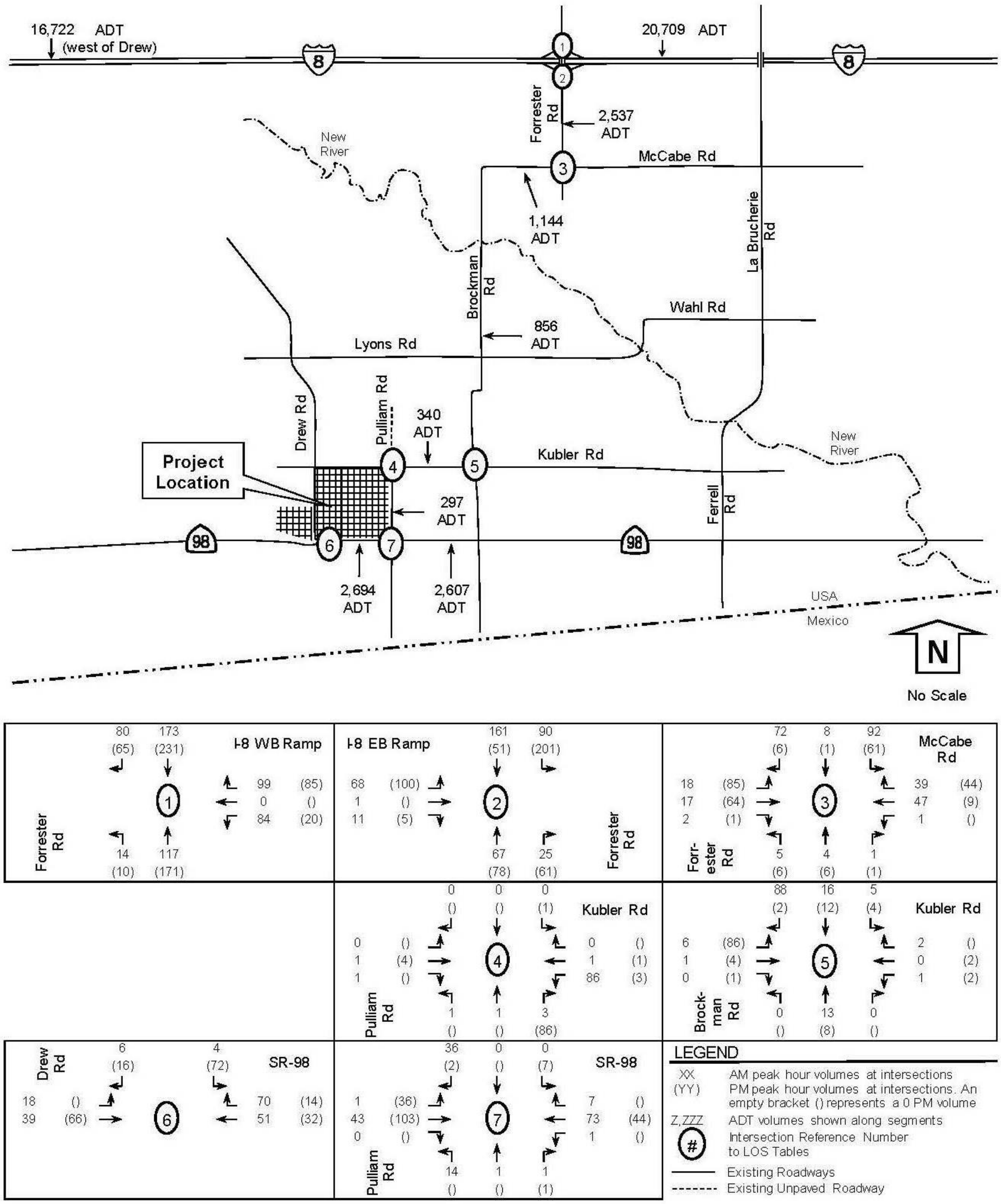
This section documents the addition of Project construction traffic onto Long-Term (Year 2027) conditions. **Figure 4.3-10a** depicts Long-Term (Year 2027) With Project Construction traffic volumes for Access Configuration #1. **Figure 4.3-10b** depicts Long-Term (Year 2027) With Project Construction traffic volumes for Access Configuration #2. Intersection, segment, and freeway LOS are shown in **Table 4.3-23a** and **Table 4.3-23b** (Access Configuration #1), **Table 4.3-24a** and **Table 4.3-24b** (Access Configuration #2) and **Table 4.3-25**.



~~Source: LOS 2018.~~

~~**FIGURE 4.3-10**~~
~~**LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION VOLUMES**~~

4.3 TRANSPORTATION



Source: LOS 2019.

FIGURE 4.3-10A

ACCESS CONFIGURATION #1 - LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION VOLUMES

County of Imperial
May 2019

Drew Solar Project
Draft EIR

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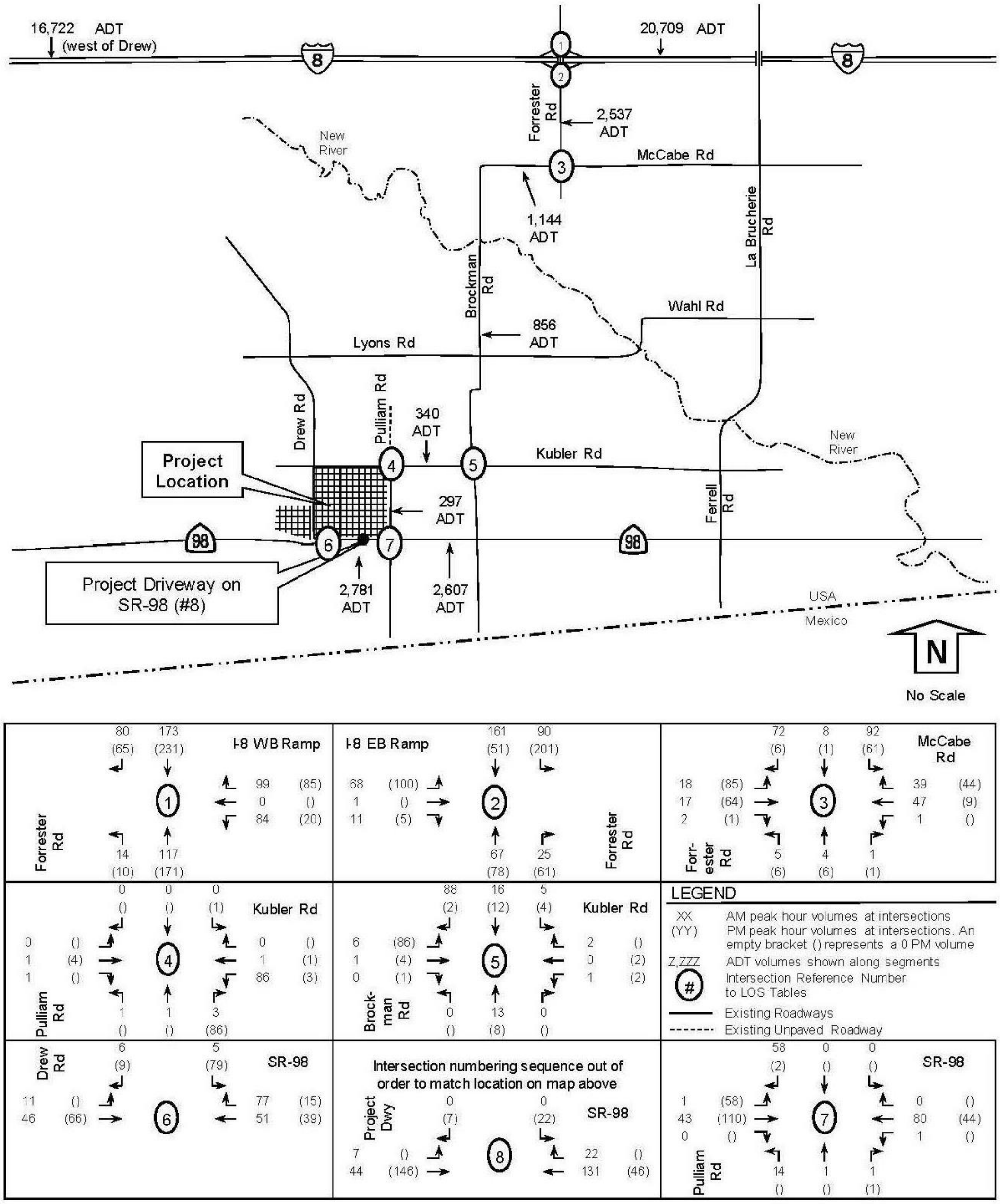

Source: LOS 2019.

FIGURE 4.3-10B
ACCESS CONFIGURATION #2 - LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION VOLUMES

4.3 TRANSPORTATION

TABLE 4.3-23A
ACCESS CONFIGURATION #1
LONG-TERM YEAR 2027 WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2027) Delay[2]	(Year 2027) LOS[3]	(Year 2027) With Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB (U)	Minor Leg	AM	10.0	B	10.6	B	0.6	None
		PM	10.0	B	10.2	B	0.2	None
2) Forrester Road at I-8 EB (U)	Minor Leg	AM	11.8	B	12.6	B	0.8	None
		PM	16.4	C	17.5	C	1.1	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	9.8	A	10.2	B	0.4	None
		PM	9.7	A	11.3	B	1.6	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A	~~9.0~~ 9.1	A	~~0.4~~ 0.5	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Rd at Kubler Rd (U)	Minor Leg	AM	8.9	A	9.1	A	0.2	None
		PM	9.0	A	9.1	A	0.1	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	~~8.9~~ 9.1	A	~~0.2~~ 0.4	None
		PM	9.0	A	~~9.2~~ 9.5	A	~~0.2~~ 0.5	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A	~~9.5~~ 9.7	A	~~0.4~~ 0.6	None
		PM	8.7	A	~~8.8~~ 9.9	A	~~0.1~~ 1.2	None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM	DNE	NA	1.0	A	NA	None
		PM	DNE	NA	9.3	A	NA	None

Source: LOS ~~2018~~ 2019a. DNE: Does Not Exist; NA: Not Applicable

Notes: [1] Intersection Control – (S) Signalized, (U) Un-signalized.
[2] Delay – HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative.

TABLE 4.3-23B
ACCESS CONFIGURATION #2
LONG-TERM YEAR 2027 WITH PROJECT CONSTRUCTION INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2027) Delay[2]	(Year 2027) LOS[3]	(Year 2027) With Project Delay[2]	With Project LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB (U)	Minor Leg	AM	10.0	B	10.6	B	0.6	None
		PM	10.0	B	10.2	B	0.2	None
2) Forrester Road at I-8 EB (U)	Minor Leg	AM	11.8	B	12.6	B	0.8	None
		PM	16.4	C	17.5	C	1.1	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	9.8	A	10.2	B	0.4	None
		PM	9.7	A	11.3	B	1.6	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.6	A	9.1	A	0.5	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Rd at Kubler Rd (U)	Minor Leg	AM	8.9	A	9.1	A	0.2	None
		PM	9.0	A	9.1	A	0.1	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	9.1	A	0.4	None
		PM	9.0	A	9.6	A	0.6	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A	9.9	A	0.8	None
		PM	8.7	A	8.9	A	0.2	None
8) SR 98 at Project West Driveway (U)	Minor Leg	AM	DNE	NA	1.0	A	NA	None
		PM	DNE	NA	9.5	A	NA	None

Source: LOS 2019b. DNE: Does Not Exist; NA: Not Applicable
Notes: [1] Intersection Control – (S) Signalized, (U) Un-signalized.
[2] Delay – HCM Average Control Delay in seconds.
[3] LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative.

As shown, under Long-Term (Year 2027) With Project Construction, all but one Project study area intersection is calculated to operate at LOS C or better. The intersection of Ferrell Road at I-8 eastbound would continue to operate at LOS C during the PM peak hour with Project traffic. The intersection of Forrester Road at McCabe Road would decline from LOS A to LOS B in both the AM and PM Peak Hour. No significant impacts to Project study area intersections were calculated due to the addition of construction traffic to existing traffic under Long-Term (Year 2027) conditions. Moreover, the increases in traffic resulting from construction of the proposed Project would not exceed LOS standards. Therefore, **less than significant impacts** to Project study area intersections would result under Long-Term (Year 2027) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-24a ~~**4.3-27**~~ summarizes roadway and State Route segment LOS for Long-Term (Year 2027) With and Without Project Construction for Access Configuration #1. **Table 4.3-24b** summarizes roadway and State Route segment LOS for Long-Term (Year 2027) With and Without Project Construction for Access Configuration #2. As shown, all segments would continue to operate above LOS C (at LOS A or LOS B). No change in LOS would occur for any segment with the addition of Long-Term (Year 2027) Project construction traffic. Therefore, **less than significant impacts** to Project study area roadway segments would occur under Long-Term (Year 2027) With Project Construction conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

4.3 TRANSPORTATION

TABLE 4.3-24A
ACCESS CONFIGURATION #1
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION ROADWAY AND STATE ROUTE SEGMENT LOS

Segment	Classification (as built)	(Year 2027) Daily Volume	LOS C Capacity	V/C	LOS	Project Daily Volume	(Year 2027) With Project Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	594	7,100	0.08	A	262	856	7,100	0.12	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	2,363	7,100	0.33	B	174	2,537	7,100	0.36	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	78	7,100	0.01	A	262	340	7,100	0.05	A	0.04	None
McCabe Road												
Brockman Road to Forrester Road	Major (2U)	882	7,100	.012	A	262	1,144	7,100	0.16	A	0.04	None
Pulliam Road						~~131~~	~~166~~		~~0.02~~		~~0.02~~	
Kubler Road to SR 98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	0.04	None
SR 98						~~153~~	~~2,651~~		~~0.37~~		~~0.02~~	
Drew Road to Pulliam Road	State Highway (SU)	2,498	7,100	0.35	B	196	2,694	7,100	0.38	B	0.03	None
Pulliam Road to Brockman Road	State Highway (SU)	2,498	7,100	0.35	B	109	2,607	7,100	0.37	B	0.02	None

Source: LOS ~~2018~~ 2019a.
Notes: Classification based on the Imperial County General Plan, Circulation and Scenic Highways Element, January 29, 2008.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

TABLE 4.3-24B
ACCESS CONFIGURATION #2
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION ROADWAY AND STATE ROUTE SEGMENT LOS

Segment	Classification (as built)	(Year 2027) Daily Volume	(Year 2027) LOS C Capacity	(Year 2027) V/C	(Year 2027) LOS	Project Daily Volume	(Year 2027) With Project Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Brockman Road												
McCabe Road to Kubler Road	Major (2U)	594	7,100	0.08	A	262	856	7,100	0.12	A	0.04	None
Forrester Road												
I-8 to McCabe Road	Prime (2U)	2,363	7,100	0.33	B	174	2,537	7,100	0.36	B	0.02	None
Kubler Road												
Brockman Road to Ferrell Road	Minor (2U)	78	7,100	0.01	A	262	340	7,100	0.05	A	0.04	None
McCabe Road												
Brockman Road to Forrester Road	Major (2U)	882	7,100	.012	A	262	1,144	7,100	0.16	A	0.04	None
Pulliam Road												
Kubler Road to SR 98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	0.04	None
SR 98												
Drew Road to Pulliam Road	State Highway (SU)	2,498	7,100	0.35	B	283	2,781	7,100	0.39	B	0.04	None
Pulliam Road to Brockman Road	State Highway (SU)	2,498	7,100	0.35	b	109	2,607	7,100	0.37	B	0.02	None

Source: LOS 2019a.
Notes: Classification based on the Imperial County General Plan, Circulation and Scenic Highways Element, January 29, 2008.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

4.3 TRANSPORTATION

Freeway Segment LOS

Table 4.3-25 summarizes freeway segment LOS under Long-Term (Year 2027) With and Without Project Construction. As shown, both freeway segments were calculated to operate above LOS C (at LOS A and LOS B). In fact, no change in LOS would occur with the addition of Project construction traffic. Moreover, the increases in traffic resulting from Project construction would not exceed V/C ratios or LOS standards. Therefore, **less than significant impacts** to Project study area freeway segments would occur under Long-Term (Year 2027) With Project construction under both the Full Build-Out Scenario and Phased CUP Scenario.

TABLE 4.3-25
LONG-TERM (YEAR 2027) WITHOUT AND WITH PROJECT CONSTRUCTION FREEWAY SEGMENT LOS

Freeway Segment	I-8 Drew Road to Forrester Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2019) Without Project								
ADT	16,700				20,600			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,231	1,349	1,550	1,583	1,580	1,767	2,025	2,023
V/C	0.262	0.287	0.330	0.335	0.336	0.368	0.423	0.430
LOS	A	A	B	B	B	B	B	B
Project Peak Hour Volume 2019 With Project								
Peak Hour Volume	1,238	1,349	1,550	1,583	1,580	1,767	2,025	2,023
V/C	0.263	0.287	0.330	0.337	0.336	0.376	0.431	0.431
LOS	A	A	B	B	B	B	B	B
Increase in V/C	0.001	0.000	0.000	0.001	0.000	0.008	0.008	0.000
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018.
Notes: [1] *Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.*
[2] *K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.*
[3] *D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.*
[4] *Truck factor from Caltrans (based on 2017 report).*
Impact? = Direct, Cumulative, or None.

Overall, under Long-Term (Year 2027) With and Without Project construction, the Project study area intersections, roadway, State Route and freeway segments were calculated to operate at LOS C or better for both Access Configuration #1 and Access Configuration #2. Thus, **less than significant impacts** were calculated with the addition of Project construction traffic to existing traffic volumes under Long-Term (Year 2027) With Project construction under both the Full Build-Out Scenario and Phased CUP Scenario.

4.3 TRANSPORTATION

Increase Hazards Due to a Geometric Design Feature – Driveways and Travel Speeds

Impact 4.3.4 Implementation of the proposed Project would not require provision of left-turn lanes at Project driveways to allow access to any of the CUPs. No geometric design features are proposed that would result in hazards. Likewise, area roadways are currently traveled by farm equipment similar in size and speed to construction equipment necessary for the proposed Project. Therefore, impacts resulting from an increase in hazards due to a geometric design feature or an incompatible use are considered **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction

Multiple County maintained roads provide access throughout the Project Area. These roads are currently traveled by farm equipment used to maintain and harvest crops currently grown on the solar field site parcels and surrounding agricultural lands. Farm equipment and construction equipment are of similar size and travel at similar speeds. Thus, the introduction of construction equipment onto area roadways would not pose a hazard or be incompatible with existing uses. The Project does not propose to use unpaved County roads for access. No left turn lanes are warranted during Project construction and none of the access points present a hazard to traffic along adjacent roadways. Therefore, **less than significant impacts** are identified with regard to hazards due to a geometric design feature or incompatible use during construction of both the Full Build-Out Scenario and Phased CUP Scenario.

Operation

During Project operation, access to each CUP will be controlled and gates will be installed at the access roads. The parking lot(s) will meet the requirements of the Imperial County Land Use Ordinance Division 3 Chapter 1 90302.02 Development of Standard I. All driveways leading to the O&M building(s) will be surfaced with a minimum of three (3) inches of asphaltic concrete paving or similar material.

Incorporation of these access points and paving features would not present a hazard. Therefore, less than significant impacts are identified with regard to hazards due to a geometric design feature during operation of both the Full Build-Out Scenario and Phased CUP Scenario.

Decommissioning

Access points to each CUP used during decommissioning are anticipated to be the same as those used during construction. Similar equipment would be involved during decommissioning as was used during construction. However, traffic volumes will likely be less and not as intensive as occurred during construction. Therefore, **less than** significant impacts are identified with regard to hazards due to a geometric design feature during decommissioning of both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not Applicable.

4.3 TRANSPORTATION

Increase Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction

Impact 4.3.5 Construction of the proposed Project will require movement of heavy equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The condition of the roadways may deteriorate rapidly based on the volume and weight of construction traffic. Therefore, impacts to County-maintained roadways are considered **potentially significant** under both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction, Operation and Decommissioning/Reclamation

Damage to County-maintained roadways would occur during construction, require repair prior to operation and be re-assessed following decommissioning. Once the project is reclaimed, no damage beyond what is currently occurring in association with existing farming operations is anticipated.

County roadways within the Project Area should be designed in accordance with the specifications outlined under item "II H. STREET STRUCTURAL SECTION" of the *Engineering Design Guidelines Manual for the Preparation and Checking of Street Improvement Drainage and Grading Plans Within Imperial County* (Imperial County 2008d). As such, the roadways may not currently be designed to accommodate high volumes of construction traffic involving heavy equipment and trucks.

According to the Applicant, the construction workforce is expected to start in 2017 and reach the highest concentration in spring of 2019 (for the near-term scenario) with an average of 250 workers. Construction activities are expected to require approximately 18 months.

The worker and construction truck traffic is calculated at 436 ADT with 144 AM peak hour trips (141 inbound and 6 outbound) and 141 PM peak hour trips (3 inbound and 144 outbound). These trips would be generated along designated Project haul routes during Project construction and would avoid unpaved County roads.

As construction of the Project includes site preparation, foundation construction, delivery of equipment and supplies, erection of major equipment and structures, installation of control systems, and start-up/testing, many of the 436 ADT would involve movement of heavy equipment and supplies including large trucks carrying oversized loads. Trucks loaded with equipment and supplies are extremely heavy. The weight of these vehicles combined with elevated volumes of trips generated during construction would accelerate the deterioration of County-maintained of roadway surfaces along designated Project haul routes. The amount of degradation associated with construction traffic is contingent upon both the design of the pavement (type and thickness) as well as the existing condition of the roadway surface. Existing County-maintained roadways in the Project vicinity are not designed with a pavement thickness sufficient to withstand a high volume of heavy-duty trucks and equipment trips. Cracks, ruts and pot-holes will develop as a result of high volumes of heavy vehicles. This damage represents a potential hazard to motorists as well as an economic burden to the County associated with roadway repairs. However, this analysis conservatively concludes that the Project's impacts to the safety of county roads is a **potentially significant impact** under both the Full Build-out Scenario and the Phased CUP Scenario.

4.3 TRANSPORTATION

Mitigation Measures

MM 4.3.5a All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)

~~The Project contractor shall utilize SR 98 for all equipment deliveries.~~ Employee and vendor routes to each CUP shall be limited to ~~SR 98,~~ Drew Road~~,~~ and Pulliam Road ~~and Kubler Road~~, unless improvements are made to other county roads leading to individual CUP sites in advance of development of each CUP.

Timing/Implementation: *Prior to the issuance of grading permit/Project contractor.*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department.*

MM 4.3.5b All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)

The CUP owner(s) shall limit the Project's construction traffic to paved County roadways. In the event the Applicant's construction traffic requires the use of unpaved County roadways, the Applicant shall mitigate those County unpaved roadways in accordance with ICAPCD Rule 805.

In addition to complying with Rule 805, if 50 vehicle trips per day (VPD) (cumulative from public and project use) are triggered by the project on any single County unpaved roadway, the Applicant shall provide for the future maintenance cost of the affected roadway for the full term of the CUP which triggered the increase beyond the 50 VPD threshold.

Timing/Implementation: *Prior to the issuance of grading permit/CUP owner(s).*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department.*

MM 4.3.5c All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)

As each CUP may be constructed individually and independently, the CUP owner(s) shall improve the roads per the approved haul route study. If the CUP owner(s) has already improved the roads that will be utilized by the next CUP to start construction, then no new road improvements are required.

Timing/Implementation: *Prior to the issuance of grading permit/CUP owner(s).*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department.*

MM 4.3.5d All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)

~~Construction traffic shall prioritize ingress and egress from SR 98~~. Project construction traffic will utilize County roads, therefore a fair share shall be paid per the approved haul route study, and the Developer will be required to repair any damages caused to County roads by construction traffic during construction and maintain them in safe conditions. The Imperial County Public Works Department/Road Commissioner shall have final authority as to the fair share percentage and the final payment amounts based on the final and approved access points in the project's grading and improvement plans. Fair share shall be paid in full prior to issuance of grading, building and encroachment permits.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

4.3 TRANSPORTATION

MM 4.3.5e CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001

Fair share payments shall be paid per the approved haul route study, as approved by Imperial County Public Works Department prior to issuance of grading, building and encroachment permits.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5f CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001

Prior to issuance of final Certificate of Occupancy, CUP owner shall be responsible for repairing any damage caused to County roads and bridges it utilizes via improvements as determined by the County Road Commissioner based on the final and approved access points in the Project's grading and improvement plans.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5g CUP#17-0031

Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Drew Road from SR 98 to the Mount Signal Drain No. 1 or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5h CUP#17-0032

Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Pulliam Road from SR 98 to the Carr Drain or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5i ~~4.3.5g~~ CUP#17-0033

Fair share payments shall be paid for future road maintenance of ~~2,800 feet of~~ at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving required on~~ along Pulliam Road from Carr Drain to Kubler Road ~~Pulliam Road north of SR 98~~ or as approved by ICDPW prior to issuance of the first grading permit ~~Final Certificate of Occupancy~~ based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.

~~Fair share payments shall be paid for 1,600 feet of asphalt patching required on Kubler Road west of Pulliam Road relating to construction haul route, or as approved by Imperial County Public Works Department prior to issuance of Final Certificate of Occupancy.~~

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5j ~~4.3.5h~~ CUP#17-0034

Fair share payments shall be paid for future road maintenance of ~~Install up to 2,400 feet~~ at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving required on Kubler Road west of Pulliam Road relating to the construction haul route and 2,400 feet of Drew Road~~ along Drew Road from Mount Signal Drain No. 1 to Kubler Road, or as approved by Imperial County Public Works Department prior to issuance of ~~Final Certificate of Occupancy~~ the first grading permit based on the final and approved access points in the Project's grading and improvement plans, unless ~~already~~ the condition has already been satisfied as part of CUP#17-0033. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.*

MM 4.3.5k ~~4.3.5i~~ CUP#17-0035 and CUP#18-0001

Fair share payments shall be paid for future road maintenance of ~~Install up to 2,400 feet of~~ at least one mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) ~~asphalt paving on~~ along Drew Road from SR 98 up to Kubler Road unless this condition has already been satisfied as part of CUP 17-0031 or CUP 17-0035 ~~required on Drew Road~~ relating to construction haul route, or as approved by Imperial County Public Works Department prior to issuance of ~~Final Certificate of Occupancy~~ the first grading permit based on the final and approved access points in the

Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.

Timing/Implementation: *Prior to the issuance of grading, building and encroachment permits.*

Enforcement/Monitoring: *Imperial County Public Works Department.*

Significance After Mitigation

Implementation of mitigation measure MM 4.3.5a would limit equipment deliveries, employee and vendor traffic to specific routes unless improvements are made to other County Roads prior to development of each CUP. Mitigation measure MM 4.3.5b requires that the Project's construction traffic use paved roads and avoid unpaved County roadways. If public unpaved roads are used for construction, then MM 4.3.5b will stipulate the mitigation utilizing acceptable best management practices in accordance with ICAPCD Rule 805. Furthermore, if the Proponent's VPD increase beyond a cumulative total of 50 trips per day, the Proponent will be responsible for the cost of future maintenance of impacted public unpaved roadways. Mitigation measure 4.3.5c requires the Applicant to improve roads to each CUP. Mitigation measure MM 4.3.5d applies to all CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001) and requires fair share payments for County roads used during construction as determined by the Imperial County Public Works Department/ Road Commissioner. Mitigation measure MM 4.3.5e requires fair share payment ~~for 1,300 feet of asphalt paving required on Drew Road immediately north of SR 98 specific to CUP#17-0031~~ based on the approved haul route study. Mitigation measure MM 4.3.5f requires the owners of CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001 to repair any damaged caused to County roads and bridges. Mitigation measure MM 4.3.5g requires the owner of CUP #17- 0031 to pay fair share payments for future road maintenance of at least one-half mile of road improvements along Drew Road from SR 98 to the Mount Signal Drain No. 1. Mitigation measure MM 4.3.5h requires the owner of CUP #17- 0032 to pay fair share payments for at least one-half mile of road improvements along Pulliam Road from SR 98 to the Carr Drain. Mitigation measure MM 4.3.5i~~g~~ requires the owner of CUP #17-0033 to pay fair share payments for future road maintenance of at least one-half mile of road improvements ~~for 2,800 feet of asphalt paving on Pulliam Road north of SR 98 and 1,600 feet of asphalt patching on Kubler Road west of Pulliam Road~~ along Pulliam Road from Carr Drain to Kubler Road. Mitigation measure MM 4.3.5j~~h~~ requires the owner of CUP #17-0034 to pay fair share payments for future road maintenance of at least one-half mile of road improvements along Drew Road from Mount Signal Drain No. 1 to Kubler Road ~~install up to 2,400 feet of asphalt paving required on Kubler Road west of Pulliam Road relating to the construction haul route and 2,400 feet of Drew Road~~. Lastly, mitigation measure MM 4.3.5k~~i~~ requires the owner of CUP#17-0035 and CUP#18-001 to pay fair share payments for at least one mile of road improvements along Drew Road from SR 98 up to Kubler Road unless condition has already been satisfied as part of CUP 17-0031 or CUP 17-0035 ~~installation up to 2,400 feet of asphalt paving on Drew Road relating to the construction route~~. Following implementation of these measures, impacts associated with damage to County-maintained roadways resulting from Project construction would be reduced to **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.

Emergency Access

Impact 4.3.6 The proposed Project includes emergency access points off of Kubler Road, Drew Road, Pulliam Road. Access of SR 98 is to a frontage road which connects with an emergency access. Final design will be review by the Imperial County Fire Department and Imperial County Sheriff's Office prior to approval. Therefore, impacts associated with adequate emergency access are **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction, Operation and Decommissioning

Project access would be installed during construction, maintained during operation and abandoned as part of decommissioning/reclamation.

Table 4.3-26 summarizes the proposed access points for each CUP and **Figure 4.3-11** depicts the location of the proposed access/driveways. As shown, driveways are accessed directly off of County roads with the exception of one driveway off of SR 98 along the southern boundary of the site. This driveway would provide access to a frontage road paralleling SR 98. This frontage road would connect to the one primary access and 1 emergency gate along the southern boundary of both CUP 17-0031 and CUP 17-0032.

TABLE 4.3-26
PROJECT ACCESS POINTS/DRIVEWAYS

CUP	Road	Number of Driveways
17-0031	SR 98	1 Driveway to frontage road to 1 primary and 1 emergency gate
17-0032	SR 98	1 Driveway to frontage road to 1 primary and 1 emergency gate
17-0033	Kubler Road on the north Pulliam Road on the East	1 Primary Access 1 Emergency Access/1 Primary Access
17-0034	Kubler Road on the north	1 Emergency Access
17-0035	Drew Road on the east	1 Primary Access/1 Emergency Access
18-0001	Drew Road on the east	

Source: See Figure 4.11-3

The Project does not propose to use unpaved County roads to access the solar field site parcels/CUP Areas. Access to components of the solar field site parcels will be controlled through security gates at access driveways for Access Configuration #1 as shown in **Figure 4.3-11a** or through access driveways for Access Configuration #2 shown in **Figure 4.3.11b.** Primary access driveways would be paved. Emergency (secondary) access driveways would be Class II base. For all CUPs (CUP#17-0031 thru CUP17#0035 and CUP#18-0001), the Applicant will provide on-site compacted dirt roads, and Class II base emergency access driveways with a 10-foot paved section adjacent to County's edge of pavement. If the emergency access point connects to a private frontage a 10-foot paved section will not be required. Both the Imperial County Fire Department and Imperial County Sheriff's Office would review the plans for adequate emergency access prior to issuance of building permits. The Imperial County Public Works Department will also review plans to ensure they are designed consistent with County design requirements. Therefore, impacts associated with a hazard due to a geometric design feature or incompatible use during construction of either the Full Build-Out Scenario or the Phased CUP Scenario are considered **less than significant** under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not Applicable.

4.3 TRANSPORTATION

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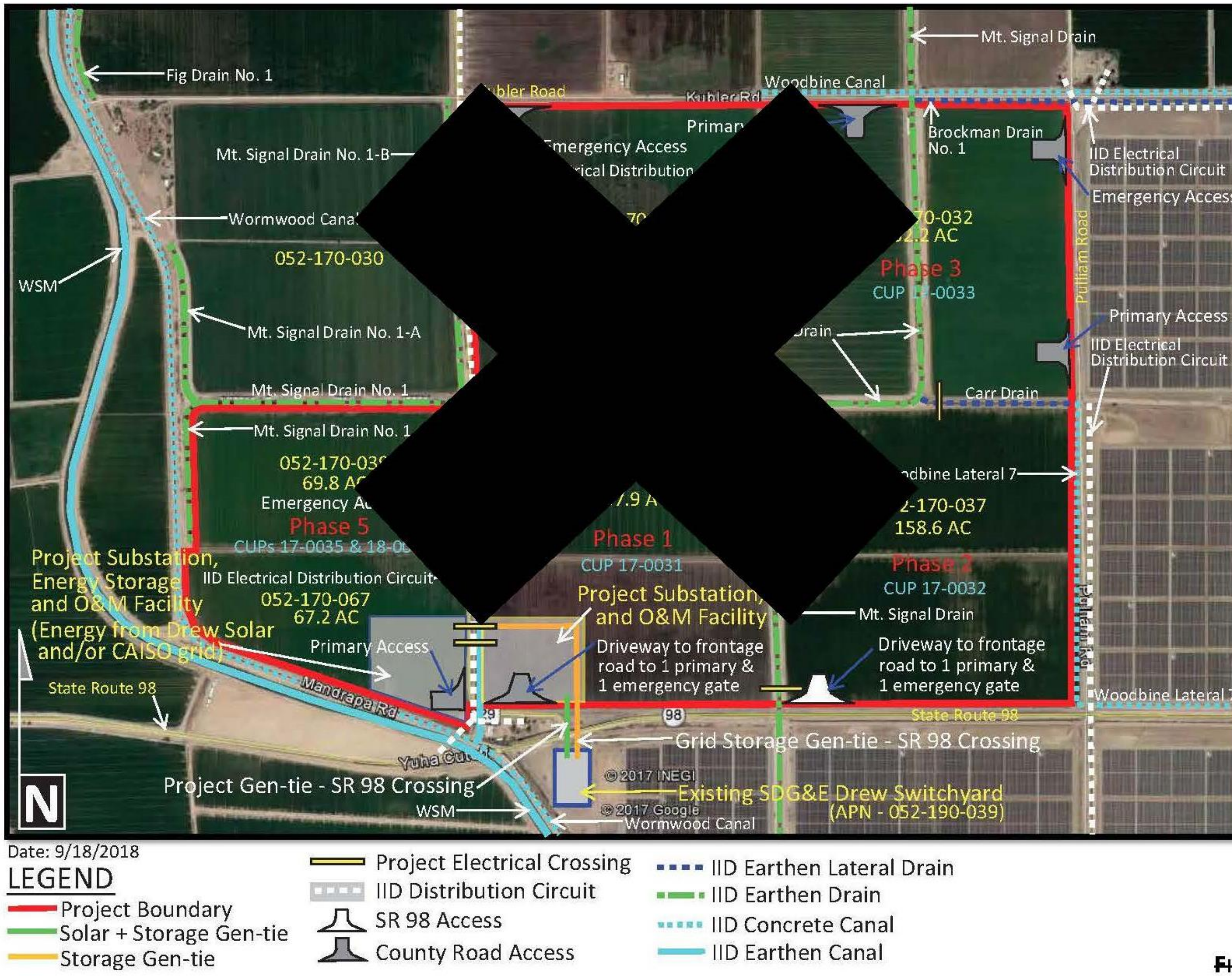
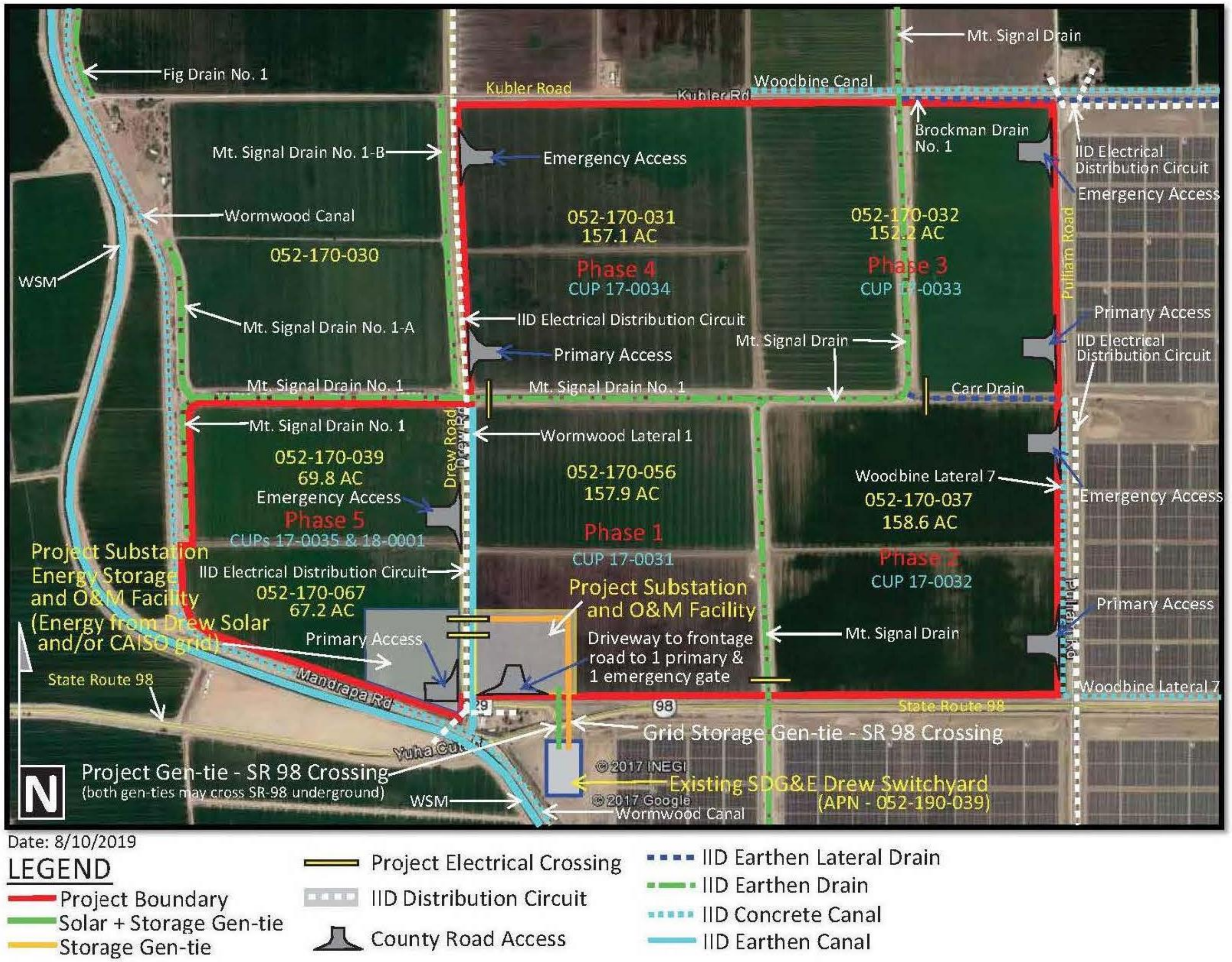


~~Source: Drew Solar 2018.~~

~~**FIGURE 4.3-11**~~
~~**PROJECT ACCESS POINTS/ DRIVEWAYS**~~



Source: Drew Solar 2019.

FIGURE 4.3-11A
ACCESS CONFIGURATION #1 - PROJECT ACCESS POINTS/ DRIVEWAYS

Source: Drew Solar 2019.

FIGURE 4.3-11B
ACCESS CONFIGURATION #2 - PROJECT ACCESS POINTS/ DRIVEWAYS

4.3 TRANSPORTATION

4.3.4 CUMULATIVE SETTING, IMPACTS AND MITIGATION MEASURES

A. CUMULATIVE SETTING

The geographic scope for the cumulative setting for transportation and circulation is based on the roadways in the vicinity of the Project study area that may be affected by traffic generated by the Project and cumulative projects. Information on cumulative projects was obtained from, and confirmed by, the County of Imperial to be current as of November 2017 (**refer to Figure 3.0-1** in Chapter 3.0 for a graphical presentation of these projects). A County of Imperial map showing planned solar farm projects is included in Appendix K of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR. Please note that the the Le Conte Battery Energy Storage Facility has submitted a CUP Application in July 2018 and is anticipated to go before the Board of Supervisors in the Spring of 2019.

The cumulative list below describes the cumulative projects in the immediate area around the Project site (i.e. projects that are generally located south of I-8 and west of Clark Road). Some of the cumulative projects have completed technical studies including traffic generation information; however, several have not. For the projects that do not have detailed traffic generation information, an estimate was calculated based on traffic generation information for similar projects and are noted below with an asterisk "*". Traffic generation calculations and copies of the cumulative project descriptions, locations, traffic generation, and assignments are also included in Appendix L of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR. Information for each cumulative project is included below:

Table 4.3-27 summarizes information for each cumulative project including its construction status.

TABLE 4.3-27
TRAFFIC GENERATED BY CUMULATIVE PROJECTS

#	Project Name	Description	Traffic Generation
1	Big Rock Solar and Laurel Solar	Solar Facility	A PV solar facility capable of producing approximately 345 MWs of electricity generally located west of Drew Road and south of I-8.
2	Calexico 1-A	Solar Facility	A PV solar facility capable of producing approximately 100 MWs of electricity generally located 6 miles west of the City of Calexico.
3	Calexico 1-B	Solar Facility	A PV solar facility capable of producing approximately 100 MWs of electricity generally located 6 miles west of the City of Calexico.
4	Calexico II-A	Solar Facility	A PV solar facility capable of producing approximately 100 MWs of electricity generally located 6 miles west of the City of Calexico.
5	Campo Verde Battery Energy Storage System	Battery Storage	A 100 MW battery storage system for the Campo Verde Solar facility generally located west of Drew Road and south of I-8.

TABLE 4.3-27
TRAFFIC GENERATED BY CUMULATIVE PROJECTS

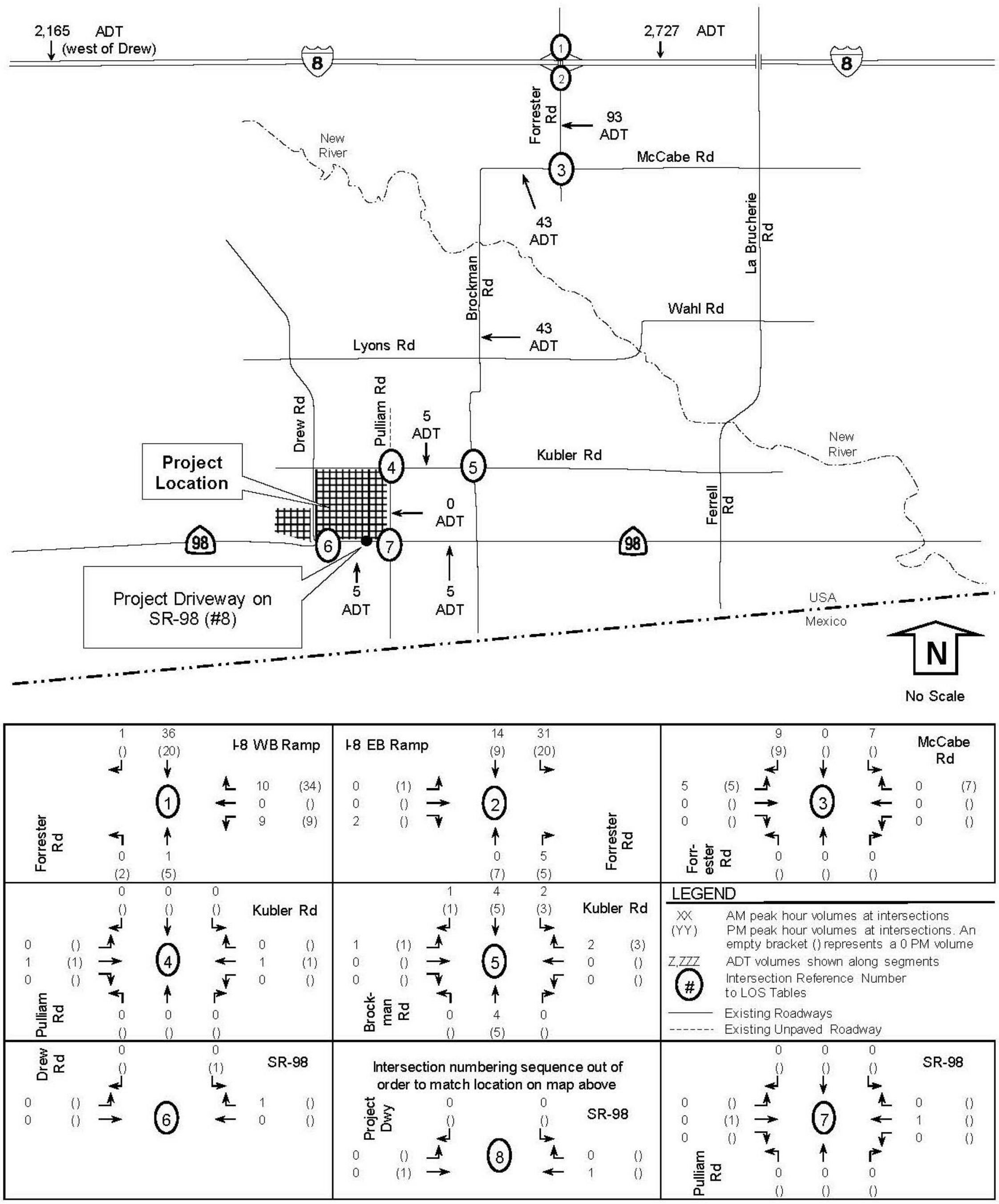
#	Project Name	Description	Traffic Generation
6	Centinela Solar Phase 2	Photovoltaic Solar Facility	A PV solar facility capable of producing approximately 100 MWs of electricity generally located east of Drew Road and south of I-8.
7	Coyne Ranch Specific Plan	Specific Plan	A residential project with up to 546 residential units located at 1642 Ross Road.
8	County Center II Expansion	Mixed-Use	A mixed-use project of a commercial center, expansion of the Imperial County Office of Education, a Joint-Use Teacher Training and Conference Center, Judicial Center, County Park, Jail expansion, County Administrative Complex, Public Works Administration, and a County Administrative Complex located on the southwest corner of McCabe Road and Clark Road.
9	IV Substation and SDG&E Ocotillo Solar	Transmission Line	A project connecting the Imperial Irrigation District's "S" line from the Imperial Irrigation District substation to the Imperial Valley substation and a PV solar facility capable of producing approximately 14 MWs of electricity generally located adjacent to the SDG&E Imperial Valley Substation.
10	IRIS Solar Farm Cluster (Ferrell, Rockwood, Iris, and Lyons)	Photovoltaic Solar Facility	PV solar facilities capable of producing approximately 360 MWs of electricity generally located north of SR-98 between Brockman Road and Weed Road.
11	Wistaria Ranch Solar Energy Center	Photovoltaic Solar Facility	A PV solar facility capable of producing approximately 250 MWs of electricity generally located 8 miles west of the city of Calexico.
12	Vega Solar	Photovoltaic Solar Facility	A PV solar facility capable of producing approximately 100 MWs of electricity generally located west of Drew Road and south of I-8.
13	Le Conte Battery Storage System	Battery Storage	Battery storage system proposed on 2.0 acres within the Centinela Solar Facility capable of strong 125 MWs.

Source: LOS 2018 based on Table 3.0-1 of Chapter 3.0.

4.3 TRANSPORTATION

B. METHODOLOGY

It was assumed that the cumulative projects listed in **Table 4.3-27** above will be generating construction traffic during the construction phase of the Drew Solar project. Presently, however, some of the cumulative projects are still in the environmental review process and, thus, may add construction traffic after the completion of the Drew Solar Project. Alternatively, some of the cumulative projects may add traffic before the construction of the proposed Project. Furthermore, most if not all of the cumulative solar projects will have a peak construction period that may or may not coincide with the Drew Solar Project peak construction period. Finally, there is a chance that some of the cumulative projects will not proceed. However, the Draft Impact Analysis is made with the conservative assumption that all of the peak cumulative construction volumes were used in the cumulative analysis. Realistically, however, there is high likelihood that all construction peaks will not coincide. The cumulative project (new development) volumes are shown in **Figure 4.3-12**.



Source: LOS 2018.

FIGURE 4.3-12
LONG-TERM CUMULATIVE PROJECT (NEW DEVELOPMENT) VOLUMES

4.3 TRANSPORTATION

C. CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS – Existing (Year 2017) With Project Construction With Cumulative Conditions

Impact 4.3.7 Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under (Year 2017) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to study area intersections, roadway, State Route and freeway segments under (Year 2017) With Project Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario under both the Full Build-Out Scenario and Phased CUP Scenario.

Existing (Year 2017) With Project Construction With Cumulative Conditions

This analysis documents the addition of Project construction traffic onto (Year 2017) with cumulative conditions. **Figure 4.3-13a** depicts (Year 2017) With Project Construction With Cumulative traffic volumes for Access Configuration #1. **Figure 4.3-13b** depicts (Year 2017) With Project Construction With Cumulative traffic volumes for Access Configuration #2. Intersection and roadway segment ~~Statement~~ and freeway segment LOS for Access Configuration #1 and Access Configuration #2 are shown in **Table 4.3-28a, Table 4.3-28b, Table 4.3-29a** and **Table 4.3-29b** ~~and~~ Freeway segment LOS is shown in **Table 4.3-30**. Intersection LOS calculations are included in Appendix N of the Draft Traffic Impact Analysis included as **Appendix C** of this EIR and as Attachments A, B and C of **Attachment 1** and **Attachment 2** of the Final EIR.

Intersection LOS

Table 4.3-28a summarizes intersection LOS under (Year 2017) With Project Construction With Cumulative conditions for Access Configuration #1. (Intersection LOS calculations are included in Appendix N of the Draft Traffic Impact Analysis [**Appendix C** of this EIR and Attachment A of the "Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment" Memo and **Attachment 1** of the Final EIR]).

TABLE 4.3-28A
ACCESS CONFIGURATION #1
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2017) With Cumulative		(Year 2017) With Cumulative With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	12.8	B	14.2	B	1.4	None
		PM	10.8	B	11.1	B	0.3	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	12.9	B	13.7	B	0.8	None
		PM	21.1	C	22.9	C	1.8	None
3) Forrester Road at McCabe Road(U)	Minor Leg	AM	12.1	B	13.7	B	1.6	None
		PM	14.9	B	18.9	C	4.0	None
4) Pulliam Road and Kubler Road (U)	Minor Leg	AM	9.0	A	9.4	A	0.4	None
		PM	9.1	A	~~9.8~~ 9.9	A	~~0.7~~ 0.8	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	10.5	B	10.9	B	0.4	None

TABLE 4.3-28A
ACCESS CONFIGURATION #1
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2017) With Cumulative		(Year 2017) With Cumulative With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
		PM	9.1	A	9.8	A	0.7	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.9	A	~~9.1~~ 9.3	A	~~0.2~~ 0.4	None
		PM	9.3	A	~~9.5~~ 9.7	A	~~0.2~~ 0.4	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.4	A	~~9.8~~ 10.0	A	~~0.4~~ 0.6	None
		PM	8.8	A	~~10.0~~ 10.1	B	~~1.2~~ 1.3	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	0.8	A	0.8	None
		PM	0.0	A	9.5	A	9.5	None

Source: LOS ~~2018~~ 2019a~~.~~
Notes: [1] Intersection Control – (S) Signalized, (U) Un-signalized;
[2] Delay – HCM Average Control Delay in seconds;
[3] LOS: Level of Service
[4] Delta is the increase in delay from project;
[5] Type of impact: none, direct or cumulative.
Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.

Table 4.3-28b summarizes intersection LOS under (Year 2017) With Project Construction With Cumulative conditions for Access Configuration #2.

TABLE 4.3-28B
ACCESS CONFIGURATION #2
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2017) With Cumulative		(Year 2017) With Cumulative With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	12.8	B	14.2	B	1.4	None
		PM	10.8	B	11.1	B	0.3	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	12.9	B	13.7	B	0.8	None
		PM	21.1	C	22.9	C	1.8	None
3) Forrester Road at McCabe Road(U)	Minor Leg	AM	12.1	B	13.7	B	1.6	None
		PM	14.9	B	18.9	C	4.0	None
4) Pulliam Road and Kubler Road (U)	Minor Leg	AM	9.0	A	9.4	A	0.4	None
		PM	9.1	A	9.9	A	0.8	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	10.5	B	10.9	B	0.4	None
		PM	9.1	A	9.8	A	0.7	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.9	A	9.3	A	0.4	None
		PM	9.3	A	9.8	A	0.5	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.4	A	10.2	B	0.8	None
		PM	8.8	A	9.0	A	0.2	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	0.8	A	0.8	None
		PM	0.0	A	9.7	A	9.7	None

Source: LOS ~~2018~~ 2019b~~.~~
Notes: [1] Intersection Control – (S) Signalized, (U) Un-signalized; [2] Delay – HCM Average Control Delay in seconds;
[3] LOS: Level of Service [4] Delta is the increase in delay from project; [5] Type of impact: none, direct or cumulative.
Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.

4.3 TRANSPORTATION

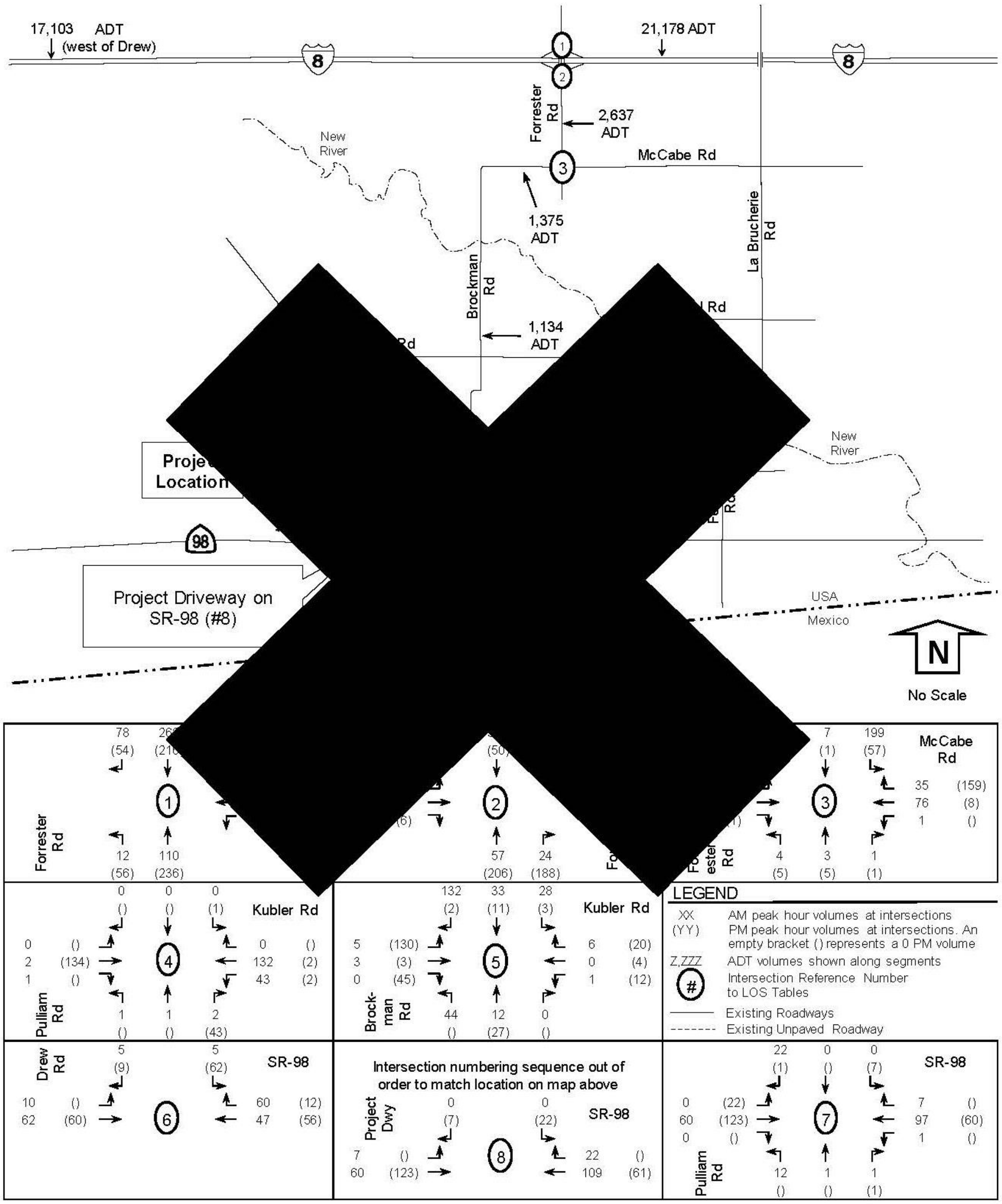
As shown, under Existing (Year 2017) With Project Construction with Cumulative Conditions, all Project study area intersections are calculated to operate at LOS C or better. One intersection (Forrester Road at McCabe Road) would experience a decline in LOS from LOS B to LOS C during the PM peak hour. Pulliam Road at SR 98 would decrease from Los A to LOS B during the PM peak hour. No other changes in LOS would occur with the addition of cumulative traffic. Moreover, the increases in traffic resulting from cumulative conditions would not exceed LOS standards. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative intersection traffic. Likewise, cumulative impacts to cumulative intersection LOS would be **less than cumulatively considerable** under Existing (Year 2017) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-29 summarizes roadway and State Route segment LOS for Existing (Year 2017) With Project Construction With Cumulative conditions. As shown, all segments would continue to operate above LOS C (LOS A or LOS B). No change in LOS would occur for any segment with the addition of Year 2017 cumulative traffic conditions. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative roadway and State Route segment traffic. Likewise, cumulative impacts to cumulative roadway and State Route segment LOS would be **less than cumulatively considerable** under Existing (Year 2017) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Freeway Segment LOS

Table 4.3-30 summarizes freeway segment LOS under Existing (Year 2017) With Project Construction With Cumulative conditions. As shown, both freeway segments were calculated to operate at or above LOS. However, the segment of I-8 from Dunaway Road to Drew Road would experience a decline in LOS from LOS A to LOS B during the AM peak hour in the westbound direction and in the PM Peak Hour in both the eastbound and westbound direction with the addition of cumulative traffic. The segment of I-8 from Forrester Road to Imperial Avenue would experience a decline from LOS A to LOS B in the AM Peak Hour in the eastbound direction and from LOS B to LOS C in the PM Peak Hour in the east bound direction. In no instance would the increases in traffic resulting from Project construction exceed V/C ratios or LOS standards. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative freeway segment traffic. Likewise, cumulative impacts to cumulative freeway segment LOS would be **less than cumulatively considerable** under Existing (Year 2017) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.



~~Source: LOS 2018.~~

~~**FIGURE 4.3-13**~~

~~**EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES**~~

4.3 TRANSPORTATION

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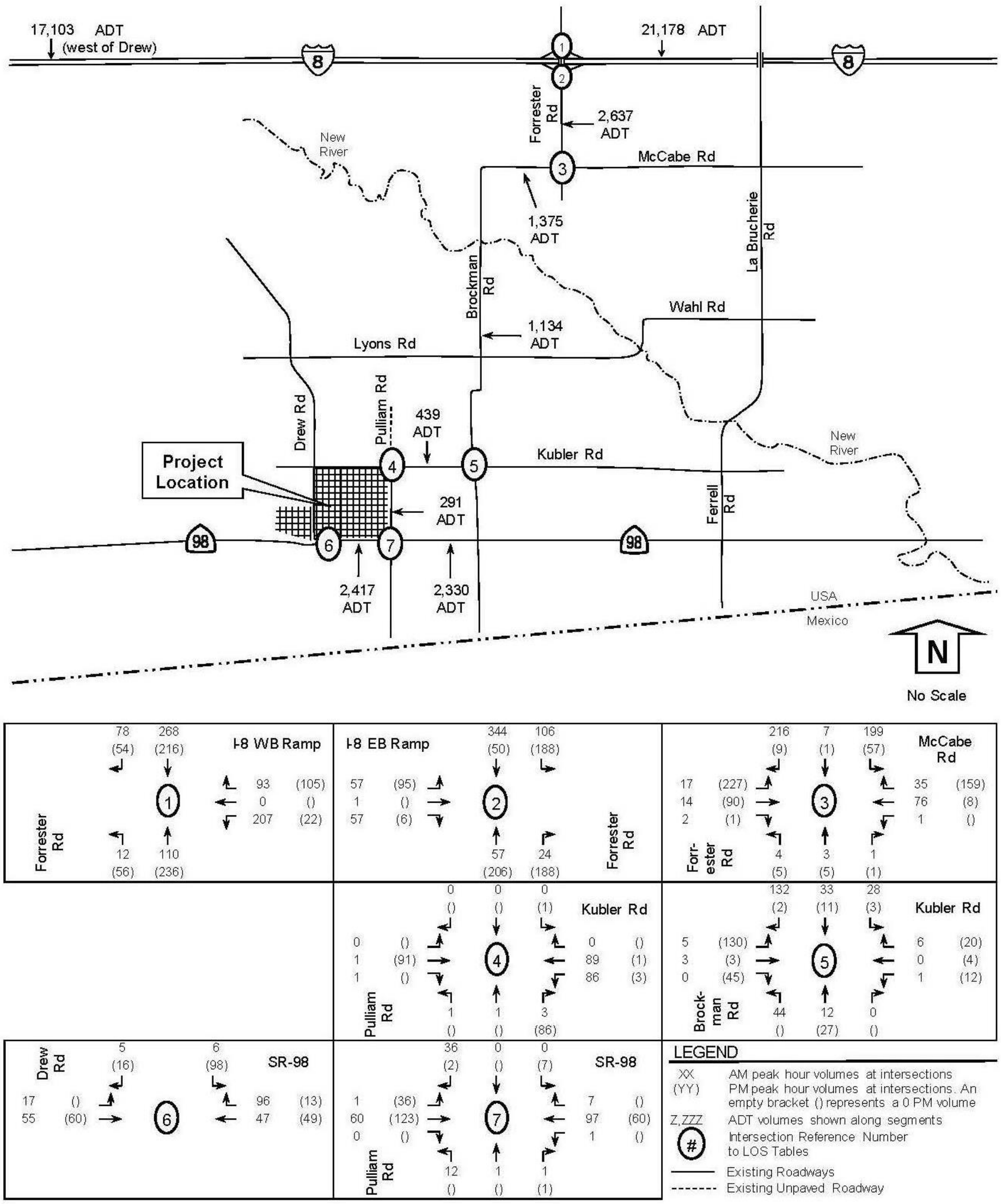

Source: LOS 2019a.

FIGURE 4.3-13A
ACCESS CONFIGURATION #1 –
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES

4.3 TRANSPORTATION

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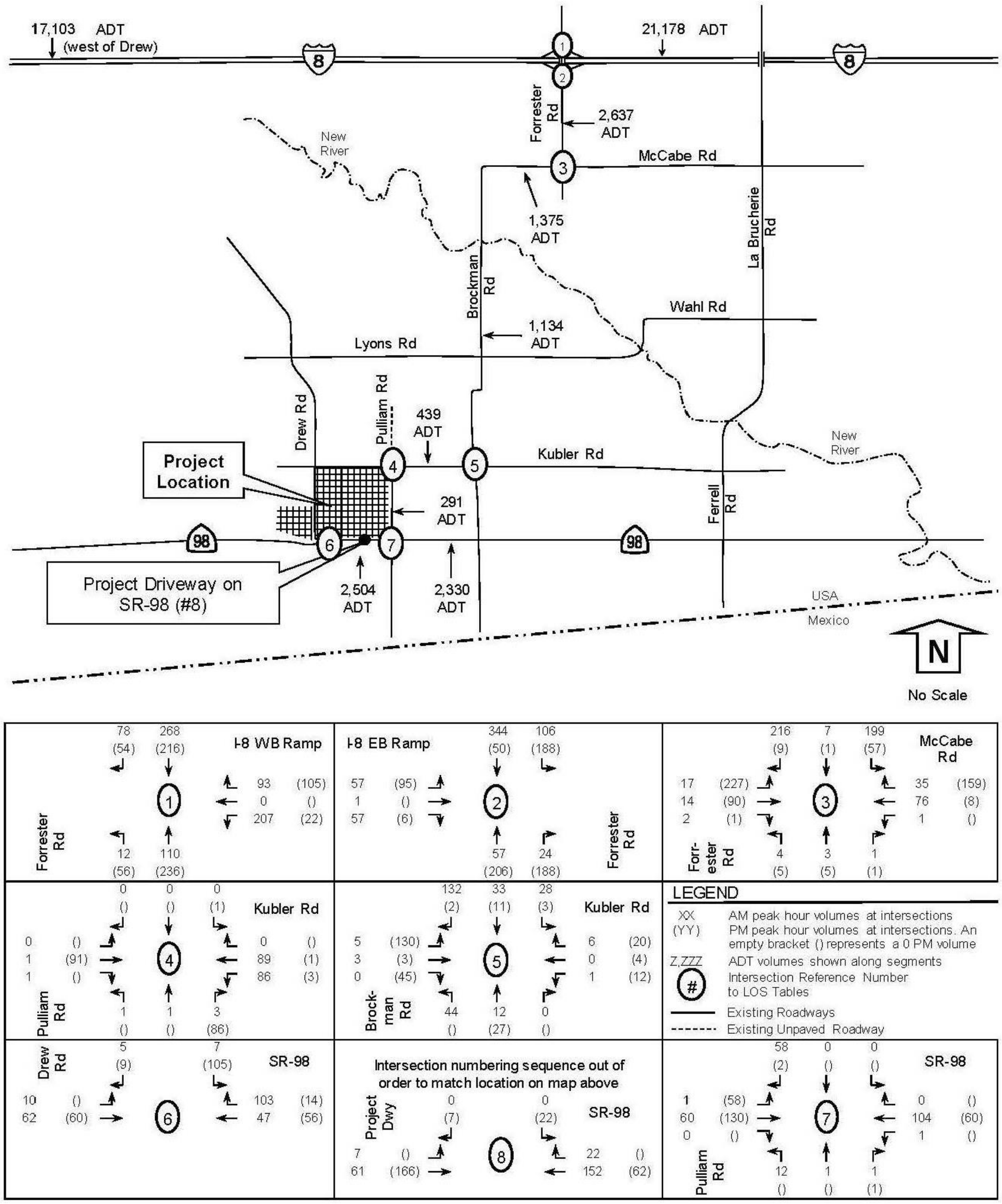


Source: LOS 2019b.

FIGURE 4.3-13B
ACCESS CONFIGURATION #2 –
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES

4.3 TRANSPORTATION

TABLE 4.3-29A
ACCESS CONFIGURATION #1
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2017) With Cumulative				Project Daily Volume	(Year 2017) With Cumulative With Project				
		Daily Volume	LOS C Capacity	V/C	LOS		Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	872	7,100	0.12	A	262	1,134	7,100	0.16	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,463	7,100	0.35	B	174	2,637	7,100	0.37	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	177	7,100	0.02	A	262	439	7,100	0.06	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	1,375	7,100	0.19	A	1,113	1,375	7,100	0.19	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	29	7,100	0.00	A	~~131~~ 262	~~260~~ 291	7,100	~~0.02~~ 0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,211	7,100	0.31	B	~~153~~ 196	~~2,374~~ 2,417	7,100	~~0.33~~ 0.34	B	None
~~Pulliam Road to Brockman Road~~	~~State Highway (2U)~~	~~2,211~~	~~7,100~~	~~0.31~~	~~B~~	~~109~~	~~2,330~~	~~7,100~~	~~0.33~~	~~B~~	~~None~~

Source: LOS ~~2018~~ 2019a.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

TABLE 4.3-29B
ACCESS CONFIGURATION #2
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2017) With Cumulative				Project Daily Volume	(Year 2017) With Cumulative With Project				
		Daily Volume	LOS C Capacity	V/C	LOS		Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	872	7,100	0.12	A	262	1,134	7,100	0.16	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,463	7,100	0.35	B	174	2,637	7,100	0.37	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	177	7,100	0.02	A	262	439	7,100	0.06	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	1,375	7,100	0.19	A	1,113	1,375	7,100	0.19	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,211	7,100	0.31	B	283	2,504	7,100	0.35	B	None
Pulliam Road to Brockman Road	State Highway (2U)	2,211	7,100	0.31	B	109	2,330	7,100	0.33	B	None

Source: LOS ~~2018~~ 2019b.
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway. Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

TABLE 4.3-30
EXISTING (YEAR 2017) WITH PROJECT CONSTRUCTION WITH CUMULATIVE FREEWAY SEGMENT LOS

Freeway Segment	I-8 Dunaway Road to Drew Road				I-8 Forrester Road to Imperial Avenue			
Existing (Year 2017)								
ADT	14,400				17,200			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,032	1,131	1,299	1,321	1,318	1,446	1,661	1,689
V/C	0.220	0.241	0.276	0.281	0.281	0.380	0.353	0.359
LOS	A	A	A	A	A	B	B	B
Cumulative With Project	248	385	435	282	237	582	643	280
Existing (Year 2017) With Cumulative With Project								
Peak Hour Volume	4,280	1,516	1,734	1,603	1,555	2,028	2,304	1,969
V/C	0.272	0.323	0.369	0.341	0.331	0.431	0.490	0.419
LOS	A	B	B	B	B	B	C	B
Increase in V/C	0.053	0.082	0.093	0.060	0.050	0.124	0.137	0.060
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.
[1] Latest K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.
[3] D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report).
Impact? = Direct, Cumulative, or None.

Overall, under Existing (Year 2017) With Project Construction With Cumulative conditions, the Project study area intersections, roadway, State Route and freeway segments were calculated to operate at LOS C or better for both Access Configuration #1 and Access Configuration #2 with **no cumulatively considerable impacts** under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not Applicable.

Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS Near-Term (Year 2019) With Project Construction With Cumulative Conditions)

Impact 4.3.8 Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under Near-Term (Year 2019) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to Project study area intersections, roadway, State Route and freeway segments under Near-Term (Year 2019) With Project

Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.

Near-Term (Year 2019) With Project Construction With Cumulative Conditions

This analysis documents the addition of construction traffic onto Near-Term (Year 2019) with Cumulative conditions. Near-Term (Year 2019) With Project Construction With Cumulative traffic volumes are shown in **Figure 4.3-14a** (Access Configuration #1) and **Figure 4.3-14b** (Access Configuration #2). Intersection, segment, and freeway LOS are shown in **Tables 4.3-31a** (Access Configuration #1), **Table 4.3-31b** (Access Configuration #2), **Table 4.3-32a** (Access Configuration #1), **Table 4.3-32b** (Access Configuration #2) and **Table 4.3-33.**

Intersection LOS

Table 4.3-31a summarizes intersection LOS under Near-Term (Year 2019) with Project Construction With Cumulative conditions for Access Configuration #1. (Intersection LOS calculations are included in Appendix N of the Draft Traffic Impact Analysis [**Appendix C** of this EIR and Attachment B of the "Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment" Memo and **Attachment 1** of the Final EIR]).

TABLE 4.3-31A
ACCESS CONFIGURATION #1
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2019) With Cumulative Delay[2]	(Year 2019) With Cumulative LOS[3]	(Year 2019) With Project Delay[2]	(Year 2019) With Project LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	13.0	B	14.4	B	1.4	None
		PM	10.9	B	11.2	B	0.3	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	13.1	B	13.9	B	0.8	None
		PM	22.2	C	24.3	C	2.1	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	12.2	B	13.9	B	1.7	None
		PM	15.1	C	19.1	C	4.0	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	9.0	A	9.4	A	0.4	None
		PM	9.1	A	~~9.8~~ 9.9	A	~~0.7~~ 0.8	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	10.5	B	10.9	B	0.4	None
		PM	9.1	A	9.8	A	0.7	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.9	A	~~9.6~~ 9.3	A	~~0.2~~ 0.4	None
		PM	9.3	A	~~9.4~~ 9.7	A	~~0.2~~ 0.4	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.4	A	~~9.8~~ 10.0	A	~~0.4~~ 0.6	None
		PM	8.8	A	10.1	B	1.3	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	0.8	A	0.8	None
		PM	0.0	A	9.5	A	9.5	None

Source: LOS ~~2018~~ 2019a. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
Notes: [1]Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative.

4.3 TRANSPORTATION

Table 4.3-31b summarizes intersection LOS under Near-Term (Year 2019) with Project Construction With Cumulative conditions for Access Configuration #2. (Intersection LOS calculations are included in Appendix N of the Draft Traffic Impact Analysis [**Appendix C** of this EIR and Attachment B of the "Drew Solar Alternative Access #2 with One SR-98 Access and No Access on Kubler" Memo and **Attachment 1** of the Final EIR]).

TABLE 4.3-31B
ACCESS CONFIGURATION #2
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2019) With Cumulative		(Year 2019) With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	13.0	B	14.4	B	1.4	None
		PM	10.9	B	11.2	B	0.3	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	13.1	B	13.9	B	0.8	None
		PM	22.2	C	24.3	C	2.1	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	12.2	B	13.9	B	1.7	None
		PM	15.1	C	19.1	C	4.0	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	9.0	A	9.4	A	0.4	None
		PM	9.1	A	9.9	A	0.8	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	10.5	B	10.9	B	0.4	None
		PM	9.1	A	9.8	A	0.7	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.9	A	9.3	A	0.4	None
		PM	9.3	A	9.9	A	0.4	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.4	A	10.2	B	0.8	None
		PM	8.8	A	9.0	A	0.2	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	0.8	A	0.8	None
		PM	0.0	A	9.8	A	9.8	None

Source: LOS 2019b. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
Notes: [1]Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative.

As shown, under Near-Term (Year 2019) With Project Construction with Cumulative Conditions, all Project study area intersections are calculated to operate at LOS C or better. Only one intersection (Pulliam Road at SR 98) would experience a decline in LOS from LOS A to LOS B during the PM Peak hour. LOS of all other segments would remain unchanged under Project construction with cumulative conditions. Moreover, the increases in traffic resulting from Project construction with cumulative conditions would not exceed the LOS standards as Forrester Road at the eastbound ramp and Forrester Road at McCabe would continue to operate at LOS C in the PM Peak Hour with Project traffic. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative intersection traffic. Likewise, cumulative impacts to cumulative intersection LOS would be **less than cumulatively considerable** under Near-Term (Year 2019) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

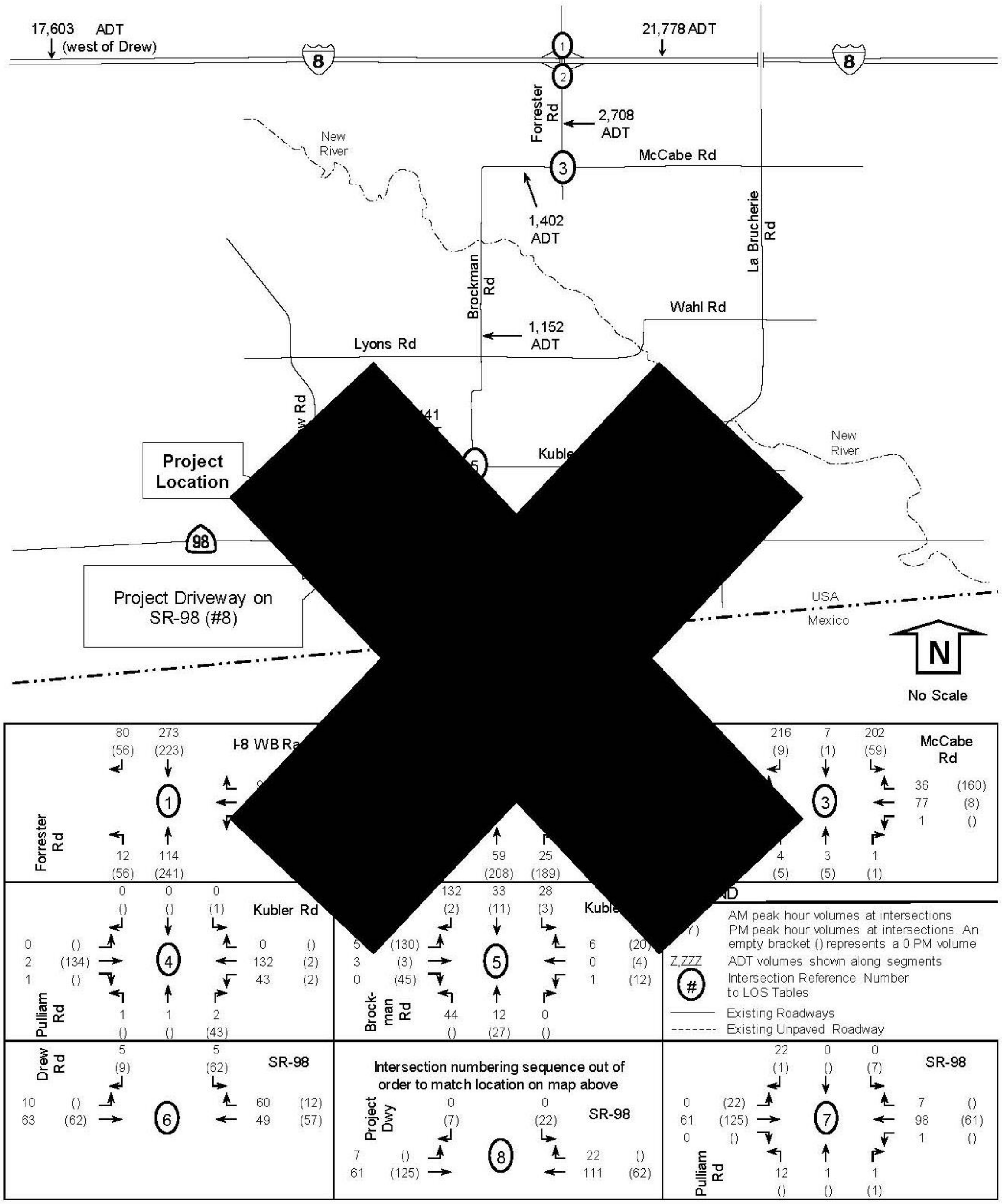
Roadway and State Route Segment LOS

Table 4.3-32a summarizes roadway segment LOS for Near-Term (Year 2019) With Project Construction With Cumulative conditions for Access Configuration #1. **Table 4.3-32b** summarizes roadway segment LOS for Near-Term (Year 2019) With Project Construction With Cumulative conditions for Access

Configuration #2. As shown, all segments would continue to operate above LOS C (at LOS A or LOS B). No change in LOS would occur for any segment with the addition of Near-Term (Year 2019) cumulative traffic conditions. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative roadway segment traffic. Likewise, cumulative impacts to cumulative roadway segment LOS would be **less than cumulatively considerable** under Near-Term (Year 2019) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Freeway Segment LOS

Table 4.3-33 summarizes freeway segment LOS under Near-Term (Year 2019) With Project Construction With Cumulative conditions. As shown, both freeway segments were calculated to operate at or above LOS C. The segment of I-8 from Drew Road to Dunaway Road would experience a decline in LOS from LOS A to LOS B during the AM peak hour in the westbound direction and in the PM Peak Hour in both the eastbound and westbound directions with the addition of cumulative traffic. The segment of I-8 from Forrester Road to Imperial Avenue would decline from LOS A to LOS B in the AM Peak Hour eastbound direction and from LOS B to LOS C in the PM Peak Hour eastbound direction. LOS of all other segments would be unchanged with the addition of cumulative traffic. Moreover, the increases in traffic resulting from Project construction would not exceed V/C ratios or LOS standards. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative freeway segment traffic. Likewise, cumulative impacts to cumulative freeway segment LOS would be **less than cumulatively considerable** under Near-Term (Year 2019) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

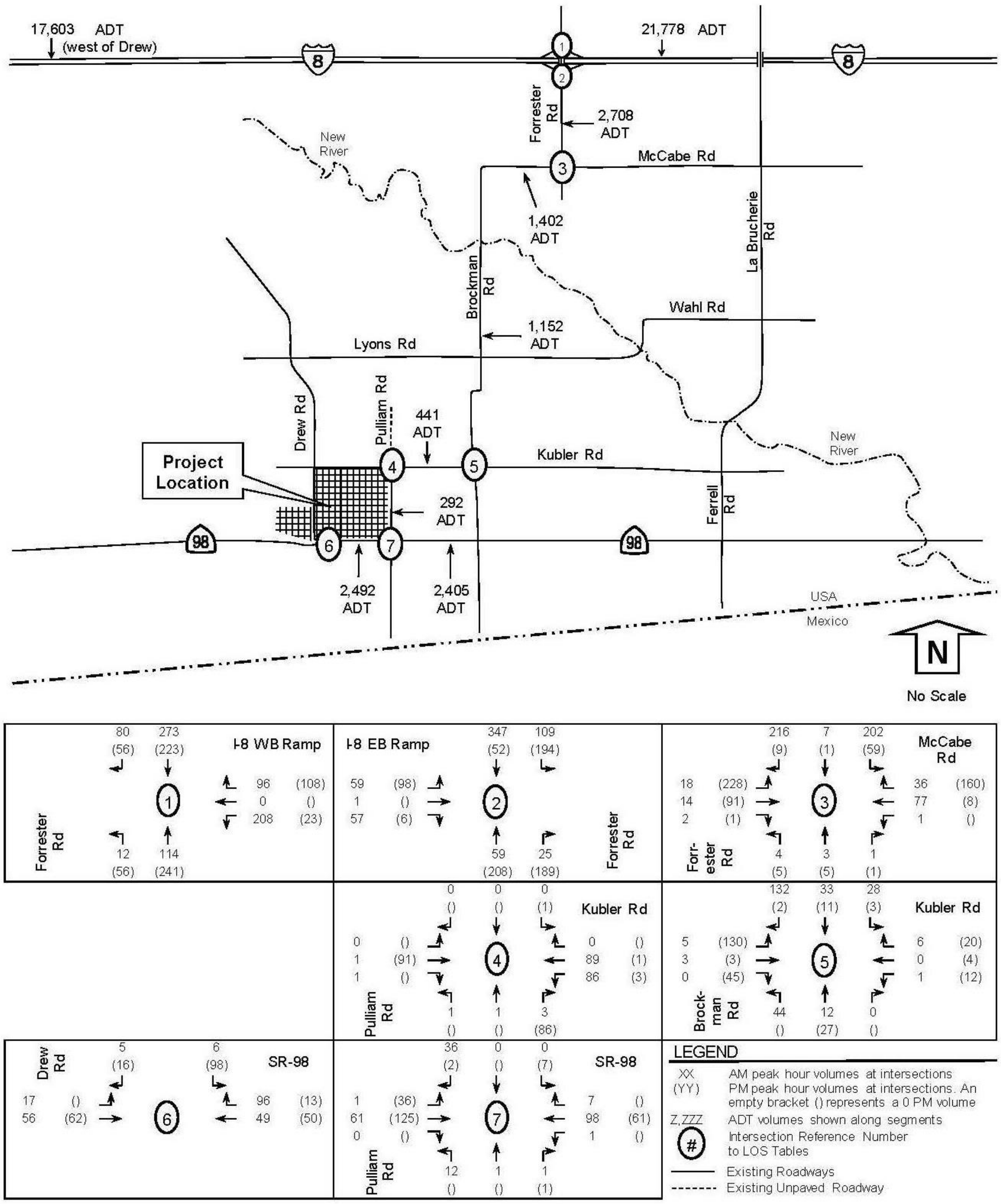


~~Source: LOS 2018.~~

~~**Figure 4.3-14**~~

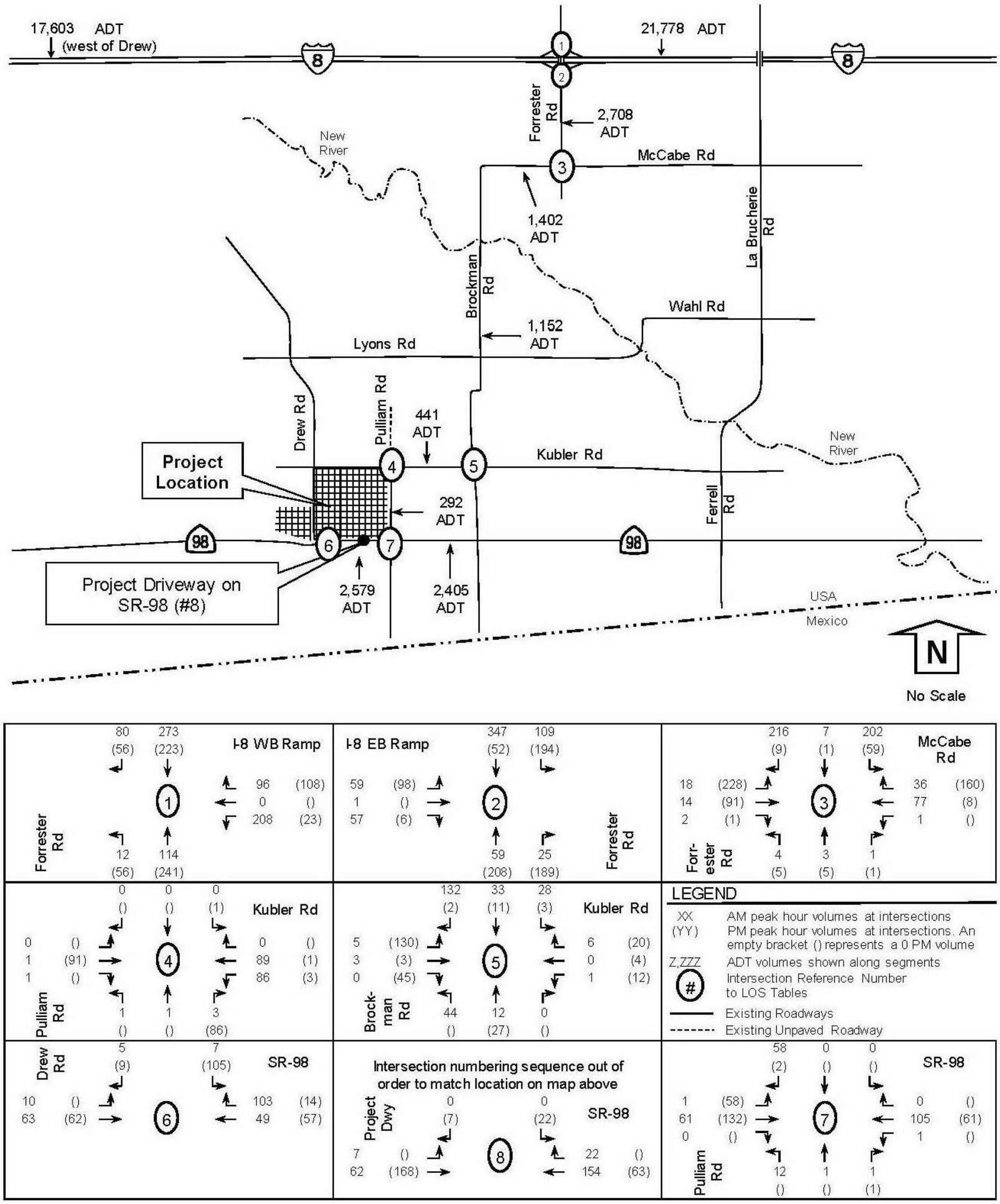
~~**Near-Term (Year 2019) With Project Construction With Cumulative Volumes**~~

4.3 TRANSPORTATION



Source: LOS 2019a.

FIGURE 4.3-14A
ACCESS CONFIGURATION #1 –
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES



Source: LOS 2019b.

FIGURE 4.3-14B
ACCESS CONFIGURATION #2 –
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES

TABLE 4.3-32A
ACCESS CONFIGURATION #1
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2019) With Cumulative				Project	(Year 2019) With Cumulative With Project				
		Daily Volume	LOS C Capacity	V/C	LOS	Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	890	7,100	0.13	A	262	1,152	7,100	0.16	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,534	7,100	0.36	B	174	2,708	7,100	0.38	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	179	7,100	0.03	A	262	441	7,100	0.06	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	1,140	7,100	0.16	A	262	1,402	7,100	0.20	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	30	7,100	0.00	A	~~131~~ 262	~~161~~ 292	7,100	~~0.02~~ 0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,296	7,100	0.32	B	~~153~~ 196	~~2,449~~ 2,492	7,100	~~0.34~~ 0.35	B	None
~~Pulliam Road to Brockman Road~~	~~State Highway (2U)~~	~~2,296~~	~~7,100~~	~~0.32~~	~~B~~	~~109~~	~~2,405~~	~~7,100~~	~~0.34~~	~~B~~	~~None~~

Source: LOS ~~2018~~ 2019a.

Notes: Classification based on the Imperial County General Plan, Circulation and Scenic Highways Element, January 29, 2008.
2U = 2-lane undivided roadway.
Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

4.3 TRANSPORTATION

TABLE 4.3-32B
ACCESS CONFIGURATION #2
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2019) With Cumulative Daily Volume	LOS C Capacity	V/C	LOS	Project Daily Volume	(Year 2019) With Cumulative With Project Daily Volume	LOS C Capacity	V/C	LOS	Impact ?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	890	7,100	0.13	A	262	1,152	7,100	0.16	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,534	7,100	0.36	B	174	2,708	7,100	0.38	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	179	7,100	0.03	A	262	441	7,100	0.06	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	1,140	7,100	0.16	A	262	1,402	7,100	0.20	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,296	7,100	0.32	B	283	2,579	7,100	0.36	B	None
Pulliam Road to Brockman Road	State Highway (2U)	2,296	7,100	0.32	B	109	2,405	7,100	0.34	B	None

Source: LOS ~~2018~~ 2019b.
Notes: Classification based on the Imperial County General Plan, Circulation and Scenic Highways Element, January 29, 2008.
2U = 2-lane undivided roadway.
Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

TABLE 4.3-33
NEAR-TERM (YEAR 2019) WITH PROJECT CONSTRUCTION WITH CUMULATIVE FREEWAY SEGMENT LOS

Freeway Segment	I-8 Drew Road to Dunaway Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2019)								
ADT	14,500				17,800			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,069	1,172	1,346	1,369	1,364	1,496	1,718	1,748
V/C	0.227	0.249	0.286	0.291	0.290	0.318	0.366	0.372
LOS	A	A	A	A	A	B	B	B
Cumulative With Project	248	385	435	282	237	582	643	280
2019 With Cumulative With Project								
Peak Hour Volume	1,317	1,557	1,781	1,651	1,601	2,078	2,361	2,028
V/C	0.280	0.331	0.379	0.351	0.341	0.442	0.52	0.431
LOS	A	B	B	B	B	B	C	B
Increase in V/C	0.053	0.082	0.093	0.060	0.050	0.124	0.137	0.060
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018. *Impact? = Direct, Cumulative, or None.*
Notes: [1] Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] K factor from Caltrans (based on 2017 report), which is the percentage of AADT in both directions.
[3] Latest D factor from Caltrans (based on 2017 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report).

Overall, under near-term (Year 2019) With Project Construction With Cumulative conditions, the Project study area intersections, roadway segments and freeway segments were calculated to operate at LOS C or better <u>for both Access Configuration #1 and Access Configuration #2</u> with **no cumulatively considerable impacts.**

Cumulative Impacts to Intersection, Roadway and Freeway Segment LOS - Long-Term (Year 2027) With Project Construction With Cumulative Conditions

Impact 4.3.9 Implementation of the proposed Project would contribute construction traffic to Project study area intersections, roadway, State Route and freeway segments under Long-Term (Year 2027) With Project Construction With Cumulative Conditions. However, none of the intersections or segments would exceed LOS C or V/C ratios under this scenario. Therefore, cumulative impacts to Project study area intersection, roadway, State Route and freeway segments under Long-Term (Year 2027) With Project Construction With Cumulative Conditions are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.

4.3 TRANSPORTATION

Long-Term (Year 2027) With Project Construction With Cumulative Conditions

This section discusses the addition of construction traffic onto Long-Term (Year 2027) with cumulative conditions. Long-Term (Year 2027) Cumulative Project traffic was used for this scenario. Long-Term (Year 2027) With Project Construction With Cumulative traffic volumes are shown in **Figure ~~4.3-16~~ 4.3-15a** (Access Configuration #1) and **Figure 4.3-15b** (Access Configuration #2). Intersection, roadway, State Route and freeway LOS are shown in **Table 4.3-34a** (Access Configuration #1), **Table 4.3-34b** (Access Configuration #2) **Table 4.3-35a** (Access Configuration #1), **Table 4.3-35b** (Access Configuration #2) and **Table 4.3-36**.

Intersection LOS

Table 4.3-34a summarizes intersection LOS under Long-Term (Year 2027) With Project Construction With Cumulative conditions for Access Configuration #1. (Intersection LOS calculations are included in Appendix U of the Draft Traffic Impact Analysis [**Appendix C** of this EIR and Attachment C of the "Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment" Memo and **Attachment 1** of the Final EIR]).

TABLE 4.3-34A
ACCESS CONFIGURATION #1
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2027) With Cumulative		(Year 2027) With Cumulative With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	10.3	B	10.9	B	0.6	None
		PM	10.3	B	10.5	B	0.2	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	12.9	B	13.9	B	1.0	None
		PM	18.2	C	19.6	C	1.4	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	939	A	10.4	B	0.5	None
		PM	9.8	A	11.3	B	1.5	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.7	A	9.1	A	0.4	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	9.0	A	9.3	A	0.3	None
		PM	9.1	A	9.3	A	0.2	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	~~8.9~~ 9.1	A	~~0.2~~ 0.4	None
		PM	9.0	A	~~9.2~~ 9.5	A	~~0.2~~ 0.5	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A	~~9.5~~ 9.7	A	~~0.4~~ 0.6	None
		PM	8.7	A	~~8.8~~ 9.9	~~B~~ A	~~0.1~~ 1.2	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	1.0	A	1.0	None
		PM	0.0	A	9.3	A	9.3	None

Source: LOS ~~2018~~ 2019a. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
Notes: [1]Control - (S) Signalized, (U) Un-signalized.
[2] Delay - HCM Average Control Delay in seconds.
[3] LOS: Level of Service.
[4] Delta is the increase in delay from project.
[5] Type of impact: none, direct, or cumulative.

Table 4.3-34b summarizes intersection LOS under Long-Term (Year 2027) With Project Construction With Cumulative conditions for Access Configuration #2. (Intersection LOS calculations are included in Appendix U of the Draft Traffic Impact Analysis [Appendix C of this EIR and Attachment C of the "Drew Solar Alternative Access #2 with One SR-98 Access and No Access on Kubler" Memo and Attachment 1 of the Final EIR]).

TABLE 4.3-34B
ACCESS CONFIGURATION #2
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE INTERSECTION LOS

Intersection & (Control)[1]	Movement	Peak Hour	(Year 2027) With Cumulative		(Year 2027) With Cumulative With Project			
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]
1) Forrester Road at I-8 WB Ramp (U)	Minor Leg	AM	10.3	B	10.9	B	0.6	None
		PM	10.3	B	10.5	B	0.2	None
2) Forrester Road at I-8 EB Ramp (U)	Minor Leg	AM	12.9	B	13.9	B	1.0	None
		PM	18.2	C	19.6	C	1.4	None
3) Forrester Road at McCabe Road (U)	Minor Leg	AM	939	A	10.4	B	0.5	None
		PM	9.8	A	11.3	B	1.5	None
4) Pulliam Road at Kubler Road (U)	Minor Leg	AM	8.7	A	9.1	A	0.4	None
		PM	8.6	A	9.2	A	0.6	None
5) Brockman Road at Kubler Road (U)	Minor Leg	AM	9.0	A	9.3	A	0.3	None
		PM	9.1	A	9.3	A	0.2	None
6) Drew Road at SR 98 (U)	Minor Leg	AM	8.7	A	9.1	A	0.4	None
		PM	9.0	A	9.6	A	0.6	None
7) Pulliam Road at SR 98 (U)	Minor Leg	AM	9.1	A	9.9	A	0.8	None
		PM	8.7	A	8.9	~~B~~ A	0.2	None
8) SR 98 at Project West Driveway(U)	Minor Leg	AM	0.0	A	1.0	A	1.0	None
		PM	0.0	A	9.5	A	9.5	None

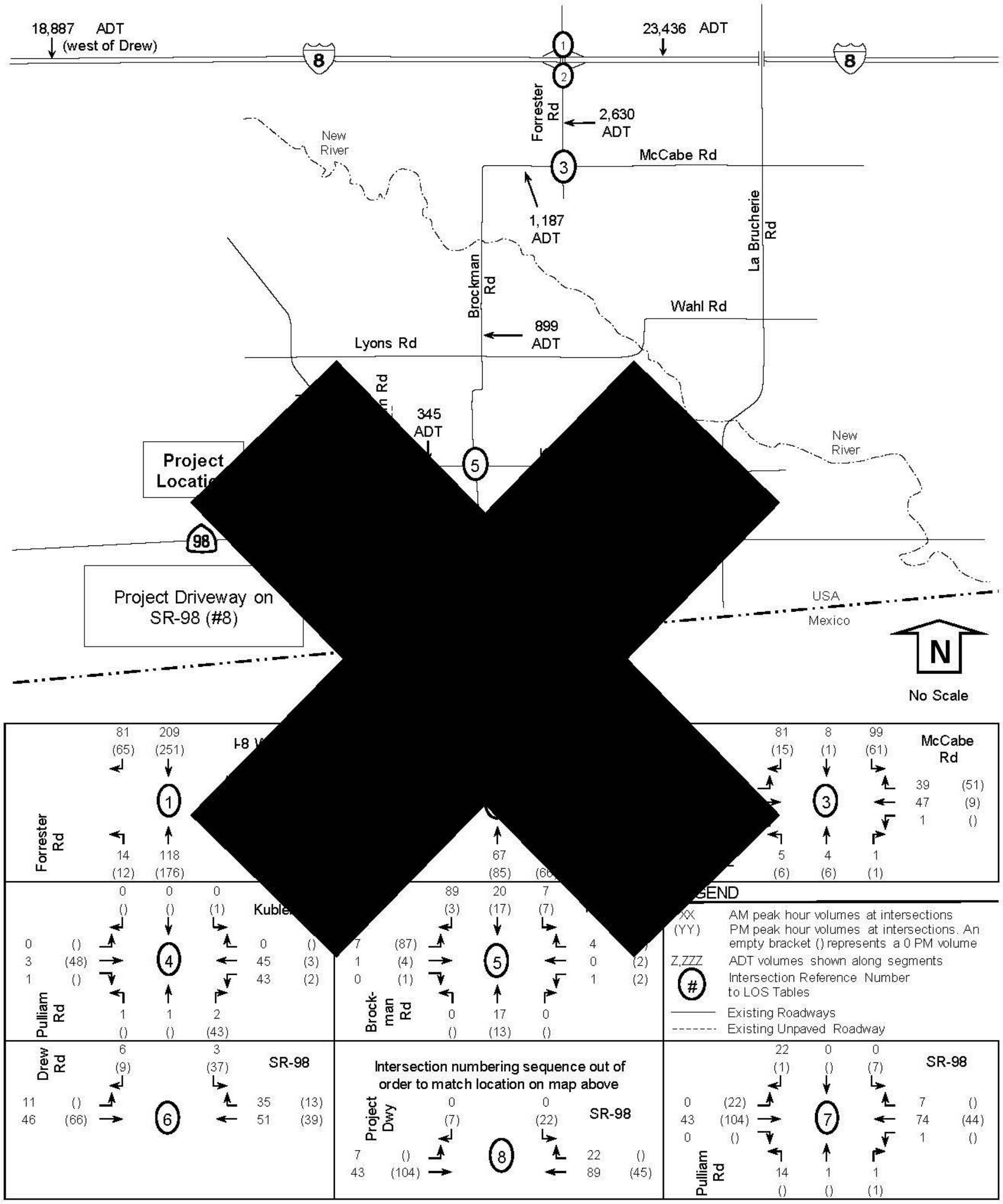
Source: LOS 2019b. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
Notes: [1]Control - (S) Signalized, (U) Un-signalized. [2] Delay - HCM Average Control Delay in seconds. [3] LOS: Level of Service.
[4] Delta is the increase in delay from project. [5] Type of impact: none, direct, or cumulative.

As shown, under Long-Term (Year 2027) With Project Construction With Cumulative Conditions, all Project study area intersections are calculated to operate at LOS C or better. One intersection (Forrester Road at McCabe Road) would experience a decline LOS A to LOS B in both the AM and PM peak hour. The intersection of Pulliam Road and SR 98 would also decline from LOS A to LOS B in the PM Peak Hour. LOS of all other segments would remain unchanged under cumulative conditions including Forrester Road at McCabe Road which currently operates at LOS C in the PM Peak Hour. In all cases, the increases in traffic resulting from cumulative conditions would not exceed LOS standards. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative intersection traffic. Likewise, cumulative impacts to cumulative intersection LOS would be **less than cumulatively considerable** under Mid-Term (Year 2019) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Roadway and State Route Segment LOS

Table 4.3-35a summarizes roadway segment LOS for Long-Term (Year 2027) With Project Construction With Cumulative conditions for Access Configuration #1. **Table 4.3-35b** summarizes roadway segment LOS for Long-Term (Year 2027) With Project Construction With Cumulative conditions for Access Configuration #2. As shown, all segments would continue to operate above LOS C (at LOS A or LOS B). No change in LOS would occur for any segment with the addition of Long-Term (Year 2027) cumulative traffic conditions. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative roadway and State Route segment traffic. Likewise, cumulative impacts to cumulative roadway and State Route segment LOS would be **less than cumulatively considerable** under Long-Term (Year 2027) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

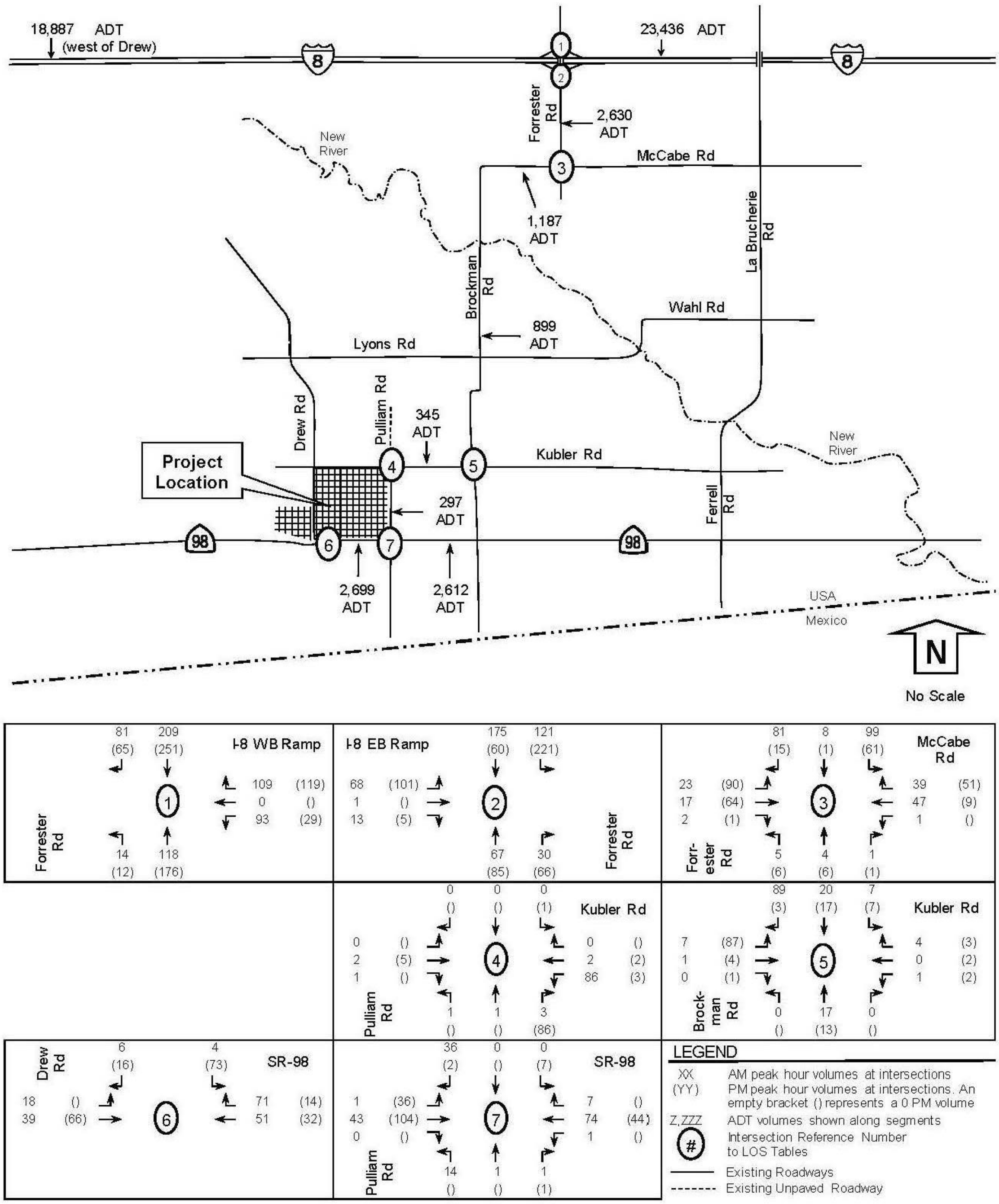
4.3 TRANSPORTATION



~~Source: LOS 2018.~~

~~**FIGURE 4.3-15**~~

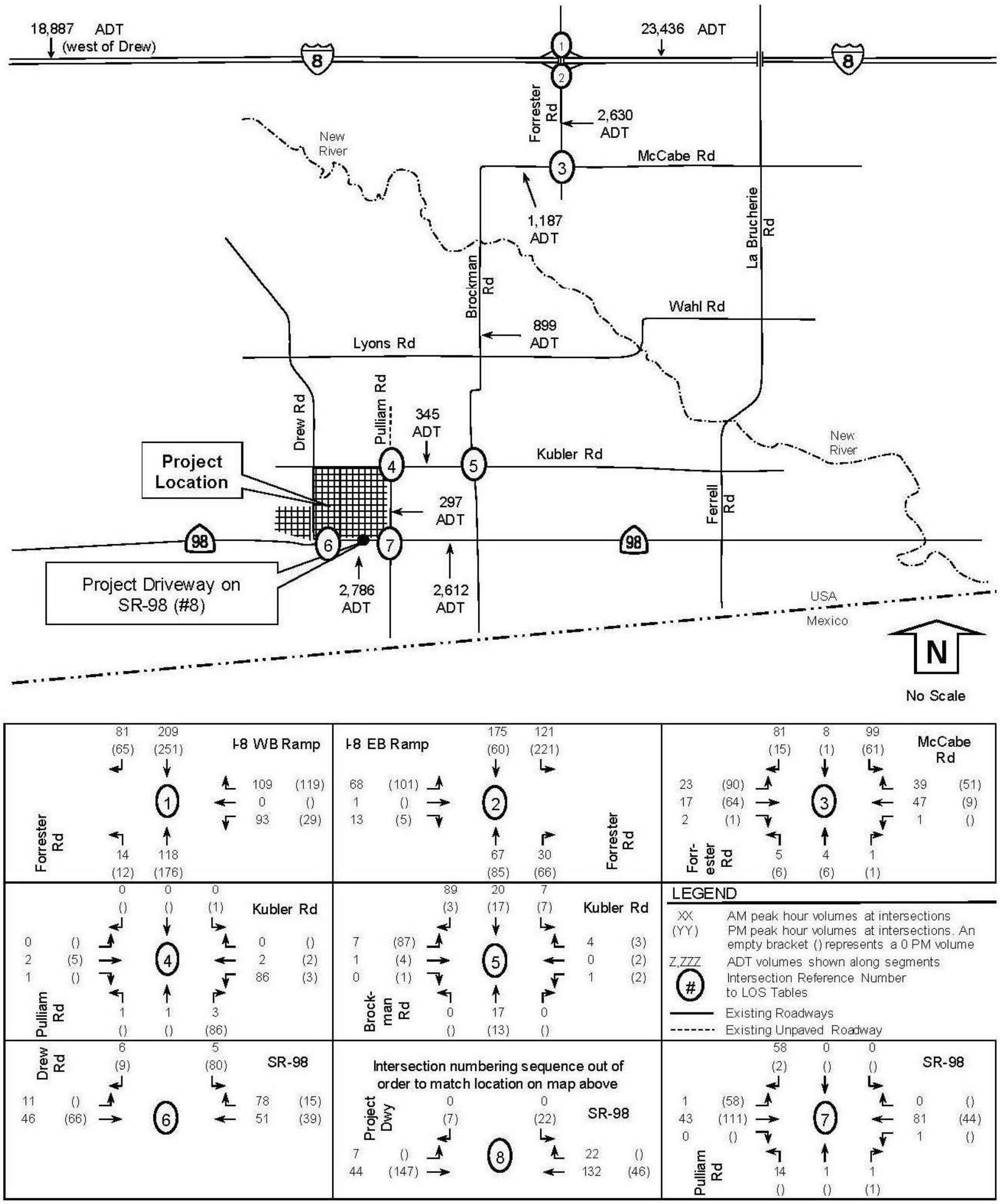
~~**LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES**~~



Source: LOS 2019a.

FIGURE 4.3-15A
ACCESS CONFIGURATION #1 –
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES

4.3 TRANSPORTATION



Source: LOS 2019b.

FIGURE 4.3-15B
ACCESS CONFIGURATION #2 –
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE VOLUMES

TABLE 4.3-35A
ACCESS CONFIGURATION #1
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE ROADWAY AND STATE ROUTE SEGMENT LOS

Roadway Segment	Classification (as built)	(Year 2027) With Cumulative				Project Daily Volume	(Year 2027) With Cumulative With Project				
		Daily Volume	LOS C Capacity	V/C	LOS		Daily Volume	LOS C Capacity	V/C	LOS	Impact ?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	637	7,100	0.09	A	262	899	7,100	0.13	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,456	7,100	0.35	B	174	2,630	7,100	0.37	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	83	7,100	0.01	A	262	345	7,100	0.05	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	925	7,100	0.13	A	262	1,187	7,100	0.17	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	35	7,100	0.00	A	~~131~~ 262	~~166~~ 297	7,100	~~0.02~~ 0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,503	7,100	0.35	B	~~153~~ 196	~~2,656~~ 2,699	7,100	~~0.37~~ 0.38	B	None
Pulliam Road to Brockman Road	State Highway (2U)	2,503	7,100	0.35	B	109	2,612	7,100	~~0.37~~	B	None

Source: LOS ~~2018~~ 2019a~~.~~
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway.
Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

4.3 TRANSPORTATION

Table 4.3-35b
Access Configuration #2
Long-Term (Year 2027) With Project Construction With Cumulative Roadway and State Route Segment LOS

Roadway Segment	Classification (as built)	(Year 2027) With Cumulative				Project Daily Volume	(Year 2027) With Cumulative With Project				
		Daily Volume	LOS C Capacity	V/C	LOS		Daily Volume	LOS C Capacity	V/C	LOS	Impact ?
Brockman Road											
McCabe Road to Kubler Road	Major (2U)	637	7,100	0.09	A	262	899	7,100	0.13	A	None
Forrester Road											
I-8 to McCabe Road	Prime (2U)	2,456	7,100	0.35	B	174	2,630	7,100	0.37	B	None
Kubler Road											
Brockman Road to Ferrell Road	Minor (2U)	83	7,100	0.01	A	262	345	7,100	0.05	A	None
McCabe Road											
Brockman Road to Forrester Road	Major (2U)	925	7,100	0.13	A	262	1,187	7,100	0.17	A	None
Pulliam Road											
Kubler Road to SR 98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	None
SR 98											
Drew Road to Pulliam Road	State Highway (2U)	2,503	7,100	0.35	B	283	2,786	7,100	0.39	B	None
Pulliam Road to Brockman Road	State Highway (2U)	2,503	7,100	0.35	B	109	2,612	7,100	0.37	B	None

Source: LOS 2019~~b~~
Notes: Classification based on January 29, 2008 Circulation and Scenic Highways Element.
2U = 2-lane undivided roadway.
Daily volume is a 24-hour volume.
LOS: Level of Service. LOS based on actual number of lanes currently constructed.
V/C: Volume to Capacity ratio.
Impact? = type of impact (none, cumulative, or direct).

Freeway Segment LOS

Table 4.3-36 summarizes freeway segment LOS under Long-Term (Year 2027) With Project Construction With Cumulative conditions.

TABLE 4.3-36
LONG-TERM (YEAR 2027) WITH PROJECT CONSTRUCTION WITH CUMULATIVE FREEWAY SEGMENT LOS

Freeway Segment	I-8 Drew Road to Forrester Road				I-8 Forrester Road to Imperial Avenue			
Forecasted (Year 2027)								
ADT	16,700				20,600			
Peak Hour	AM		PM		AM		PM	
Direction	EB	WB	EB	WB	EB	WB	EB	WB
Number of Lanes	2	2	2	2	2	2	2	2
Capacity [1]	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
K Factor[2]	0.1346	0.1346	0.1631	0.1631	0.1346	0.1346	0.1631	0.1631
D Factor[3]	0.4770	0.5230	0.4958	0.5042	0.4770	0.5230	0.4958	0.5042
Truck Factor[4]	0.8712	0.8712	0.8712	0.8712	0.8376	0.8376	0.8376	0.8376
Peak Hour Volume	1,31	1,349	1,550	1,576	1,579	1,731	1,989	2,022
Volume to Capacity	0.262	0.287	0.330	0.335	0.336	0.368	0.423	0.430
LOS	A	A	B	B	B	B	B	B
Cumulative With Project	248	385	435	282	237	582	643	280
2027 With Cumulative With Project								
Peak Hour Volume	1,479	1,734	1,985	1,858	1,816	2,313	2,632	2,302
V/C	0.315	0.369	0.422	0.395	0.386	0.492	0.560	0.490
LOS	B	B	B	B	B	C	C	B
Increase in V/C	0.053	0.082	0.093	0.060	0.050	0.124	0.137	0.060
Impact	None	None	None	None	None	None	None	None

Source: LOS 2018.
Notes: [1] Capacity of 2,350 pcphpl from CALTRANS' Guide for the Preparation of Traffic Impact Studies, December 2002.
[2] Latest K factor from Caltrans (based on 2007 report), which is the percentage of AADT in both directions.
[2] Latest D factor from Caltrans (based on 2007 report), which when multiplied by K and ADT will provide peak hour volume.
[4] Latest truck factor from Caltrans (based on 2015 report).
Impact? = Direct, Cumulative, or None.

As shown, both freeway segments were calculated to operate at or above LOS C. However, the AM LOS for the segment of I-8 from Dunaway Road to Drew Road would decrease from LOS A to LOS B in both the eastbound and westbound direction. Likewise, the westbound segment of I-8 from Forrester Road to Imperial Avenue would decline from LOS B to LOS C in the AM Peak Hour going westbound and PM Peak Hour going eastbound with the addition of cumulative traffic. In no case would the increases in traffic resulting from Project construction exceed V/C ratios or LOS standards. Therefore, the proposed Project would result in a **less than cumulatively considerable contribution** to cumulative freeway segment traffic. Likewise, cumulative impacts to cumulative freeway segment LOS would be **less than cumulatively considerable** under Long-Term (Year 2027) With Project Construction With Cumulative conditions under both the Full Build-Out Scenario and Phased CUP Scenario.

Overall, under Long-Term (Year 2027) With Project Construction With Cumulative Conditions, the Project study area intersections, roadway, State Route and freeway segments were calculated to operate at LOS

4.3 TRANSPORTATION

C or better for both Access Configuration #1 and Access Configuration #2 with **no cumulatively considerable impacts** under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not Applicable.

Cumulative Increase Hazards Due to a Geometric Design Feature

Impact 4.3.10 Implementation of the proposed Project would not require improvements or modifications to any Project study area roadways. Therefore cumulative increases in hazards due to a geometric design feature are considered **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

Construction, Operation and Decommissioning/Reclamation

Multiple County maintained roads provide access throughout the Project Area and to each CUP (refer to **Figure 4.3-11**). Access to each CUP will primarily be via the following paved roads: Pulliam Road, Drew Road, Kubler Road and SR 98. None of these roads would require the addition of left-turn lanes or other geometric design features that could create a hazard. Improvements associated with other cumulative projects identified in **Table 4.3-27** would be assessed on a project-by-project basis and any geometric design features which may be considered a hazard would be address on a project-specific level. Therefore the Project's contribution to the cumulative increases in hazards due to a geometric design feature are **considered less than cumulatively considerable** during Project construction, operation and decommissioning. Likewise, cumulative increases in hazards due to a geometric design feature are considered **less than cumulatively considerable** during Project construction, operation and decommissioning/reclamation under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

None required.

Significance After Mitigation

Not Applicable.

Cumulative Increases in Hazards Due to a Geometric Design Feature – Damage to County-Maintained Roadways During Project Construction

Impact 4.3.11 Construction of the proposed Project, in combination with other cumulative projects using Project study area roadways, will require movement of heavy-duty equipment and large vehicles on County roadways not designed to accommodate high volumes of overweight trucks and loads. The high volume of trips in combination with the weight of construction vehicles would deteriorate the surface of Project study area roadways. This is considered a **cumulatively considerable impact** under both the Full Build-Out Scenario and Phased CUP Scenario.

FULL BUILD-OUT SCENARIO/PHASED CUP SCENARIO

As described under Impact 4.3.11, above, implementation of the proposed Project has the potential to damage area roadways and other infrastructure (e.g. IID canals and drains) that are not designed to accommodate the volume or weight of traffic associated with construction. Likewise, the number of cumulative projects in the vicinity of the Project Area that would use Project study area roadways would also contribute to wear and tear on these roadways. Given the volume of trips and the weight of vehicles using these roadways, it is anticipated that the proposed Project would result in a **cumulatively considerable contribution** to damage to County-maintained roadways during construction. Likewise, the construction of either the Full Build-Out Scenario/Phased CUP Scenario, in combination with other cumulative projects identified in **Table 4.3-27** that would also use Project study area roadways, would result in a **cumulative considerable impact** with regard to damage to County-maintained roadways under both the Full Build-Out Scenario and Phased CUP Scenario.

Mitigation Measures

Project-specific mitigation measures were identified in association with Impact 4.3.5 to minimize impacts to county roads and repair any damage resulting from construction traffic on county roads. Mitigation measures MM 4.3.5a through MM 4.3.5~~i~~k would address these impacts as they apply to each CUP.

Significance After Mitigation

Implementation of mitigation measures MM 4.3.5a through MM 4.3.5~~i~~k would minimize damage to county roads and address any damage to County-maintained roadways attributed to construction of the proposed Project. Following implementation, the Project's contribution to damage to Project Area roadways would be reduced to **less than cumulatively considerable** under both the Full Build-Out Scenario and Phased CUP Scenario.

SECTION 4.4, AIR QUALITY

Pages 4.4-18 and 4.4-19 of the Draft EIR, the discussion under Impact 4.4.1, has been revised as follows:

"***All Project Components***

As discussed under the Regulatory Framework, (National Ambient Air Quality Standards [NAAQS] and the California Ambient Air Quality Standards [CAAQS]) the Project Site is in non-attainment areas for NAAQS and CAAQS for ozone and particulate matter. The majority of regional PM_{10} and $PM_{2.5}$ emissions originate from dust stirred up by wind or by vehicle traffic on unpaved roads (ICAPCD 2009). The Project is located in an area defined by the ICAPCD's *High Wind Exceptional Fugitive Dust Mitigation Plan* as a "high wind corridor" that is subject to periodic strong westerly winds that create wind-dust channels. Thus ~~there~~, there is an increased potential for high winds to entrain fugitive dust during construction and operation of the Project (Blondell 2019). Other PM_{10} and $PM_{2.5}$ emissions originate from grinding operations, combustion sources such as motor vehicles, power plants, wood burning, forest fires, agricultural burning, and industrial processes. Ozone is not emitted directly but is a result of atmospheric activity on precursors. NO_X and ROG are known as the chief "precursors" of ozone. These compounds react in the presence of sunlight to produce ozone. Approximately 88 percent of NO_X and 40 percent of ROG regional emissions originate from on- and off-road vehicles (ICAPCD 2010). Other major sources include solvent evaporation and miscellaneous processes such as pesticide application. <u>While the proposed Project would not exceed an ICAPCD threshold for criteria pollutants during either construction (see Table 4.4-7) or operations (see Table 4.4-8), ICAPCD Regulation VIII would be enforced in keeping with the mandatory construction dust control plan and operational dust control plan.</u>"

Page 4.4-23 of the Draft EIR, the following revision has been made to clarify the duration of the CUP

<u>"Decommissioning/Reclamation</u>

Decommissioning/reclamation activities would increase air pollutant emissions as a result of earth-moving and exhaust from diesel equipment. The dust and exhaust generated would be temporary in nature and are anticipated to be similar to levels generated during construction. However, it is anticipated that regulatory compliance similar to or greater than those currently in place (e.g. Regulation VIII) would be required at the time of reclamation. Likewise, BACTs are also anticipated to be more stringent, and cleaner burning equipment is anticipated to be available, at the time of Project decommissioning/reclamation (i.e. 40 years in the future <u>assuming 30 years plus one 10-year extension to the CUP, if approved)</u>. In addition, all other cumulative projects with dust and diesel-generated emissions would be required to comply with applicable regulations and BACTs to reduce their individual construction air quality emissions. In this way, each individual cumulative project would reduce decommissioning/reclamation emissions on a project-by-project basis resulting in a **less than cumulatively considerable contribution** to identified criteria pollutants under both the Full Buildout Scenario and Phased CUP Scenario. Because the proposed Project and other cumulative projects would reduce reclamation emissions on a project-by-project basis, emissions resulting in a violation of an air quality standard would be reduced to **less than cumulatively considerable** under both the Full Buildout Scenario and Phased CUP Scenario."

SECTION 4.5, GREENHOUSE GASES

Page 4.5-10, the bullet discussion under Tier 5 has been revised as follows to clarify the length of the CUP:

> **"Tier 5** – Off-sets ~~along~~ alone or in combination with the above target Significance Screening Level. Offsets must be provided for a 30- to 40 year project life (30 years plus one 10-year extension to the CUP, if approved), unless the project life is limited by permit, lease, or other legally binding condition."

SECTION 4.6, GEOLOGY AND SOILS

Page 4.6-30, under "Significance After Mitigation", the following revisions have been made.

> "Implementation of mitigation measure MM 4.6.8 ~~4.7.4 (identified in Section 4.7 Cultural Resources & Tribal Cultural Resources)~~, would employ paleontological monitoring during excavations or drilling that would be at depths of 10 feet or more. The paleontologist would be empowered to determine the level of monitoring necessary; to halt or divert construction away from large specimens; and to curate fossil specimens. In addition, paleontological monitoring shall be required if decommissioning activities reach a certain depth. Implementation of mitigation measure MM 4.6.8 ~~4.7.4~~ would reduce impacts to paleontological resources to **less than significant** for both the Full Build-out Scenario and Phased CUP Scenario."

Page 4.6-33 of the Draft EIR, the 6th sentence of the paragraph under the discussion of "Decommissioning/Reclamation" has been revised as follows to clarify the length of the CUP:

> "All decommissioning activities would be required to implement appropriate fugitive dust control measures consistent with applicable ICAPCD requirements in effect at the time of site closure (i.e. at the end of each CUP or 30 or 40 years [30 years plus one 10-year extension to the CUP, if approved], whichever is later)."

SECTION 4.7, CULTURAL RESOURCES & TRIBAL CULTURAL RESOURCES

Mitigation Measure MM 4.7.3 on page 4.7-34 and 4.7-35 has been revised as follows:

"**Mitigation Measure**

MM 4.7.3 In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County Coroner shall be notified of the discovery immediately. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined, within 2 working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County Coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code Section 5097.98, the NAHC must immediately notify those persons it believes to be the MLD from the deceased Native American. The MLD shall complete inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

In the event that any human remains or objects subject to provision of the Native American Graves Protection and Repatriation Act, or cultural resources such as sites, trails, artifacts are identified during ground disturbance, please contact the Colorado River Indian Tribes' Tribal Historic Preservation Office (CRIT THPO) within 48 hours.

Timing/Implementation: *During construction.*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department, Imperial County Coroner in coordination with NAHC and CRIT THPO."*

Mitigation Measure MM 4.7.2 on page 4.7-32 has been revised as follows

"MM 4.7.2a A monitor from the Campo Band of Mission Indians and the Colorado River Indian Tribes shall be present as ~~a~~ Native American monitors for initial ground disturbing activities within the boundaries of the Project site. Following initial disturbance, a determination shall be made by the County in accordance with State regulations if continued monitoring is necessary based on the outcome of any discoveries or lack thereof.

Timing/Implementation: *During initial ground disturbing activities/as needed.*
Enforcement/Monitoring: *Imperial County Planning and Development Services Department/Campo Band of Mission Indians and Colorado River Indian Tribes."*

SECTION 4.8, NOISE

No revisions.

SECTION 4.9, AGRICULTURAL RESOURCES

Page 4.9-14 of the Draft EIR, items b, c and d have been revised as follows:

"b) Permittee shall pay an annual fee of $20 per acre per year (based on developed acreage defined in the Building Permit) during the post-construction, operational phase of the Project to address the Imperial County Fire/OES expenses for service calls within the Project's Utility/Transmission area. Said fee will be paid to the Fire Department to cover on-going maintenance and operations cost created by the project. A $100 per acre (based on developed acreage defined in the Building Permit) is to be paid be the Permittee for Fire/OES capital purchases prior to issuance of the initial building permit.

c) (applies to a & b) Costs associated with ~~items~~ the two above items shall be annually adjusted on January 1st to add a CPI (Los Angeles) increase. Such costs associated with these items can be readjusted in the County's sole discretion if a new ~~1~~service analysis is prepared and that service analysis is approved by both the County and the Permittee.

d) Fiscal Impacts will remain open in regard to solar generation and battery (energy) storage until meeting with the department head(s) and developer(s), which may include but not limited to: Capital purchases which may be required to assist in servicing this project: costs for services during construction and life of the project: and training. Fiscal Impact negotiations will take place prior to issuance of the initial building permit.

Page 4.9-34 of the Draft EIR, the first sentence under the discussion of "Decommissioning/Reclamation" has been modified as follows to clarify the length of the CUP:

"At the end of the 30-year operational life (up to 40 years assuming 30 years plus one 10-year extension to the CUP, if approved) of the Project's CUPs, the facilities in each of the CUP Areas would be disassembled and removed;"

Page 4.9-40 of the Draft EIR, the last sentence under Table 4.9-17 has been modified as follows to clarify the length of the CUP:

"Furthermore, the conversion would be temporary and last for the duration the Project's operational life stated in the CUP (i.e., 30 years or up to 40 years assuming 30 years plus one 10-year extension to the CUP, if approved)."

SECTION 4.10, HAZARDS AND HAZARDOUS MATERIALS

No revisions.

SECTION 4.11, HYDROLOGY AND WATER QUALITY

No revisions.

SECTION 4.12, BIOLOGICAL RESOURCES

The discussion of the Migratory Bird Treaty Act in on page 4.12-3 of the Draft EIR has been revised to include the following text following the first paragraph:

"**A. Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (MBTA) implements international treaties between the United States and other nations that protect migratory birds, (including their parts, eggs, and nests) from killing, hunting, pursuing, capturing, selling, and shipping unless expressly authorized or permitted. Generally, the list of species protected under the MBTA includes those where evidence of natural occurrence in the United States or its territories exists, and the documentation of such records has been recognized by the American Ornithologists Union or other competent scientific authorities. Species not protected under the MBTA include those whose occurrences in the United States are strictly the result of intentional human introduction.

"The MBTA prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the MBTA, "take" is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so (16 U.S.C. 703 et seq.). In December 2017, Department of Interior Principal Deputy Solicitor Jorjani issued a memorandum (M-37050) interpreting the MBTA, as follows:

"Interpreting the MBTA to apply to incidental or accidental actions hangs the sword of Damocles over a host of otherwise lawful and productive actions, threatening up to six months in jail and a $15,000 penalty for each and every bird injured or killed. As Justice Marshall warned, "the value of a sword of Damocles is that it hangs—not that it drops." Indeed, the mere threat of prosecution inhibits otherwise lawful conduct. For the reasons explained below, this Memorandum finds that, consistent with the text, history, and purpose of the MBTA, the statute's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs."

Page 4.12-30, the first bullet at the top of the page under mitigation measure 4.12.1a has been eliminated:

~~" • Night-time construction should be minimized to the extent possible. However, if night-time activity (e.g., equipment maintenance) is necessary, then the speed limit shall be 10 mph."~~

SECTION 4.13, PUBLIC SERVICES AND UTILITIES

Page 4.13-26 of the Draft EIR, the second paragraph under the discussion of "Construction" has been revised as follows to clarify the length of the CUP:

"Due to the proposed Project phasing under the development agreement, it is unknown which year within the first 10 years of the 40-year (10 years from Development Agreement plus 30 years for the CUP) CUPs the Project will commence construction. It is possible that construction will commence in 2019 at one time, or over five phases over a 10-year period. Regardless of construction phasing, total construction and decommissioning water demands are anticipated to be 1,200 AF each. In order to provide a conservative assessment, the WSA assumed that all the CUPs will commence construction in 2019 at once to allow for the longest fully operational lifetime of the Project (39 years) (Fuscoe 2018b, p. 41). Decommissioning of the Project would occur immediately after the 40-year CUP term (10 years from Development Agreement plus 30 years for the CUP) in year 41 and is assumed to take one year. Therefore, an amortized water demand of 116 AFY level for 41 years is assumed. This would result in a total water demand of 4,740 AF as shown in **Table 4.13-6** below (Fuscoe 2018b, p. 39)."

Page 4.13-27 of the Draft EIR, the paragraph under the discussion of "Decommissioning/Reclamation" has been revised as follows to clarify the length of the CUP:

"At the end of the Project's operational life, the components of the Project would be removed and decommissioned and the solar field site parcels would be restored to pre-Project soil conditions. Decommissioning activities are similar to construction activities and would occur immediately after the 40-year CUP term (10 years from Development Agreement plus 30 years for the CUP) in year 41. Decommissioning is assumed to take one year."

Chapter 5.0, Alternatives

No revisions.

Chapter 6.0, Other CEQA Required Considerations

Page 6.0-5 of the Draft EIR, the last bullet describing the Development Agreement has been revised as follows to clarify the length of the CUP:

- "A Development Agreement between the County and the Applicant to enable and control a phased build-out of the Project that is capable of meeting changing market demands by authorizing initiation of the CUP or CUPs anytime within a 10-year period. Pursuant to the terms of the Development Agreement, thereafter, the CUPs would be valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

Page 6.0-6 of the Draft EIR, the last two sentences of the first paragraph have been revised as follows to clarify the length of the CUP:

"Thereafter, the CUPs are valid for the remaining period of ~~40~~ 30 years from the date of the CUP approval. The requested Development Agreement would provide flexibility to allow the start of construction to commence for up to 10 years after the CUPs are approved. Pursuant to the terms of the Development Agreement the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

Page 6.0-8, second to the last sentence in the discussion of 6.4.2 Secondary Effects of Growth has been revised as follows to clarify the length of the CUP:

"Once operational, the Project would require limited trips to each CUP for operation and maintenance activities during the operational lifespan of each CUP which is expected to be operate for 30 to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

Page 6.0-8 of the Draft EIR, the last sentence of the paragraph under "6.5.1 Introduction" has been revised as follows to clarify the length of the CUP:

"Moreover, the Applicant is required to restore the solar field site parcels to pre-Project conditions at the end of each CUP which could operate for up to ~~40~~ 30 years from CUP approval date. Pursuant to the terms of the Development Agreement the proposed Project could operate for up to 40 years (10 years from Development Agreement plus 30 years for the CUP)."

CHAPTER 7.0, LIST OF PREPARERS

No revisions.

CHAPTER 8.0, REFERENCES

Argonne National laboratory Environmental Science Division. 2018 http://blmsolar.anl.gov/program/avian-solar/docs/Avian-Solar_Data_and_Monitoring_Report.pdf. August 2018. Referenced in text as (Argonne National laboratory Environmental Science Division 2018).

Bates, C. 2006. Burrowing Owl (*Athene cunicularia*). In *The Draft Desert Bird Conservation Plan: a strategy for reversing the decline of desert-associated birds in California. California Partners in Flight*. http://www.prbo.org/calpif/htmldocs/desert.html

California Public Utilities Commission. https://www.cpuc.ca.gov/environment/info/aspen/sunrise/feir/apps/a08/Fig%20Ap8C-03%20Survey%20Locations%20-%20Burrowing%20Owl.pdf Referenced in text as (CPUC 2008).

Clayton, K. M., and J. F. Schmutz. 1997. Burrowing Owl (*Speotyto cunicularia*) survival in prairie Canada. Pages 107-110 in J. R. Duncan, D. H. Johnson, and T. H. NichoCallls, editors. Biology and conservation of owls of the Northern Hemisphere. U.S.D.A. Forest Service, General Technical Report NC-190. North Central Forest Experiment Station, St. Paul, Minnesota. (Referenced in text as Clayton and Schmutz 1997).

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CHAPTER 5.0

MITIGATION MONITORING AND REPORTING PROGRAM

5.1 INTRODUCTION

This document is the Final Mitigation Monitoring and Reporting Program (Final MMRP) for the Drew Solar Project. This Final MMRP has been prepared pursuant to Section 21081.6 of the California Public Resources Code, which requires public agencies to "adopt a reporting and monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment." A Final MMRP is required for the proposed Project because the EIR identified significant adverse impacts and mitigation measures have been identified to address these impacts. The numbering of the individual mitigation measures follows the numbering sequence as found in the Final EIR. All revisions to mitigation measures that were necessary, as a result of responding to public comments and incorporating staff-initiated revisions have been incorporated into this Final MMRP.

5.2 MITIGATION MONITORING AND REPORTING PROGRAM

The Final MMRP, as outlined in the table beginning on page 5.0-3, describes mitigation timing, monitoring responsibilities, and compliance verification responsibility for all mitigation measures identified in this Final EIR. The County of Imperial will be the primary agency, but not the only agency responsible for implementing the mitigation measures. In some cases, other public agencies will implement measures. In other cases, the project applicant will be responsible for implementation of measures and the County's role is exclusively to monitor the implementation of the measures. In such cases, the project applicant may choose to require the construction contractor to implement specific mitigation measures prior to and/or during construction. The County will continue to monitor mitigation measures that are required to be implemented during the operation of the project.

The Final MMRP is presented in tabular form on the following pages. The components of the Final MMRP are described briefly below:

Mitigation Measures: The mitigation measures are taken from the Draft EIR, in the same order that they appear in the Draft EIR. The Final MMRP incorporates revisions to mitigation measures as well as any new mitigation measures that were necessitated as part of response to comments or the Errata.

Mitigation Timing: Identifies at which stage of the Project mitigation must be completed.

Monitoring Responsibility: Identifies the department within the County, project applicant, or consultant responsible for mitigation monitoring.

Compliance Verification Responsibility: Identifies the department of the County or other State agency responsible for verifying compliance with the mitigation. In some cases, verification will include contact with responsible state and federal agencies.

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MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
TRANSPORTATION				
4.3.5a	**All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** Employee and vendor routes to each CUP shall be limited to Drew Road and Pulliam Road unless improvements are made to other county roads leading to individual CUP sites in advance of development of each CUP.	Imperial County Planning and Development Services Department, Imperial County Public Works Department.	Prior to the issuance of grading permit/ Project contractor.	
4.3.5b	**All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** The CUP owner(s) shall limit the Project's construction traffic to paved County roadways. In the event the Applicant's construction traffic requires the use of unpaved County roadways, the Applicant shall mitigate those County unpaved roadways in accordance with ICAPCD Rule 805. In addition to complying with Rule 805, if 50 vehicle trips per day (VPD) (cumulative from public and project use) are triggered by the project on any single County unpaved roadway, the Applicant shall provide for the future maintenance cost of the affected roadway for the full term of the CUP which triggered the increase beyond the 50 VPD threshold.	Imperial County Planning and Development Services Department, Imperial County Public Works Department.	Prior to the issuance of grading permit/ CUP owner(s).	
4.3.5c	**All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** As each CUP may be constructed individually and independently, the CUP owner(s) shall improve the roads per the approved haul route study. If the CUP owner(s) has already improved the roads that will be utilized by the next CUP to start construction, then no new road improvements are required.	Imperial County Planning and Development Services Department, Imperial County Public Works Department.	Prior to the issuance of grading permit/ CUP owner(s).	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.3.5d	**All CUPs (CUP#17-0031 thru CUP#17-0035 and CUP#18-0001)** Project construction traffic will utilize County roads, therefore a fair share shall be paid per the approved haul route study, and the Developer will be required to repair any damages caused to County roads by construction traffic during construction and maintain them in safe conditions. The Imperial County Public Works Department/Road Commissioner shall have final authority as to the fair share percentage and the final payment amounts based on the final and approved access points in the project's grading and improvement plans. Fair share shall be paid in full prior to Issuance of grading, building and encroachment permits.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	
4.3.5e	**CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001** Fair share payments shall be paid per the approved haul route study as approved by Imperial County Public Works Department prior to issuance of grading, building and encroachment permits.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	
4.3.5f	**CUP#17-0031, CUP#17-0032, CUP#17-0033, CUP#17-0034, CUP#17-0035 and CUP#18-0001** Prior to issuance of final Certificate of Occupancy, CUP owner shall be responsible for repairing any damage caused to County roads and bridges it utilizes via improvements as determined by the County Road Commissioner based on the final and approved access points in the Project's grading and improvement plans.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.3.5g	**CUP#17-0031** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Drew Road from SR 98 to the Mount Signal Drain No. 1 or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	
4.3.5h	**CUP#17-0032** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Pulliam Road from SR 98 to the Carr Drain or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	
4.3.5i	**CUP#17-0033** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Pulliam Road from Carr Drain to Kubler Road or as approved by ICDPW prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.3.5j	**CUP#17-0034** Fair share payments shall be paid for future road maintenance of at least one-half mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Drew Road from Mount Signal Drain No. 1 to Kubler Road, or as approved by Imperial County Public Works Department prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans, unless the condition has already been satisfied as part of CUP#17-0033. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	Imperial County Planning and Development Services Department, Imperial County Public Works Department/Road Commissioner.	Prior to the issuance of grading, building and encroachment permits.	
4.3.5k	**CUP#17-0035 and CUP#18-0001** Fair share payments shall be paid for future road maintenance of at least one mile of road improvements (calculated to include 100% of shoulder work, grinding 1-inch of asphalt and final 2-inches of overlays) along Drew Road from SR 98 up to Kubler Road unless this condition has already been satisfied as part of CUP 17-0031 or CUP 17-0035 relating to construction haul route, or as approved by Imperial County Public Works Department prior to issuance of the first grading permit based on the final and approved access points in the Project's grading and improvement plans. Final distance of road improvements and unit costs for the fair share shall be determined by the Road Commissioner.	Imperial County Public Works Department.	Prior to the issuance of grading, building and encroachment permits.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
GEOLOGY AND SOILS				
4.6.1	A Fault Hazard Study including fault trenching shall be prepared for CUP#17-0035 and CUP#18-0001 to address any issues associated with the presence of an Alquist-Priolo Earthquake Fault Zone.	Imperial County Department of Planning and Development Services, Division of Building & Safety.	As a Condition of Approval/Prior to approval of final building plans.	
4.6.2	Prior to approval of final building plans, a registered civil engineer or certified engineering geologist, having at least five years of experience in the field of seismic hazard evaluation and mitigation, shall prepare a Final Geotechnical and GeoHazards Report containing site-specific evaluations of the ground shaking hazards affecting the Project, identify the portions of the Project site containing ground shaking hazards, and identify appropriate Project design measures pursuant to the established and proven methodologies (e.g. Special Publication 117A). The Report shall also include site-specific evaluations of potential for liquefaction, expansive soils and corrosive soils for all solar field site parcels, energy storage components and Gen-Tie foundations. The Report shall identify appropriate Project design measures pursuant to the established and proven methodologies set forth in the 2016 CBC. All recommended Project design measures as set forth in the Final Geotechnical and GeoHazards Report shall be incorporated into and reflected on the final design and building plans for each CUP. All recommended Project design measures as set forth in the Final Geotechnical and GeoHazards Report shall be incorporated into and reflected on the final design and building plans. The Final Geotechnical and GeoHazards Report and Project plans shall be submitted for review and approval by the Imperial County Planning and Development Services Department, Division of Building & Safety prior to approval of the final building plans.	Imperial County Department of Planning and Development Services, Division of Building & Safety.	Prior to approval of final building plans/ As part of Project design.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.6.7a	Concrete mixed with higher cement contents (6 sacks Type V Portland Cement) and low water-cement ratios (0.45 w/c ratio) shall be used for all concrete structures proposed as part of the Project subject to approval by the County Engineer and Planning Director.	Imperial County Engineer/Imperial County Department of Planning and Development Services, Division of Building & Safety.	During Project construction.	
4.6.7b	Zinc coatings (galvanizing) or increased structural sections shall be used to protect all steel posts and to compensate for metal loss due to corrosion subject to approval by the County Engineer and Planning Director.	Imperial County Engineer/Imperial County Department of Planning and Development Services, Division of Building & Safety.	During Project construction.	
4.6.8	Qualified Paleontological monitor(s) shall be hired to oversee excavations or drilling activities greater than 10 feet in depth. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Recovered specimens shall be prepared to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Fossil specimens shall be curated by accessioning into an established, accredited museum repository with permanent retrievable paleontological storage. A report of findings with an appended itemized inventory of specimens shall be prepared. Submittal of the report and inventory to the Imperial County Planning and Development Services Department, along with confirmation of the curation of recovered specimens into an established, accredited museum repository, shall signify completion of the program to mitigate impacts to paleontological resources.	Paleontological Monitor and Imperial County Planning and Development Services Department.	During construction involving drilling or excavations to depths of 10 feet or more.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
CULTURAL RESOURCES & TRIBAL CULTURAL RESOURCES				
4.7.2a	A monitor from the Campo Band of Mission Indians and the Colorado River Indian Tribes_shall be present as Native American monitors for initial ground disturbing activities within the boundaries of the Project site. Following initial disturbance, a determination shall be made by the County in accordance with State regulations if continued monitoring is necessary based on the outcome of any discoveries or lack thereof.	Imperial County Planning and Development Services Department/Campo Band of Mission Indians and Colorado River Indian Tribes.	During initial ground disturbing activities/ as needed.	
4.7.2b	In the event that archaeological resources (sites, features, or artifacts) are exposed during construction activities for the Project, all construction work occurring within 100 feet of the find shall immediately stop until a qualified archaeologist meeting the Secretary of the Interior's Professional Qualification Standards can evaluate the significance of the find and determine whether or not additional study is warranted. If the discovery is clearly not significant (e.g., an isolate) the archaeologist may simply record the find and allow work to continue. If the discovery proves potentially significant under CEQA, additional work such as preparation of an archaeological treatment plan, testing, or data recovery may be warranted.	Archaeological Monitor and Imperial County Planning and Development Services Department.	During construction involving drilling or excavations to depths of 10 feet or more.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.7.3	In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County Coroner shall be notified of the discovery immediately. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County Coroner has determined, within 2 working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County Coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code Section 5097.98, the NAHC must immediately notify those persons it believes to be the MLD from the deceased Native American. The MLD shall complete inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains. In the event that any human remains or objects subject to provision of the Native American Graves Protection and Repatriation Act, or cultural resources such as sites, trails, artifacts are identified during ground disturbance, please contact the Colorado River Indian Tribes' Tribal Historic Preservation Office (CRIT THPO) within 48 hours.	Imperial County Planning and Development Services Department, Imperial County Coroner in coordination with NAHC and CRIT THPO.	During construction.	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
	AGRICULTURAL RESOURCES			
4.9.1a	One of the following options included below shall be implemented prior to the issuance of a grading permit or building permit (whichever is issued first) for the proposed Project: **<u>For Non-Prime Farmland</u>:** • **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a 1 to 1 basis on land of equal size, of equal quality of farmland, outside the path of development. The Conservation Easement shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits; • **Option 2**: The Permittee shall pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 20% of the fair market value per acre for the total acres of proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis. The Agricultural In-Lieu Mitigation Fee, will be placed in a trust account administered by the Imperial County Agricultural Commissioner's office and will be used for such purposes as the acquisition, stewardship, preservation and enhancement of agricultural lands within Imperial County; or **Payment of Agricultural and Other Benefit Fees** One of the following options included below shall be implemented prior to the issuance of a grading permit or building permit (whichever is issued first) for the proposed Project:	*Imperial County Planning and Development Services Department.*	*Prior to the issuance of a grading permit or building permit (whichever is issued first).*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.9.1a	<u>**For Non-Prime Farmland**</u>: • **Option 1**: The Permittee shall procure Agricultural Conservation Easements on a 1 to 1 basis on land of equal size, of equal quality of farmland, outside the path of development. The Conservation Easement shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits; • **Option 2**: The Permittee shall pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 20% of the fair market value per acre for the total acres of proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis. The Agricultural In-Lieu Mitigation Fee, will be placed in a trust account administered by the Imperial County Agricultural Commissioner's office and will be used for such purposes as the acquisition, stewardship, preservation and enhancement of agricultural lands within Imperial County; or • **Option 3**: The Permittee and County voluntarily enter into an enforceable Public Benefit Agreement or Development Agreement that includes an Agricultural Benefit Fee payment that is (1) consistent with Board Resolution 2012-005; (2) the Agricultural Benefit Fee must be held by the County in a restricted account to be used by the County only for such purposes as the stewardship, preservation and enhancement of agricultural lands within Imperial County and to implement the goals and objectives of the Agricultural Benefit program, as specified the Development Agreement, including addressing the mitigation of agricultural job loss on the local economy.	*Imperial County Planning and Development Services Department.*	*Prior to the issuance of a grading permit or building permit (whichever is issued first).*	

<table>
<tr><th>MM #</th><th>Mitigation Measure</th><th>Monitoring Responsibility</th><th>Timing</th><th>Verification (Date and Initials)</th></tr>
<tr><td>4.9.1a</td><td><u>For Prime Farmland</u>:
Option 1: The Permittee shall procure Agricultural Conservation Easements on a "2 to 1" basis on land of equal size, of equal quality farmland, outside of the path of development. The Conservation Easements shall meet the State Department of Conservation's regulations and shall be recorded prior to issuance of any grading or building permits; or
Option 2: The Permittee shall pay an "Agricultural In-Lieu Mitigation Fee" in the amount of 30 percent of the fair market value per acre for the total acres of the proposed site based on five comparable sales of land used for agricultural purposes as of the effective date of the permit, including program costs on a cost recovery/time and material basis. The Agricultural In-Lieu Mitigation Fee, will be placed in a trust account administered by the Imperial County Agricultural Commissioner's office and will be used for such purposes as the acquisition, stewardship, preservation and enhancement of agricultural lands within Imperial County.
Option 3: The Permittee and County shall enter into an enforceable Public Benefit Agreement or Development Agreement that includes an Agricultural Benefit Fee payment that is (1) consistent with Board Resolution 2012-005; (2) the Agricultural Benefit Fee must be held by the County in a restricted account to be used by the County only for such purposes as the stewardship, preservation and enhancement of agricultural lands within Imperial County and to implement the goals and objectives of the Agricultural Benefit program, as specified the Development Agreement, including addressing the mitigation of agricultural job loss on the local economy; the Project and other recipients of the Project’s Agricultural Benefit Fee funds; or emphasis on creation of jobs in the</td><td>Imperial County Planning and Development Services Department.</td><td>Prior to the issuance of a grading permit or building permit (whichever is issued first).</td><td></td></tr>
</table>

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.9.1a	agricultural sector of local economy for the purpose of off-setting jobs displaced by this Project. • **Option 4**: The Permittee shall revise their CUP Application/Site Plan to avoid Prime Farmland.			
4.9.1b	**Reclamation/Decommissioning Plan and Security** Prior to the issuance of a grading permit or building permit (whichever is issued first) for the proposed Project, the Permittee shall submit to Imperial County a Reclamation and Decommissioning Plan. The plan shall document the procedures by which each CUP area will be returned to its current agricultural condition/LESA score of 57.9. The Permittee shall also provide financial assurance/bonding in an amount equal to a cost estimate prepared by a California-licensed general contractor or civil engineer for implementation of the Reclamation Plan in the event Permittee fails to perform the Reclamation Plan.	*Imperial County Planning and Development Services Department.*	*Prior to the issuance of a grading permit or building permit (whichever is issued first).*	
BIOLOGICAL RESOURCES				
4.12.1a	**General Avoidance and Minimization Measures** **<u>Debris/Non-native Vegetation/Pollution</u>** • Fully covered trash receptacles that are animal-proof will be installed and used onsite to contain all food, food scraps, food wrappers, beverage containers, and other miscellaneous trash. • No litter or debris will be discharged into state-jurisdictional waters. • Work areas shall be kept clean of debris, such as trash, and construction materials. • Vehicle and Equipment Restrictions and Maintenance • Vehicle operation within jurisdictional resources when surface water is present will be prohibited except as necessary to perform work in IID facilities pursuant to USACE, RWQCB, and/or CDFW permits and/or authorizations. Any equipment or vehicles driven and/or operated within or adjacent to a state-jurisdictional channel will be	*Imperial County Planning and Development Services Department.*	*During construction and operation, as appropriate/Applicant and Project Contractor.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1a	checked and maintained by the operator daily to prevent leaks of oil or other petroleum products that could be deleterious to aquatic life if introduced to the watercourse. • Vehicles and equipment access will be limited to the identified impact areas and speed limit of 15 mph will be enforced. The work areas and sensitive areas will be flagged prior to construction in order to ensure construction activities remain within the approved work limits. During operations and maintenance, vehicles and equipment will be restricted from entering sensitive habitat, and limited to maintenance access roads, where feasible, and the minimal area necessary to perform the work. • Staging and storage areas for spoils, equipment, materials, fuels, lubricants, and solvents will be located outside the state-jurisdictional channels and within the designated impact area. Stationary equipment, such as motors, pumps, generators, compressors, and welders, located adjacent to state-jurisdictional waters shall be positioned over drip-pans or other containment. Prior to refueling and lubrication, vehicles and other equipment shall be moved away from the jurisdictional waters. **Other Restrictions on Activities and Personnel** • No pets, such as cats or dogs, permitted on the Project site during construction or operations and maintenance. • Any contractor, employee, or agency personnel who kills, injures, or traps a wildlife species shall immediately report the incident to the Project biologist during construction and the operations manager during operations and maintenance. • All pipes, culverts, or similar structures with a diameter of 4 inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for special-status wildlife and	*Imperial County Planning and Development Services Department.*	*During construction and operation, as appropriate/Applicant and Project Contractor.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1a	nesting birds before the pipe is subsequently buried, capped, or otherwise used or moved in any way, and subsequently covered to prevent entry to nesting birds and other wildlife. If an animal is discovered inside a pipe, that section of pipe shall not be moved until the Project biologist has been consulted and the animal has either moved from the structure on its own accord or until the animal has been captured and relocated by a qualified biologist.	*Imperial County Planning and Development Services Department.*	*During construction and operation, as appropriate/Applicant and Project Contractor.*	
4.12.1b	**Environmental Awareness Training, Biological Monitoring, and Compliance** Worker Environmental Awareness Program and Ongoing Training Prior to the initiation of any on-site grading, all construction/contractor personnel working on site must complete training through a Worker Environmental Awareness Program (WEAP). New construction workers engaged in construction activities (e.g., grading, utility installation, etc.) shall complete WEAP training within the first week of deployment on the site. Additionally, operational staff shall complete WEAP training prior to deployment on the site. Biological Monitoring and Compliance Documentation • The Project biologist shall perform the biological monitoring and compliance documentation for the Project during construction, including the following: • Prior to the initiation of any on-site grading, the Project biologist will document that required pre-construction surveys and/or relocation efforts have been implemented. • The Project biologist will periodically monitor activities during initial grading. • The Project biologist will note any evidence of trash and, if present, communicate the presence and requirement to remove the trash to the construction manager.	*Imperial County Planning and Development Services Department.*	*During construction and operation, as appropriate/ Applicant, Project Contractor and Operator.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1b	• The Project Biologist shall have the following minimum qualifications: (1) Have a bachelor's degree in biological sciences, zoology, botany, ecology or a closely related field; (2) Have at least 2 years of experience in biological compliance for construction projects; and (3) Have at least 1 year of field experience with biological resources found in the geographic region of the Project.	*Imperial County Planning and Development Services Department.*	*During construction and operation, as appropriate/ Applicant, Project Contractor and Operator.*	
4.12.1c	**Burrowing Owl Surveys and Avoidance/Relocation.** • No more than 14 days prior to ground-disturbing activities (vegetation clearance, grading), a qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction take avoidance surveys on and within 656 feet of the construction zone (where safe and legally accessible) to identify occupied breeding or wintering burrowing owl burrows. The two-pass take avoidance burrowing owl surveys shall be conducted in accordance with the Staff Report on Burrowing Owl Mitigation (2012 Staff Report; CDFG 2012) and shall consist of walking parallel transects 22 feet to 65 feet apart, adjusting for vegetation height and density as needed, and noting any suitably sized burrows with fresh burrowing owl sign or presence of burrowing owls. As each burrow is investigated, biologists shall also look for signs of American badger and desert kit fox. Copies of the burrowing owl survey results will be submitted to the CDFW.	*Imperial County Planning and Development Services Department.*	*No more than 14 days prior to ground-disturbing activities/ qualified wildlife biologist.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1c	• If burrowing owls are detected on site, no ground-disturbing activities will be permitted within 656 feet of an occupied burrow during the breeding season (February 1 to August 31), unless otherwise authorized by CDFW. During the nonbreeding season (September 1 to January 31), ground-disturbing work can proceed near active burrows as long as the work occurs no closer than 165 feet from the burrow. Depending on the level of disturbance, a smaller buffer may be established in consultation with CDFW. • If avoidance of active burrows is infeasible during the nonbreeding season, then, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping, a qualified biologist shall implement a passive relocation program in accordance with Appendix E (i.e., Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans) of the 2012 Staff Report. Passive relocation consists of excluding burrowing owls from occupied burrows by closing or collapsing the burrows and providing suitable artificial burrows nearby for the excluded burrowing owls. • Where required buffering will not be feasible, passive relocation is an option in consultation with CDFW, but it is preferred to install appropriate artificial burrows (in accordance with the negotiated Plan) and then let the owls decide whether they would like to abandon the existing burrow. Only burrows that are in danger by construction should be collapsed if at all possible. • A Burrowing Owl Relocation Plan will be prepared and approved by CDFW prior to commencement of burrowing owl exclusion activities if this method of mitigation is required. The plan will detail the procedures of the passive relocation effort, the location of constructed replacement burrows, design of replacement burrows, and post relocation monitoring requirements.	*Imperial County Planning and Development Services Department.*	*No more than 14 days prior to ground-disturbing activities/ qualified wildlife biologist.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1d	**Nesting Bird Pre-Construction Surveys and Avoidance Plan** • The Project biologist shall conduct pre-construction surveys no earlier than 7 days prior to any on-site grading and construction activities that occurs during the nesting season defined as February 1 – September 15 or as determined by the Project biologist. Pre-construction surveys shall be conducted within the designated construction area and a 500-foot buffer (where safe and legally accessible). Burrowing owl measures are addressed in MM 4.12.1c. • The purpose of the pre-construction surveys will be to determine whether occupied nests are present in the construction zone or within 500 feet of the construction zone boundary on lands that are legally accessible. • If occupied nests are found, then limits of construction to avoid occupied nests shall be established by the Project biologist in the field with flagging, fencing, or other appropriate barriers (e.g., 250 feet around active passerine nests to 500 feet around active raptor nests), and construction personnel shall be instructed on the sensitivity of nest areas. The Project biologist may adjust the 250-foot or 500-foot setback at his or her discretion depending on the species and the location of the nest (e.g., if the nest is well protected in an area buffered by dense vegetation the setback may be reduced). Once a Project biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, construction may proceed.	*Imperial County Planning and Development Services Department.*	*No earlier than 7 days prior to any on-site grading and construction activities that occurs during the nesting season/Project biologist.*	

MM #	Mitigation Measure	Monitoring Responsibility	Timing	Verification (Date and Initials)
4.12.1e	**Transmission Line Design** All transmission towers and lines are designed to conform to Avian Power Line Interaction Committee (APLIC) standards. APLIC standards identify the necessary physical separation between energized and/or grounded structures, conductors, hardware, or equipment to avoid the potential for that to be bridged by birds, thus avoiding the potential for electrocution. The proposed Project shall implement recommendations by the APLIC (2006, 2012) to protect raptors and other birds.	During Project design/As part of Project construction.	*Imperial County Planning and Development Services Department.*	
4.12.3	**CUP#17-0033 - Federal and State Agency Permits** To comply with the state and federal regulations for impacts to jurisdictional resources regulated by the United States and State of California, the following permits and agreement shall be obtained, or evidence shall be provided from the respective resource agency satisfactory to the County that such an agreement or permit is not required if development activities are proposed within jurisdictional waters: • A Clean Water Act Section 404 permit issued by the USACE for all Project-related disturbances of jurisdictional non-wetland waters and/or wetlands. • A Clean Water Act Section 401 permit issued by the RWQCB for all Project-related disturbances of jurisdictional non-wetland waters and/or wetlands. • A Section 1602 Streambed Alteration Agreement issued by the CDFW for all Project-related disturbances of any streambed and associated riparian habitat.	*Imperial County Planning and Development Services Department, USACE, RWQCB and CDFW.*	*Prior to issuance of a Building Permit/In accordance with USACE, RWQCB and CDFW requirements.*	

ATTACHMENT 1

Caltrans Response Memo

August 12, 2019

To: Ms. Patricia Valenzuela
Imperial County Planning & Development Services
801 W. Main Street
El Centro, CA 92243

From: Justin Rasas, P.E.

RE: Drew Solar Analysis Addressing Caltrans' 7/1/19 No SR-98 Driveway Comment

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The purpose of this memo is to document the analysis of Drew Solar traffic patterns based on Caltrans' comment of no permitted access on SR-98 for the SE ¼ Section of Drew Solar resulting in using Pulliam Road for 2 access points, and using Drew Road for 2 access points instead of 2 access points on Kubler Road for the NW ¼ Section and the west half of the NE ¼ Section of Drew Solar. With no further access points on Kubler this memo documents the refined distribution around the site due to re-located driveways and the applicant's proposed restriction of employees and deliveries from using Kubler Road between Pulliam Road and Drew Road. In summary, the refined access includes Pulliam Road for 2 access points instead of 1 access point on SR-98 for the SE ¼ Section of Drew Solar, and using Drew Road for 2 access points instead of 2 access points on Kubler Road for the NW ¼ Section and the west half of the NE ¼ Section of Drew Solar.

As shown in **Figure 1** (included at the end of the text and tables to keep text continuity), the project driveway on SR-98 is removed and the remaining project driveways are located along Pulliam Road and Drew Road. On Drew Road, two of the driveways are near SR-98 and one driveway is just north of Mr. Signal Drain No. 1. The most northerly driveway on Drew Road is for emergency only access. Therefore, the applicant's restriction of travel on Kubler Rd between Drew Road and Pulliam Road does not result in a significant amount of out of way travel. The refined project distribution is shown in **Figure 2** with the project trip assignment shown in **Figure 3**.

This analysis covers the intersections and segments that have the refined distribution without SR-98 access and eliminated Kubler Rd project driveways. The intersections and segments with new volumes and LOS include:

1) Intersection of Kubler Rd/Pulliam Rd (int #4)
2) Intersection of SR-98/Drew Rd (int #6)
3) Intersection of SR-98/Pulliam Rd (int #7)
4) Segment of Pulliam Rd from Kubler Rd to SR-98
5) Segment of SR-98 from Drew Rd to Pulliam Rd

The remaining study intersections and segments remain unchanged from the 8/8/2018 traffic study. The study scenarios for this memo include:

1) Year 2017 + project
2) Year 2017 + project + cumulative

3) Year 2019 + project
4) Year 2019 + project + cumulative
5) Year 2027 + project
6) Year 2027 + project + cumulative

Year 2017 Scenario

The year 2017 + project volumes are shown in **Figure 4** and year 2017 + project + cumulative volumes are shown in **Figure 5**. The intersection LOS for year 2017 + project conditions are shown in **Table 1** and **Table 2** for segment operations. The intersection LOS for year 2017 + project + cumulative conditions are shown in **Table 3** and **Table 4** for segment operations. LOS calculations are included in **Attachment A**.

Table 1: Year 2017 + Project Intersection Operations

Intersection &	Movement	Year 2017		Year 2017 + Project			
(Control)[1]		Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	8.6	A	9.1	A	0.5	None
Kubler Rd (U)	Leg	8.6	A	9.2	A	0.6	None
6) Drew Rd at	Minor	8.7	A	9.0	A	0.3	None
SR-98 (U)	Leg	8.9	A	9.3	A	0.4	None
7) Pulliam Rd at	Minor	9.0	A	9.5	A	0.5	None
SR-98 (U)	Leg	8.6	A	9.7	A	1.1	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 2: Year 2017 + Project Segment Operations

Segment	Classification (as built)	Year 2017				Project	Year 2017 + Project					
		Daily Volume	LOS C Capacity	V/C	LOS	Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,090	7,100	0.29	B	196	2,286	7,100	0.32	B	0.03	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 3: Year 2017 + Project + Cumulative Intersection Operations

Intersection &	Movement	Peak	Year 2017 + Cumulative		Year 2017 + Cumulative + Project			
(Control)[1]		Hour	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	AM	9.0	A	9.4	A	0.4	None
Kubler Rd (U)	Leg	PM	9.1	A	9.9	A	0.8	None
6) Drew Rd at	Minor	AM	8.9	A	9.3	A	0.4	None
SR-98 (U)	Leg	PM	9.3	A	9.7	A	0.4	None
7) Pulliam Rd at	Minor	AM	9.4	A	10.0	B	0.6	None
SR-98 (U)	Leg	PM	8.8	A	10.1	B	1.3	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 4: Year 2017 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2017 + Cumulative				Project	Year 2017 + Cumulative + Project				
		Daily Volume	LOS C Capacity	V/C	LOS	Daily Volumes	Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,221	7,100	0.31	B	196	2,417	7,100	0.34	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2017 + project and 2017 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

Year 2019 Scenario

The year 2019 + project volumes are shown in **Figure 6** and year 2019 + project + cumulative volumes are shown in **Figure 7**. The intersection LOS for year 2019 + project conditions are shown in **Table 5** and **Table 6** for segment operations. The intersection LOS for year 2019 + project + cumulative conditions are shown in **Table 7** and **Table 8** for segment operations. LOS calculations are included in **Attachment B**.

Table 5: Year 2019 + Project Intersection Operations

Intersection & (Control)[1]	Movement	Year 2019		Year 2019 + Project			
		Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at Kubler Rd (U)	Minor Leg	8.6 8.6	A A	9.1 9.2	A A	0.5 0.6	None None
6) Drew Rd at SR-98 (U)	Minor Leg	8.7 8.9	A A	9.1 9.4	A A	0.4 0.5	None None
7) Pulliam Rd at SR-98 (U)	Minor Leg	9.1 8.6	A A	9.6 9.7	A A	0.5 1.1	None None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 6: Year 2019 + Project Segment Operations

Segment	Classification (as built)	Year 2019				Project	Year 2019 + Project					
		Daily Volume	LOS C Capacity	V/C	LOS	Daily Volume	Daily Volume	LOS C Capacity	V/C	LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,165	7,100	0.30	B	196	2,361	7,100	0.33	B	0.03	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 7: Year 2019 + Project + Cumulative Intersection Operations

Intersection & (Control)[1]	Movement	Peak Hour	Year 2019 + Cumulative Delay[2]	Year 2019 + Cumulative LOS[3]	Year 2019 + Cumulative + Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at Kubler Rd (U)	Minor Leg	AM	9.0	A	9.4	A	0.4	None
		PM	9.1	A	9.9	A	0.8	None
6) Drew Rd at SR-98 (U)	Minor Leg	AM	8.9	A	9.3	A	0.4	None
		PM	9.3	A	9.7	A	0.4	None
7) Pulliam Rd at SR-98 (U)	Minor Leg	AM	9.4	A	10.0	B	0.6	None
		PM	8.8	A	10.1	B	1.3	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 8: Year 2019 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2019 + Cumulative Daily Volume	Year 2019 + Cumulative LOS C Capacity	V/C	LOS	Project Daily Volumes	Year 2019 + Cumulative + Project Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,296	7,100	0.32	B	196	2,492	7,100	0.35	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2019 + project and 2019 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

Year 2027 Scenario

The year 2027 + project volumes are shown in **Figure 8** and year 2027 + project + cumulative volumes are shown in **Figure 9**. The intersection LOS for year 2027 + project conditions are shown in **Table 9** and **Table 10** for segment operations. The intersection LOS for year 2027 + project + cumulative conditions are shown in **Table 11** and **Table 12** for segment operations. LOS calculations are included in **Attachment C**.

Table 9: Year 2027 + Project Intersection Operations

Intersection & (Control)[1]	Movement	Year 2027 Delay[2]	Year 2027 LOS[3]	Year 2027 + Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at Kubler Rd (U)	Minor Leg	8.6	A	9.1	A	0.5	None
		8.6	A	9.2	A	0.6	None
6) Drew Rd at SR-98 (U)	Minor Leg	8.7	A	9.1	A	0.4	None
		9.0	A	9.5	A	0.5	None
7) Pulliam Rd at SR-98 (U)	Minor Leg	9.1	A	9.7	A	0.6	None
		8.7	A	9.9	A	1.2	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds.
3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches.
4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 10: Year 2027 + Project Segment Operations

Segment	Classification (as built)	Year 2027 Daily Volume	Year 2027 LOS C Capacity	Year 2027 V/C	Year 2027 LOS	Project Daily Volume	Year 2027 + Project Daily Volume	Year 2027 + Project LOS C Capacity	Year 2027 + Project V/C	Year 2027 + Project LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,498	7,100	0.35	B	196	2,694	7,100	0.38	B	0.03	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 11: Year 2027 + Project + Cumulative Intersection Operations

Intersection & (Control)[1]	Movement	Peak Hour	Year 2027 + Cumulative Delay[2]	Year 2027 + Cumulative LOS[3]	Year 2027 + Cumulative + Project Delay[2]	Year 2027 + Cumulative + Project LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	AM	8.7	A	9.1	A	0.4	None
Kubler Rd (U)	Leg	PM	8.6	A	9.2	A	0.6	None
6) Drew Rd at	Minor	AM	8.7	A	9.1	A	0.4	None
SR-98 (U)	Leg	PM	9.0	A	9.5	A	0.5	None
7) Pulliam Rd at	Minor	AM	9.1	A	9.7	A	0.6	None
SR-98 (U)	Leg	PM	8.7	A	9.9	A	1.2	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 12: Year 2027 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2027 + Cumulative Daily Volume	Year 2027 + Cumulative LOS C Capacity	Year 2027 + Cumulative V/C	Year 2027 + Cumulative LOS	Project Daily Volumes	Year 2027 + Cumulative + Project Daily Volume	Year 2027 + Cumulative + Project LOS C Capacity	Year 2027 + Cumulative + Project V/C	Year 2027 + Cumulative + Project LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,503	7,100	0.35	B	196	2,699	7,100	0.38	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2027 + project and 2027 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

CONCLUSION

The redistribution around the project site due to the elimination of a project driveway on SR-98 and shifting of the two project driveways on Kubler Road to Drew Road did not change the conclusions of the 8/8/2018 traffic study. This memo and analysis has documented LOS B or better conditions with no significant project impacts.

Figure 1: Site Plan with New Driveway Locations

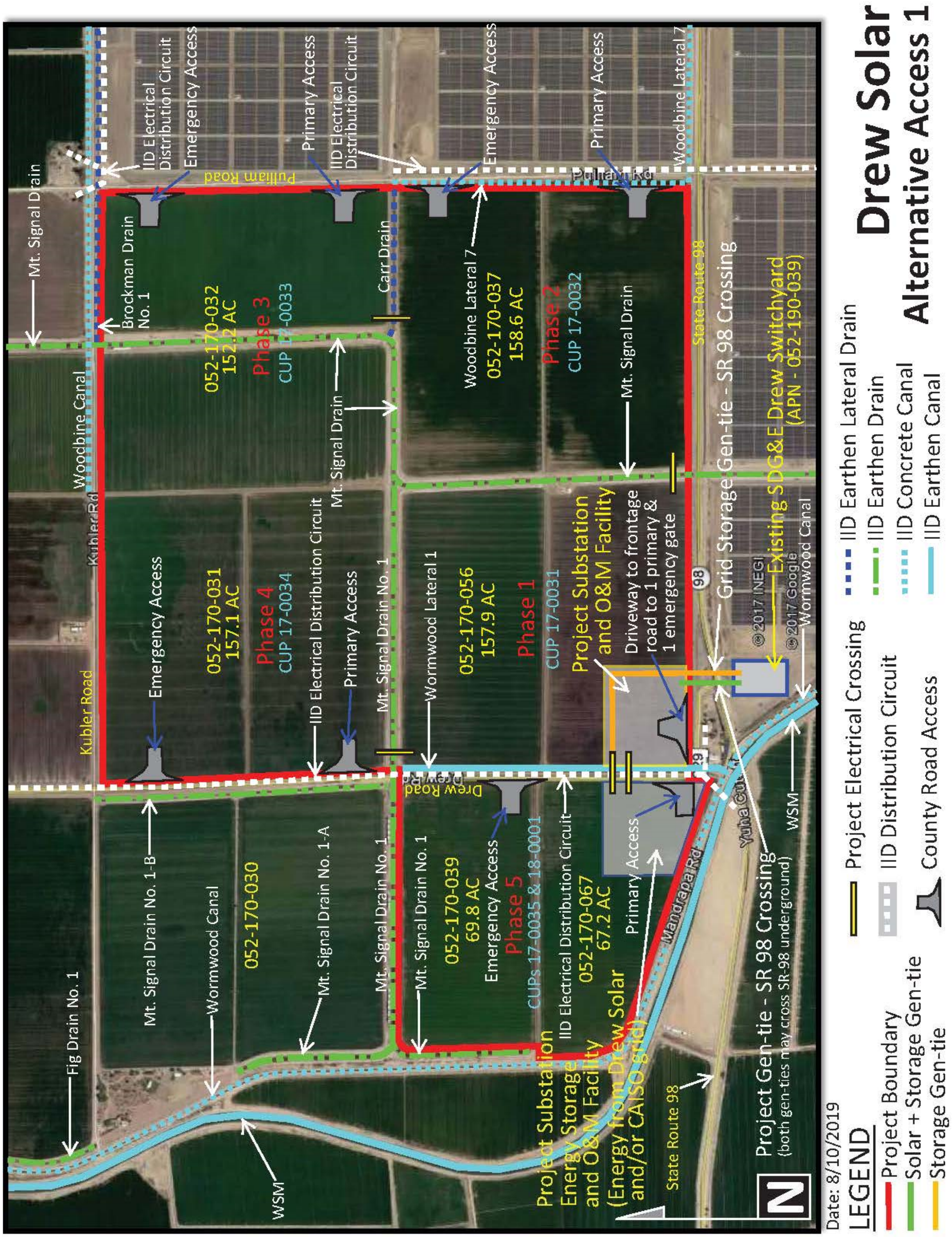


Figure 2: New Project Distribution Immediately Around Project Site

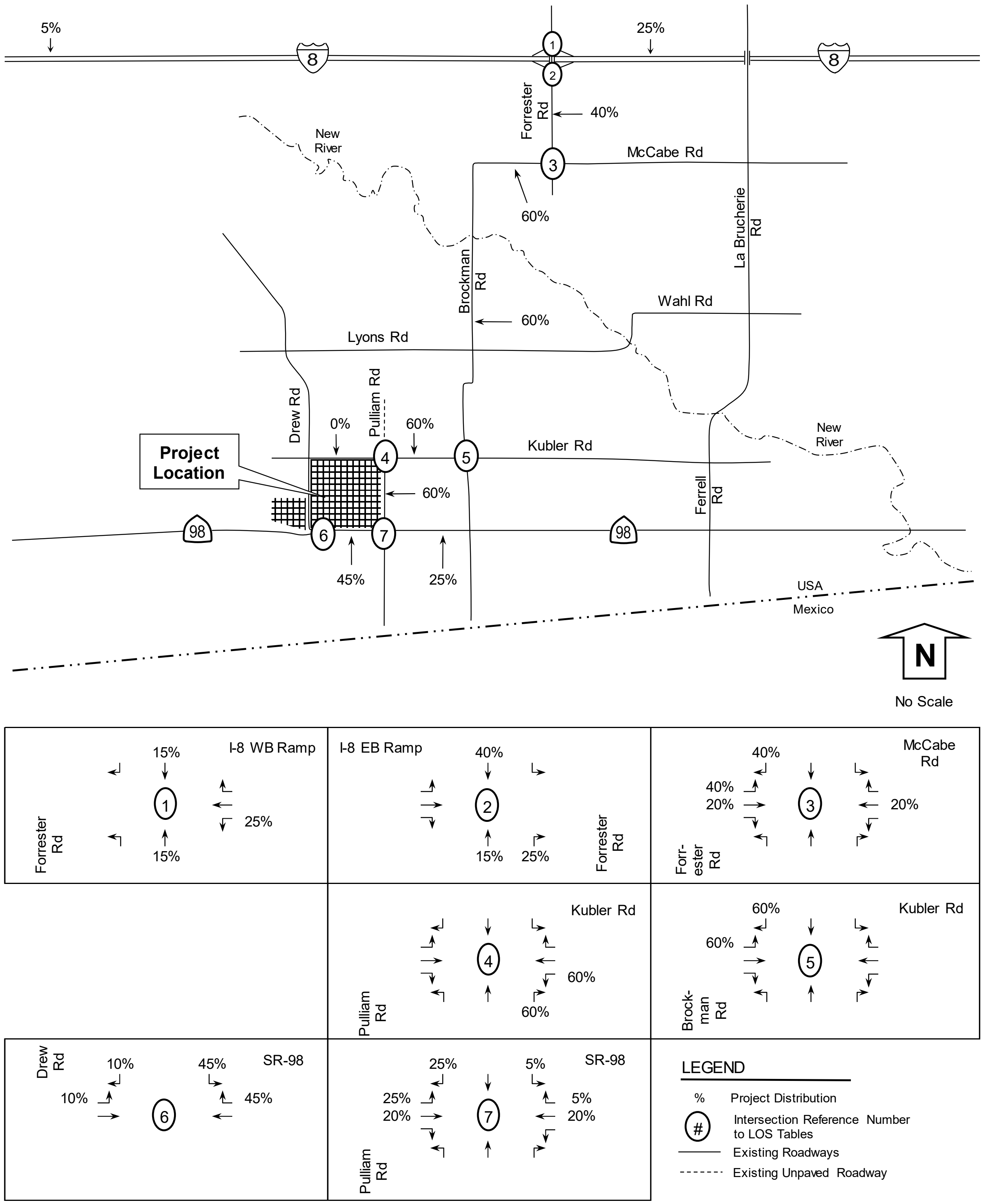


Figure 3: New Project Assignment Immediately Around Project Site

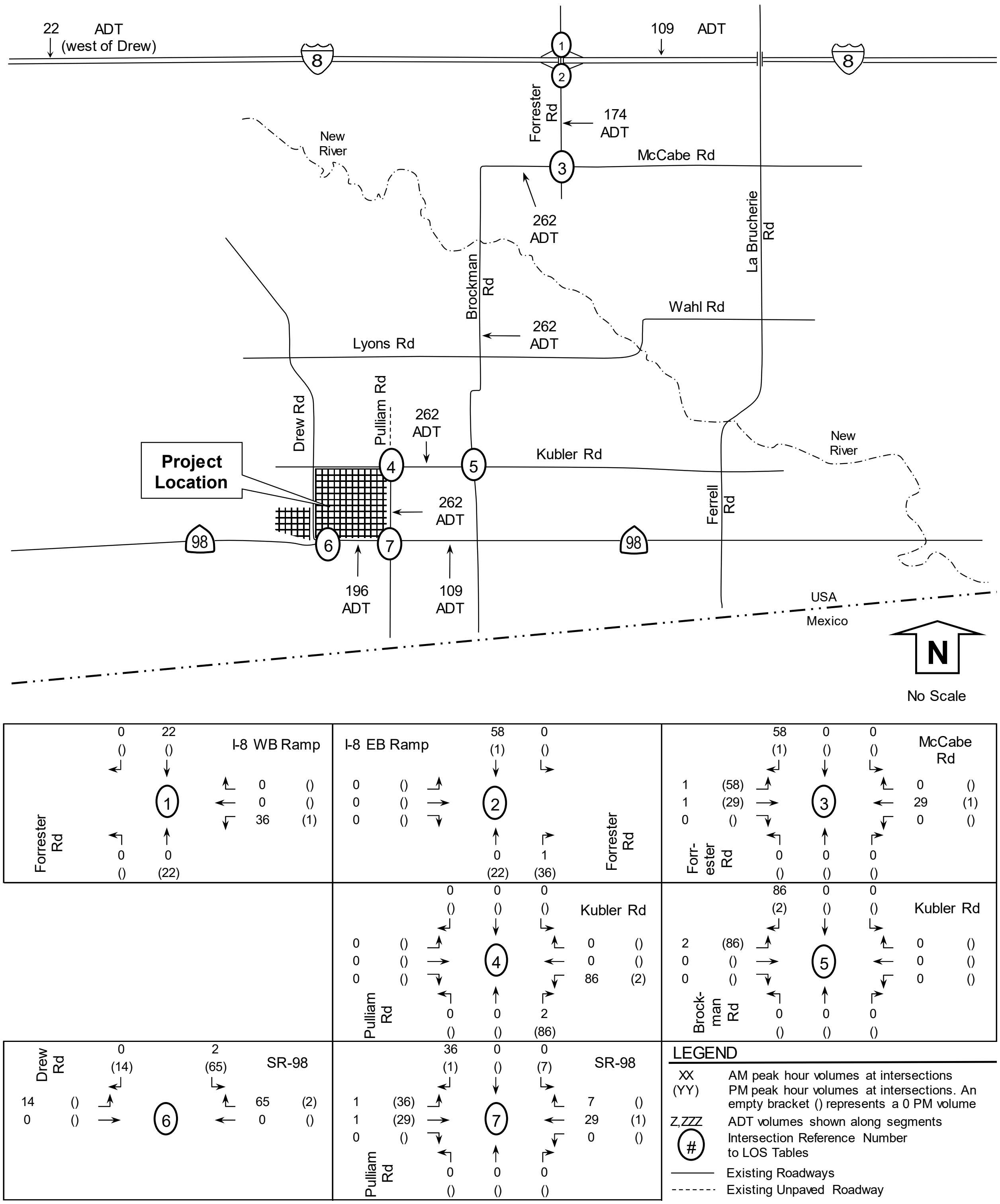


Figure 4: Year 2017 + Project Volumes

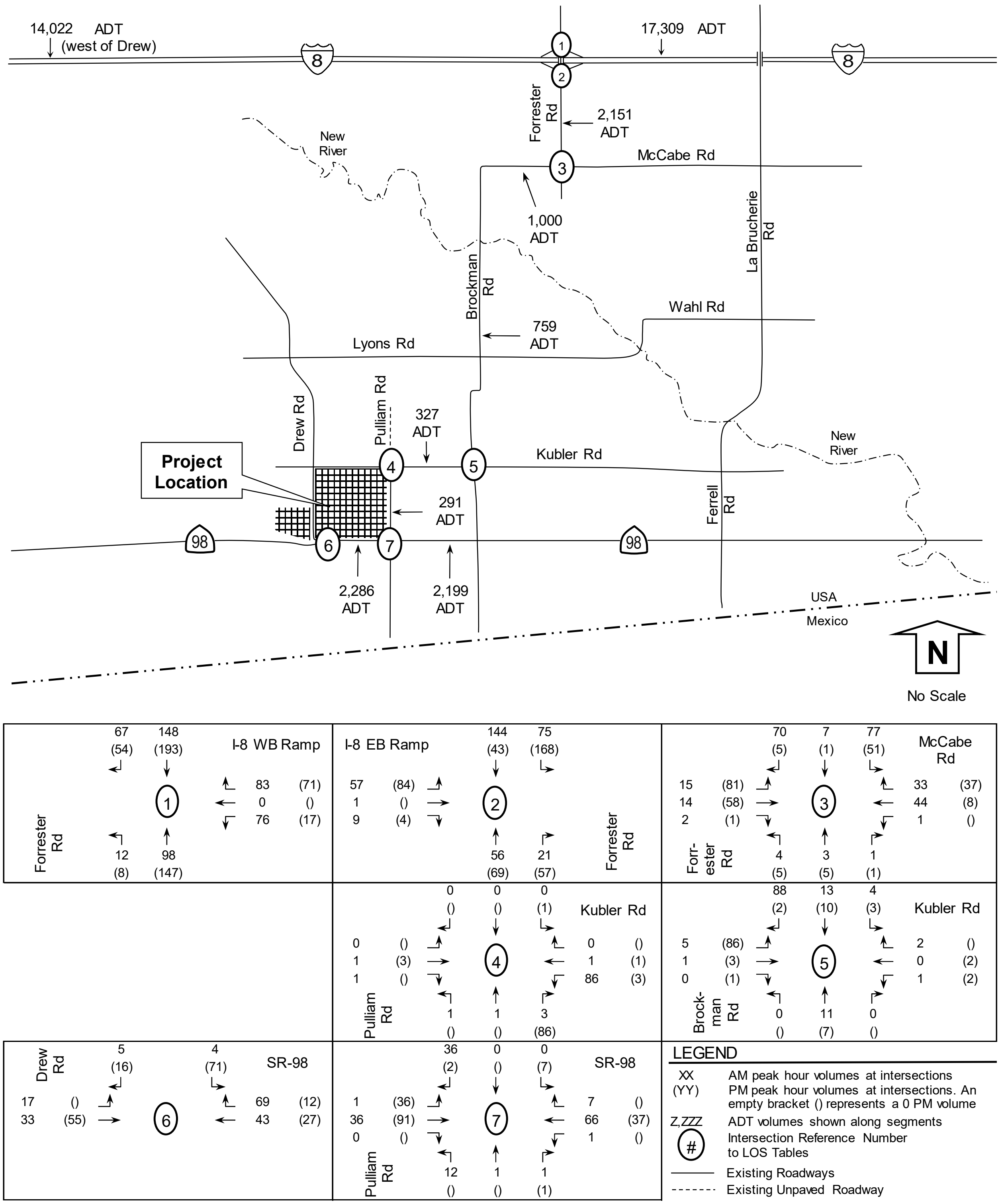


Figure 5: Year 2017 + Project + Cumulative Volumes

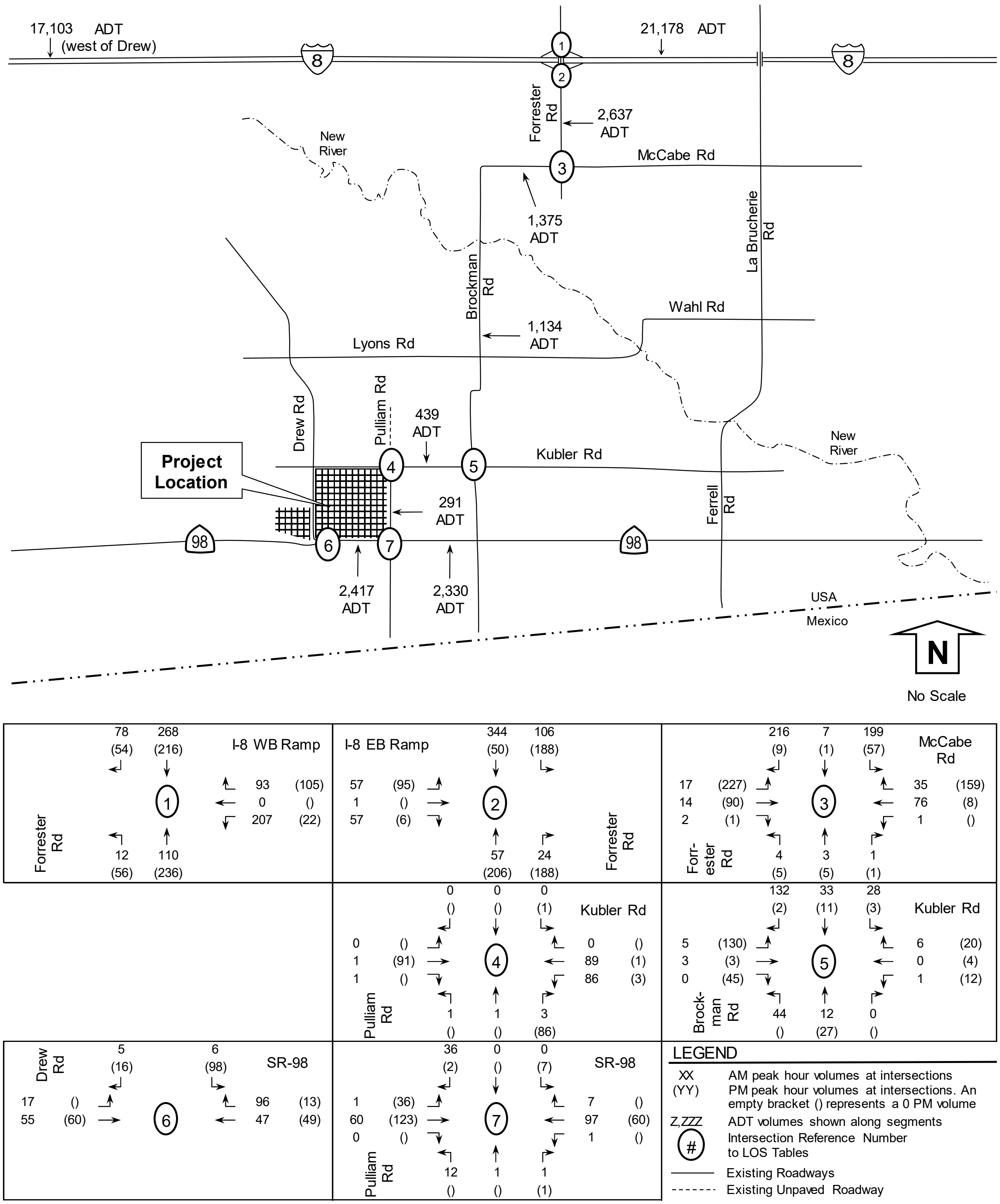


Figure 6: Year 2019 + Project Volumes

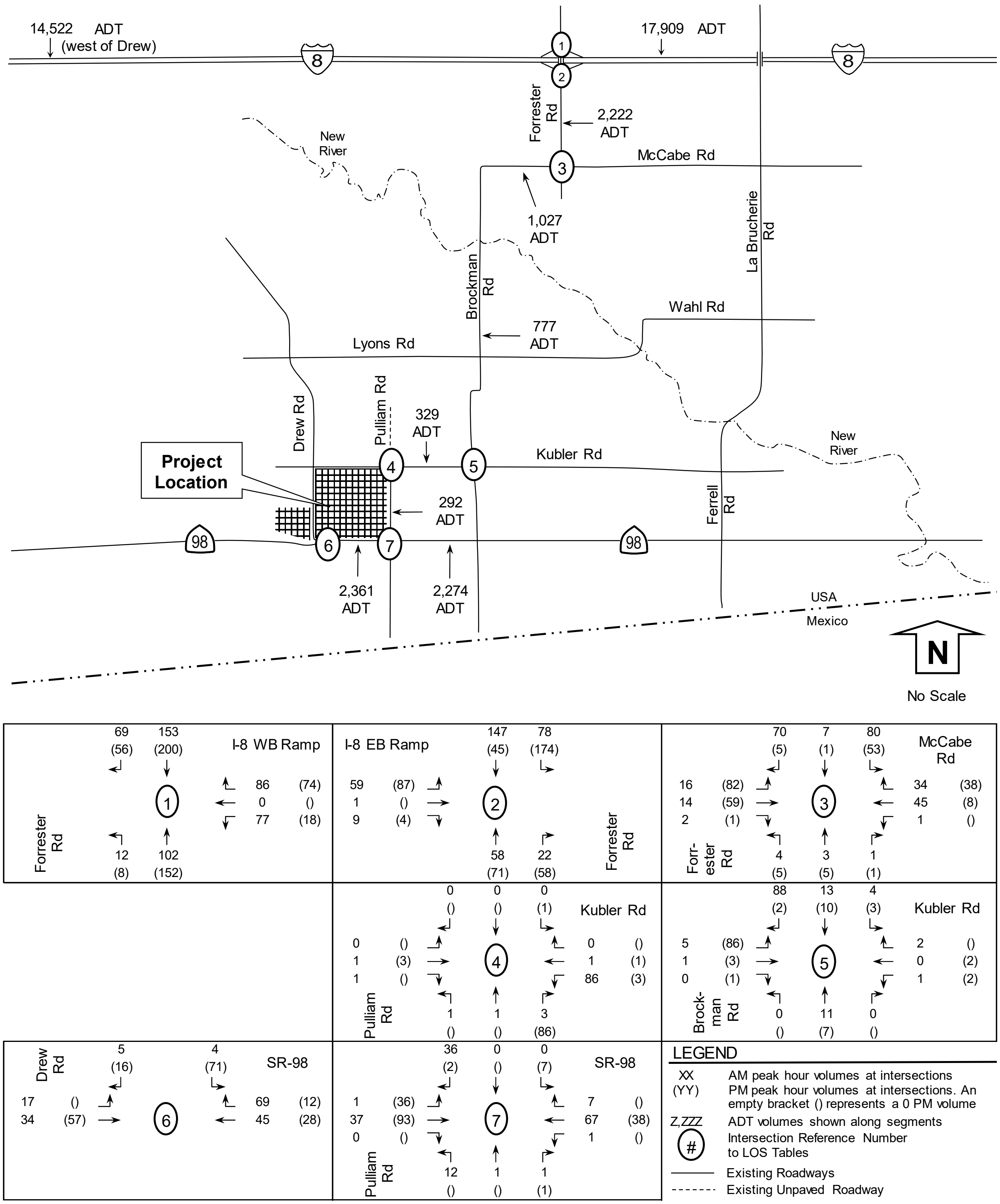


Figure 7: Year 2019 + Project + Cumulative Volumes

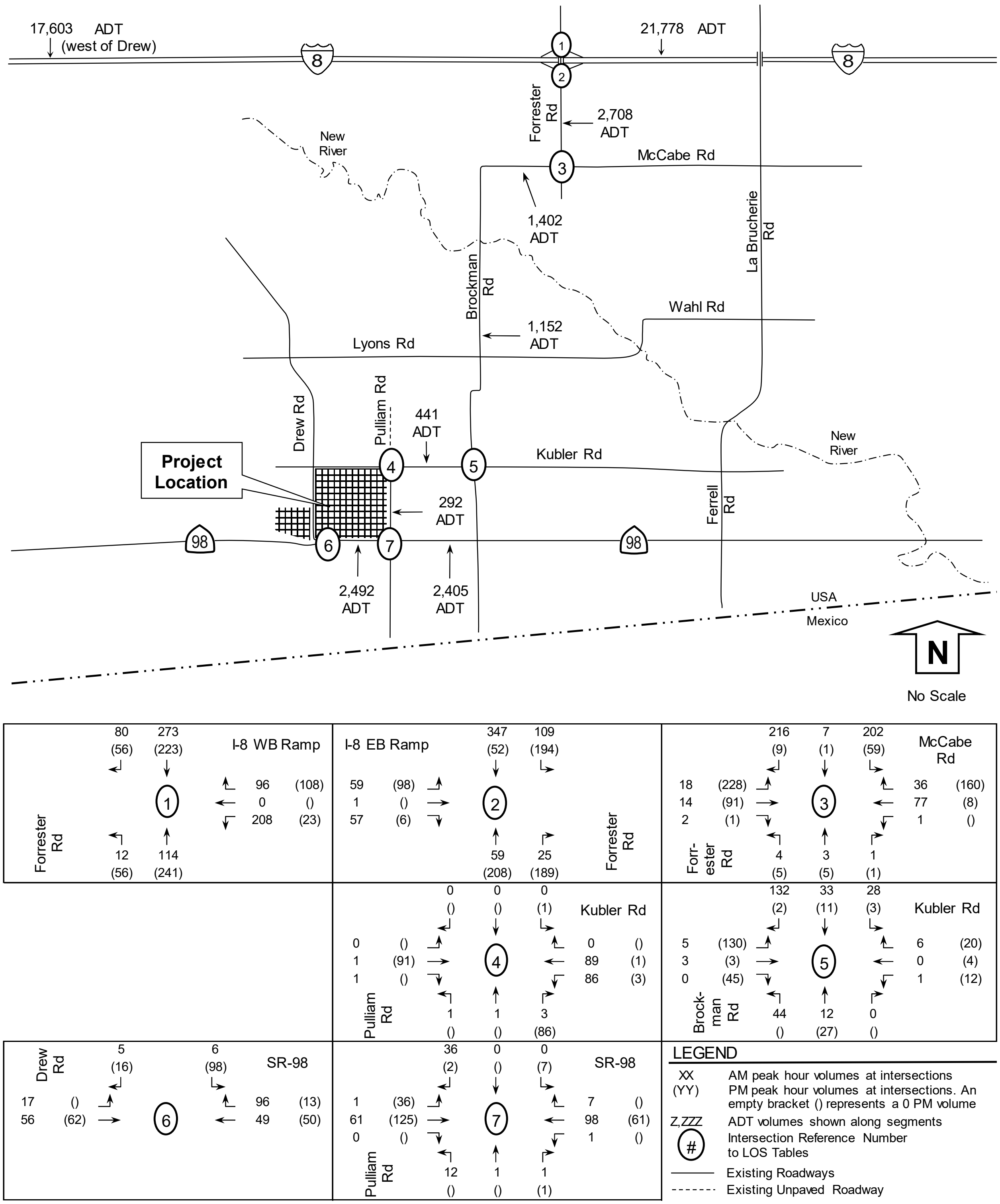


Figure 8: Year 2027 + Project Volumes

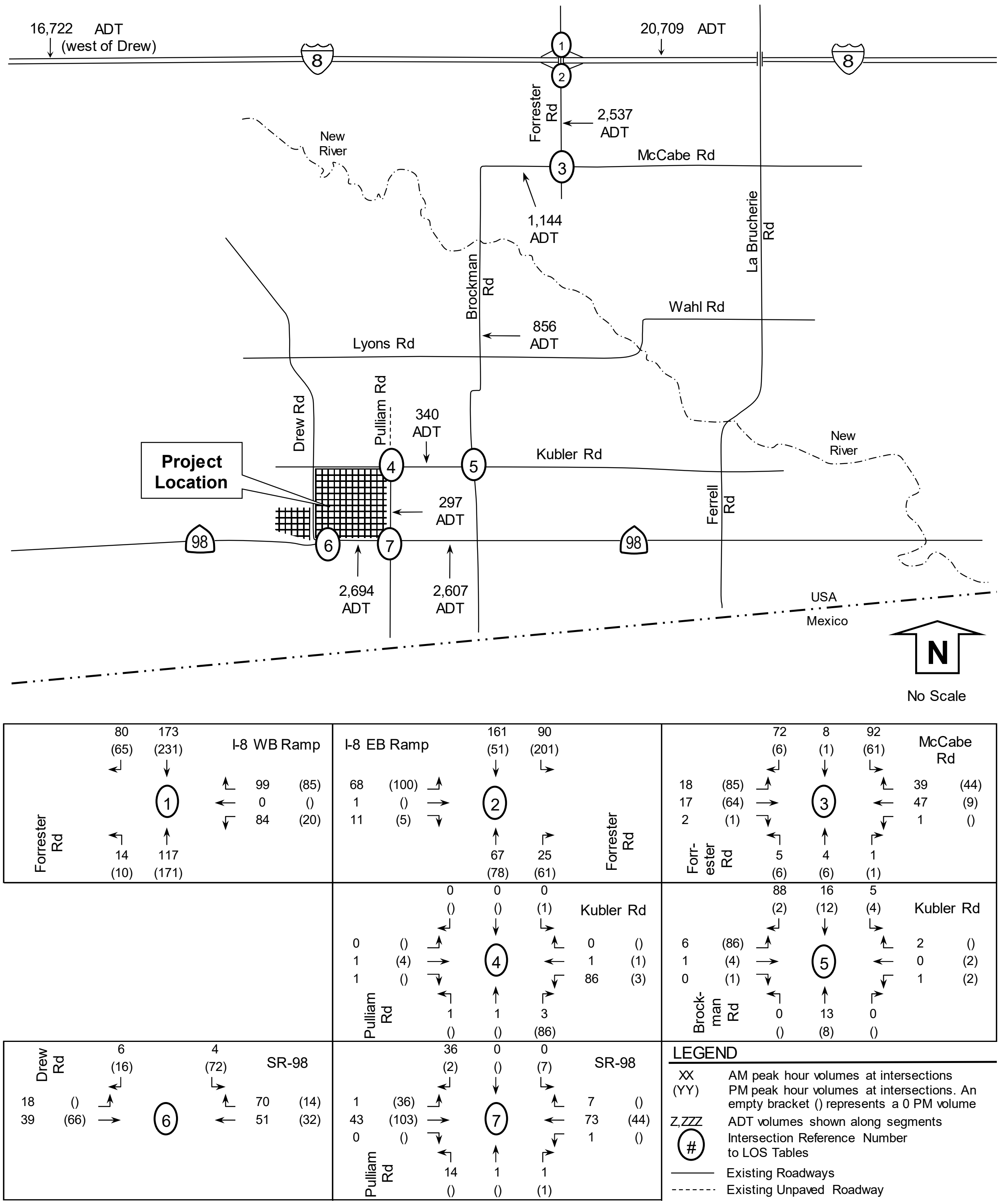
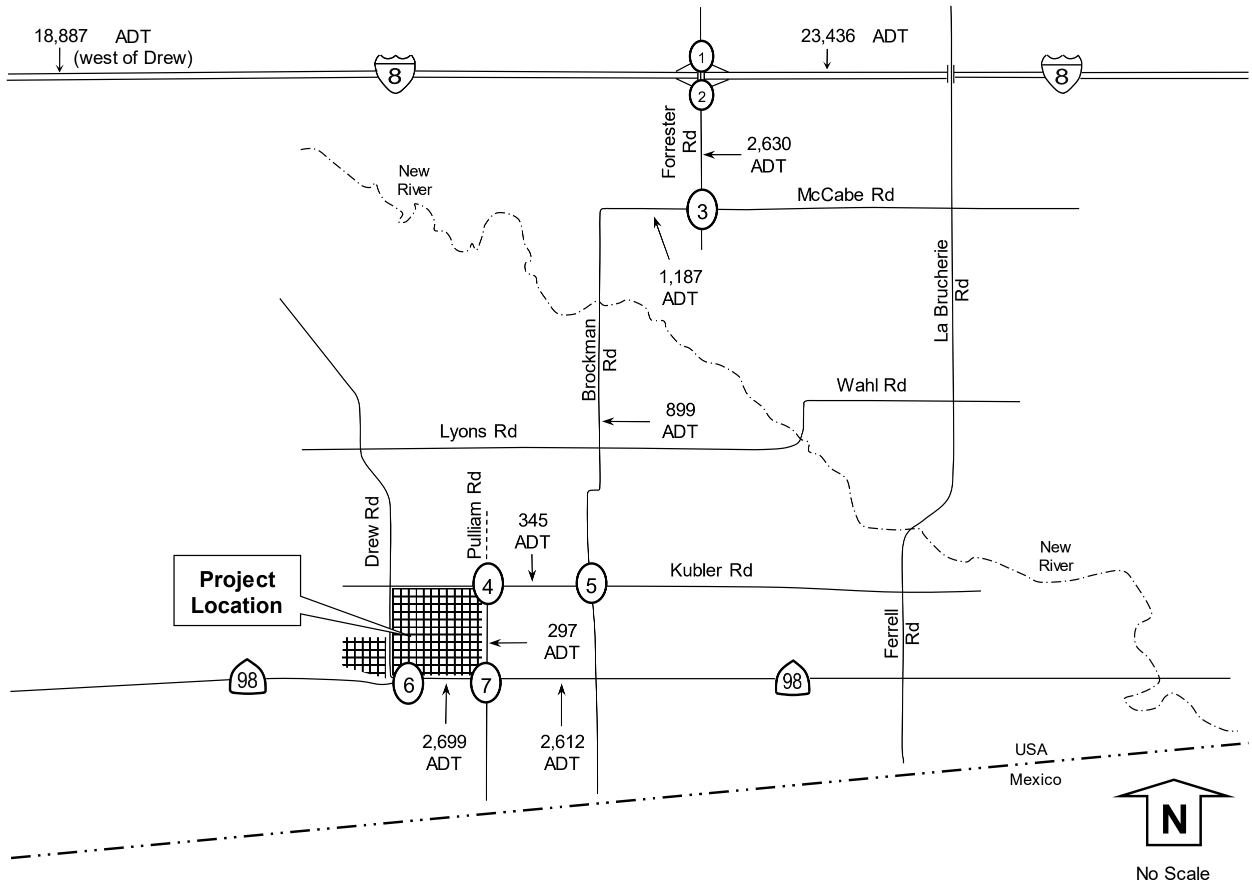
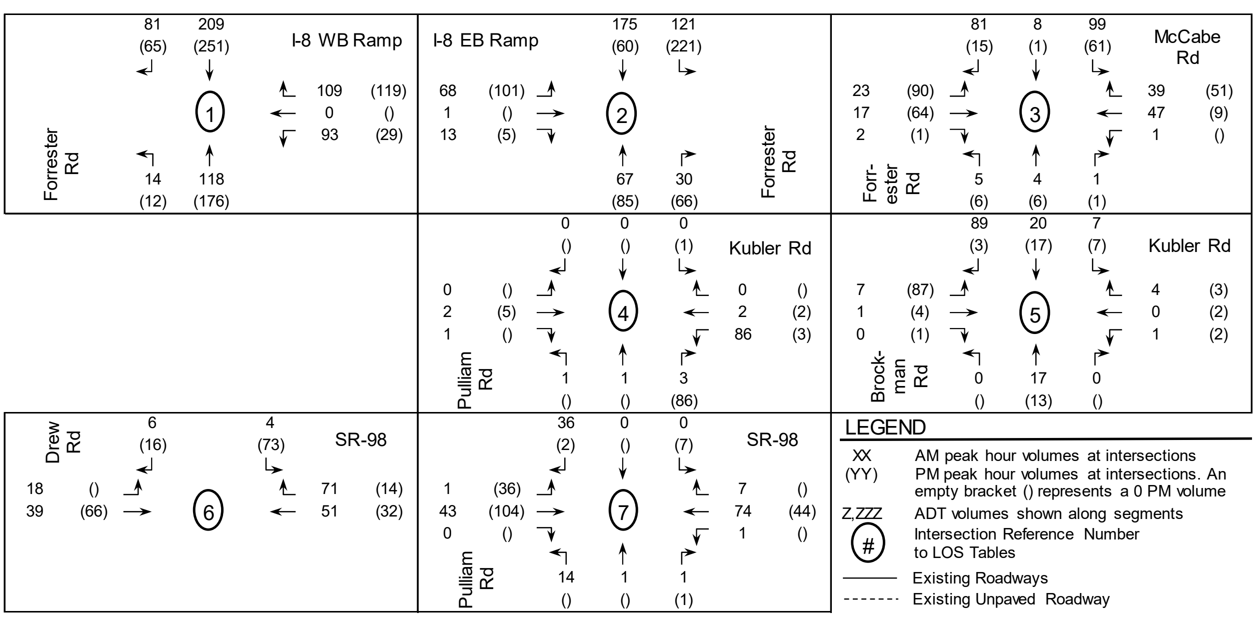


Figure 9: Year 2027 + Project + Cumulative Volumes





ATTACHMENT A

Year 2017 + Project and Year 2017 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	33	43	69	4	5
Future Vol, veh/h	17	33	43	69	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	36	47	75	4	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	122	0	-	0	157	85
Stage 1	-	-	-	-	85	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1465	-	-	-	834	974
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1465	-	-	-	823	974
Mov Cap-2 Maneuver	-	-	-	-	823	-
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	951	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1465	-	-	-	901
HCM Lane V/C Ratio	0.013	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	36	0	1	66	7	12	1	1	0	0	36
Future Vol, veh/h	1	36	0	1	66	7	12	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	39	0	1	72	8	13	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	80	0	0	39	0	0	139	123	39	120	119	76
Stage 1	-	-	-	-	-	-	41	41	-	78	78	-
Stage 2	-	-	-	-	-	-	98	82	-	42	41	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1518	-	-	1571	-	-	831	767	1033	855	771	985
Stage 1	-	-	-	-	-	-	974	861	-	931	830	-
Stage 2	-	-	-	-	-	-	908	827	-	972	861	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1518	-	-	1571	-	-	797	765	1033	852	769	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	797	765	-	852	769	-
Stage 1	-	-	-	-	-	-	973	860	-	930	829	-
Stage 2	-	-	-	-	-	-	871	826	-	969	860	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.5	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	808	1518	-	-	1571	-	-	985
HCM Lane V/C Ratio	0.019	0.001	-	-	0.001	-	-	0.04
HCM Control Delay (s)	9.5	7.4	0	-	7.3	0	-	8.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	3	0	0	10	10	3	57	10	1
Stage 1	-	-	-	-	-	-	3	3	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	50	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1619	-	-	1008	885	1081	940	885	1084
Stage 1	-	-	-	-	-	-	1020	893	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	963	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1619	-	-	1006	883	1081	857	883	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1006	883	-	857	883	-
Stage 1	-	-	-	-	-	-	1020	893	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	880	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1081	1622	-	-	1619	-	-	857
HCM Lane V/C Ratio	0.086	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	55	27	12	71	16
Future Vol, veh/h	0	55	27	12	71	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	60	29	13	77	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	42	0	-	0	96	36
Stage 1	-	-	-	-	36	-
Stage 2	-	-	-	-	60	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1567	-	-	-	903	1037
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	963	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1567	-	-	-	903	1037
Mov Cap-2 Maneuver	-	-	-	-	903	-
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	963	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1567	-	-	-	925
HCM Lane V/C Ratio	-	-	-	-	0.102
HCM Control Delay (s)	0	-	-	-	9.3
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	91	0	0	37	0	0	0	1	7	0	2
Future Vol, veh/h	36	91	0	0	37	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	99	0	0	40	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	40	0	0	99	0	0	218	217	99	218	217	40
Stage 1	-	-	-	-	-	-	177	177	-	40	40	-
Stage 2	-	-	-	-	-	-	41	40	-	178	177	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1570	-	-	1494	-	-	738	681	957	738	681	1031
Stage 1	-	-	-	-	-	-	825	753	-	975	862	-
Stage 2	-	-	-	-	-	-	974	862	-	824	753	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1570	-	-	1494	-	-	722	663	957	723	663	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	722	663	-	723	663	-
Stage 1	-	-	-	-	-	-	804	733	-	950	862	-
Stage 2	-	-	-	-	-	-	972	862	-	802	733	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0	8.8	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1570	-	-	1494	-	-	774
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.013
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	9.7
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	97	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	2	0	0	285	285	2	287	285	97
Stage 1	-	-	-	-	-	-	2	2	-	283	283	-
Stage 2	-	-	-	-	-	-	283	283	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1496	-	-	1620	-	-	667	624	1082	665	624	959
Stage 1	-	-	-	-	-	-	1021	894	-	724	677	-
Stage 2	-	-	-	-	-	-	724	677	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1496	-	-	1620	-	-	636	586	1082	631	586	959
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	586	-	631	586	-
Stage 1	-	-	-	-	-	-	1021	894	-	724	636	-
Stage 2	-	-	-	-	-	-	680	636	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.6	9.4	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	826	1496	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.007	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.4	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	55	47	96	6	5
Future Vol, veh/h	17	55	47	96	6	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	60	51	104	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	155	0	-	0	199	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	96	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1425	-	-	-	790	952
Stage 1	-	-	-	-	921	-
Stage 2	-	-	-	-	928	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1425	-	-	-	780	952
Mov Cap-2 Maneuver	-	-	-	-	780	-
Stage 1	-	-	-	-	909	-
Stage 2	-	-	-	-	928	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1425	-	-	-	850
HCM Lane V/C Ratio	0.013	-	-	-	0.014
HCM Control Delay (s)	7.6	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	60	0	1	97	7	12	1	1	0	0	36
Future Vol, veh/h	1	60	0	1	97	7	12	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	65	0	1	105	8	13	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	113	0	0	65	0	0	198	182	65	179	178	109
Stage 1	-	-	-	-	-	-	67	67	-	111	111	-
Stage 2	-	-	-	-	-	-	131	115	-	68	67	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1476	-	-	1537	-	-	761	712	999	783	716	945
Stage 1	-	-	-	-	-	-	943	839	-	894	804	-
Stage 2	-	-	-	-	-	-	873	800	-	942	839	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1476	-	-	1537	-	-	728	711	999	780	715	945
Mov Cap-2 Maneuver	-	-	-	-	-	-	728	711	-	780	715	-
Stage 1	-	-	-	-	-	-	942	838	-	893	803	-
Stage 2	-	-	-	-	-	-	836	799	-	939	838	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	10	9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	741	1476	-	-	1537	-	-	945
HCM Lane V/C Ratio	0.021	0.001	-	-	0.001	-	-	0.041
HCM Control Delay (s)	10	7.4	0	-	7.3	0	-	9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	99	0	0	106	106	99	153	106	1
Stage 1	-	-	-	-	-	-	99	99	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	146	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1494	-	-	873	784	957	814	784	1084
Stage 1	-	-	-	-	-	-	907	813	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	857	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1494	-	-	871	782	957	733	782	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	871	782	-	733	782	-
Stage 1	-	-	-	-	-	-	907	813	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	773	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.6	9.2	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1622	-	-	1494	-	-	733
HCM Lane V/C Ratio	0.098	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	9.2	0	-	-	7.4	0	-	9.9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	49	13	98	16
Future Vol, veh/h	0	60	49	13	98	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	65	53	14	107	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	67	0	-	0	125	60
Stage 1	-	-	-	-	60	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1535	-	-	-	870	1005
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	958	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1535	-	-	-	870	1005
Mov Cap-2 Maneuver	-	-	-	-	870	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1535	-	-	-	887
HCM Lane V/C Ratio	-	-	-	-	0.14
HCM Control Delay (s)	0	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	123	0	0	60	0	0	0	1	7	0	2
Future Vol, veh/h	36	123	0	0	60	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	134	0	0	65	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	65	0	0	134	0	0	278	277	134	278	277	65
Stage 1	-	-	-	-	-	-	212	212	-	65	65	-
Stage 2	-	-	-	-	-	-	66	65	-	213	212	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1537	-	-	1451	-	-	674	631	915	674	631	999
Stage 1	-	-	-	-	-	-	790	727	-	946	841	-
Stage 2	-	-	-	-	-	-	945	841	-	789	727	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1537	-	-	1451	-	-	658	614	915	659	614	999
Mov Cap-2 Maneuver	-	-	-	-	-	-	658	614	-	659	614	-
Stage 1	-	-	-	-	-	-	769	707	-	920	841	-
Stage 2	-	-	-	-	-	-	943	841	-	767	707	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0	8.9	10.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	915	1537	-	-	1451	-	-	713
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.014
HCM Control Delay (s)	8.9	7.4	0	-	0	-	-	10.1
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

ATTACHMENT B

Year 2019 + Project and Year 2019 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	34	45	69	4	5
Future Vol, veh/h	17	34	45	69	4	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	37	49	75	4	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	124	0	-	0	160	87
Stage 1	-	-	-	-	87	-
Stage 2	-	-	-	-	73	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1463	-	-	-	831	971
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	950	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	820	971
Mov Cap-2 Maneuver	-	-	-	-	820	-
Stage 1	-	-	-	-	924	-
Stage 2	-	-	-	-	950	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1463	-	-	-	898
HCM Lane V/C Ratio	0.013	-	-	-	0.011
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	37	0	1	67	7	12	1	1	0	0	36
Future Vol, veh/h	1	37	0	1	67	7	12	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	40	0	1	73	8	13	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	81	0	0	40	0	0	141	125	40	122	121	77
Stage 1	-	-	-	-	-	-	42	42	-	79	79	-
Stage 2	-	-	-	-	-	-	99	83	-	43	42	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1517	-	-	1570	-	-	829	765	1031	853	769	984
Stage 1	-	-	-	-	-	-	972	860	-	930	829	-
Stage 2	-	-	-	-	-	-	907	826	-	971	860	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1517	-	-	1570	-	-	795	763	1031	850	767	984
Mov Cap-2 Maneuver	-	-	-	-	-	-	795	763	-	850	767	-
Stage 1	-	-	-	-	-	-	971	859	-	929	828	-
Stage 2	-	-	-	-	-	-	870	825	-	968	859	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.6	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	806	1517	-	-	1570	-	-	984
HCM Lane V/C Ratio	0.019	0.001	-	-	0.001	-	-	0.04
HCM Control Delay (s)	9.6	7.4	0	-	7.3	0	-	8.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	3	0	0	10	10	3	57	10	1
Stage 1	-	-	-	-	-	-	3	3	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	50	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1619	-	-	1008	885	1081	940	885	1084
Stage 1	-	-	-	-	-	-	1020	893	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	963	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1619	-	-	1006	883	1081	857	883	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1006	883	-	857	883	-
Stage 1	-	-	-	-	-	-	1020	893	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	880	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1081	1622	-	-	1619	-	-	857
HCM Lane V/C Ratio	0.086	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	57	28	12	71	16
Future Vol, veh/h	0	57	28	12	71	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	62	30	13	77	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	99	37
Stage 1	-	-	-	-	37	-
Stage 2	-	-	-	-	62	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1566	-	-	-	900	1035
Stage 1	-	-	-	-	985	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1566	-	-	-	900	1035
Mov Cap-2 Maneuver	-	-	-	-	900	-
Stage 1	-	-	-	-	985	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1566	-	-	-	922
HCM Lane V/C Ratio	-	-	-	-	0.103
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	36	93	0	0	38	0	0	0	1	7	0	2
Future Vol, veh/h	36	93	0	0	38	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	101	0	0	41	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	101	0	0	221	220	101	221	220	41
Stage 1	-	-	-	-	-	-	179	179	-	41	41	-
Stage 2	-	-	-	-	-	-	42	41	-	180	179	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1491	-	-	735	678	954	735	678	1030
Stage 1	-	-	-	-	-	-	823	751	-	974	861	-
Stage 2	-	-	-	-	-	-	972	861	-	822	751	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1568	-	-	1491	-	-	719	660	954	720	660	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	719	660	-	720	660	-
Stage 1	-	-	-	-	-	-	802	731	-	949	861	-
Stage 2	-	-	-	-	-	-	970	861	-	800	731	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0	8.8	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	954	1568	-	-	1491	-	-	772
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.013
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	9.7
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	97	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	2	0	0	285	285	2	287	285	97
Stage 1	-	-	-	-	-	-	2	2	-	283	283	-
Stage 2	-	-	-	-	-	-	283	283	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1496	-	-	1620	-	-	667	624	1082	665	624	959
Stage 1	-	-	-	-	-	-	1021	894	-	724	677	-
Stage 2	-	-	-	-	-	-	724	677	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1496	-	-	1620	-	-	636	586	1082	631	586	959
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	586	-	631	586	-
Stage 1	-	-	-	-	-	-	1021	894	-	724	636	-
Stage 2	-	-	-	-	-	-	680	636	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.6	9.4	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	826	1496	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.007	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.4	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	56	49	96	6	5
Future Vol, veh/h	17	56	49	96	6	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	61	53	104	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	157	0	-	0	202	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	97	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1423	-	-	-	787	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	927	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1423	-	-	-	777	949
Mov Cap-2 Maneuver	-	-	-	-	777	-
Stage 1	-	-	-	-	907	-
Stage 2	-	-	-	-	927	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1423	-	-	-	847
HCM Lane V/C Ratio	0.013	-	-	-	0.014
HCM Control Delay (s)	7.6	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	61	0	1	98	7	12	1	1	0	0	36
Future Vol, veh/h	1	61	0	1	98	7	12	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	66	0	1	107	8	13	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	115	0	0	66	0	0	201	185	66	182	181	111
Stage 1	-	-	-	-	-	-	68	68	-	113	113	-
Stage 2	-	-	-	-	-	-	133	117	-	69	68	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1474	-	-	1536	-	-	757	709	998	779	713	942
Stage 1	-	-	-	-	-	-	942	838	-	892	802	-
Stage 2	-	-	-	-	-	-	870	799	-	941	838	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1474	-	-	1536	-	-	724	708	998	776	712	942
Mov Cap-2 Maneuver	-	-	-	-	-	-	724	708	-	776	712	-
Stage 1	-	-	-	-	-	-	941	837	-	891	801	-
Stage 2	-	-	-	-	-	-	833	798	-	938	837	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	10	9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	737	1474	-	-	1536	-	-	942
HCM Lane V/C Ratio	0.021	0.001	-	-	0.001	-	-	0.042
HCM Control Delay (s)	10	7.4	0	-	7.3	0	-	9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	99	0	0	106	106	99	153	106	1
Stage 1	-	-	-	-	-	-	99	99	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	146	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1494	-	-	873	784	957	814	784	1084
Stage 1	-	-	-	-	-	-	907	813	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	857	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1494	-	-	871	782	957	733	782	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	871	782	-	733	782	-
Stage 1	-	-	-	-	-	-	907	813	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	773	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.6	9.2	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1622	-	-	1494	-	-	733
HCM Lane V/C Ratio	0.098	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	9.2	0	-	-	7.4	0	-	9.9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	62	50	13	98	16
Future Vol, veh/h	0	62	50	13	98	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	67	54	14	107	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	68	0	-	0	128	61
Stage 1	-	-	-	-	61	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1533	-	-	-	866	1004
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1533	-	-	-	866	1004
Mov Cap-2 Maneuver	-	-	-	-	866	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1533	-	-	-	883
HCM Lane V/C Ratio	-	-	-	-	0.14
HCM Control Delay (s)	0	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	125	0	0	61	0	0	0	1	7	0	2
Future Vol, veh/h	36	125	0	0	61	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	136	0	0	66	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	66	0	0	136	0	0	281	280	136	281	280	66
Stage 1	-	-	-	-	-	-	214	214	-	66	66	-
Stage 2	-	-	-	-	-	-	67	66	-	215	214	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1536	-	-	1448	-	-	671	628	913	671	628	998
Stage 1	-	-	-	-	-	-	788	725	-	945	840	-
Stage 2	-	-	-	-	-	-	943	840	-	787	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1536	-	-	1448	-	-	656	611	913	656	611	998
Mov Cap-2 Maneuver	-	-	-	-	-	-	656	611	-	656	611	-
Stage 1	-	-	-	-	-	-	767	705	-	919	840	-
Stage 2	-	-	-	-	-	-	941	840	-	765	705	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0	8.9	10.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	913	1536	-	-	1448	-	-	710
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.014
HCM Control Delay (s)	8.9	7.4	0	-	0	-	-	10.1
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

ATTACHMENT C

Year 2027 + Project and Year 2027 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	39	51	70	4	6
Future Vol, veh/h	18	39	51	70	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	42	55	76	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	131	0	-	0	175	93
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	82	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1454	-	-	-	815	964
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1454	-	-	-	804	964
Mov Cap-2 Maneuver	-	-	-	-	804	-
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	941	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1454	-	-	-	893
HCM Lane V/C Ratio	0.013	-	-	-	0.012
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	43	0	1	73	7	14	1	1	0	0	36
Future Vol, veh/h	1	43	0	1	73	7	14	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	47	0	1	79	8	15	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	87	0	0	47	0	0	154	138	47	135	134	83
Stage 1	-	-	-	-	-	-	49	49	-	85	85	-
Stage 2	-	-	-	-	-	-	105	89	-	50	49	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1509	-	-	1560	-	-	813	753	1022	836	757	976
Stage 1	-	-	-	-	-	-	964	854	-	923	824	-
Stage 2	-	-	-	-	-	-	901	821	-	963	854	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1509	-	-	1560	-	-	779	751	1022	833	755	976
Mov Cap-2 Maneuver	-	-	-	-	-	-	779	751	-	833	755	-
Stage 1	-	-	-	-	-	-	963	853	-	922	823	-
Stage 2	-	-	-	-	-	-	864	820	-	960	853	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.7	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	789	1509	-	-	1560	-	-	976
HCM Lane V/C Ratio	0.022	0.001	-	-	0.001	-	-	0.04
HCM Control Delay (s)	9.7	7.4	0	-	7.3	0	-	8.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	4	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	4	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	4	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	4	0	0	11	11	4	58	11	1
Stage 1	-	-	-	-	-	-	4	4	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	51	4	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1618	-	-	1007	884	1080	939	884	1084
Stage 1	-	-	-	-	-	-	1018	892	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	962	892	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1618	-	-	1005	882	1080	856	882	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1005	882	-	856	882	-
Stage 1	-	-	-	-	-	-	1018	892	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	879	892	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1080	1622	-	-	1618	-	-	856
HCM Lane V/C Ratio	0.087	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	66	32	14	72	16
Future Vol, veh/h	0	66	32	14	72	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	35	15	78	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	115	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1557	-	-	-	881	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1557	-	-	-	881	1027
Mov Cap-2 Maneuver	-	-	-	-	881	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	951	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1557	-	-	-	904
HCM Lane V/C Ratio	-	-	-	-	0.106
HCM Control Delay (s)	0	-	-	-	9.5
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	103	0	0	44	0	0	0	1	7	0	2
Future Vol, veh/h	36	103	0	0	44	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	112	0	0	48	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	112	0	0	239	238	112	239	238	48
Stage 1	-	-	-	-	-	-	190	190	-	48	48	-
Stage 2	-	-	-	-	-	-	49	48	-	191	190	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1478	-	-	715	663	941	715	663	1021
Stage 1	-	-	-	-	-	-	812	743	-	965	855	-
Stage 2	-	-	-	-	-	-	964	855	-	811	743	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1559	-	-	1478	-	-	699	645	941	699	645	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	699	645	-	699	645	-
Stage 1	-	-	-	-	-	-	790	723	-	939	855	-
Stage 2	-	-	-	-	-	-	962	855	-	788	723	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0	8.8	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	941	1559	-	-	1478	-	-	752
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.013
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	9.9
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2	1	86	2	0	1	1	3	0	0	0
Future Vol, veh/h	0	2	1	86	2	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2	1	93	2	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2	0	0	3	0	0	191	191	3	193	191	2
Stage 1	-	-	-	-	-	-	3	3	-	188	188	-
Stage 2	-	-	-	-	-	-	188	188	-	5	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1620	-	-	1619	-	-	769	704	1081	767	704	1082
Stage 1	-	-	-	-	-	-	1020	893	-	814	745	-
Stage 2	-	-	-	-	-	-	814	745	-	1017	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1620	-	-	1619	-	-	735	663	1081	730	663	1082
Mov Cap-2 Maneuver	-	-	-	-	-	-	735	663	-	730	663	-
Stage 1	-	-	-	-	-	-	1020	893	-	814	702	-
Stage 2	-	-	-	-	-	-	767	702	-	1013	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.2	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	886	1620	-	-	1619	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	39	51	71	4	6
Future Vol, veh/h	18	39	51	71	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	42	55	77	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	132	0	-	0	176	94
Stage 1	-	-	-	-	94	-
Stage 2	-	-	-	-	82	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1453	-	-	-	814	963
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1453	-	-	-	803	963
Mov Cap-2 Maneuver	-	-	-	-	803	-
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	941	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1453	-	-	-	892
HCM Lane V/C Ratio	0.013	-	-	-	0.012
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	43	0	1	74	7	14	1	1	0	0	36
Future Vol, veh/h	1	43	0	1	74	7	14	1	1	0	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	47	0	1	80	8	15	1	1	0	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	47	0	0	155	139	47	136	135	84
Stage 1	-	-	-	-	-	-	49	49	-	86	86	-
Stage 2	-	-	-	-	-	-	106	90	-	50	49	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1560	-	-	812	752	1022	835	756	975
Stage 1	-	-	-	-	-	-	964	854	-	922	824	-
Stage 2	-	-	-	-	-	-	900	820	-	963	854	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1508	-	-	1560	-	-	778	750	1022	832	754	975
Mov Cap-2 Maneuver	-	-	-	-	-	-	778	750	-	832	754	-
Stage 1	-	-	-	-	-	-	963	853	-	921	823	-
Stage 2	-	-	-	-	-	-	863	819	-	960	853	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.7	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	788	1508	-	-	1560	-	-	975
HCM Lane V/C Ratio	0.022	0.001	-	-	0.001	-	-	0.04
HCM Control Delay (s)	9.7	7.4	0	-	7.3	0	-	8.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	5	0	3	2	0	0	0	86	1	0	0
Future Vol, veh/h	0	5	0	3	2	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	5	0	3	2	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2	0	0	5	0	0	13	13	5	60	13	2
Stage 1	-	-	-	-	-	-	5	5	-	8	8	-
Stage 2	-	-	-	-	-	-	8	8	-	52	5	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1620	-	-	1616	-	-	1004	881	1078	936	881	1082
Stage 1	-	-	-	-	-	-	1017	892	-	1013	889	-
Stage 2	-	-	-	-	-	-	1013	889	-	961	892	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1620	-	-	1616	-	-	1002	879	1078	854	879	1082
Mov Cap-2 Maneuver	-	-	-	-	-	-	1002	879	-	854	879	-
Stage 1	-	-	-	-	-	-	1017	892	-	1013	887	-
Stage 2	-	-	-	-	-	-	1011	887	-	878	892	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4.3	8.7	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1078	1620	-	-	1616	-	-	854
HCM Lane V/C Ratio	0.087	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.7	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	66	32	14	73	16
Future Vol, veh/h	0	66	32	14	73	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	35	15	79	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	115	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1557	-	-	-	881	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1557	-	-	-	881	1027
Mov Cap-2 Maneuver	-	-	-	-	881	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	951	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1557	-	-	-	904
HCM Lane V/C Ratio	-	-	-	-	0.107
HCM Control Delay (s)	0	-	-	-	9.5
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	36	104	0	0	44	0	0	0	1	7	0	2
Future Vol, veh/h	36	104	0	0	44	0	0	0	1	7	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	113	0	0	48	0	0	0	1	8	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	113	0	0	240	239	113	240	239	48
Stage 1	-	-	-	-	-	-	191	191	-	48	48	-
Stage 2	-	-	-	-	-	-	49	48	-	192	191	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1476	-	-	714	662	940	714	662	1021
Stage 1	-	-	-	-	-	-	811	742	-	965	855	-
Stage 2	-	-	-	-	-	-	964	855	-	810	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1559	-	-	1476	-	-	698	644	940	698	644	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	698	644	-	698	644	-
Stage 1	-	-	-	-	-	-	789	722	-	939	855	-
Stage 2	-	-	-	-	-	-	962	855	-	787	722	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0	8.8	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	940	1559	-	-	1476	-	-	751
HCM Lane V/C Ratio	0.001	0.025	-	-	-	-	-	0.013
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	9.9
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

ATTACHMENT 2

Second Access Alternative Memo

August 12, 2019

To: Ms. Patricia Valenzuela
Imperial County Planning & Development Services
801 W. Main Street
El Centro, CA 92243

From: Justin Rasas, P.E.

RE: Drew Solar Alternative Access #2 with one SR-98 access and no access on Kubler

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The purpose of this memo is to document the analysis of Drew Solar traffic using Pulliam Road for 2 access points and 1 access point on SR-98 for the SE ¼ Section of Drew Solar, and using Drew Road for 2 access points instead of 2 access points on Kubler Road for the NW ¼ Section and the west half of the NE ¼ Section of Drew Solar. With no further access points on Kubler this memo documents the refined distribution around the site due to re-located driveways and the applicant's proposed restriction of employees and deliveries from using Kubler Road between Pulliam Road and Drew Road. In summary, the refined access includes 1 access point on SR-98 for the SE ¼ Section of Drew Solar, and 2 access points on Drew Road instead of 2 access points on Kubler Road for the NW ¼ Section and the west half of the NE ¼ Section of Drew Solar.

As shown in **Figure 1** (included at the end of the text and tables to keep text continuity), a project driveway is proposed on SR-98 and the remaining project driveways are located along Pulliam Road and Drew Road. On Drew Road, two of the driveways are near SR-98 and one driveway is just north of Mr. Signal Drain No. 1. The most northerly driveway on Drew Road is for emergency only access. Therefore, the applicant's restriction of travel on Kubler Rd between Drew Road and Pulliam Road does not result in a significant amount of out of way travel. The refined project distribution is shown in **Figure 2** with the project trip assignment shown in **Figure 3**.

This analysis covers the intersections and segments that have the refined distribution without SR-98 access and eliminated Kubler Rd project driveways. The intersections and segments with new volumes and LOS include:

1) Intersection of Kubler Rd/Pulliam Rd (int #4)
2) Intersection of SR-98/Drew Rd (int #6)
3) Intersection of SR-98/Pulliam Rd (int #7)
4) Intersection of SR-98/Proposed Project Driveway (int #8)
5) Segment of Pulliam Rd from Kubler Rd to SR-98
6) Segment of SR-98 from Drew Rd to Pulliam Rd

The remaining study intersections and segments remain unchanged from the 8/8/2018 traffic study. The study scenarios for this memo include:

1) Year 2017 + project
2) Year 2017 + project + cumulative

3) Year 2019 + project
4) Year 2019 + project + cumulative
5) Year 2027 + project
6) Year 2027 + project + cumulative

Year 2017 Scenario

The year 2017 + project volumes are shown in **Figure 4** and year 2017 + project + cumulative volumes are shown in **Figure 5**. The intersection LOS for year 2017 + project conditions are shown in **Table 1** and **Table 2** for segment operations. The intersection LOS for year 2017 + project + cumulative conditions are shown in **Table 3** and **Table 4** for segment operations. LOS calculations are included in **Attachment A**.

Table 1: Year 2017 + Project Intersection Operations

Intersection & (Control)[1]	Movement	Year 2017 Delay[2]	Year 2017 LOS[3]	Year 2017 + Project Delay[2]	Year 2017 + Project LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	8.6	A	9.1	A	0.5	None
Kubler Rd (U)	Leg	8.6	A	9.2	A	0.6	None
6) Drew Rd at	Minor	8.7	A	9.1	A	0.4	None
SR-98 (U)	Leg	8.9	A	9.4	A	0.5	None
7) Pulliam Rd at	Minor	9.0	A	9.7	A	0.7	None
SR-98 (U)	Leg	8.6	A	8.8	A	0.2	None
8) SR-98 at Project	Minor	DNE	NA	1.2	A	NA	None
Driveway (U)	Leg	DNE	NA	9.4	A	NA	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative. DNE: Does Not Exist NA: Not Applicable.

Table 2: Year 2017 + Project Segment Operations

Segment	Classification (as built)	Year 2017 Daily Volume	Year 2017 LOS C Capacity	Year 2017 V/C	Year 2017 LOS	Project Daily Volume	Year 2017 + Project Daily Volume	Year 2017 + Project LOS C Capacity	Year 2017 + Project V/C	Year 2017 + Project LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,090	7,100	0.29	B	283	2,373	7,100	0.33	B	0.04	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 3: Year 2017 + Project + Cumulative Intersection Operations

Intersection & (Control)[1]	Movement	Peak Hour	Year 2017 + Cumulative Delay[2]	Year 2017 + Cumulative LOS[3]	Year 2017 + Cumulative + Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	AM	9.0	A	9.4	A	0.4	None
Kubler Rd (U)	Leg	PM	9.1	A	9.9	A	0.8	None
6) Drew Rd at	Minor	AM	8.9	A	9.3	A	0.4	None
SR-98 (U)	Leg	PM	9.3	A	9.8	A	0.5	None
7) Pulliam Rd at	Minor	AM	9.4	A	10.2	B	0.8	None
SR-98 (U)	Leg	PM	8.8	A	9.0	A	0.2	None
8) SR-98 at Project	Minor	AM	0.0	A	0.8	A	0.8	None
Driveway (U)	Leg	PM	0.0	A	9.7	A	9.7	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 4: Year 2017 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2017 + Cumulative Daily Volume	Year 2017 + Cumulative LOS C Capacity	V/C	LOS	Project Daily Volumes	Year 2017 + Cumulative + Project Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	29	7,100	0.00	A	262	291	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,221	7,100	0.31	B	283	2,504	7,100	0.35	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2017 + project and 2017 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

Year 2019 Scenario

The year 2019 + project volumes are shown in **Figure 6** and year 2019 + project + cumulative volumes are shown in **Figure 7**. The intersection LOS for year 2019 + project conditions are shown in **Table 5** and **Table 6** for segment operations. The intersection LOS for year 2019 + project + cumulative conditions are shown in **Table 7** and **Table 8** for segment operations. LOS calculations are included in **Attachment B**.

Table 5: Year 2019 + Project Intersection Operations

Intersection & (Control)[1]	Movement	Year 2019 Delay[2]	Year 2019 LOS[3]	Year 2019 + Project Delay[2]	Year 2019 + Project LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	8.6	A	9.1	A	0.5	None
Kubler Rd (U)	Leg	8.6	A	9.2	A	0.6	None
6) Drew Rd at	Minor	8.7	A	9.1	A	0.4	None
SR-98 (U)	Leg	8.9	A	9.5	A	0.6	None
7) Pulliam Rd at	Minor	9.1	A	9.8	A	0.7	None
SR-98 (U)	Leg	8.6	A	8.8	A	0.2	None
8) SR-98 at Project	Minor	DNE	NA	1.2	A	NA	None
Driveway (U)	Leg	DNE	NA	9.4	A	NA	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative. DNE: Does Not Exist NA: Not Applicable.

Table 6: Year 2019 + Project Segment Operations

Segment	Classification (as built)	Year 2019 Daily Volume	Year 2019 LOS C Capacity	Year 2019 V/C	Year 2019 LOS	Project Daily Volume	Year 2019 + Project Daily Volume	Year 2019 + Project LOS C Capacity	Year 2019 + Project V/C	Year 2019 + Project LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,165	7,100	0.30	B	283	2,448	7,100	0.34	B	0.04	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 7: Year 2019 + Project + Cumulative Intersection Operations

Intersection & (Control)[1]	Movement	Peak Hour	Year 2019 + Cumulative Delay[2]	Year 2019 + Cumulative LOS[3]	Year 2019 + Cumulative + Project Delay[2]	Year 2019 + Cumulative + Project LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	AM	9.0	A	9.4	A	0.4	None
Kubler Rd (U)	Leg	PM	9.1	A	9.9	A	0.8	None
6) Drew Rd at	Minor	AM	8.9	A	9.3	A	0.4	None
SR-98 (U)	Leg	PM	9.3	A	9.9	A	0.6	None
7) Pulliam Rd at	Minor	AM	9.4	A	10.2	B	0.8	None
SR-98 (U)	Leg	PM	8.8	A	9.0	A	0.2	None
8) SR-98 at Project	Minor	AM	0.0	A	0.8	A	0.8	None
Driveway (U)	Leg	PM	0.0	A	9.8	A	9.8	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 8: Year 2019 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2019 + Cumulative Daily Volume	Year 2019 + Cumulative LOS C Capacity	Year 2019 + Cumulative V/C	Year 2019 + Cumulative LOS	Project Daily Volumes	Year 2019 + Cumulative + Project Daily Volume	Year 2019 + Cumulative + Project LOS C Capacity	Year 2019 + Cumulative + Project V/C	Year 2019 + Cumulative + Project LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	30	7,100	0.00	A	262	292	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,296	7,100	0.32	B	283	2,579	7,100	0.36	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2019 + project and 2019 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

Year 2027 Scenario

The year 2027 + project volumes are shown in **Figure 8** and year 2027 + project + cumulative volumes are shown in **Figure 9**. The intersection LOS for year 2027 + project conditions are shown in **Table 9** and **Table 10** for segment operations. The intersection LOS for year 2027 + project + cumulative conditions are shown in **Table 11** and **Table 12** for segment operations. LOS calculations are included in **Attachment C**.

Table 9: Year 2027 + Project Intersection Operations

Intersection & (Control)[1]	Movement	Year 2027 Delay[2]	Year 2027 LOS[3]	Year 2027 + Project Delay[2]	Year 2027 + Project LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at Kubler Rd (U)	Minor Leg	8.6	A	9.1	A	0.5	None
		8.6	A	9.2	A	0.6	None
6) Drew Rd at SR-98 (U)	Minor Leg	8.7	A	9.1	A	0.4	None
		9.0	A	9.6	A	0.6	None
7) Pulliam Rd at SR-98 (U)	Minor Leg	9.1	A	9.9	A	0.8	None
		8.7	A	8.9	A	0.2	None
8) SR-98 at Project Driveway (U)	Minor Leg	DNE	NA	1.0	A	NA	None
		DNE	NA	9.5	A	NA	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative. DNE: Does Not Exist NA: Not Applicable.

Table 10: Year 2027 + Project Segment Operations

Segment	Classification (as built)	Year 2027 Daily Volume	Year 2027 LOS C Capacity	Year 2027 V/C	Year 2027 LOS	Project Daily Volume	Year 2027 + Project Daily Volume	Year 2027 + Project LOS C Capacity	Year 2027 + Project V/C	Year 2027 + Project LOS	Change in V/C	Impact?
Pulliam Road												
Kubler Rd to SR-98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	0.04	None
SR-98												
Drew Rd to Pulliam Rd	State Highway (2U)	2,498	7,100	0.35	B	283	2,781	7,100	0.39	B	0.04	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Table 11: Year 2027 + Project + Cumulative Intersection Operations

Intersection & (Control)[1]	Movement	Peak Hour	Year 2027 + Cumulative Delay[2]	Year 2027 + Cumulative LOS[3]	Year 2027 + Cumulative + Project Delay[2]	LOS[3]	Delta[4]	Impact[5]
4) Pulliam Rd at	Minor	AM	8.7	A	9.1	A	0.4	None
Kubler Rd (U)	Leg	PM	8.6	A	9.2	A	0.6	None
6) Drew Rd at	Minor	AM	8.7	A	9.1	A	0.4	None
SR-98 (U)	Leg	PM	9.0	A	9.6	A	0.6	None
7) Pulliam Rd at	Minor	AM	9.1	A	9.9	A	0.8	None
SR-98 (U)	Leg	PM	8.7	A	8.9	A	0.2	None
8) SR-98 at Projec	Minor	AM	0.0	A	1.0	A	1.0	None
Driveway (U)	Leg	PM	0.0	A	9.5	A	9.5	None

Notes: 1) Intersection Control - (S) Signalized, (U) Unsignalized. 2) Delay - HCM Average Control Delay in seconds. 3) LOS: Level of Service. Minor Leg: approach LOS of minor/lesser roadway. All: combined LOS for all approaches. 4) Delta is the increase in delay from project. 5) Type of impact: none, direct, or cumulative.

Table 12: Year 2027 + Project + Cumulative Segment Operations

Segment	Classification (as built)	Year 2027 + Cumulative Daily Volume	Year 2027 + Cumulative LOS C Capacity	V/C	LOS	Project Daily Volumes	Year 2027 + Cumulative + Project Daily Volume	LOS C Capacity	V/C	LOS	Impact?
Pulliam Road											
Kubler Rd to SR-98	Minor (2U)	35	7,100	0.00	A	262	297	7,100	0.04	A	None
SR-98											
Drew Rd to Pulliam Rd	State Highway (2U)	2,503	7,100	0.35	B	283	2,786	7,100	0.39	B	None

Notes: Classification based on 1/29/08 Circulation and Scenic Highways Element. 2U = 2 lane undivided roadway. Daily volume is a 24 hour volume. LOS: Level of Service. LOS based on actual number of lanes currently constructed. V/C: Volume to Capacity ratio. Impact? = type of impact (none, cumulative, or direct).

Under existing year 2027 + project and 2027 + project + cumulative conditions, the study intersection, roadways, and State Route were calculated to operate at LOS B or better with no significant project impacts.

CONCLUSION

The redistribution around the project site due to keeping a project driveway on SR-98 and shifting two project driveways from Kubler Road to Drew Road did not change the conclusions of the 8/8/2018 traffic study. This memo and analysis has documented LOS B or better conditions with no significant project impacts.

Figure 1: Site Plan with New Driveway Locations

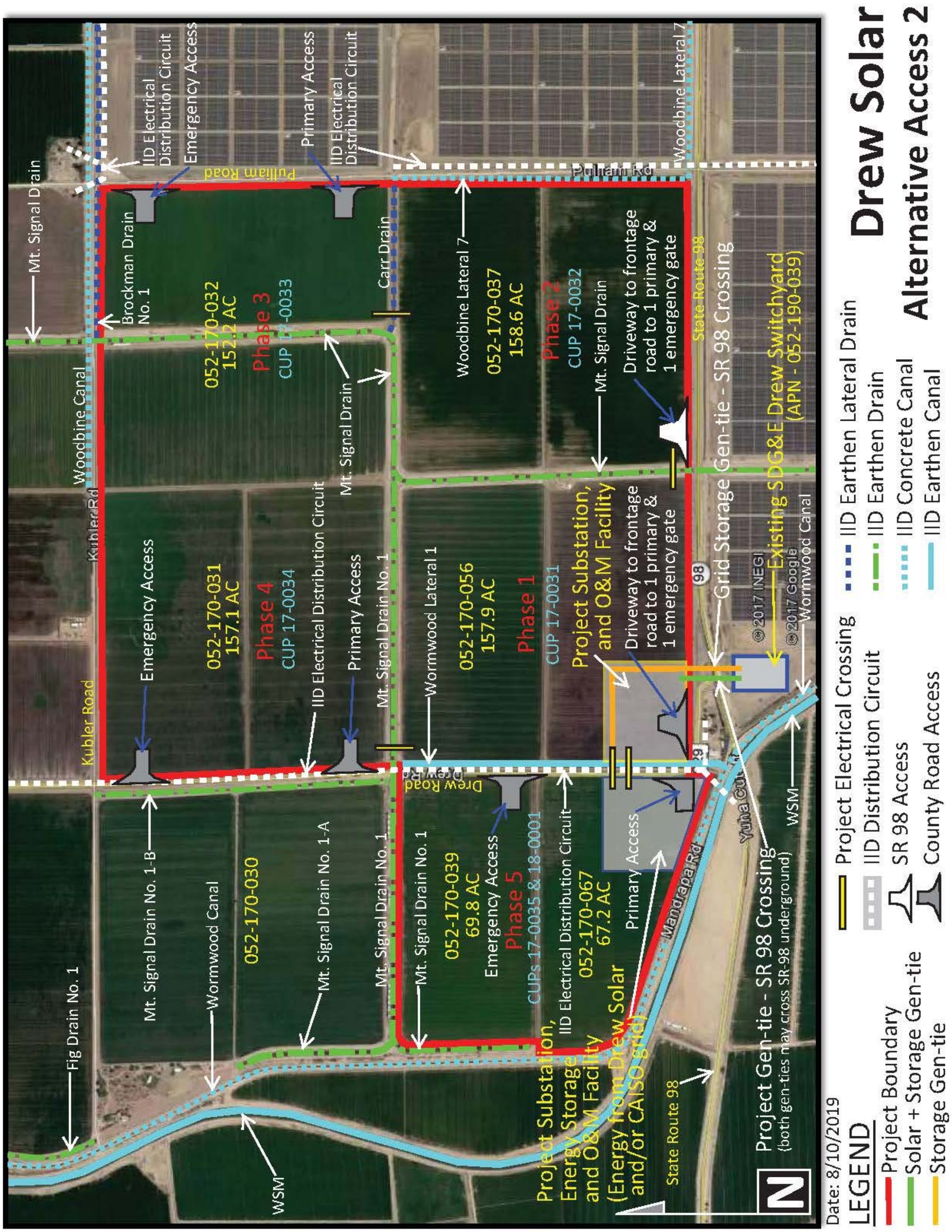
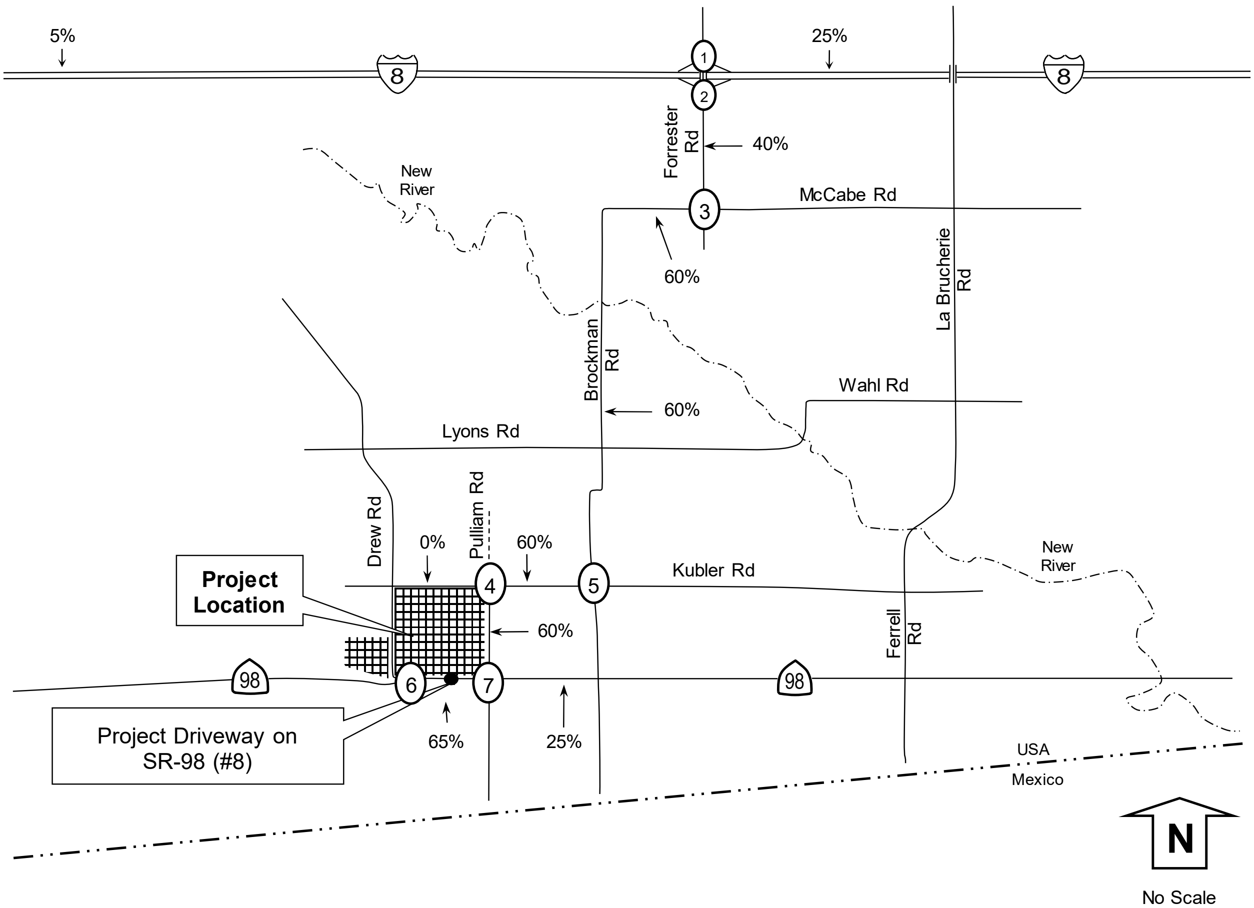


Figure 2: New Project Distribution Immediately Around Project Site



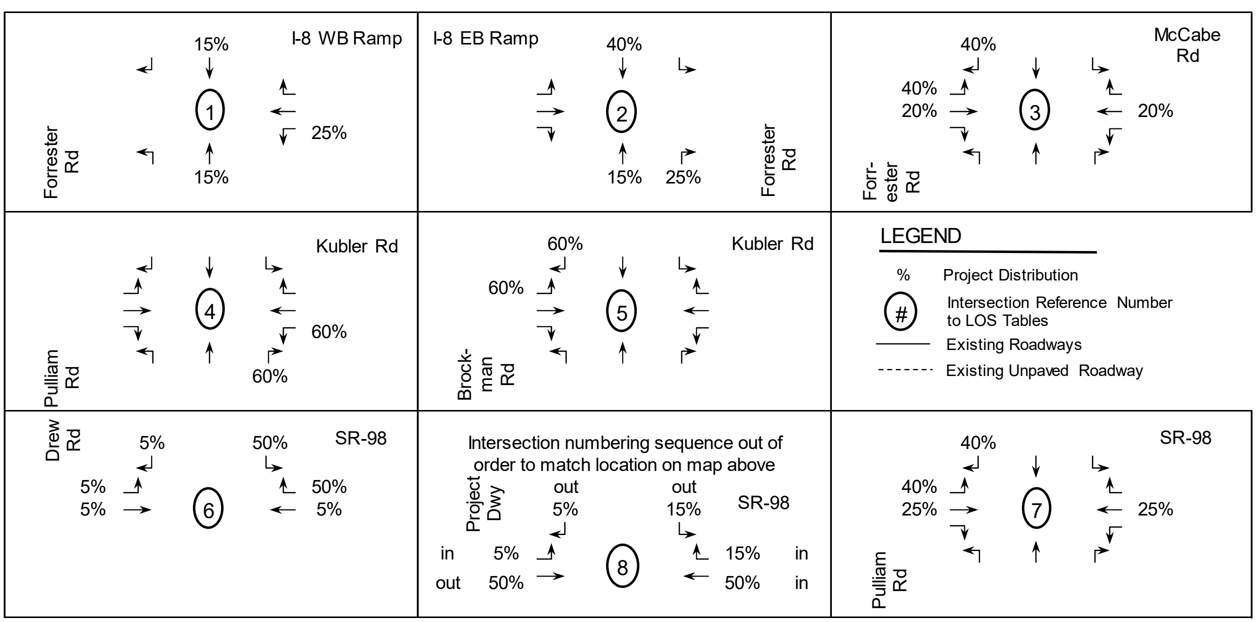


Figure 3: New Project Assignment Immediately Around Project Site

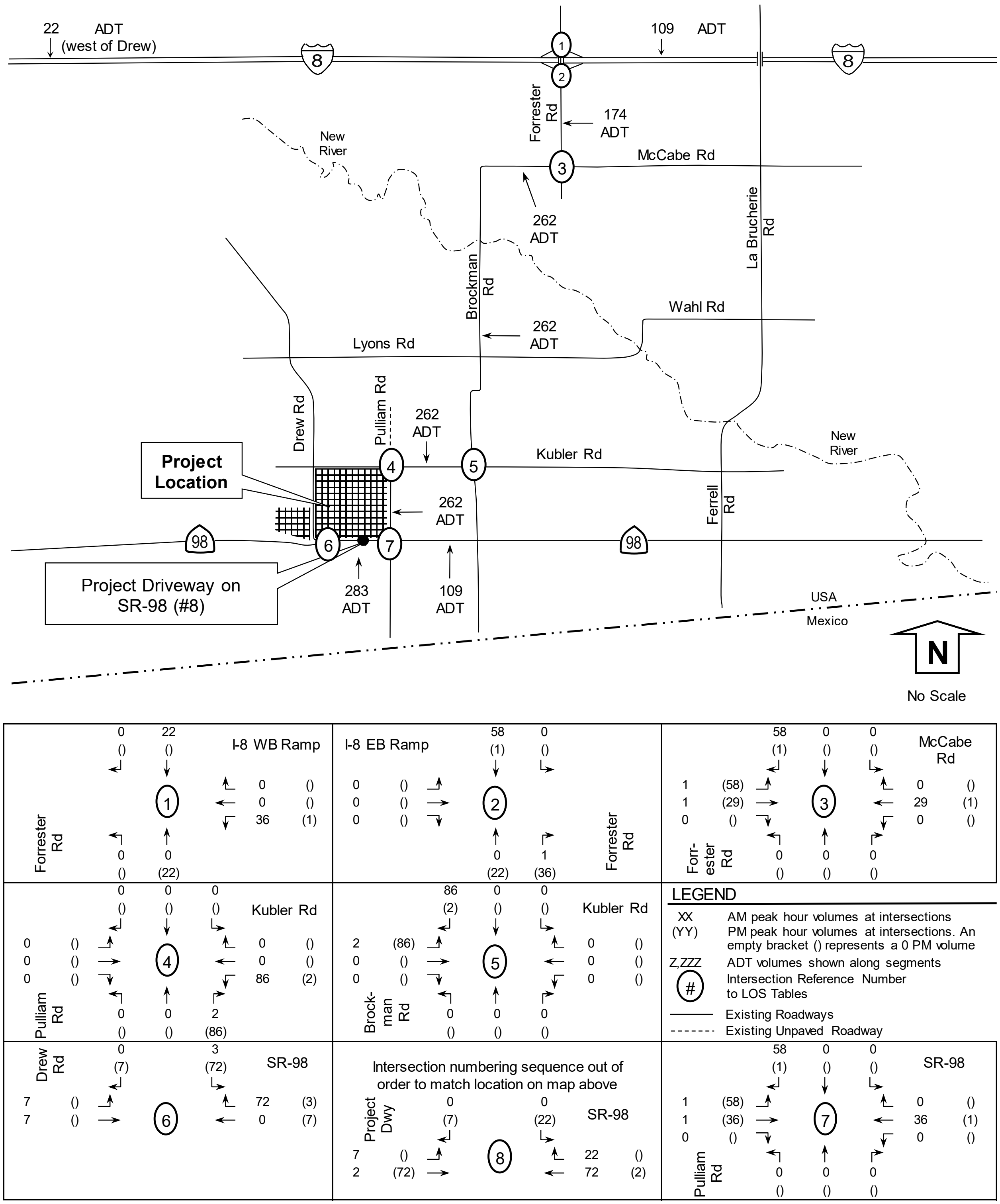
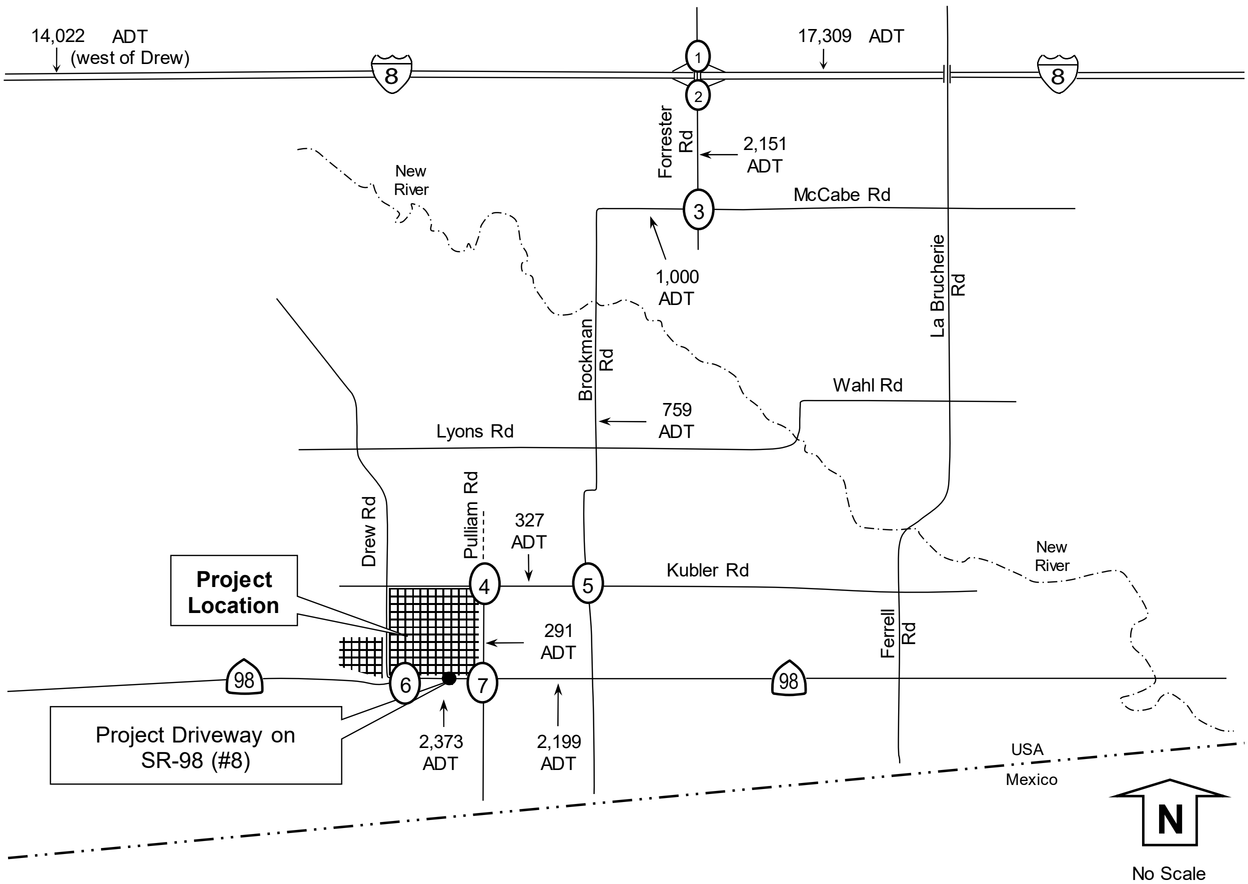


Figure 4: Year 2017 + Project Volumes



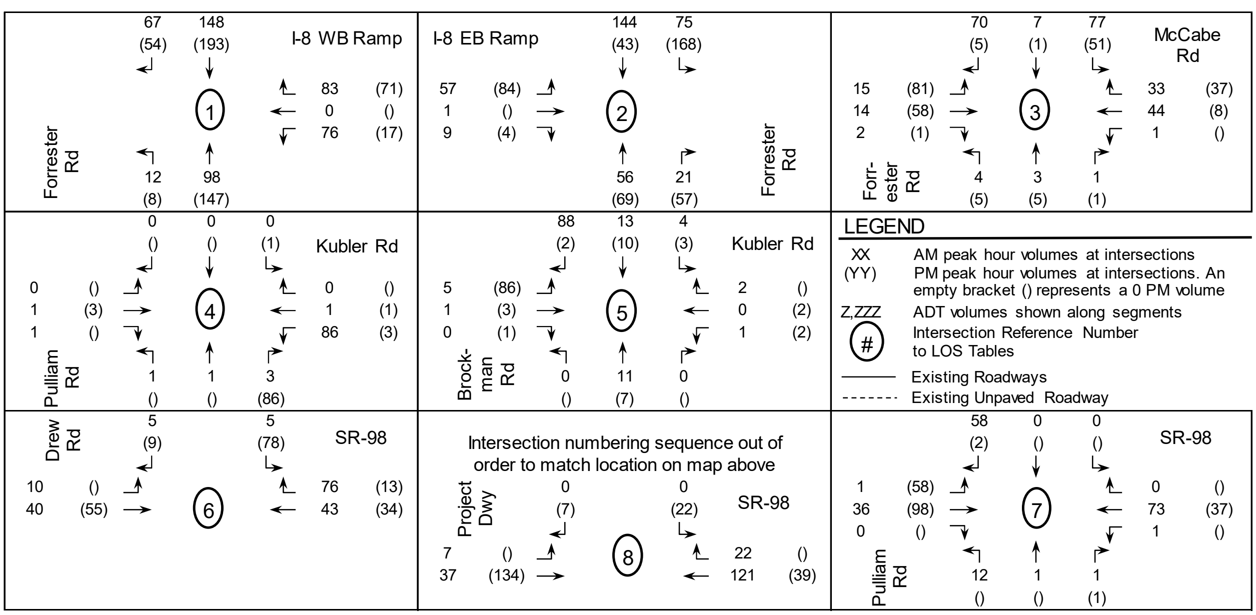
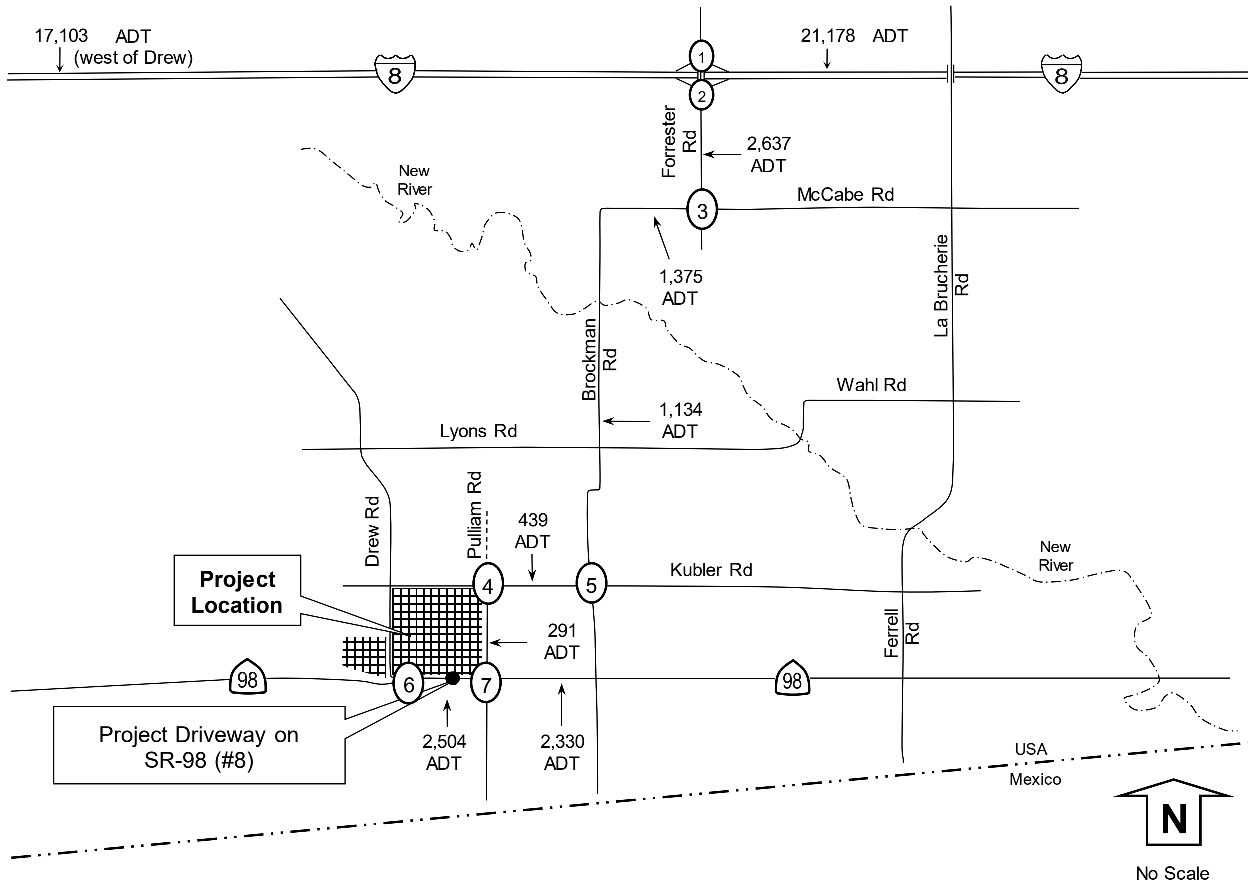


Figure 5: Year 2017 + Project + Cumulative Volumes



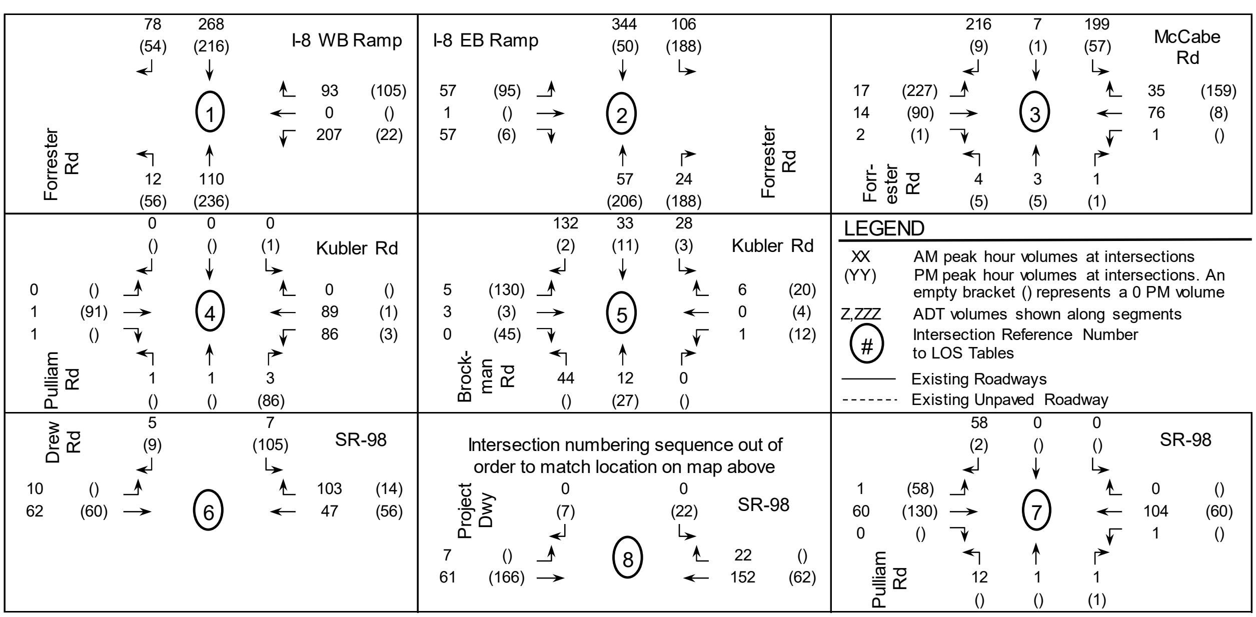


Figure 6: Year 2019 + Project Volumes

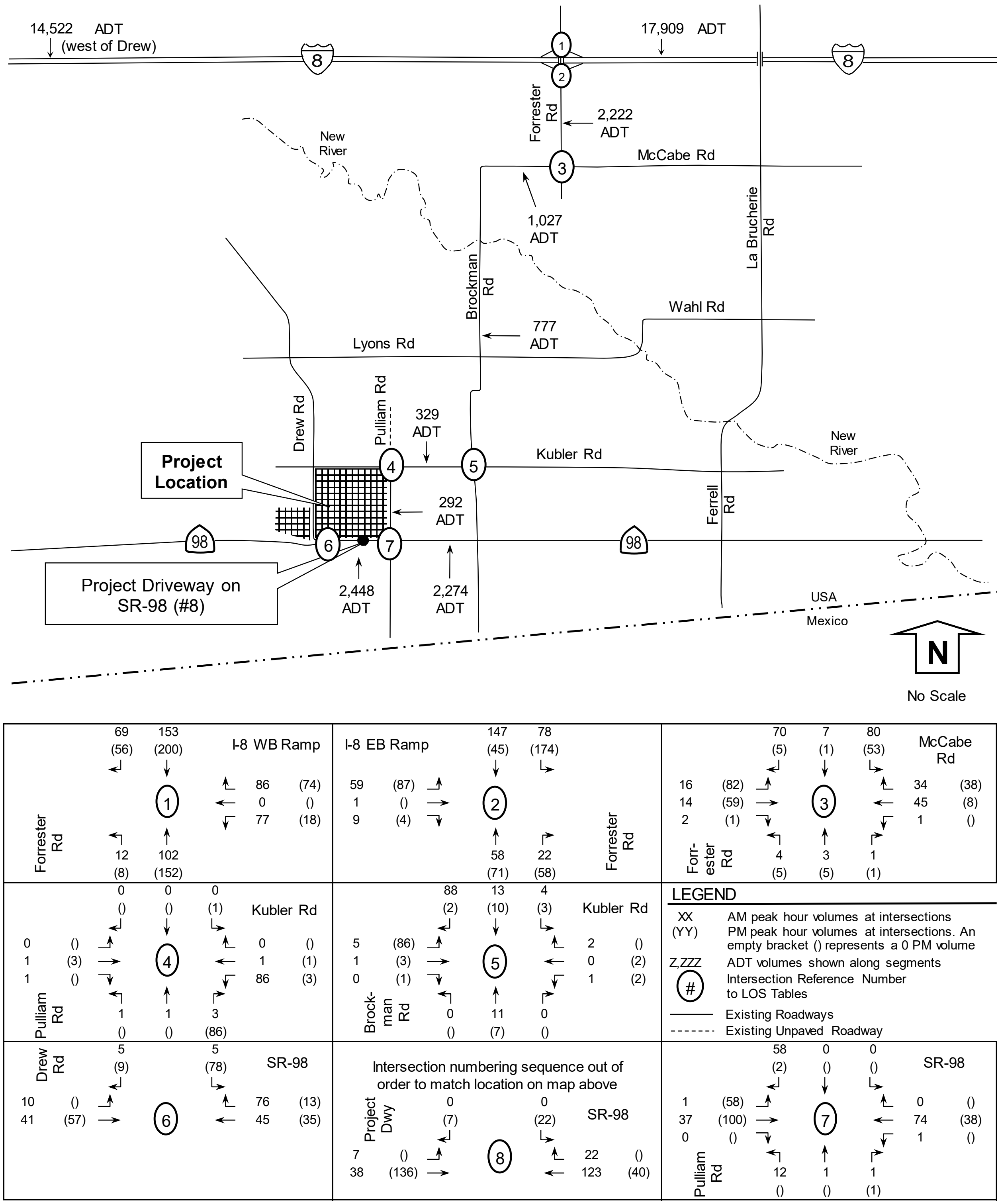
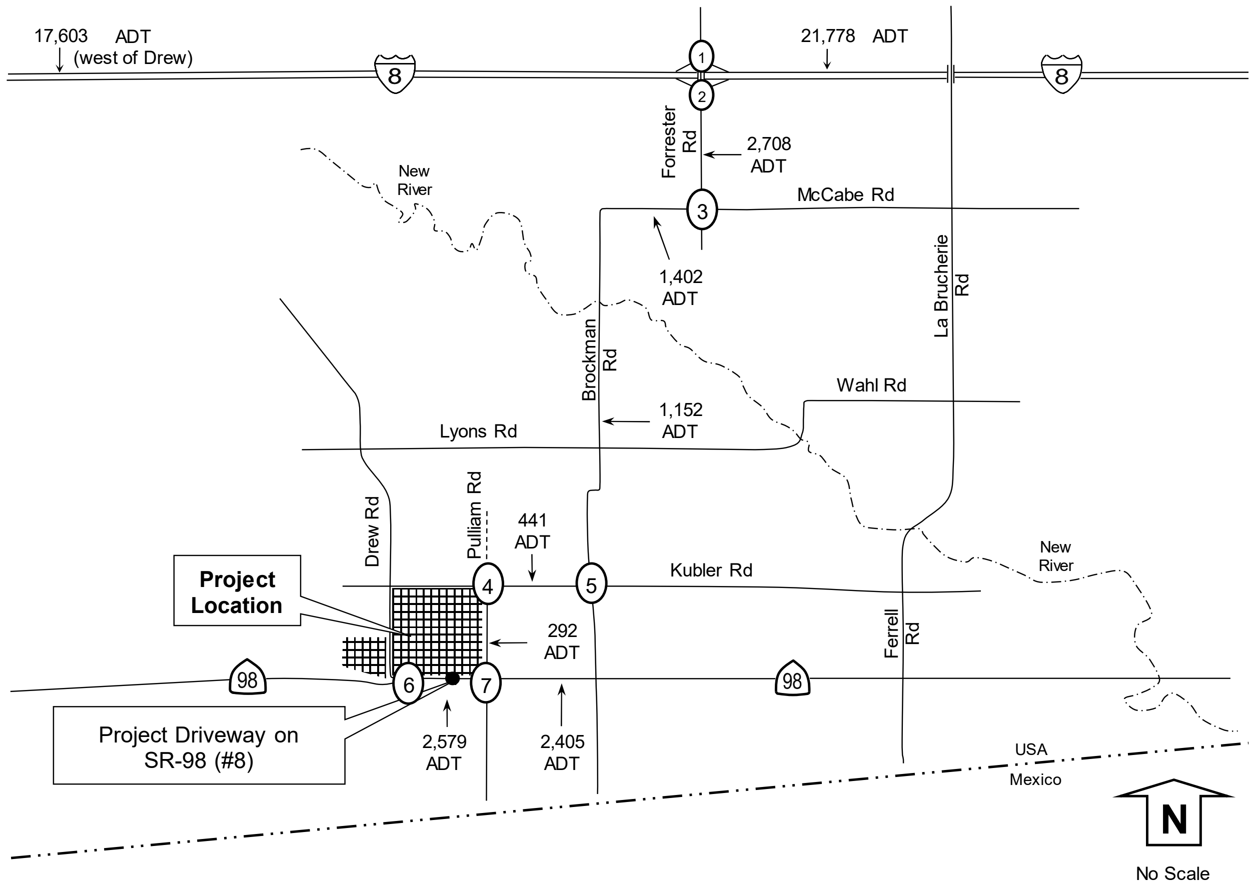


Figure 7: Year 2019 + Project + Cumulative Volumes



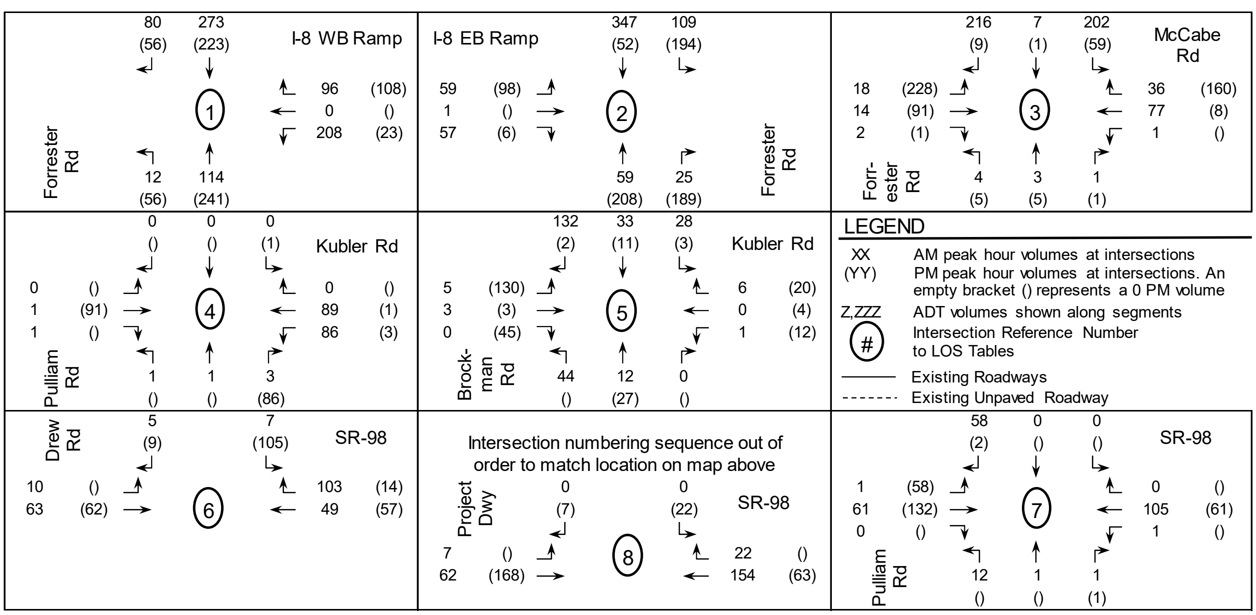


Figure 8: Year 2027 + Project Volumes

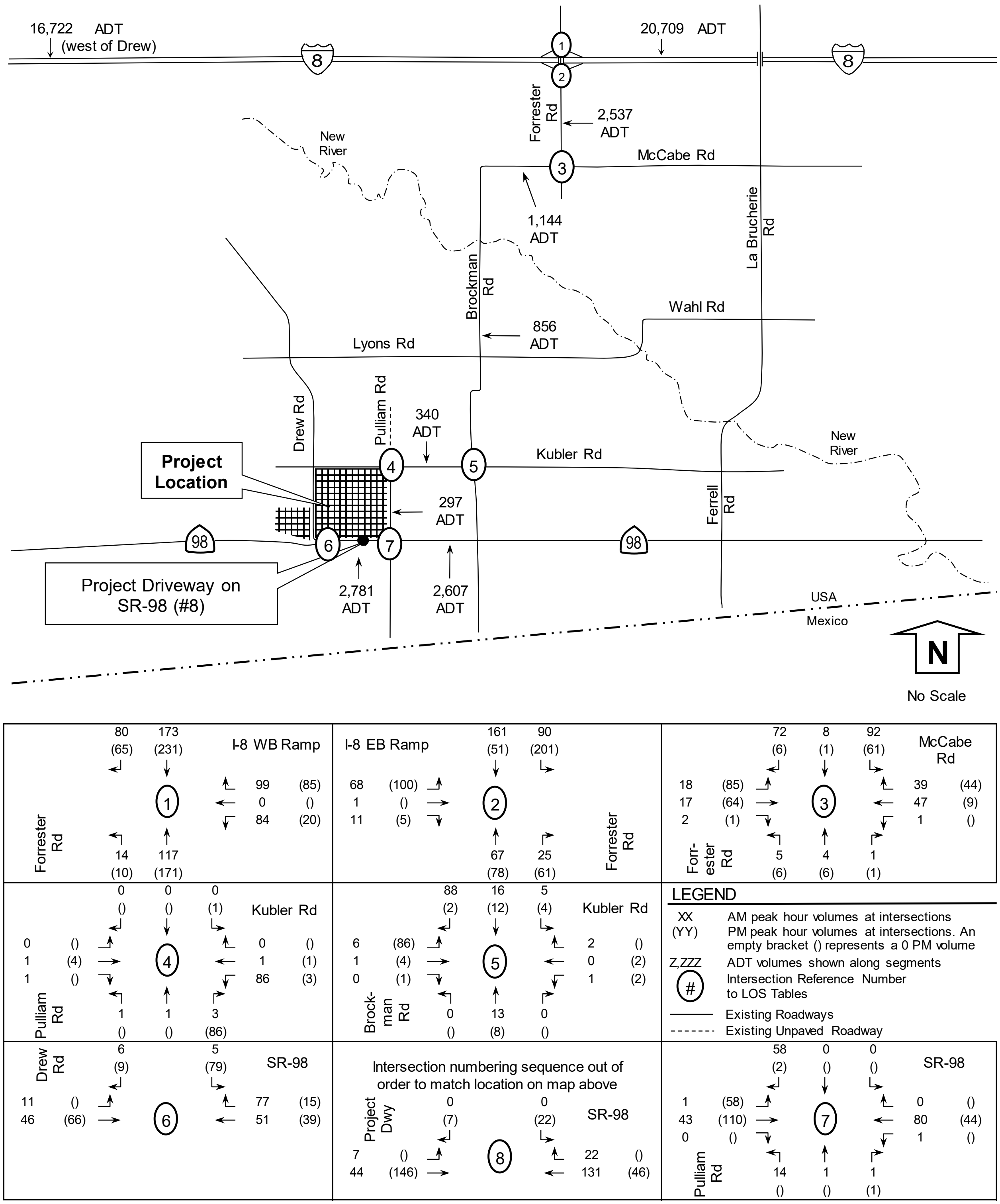
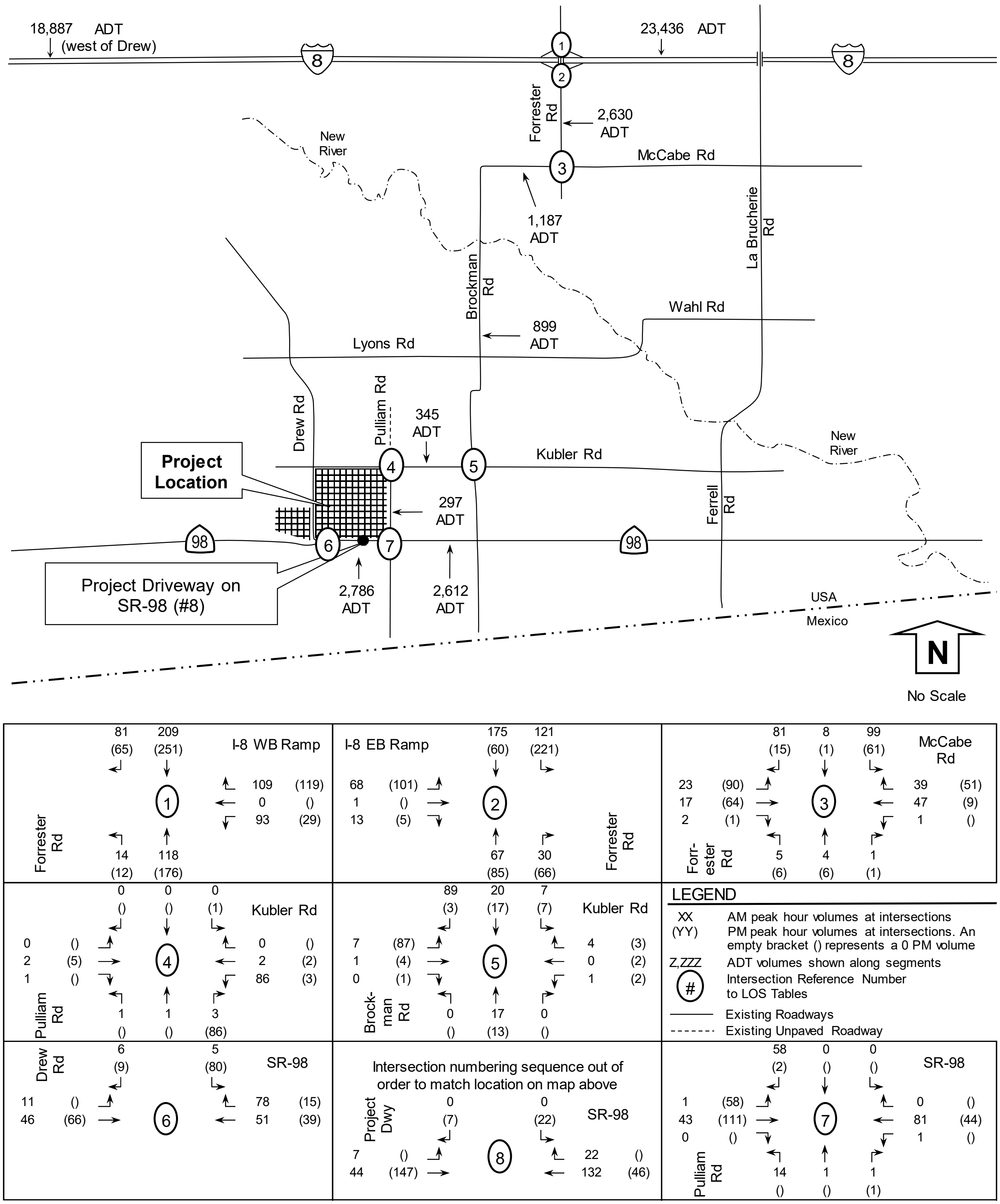


Figure 9: Year 2027 + Project + Cumulative Volumes



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ATTACHMENT A

Year 2017 + Project and Year 2017 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	40	43	76	5	5
Future Vol, veh/h	10	40	43	76	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	43	47	83	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	130	0	-	0	154	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1455	-	-	-	838	969
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	958	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1455	-	-	-	831	969
Mov Cap-2 Maneuver	-	-	-	-	831	-
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1455	-	-	-	895
HCM Lane V/C Ratio	0.007	-	-	-	0.012
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	36	0	1	73	0	12	1	1	0	0	58
Future Vol, veh/h	1	36	0	1	73	0	12	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	39	0	1	79	0	13	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	79	0	0	39	0	0	154	122	39	123	122	79
Stage 1	-	-	-	-	-	-	41	41	-	81	81	-
Stage 2	-	-	-	-	-	-	113	81	-	42	41	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1519	-	-	1571	-	-	813	768	1033	852	768	981
Stage 1	-	-	-	-	-	-	974	861	-	927	828	-
Stage 2	-	-	-	-	-	-	892	828	-	972	861	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1571	-	-	759	766	1033	849	766	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	759	766	-	849	766	-
Stage 1	-	-	-	-	-	-	973	860	-	926	827	-
Stage 2	-	-	-	-	-	-	834	827	-	969	860	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.7	8.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	774	1519	-	-	1571	-	-	981
HCM Lane V/C Ratio	0.02	0.001	-	-	0.001	-	-	0.064
HCM Control Delay (s)	9.7	7.4	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	37	121	22	0	0
Future Vol, veh/h	7	37	121	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	40	132	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	156	0	-	0	200	144
Stage 1	-	-	-	-	144	-
Stage 2	-	-	-	-	56	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1424	-	-	-	789	903
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	967	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1424	-	-	-	784	903
Mov Cap-2 Maneuver	-	-	-	-	784	-
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	967	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1424	-	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-	-
HCM Control Delay (s)	7.5	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	3	0	0	10	10	3	57	10	1
Stage 1	-	-	-	-	-	-	3	3	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	50	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1619	-	-	1008	885	1081	940	885	1084
Stage 1	-	-	-	-	-	-	1020	893	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	963	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1619	-	-	1006	883	1081	857	883	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1006	883	-	857	883	-
Stage 1	-	-	-	-	-	-	1020	893	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	880	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1081	1622	-	-	1619	-	-	857
HCM Lane V/C Ratio	0.086	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	55	34	13	78	9
Future Vol, veh/h	0	55	34	13	78	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	60	37	14	85	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	104	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	60	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1555	-	-	-	894	1026
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	963	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1555	-	-	-	894	1026
Mov Cap-2 Maneuver	-	-	-	-	894	-
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	963	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1555	-	-	-	906
HCM Lane V/C Ratio	-	-	-	-	0.104
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	98	0	0	37	0	0	0	1	0	0	2
Future Vol, veh/h	58	98	0	0	37	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	107	0	0	40	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	40	0	0	107	0	0	274	273	107	274	273	40
Stage 1	-	-	-	-	-	-	233	233	-	40	40	-
Stage 2	-	-	-	-	-	-	41	40	-	234	233	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1570	-	-	1484	-	-	678	634	947	678	634	1031
Stage 1	-	-	-	-	-	-	770	712	-	975	862	-
Stage 2	-	-	-	-	-	-	974	862	-	769	712	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1570	-	-	1484	-	-	654	607	947	655	607	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-	654	607	-	655	607	-
Stage 1	-	-	-	-	-	-	737	681	-	933	862	-
Stage 2	-	-	-	-	-	-	972	862	-	735	681	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.7	0	8.8	8.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	947	1570	-	-	1484	-	-	1031
HCM Lane V/C Ratio	0.001	0.04	-	-	-	-	-	0.002
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	8.5
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection						
Int Delay, s/veh	1.3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	134	39	0	22	7
Future Vol, veh/h	0	134	39	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	146	42	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	42	0	-	0	188	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	146	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1567	-	-	-	801	1029
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	881	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1567	-	-	-	801	1029
Mov Cap-2 Maneuver	-	-	-	-	801	-
Stage 1	-	-	-	-	980	-
Stage 2	-	-	-	-	881	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1567	-	-	-	846
HCM Lane V/C Ratio	-	-	-	-	0.037
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	97	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	2	0	0	285	285	2	287	285	97
Stage 1	-	-	-	-	-	-	2	2	-	283	283	-
Stage 2	-	-	-	-	-	-	283	283	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1496	-	-	1620	-	-	667	624	1082	665	624	959
Stage 1	-	-	-	-	-	-	1021	894	-	724	677	-
Stage 2	-	-	-	-	-	-	724	677	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1496	-	-	1620	-	-	636	586	1082	631	586	959
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	586	-	631	586	-
Stage 1	-	-	-	-	-	-	1021	894	-	724	636	-
Stage 2	-	-	-	-	-	-	680	636	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.6	9.4	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	826	1496	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.007	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.4	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	62	47	103	7	5
Future Vol, veh/h	10	62	47	103	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	67	51	112	8	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	163	0	-	0	196	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	89	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1416	-	-	-	793	947
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	934	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1416	-	-	-	787	947
Mov Cap-2 Maneuver	-	-	-	-	787	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1416	-	-	-	847
HCM Lane V/C Ratio	0.008	-	-	-	0.015
HCM Control Delay (s)	7.6	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	1	60	0	1	104	0	12	1	1	0	0	58
Future Vol, veh/h	1	60	0	1	104	0	12	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	65	0	1	113	0	13	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	113	0	0	65	0	0	214	182	65	183	182	113
Stage 1	-	-	-	-	-	-	67	67	-	115	115	-
Stage 2	-	-	-	-	-	-	147	115	-	68	67	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1476	-	-	1537	-	-	743	712	999	778	712	940
Stage 1	-	-	-	-	-	-	943	839	-	890	800	-
Stage 2	-	-	-	-	-	-	856	800	-	942	839	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1476	-	-	1537	-	-	692	711	999	775	711	940
Mov Cap-2 Maneuver	-	-	-	-	-	-	692	711	-	775	711	-
Stage 1	-	-	-	-	-	-	942	838	-	889	799	-
Stage 2	-	-	-	-	-	-	798	799	-	939	838	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	10.2	9.1
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	709	1476	-	-	1537	-	-	940
HCM Lane V/C Ratio	0.021	0.001	-	-	0.001	-	-	0.067
HCM Control Delay (s)	10.2	7.4	0	-	7.3	0	-	9.1
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	61	152	22	0	0
Future Vol, veh/h	7	61	152	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	66	165	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	189	0	-	0	259	177
Stage 1	-	-	-	-	177	-
Stage 2	-	-	-	-	82	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1385	-	-	-	730	866
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1385	-	-	-	726	866
Mov Cap-2 Maneuver	-	-	-	-	726	-
Stage 1	-	-	-	-	849	-
Stage 2	-	-	-	-	941	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1385	-	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-	-
HCM Control Delay (s)	7.6	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	99	0	0	106	106	99	153	106	1
Stage 1	-	-	-	-	-	-	99	99	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	146	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1494	-	-	873	784	957	814	784	1084
Stage 1	-	-	-	-	-	-	907	813	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	857	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1494	-	-	871	782	957	733	782	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	871	782	-	733	782	-
Stage 1	-	-	-	-	-	-	907	813	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	773	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.6	9.2	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1622	-	-	1494	-	-	733
HCM Lane V/C Ratio	0.098	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	9.2	0	-	-	7.4	0	-	9.9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	56	14	105	9
Future Vol, veh/h	0	60	56	14	105	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	65	61	15	114	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	76	0	-	0	134	69
Stage 1	-	-	-	-	69	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1523	-	-	-	860	994
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	958	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1523	-	-	-	860	994
Mov Cap-2 Maneuver	-	-	-	-	860	-
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1523	-	-	-	869
HCM Lane V/C Ratio	-	-	-	-	0.143
HCM Control Delay (s)	0	-	-	-	9.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	130	0	0	60	0	0	0	1	0	0	2
Future Vol, veh/h	58	130	0	0	60	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	141	0	0	65	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	65	0	0	141	0	0	333	332	141	333	332	65
Stage 1	-	-	-	-	-	-	267	267	-	65	65	-
Stage 2	-	-	-	-	-	-	66	65	-	268	267	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1537	-	-	1442	-	-	620	588	907	620	588	999
Stage 1	-	-	-	-	-	-	738	688	-	946	841	-
Stage 2	-	-	-	-	-	-	945	841	-	738	688	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1537	-	-	1442	-	-	598	562	907	598	562	999
Mov Cap-2 Maneuver	-	-	-	-	-	-	598	562	-	598	562	-
Stage 1	-	-	-	-	-	-	706	658	-	904	841	-
Stage 2	-	-	-	-	-	-	943	841	-	705	658	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0	9	8.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	907	1537	-	-	1442	-	-	999
HCM Lane V/C Ratio	0.001	0.041	-	-	-	-	-	0.002
HCM Control Delay (s)	9	7.4	0	-	0	-	-	8.6
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	166	62	0	22	7
Future Vol, veh/h	0	166	62	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	180	67	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	67	0	-	0	247	67
Stage 1	-	-	-	-	67	-
Stage 2	-	-	-	-	180	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1535	-	-	-	741	997
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	851	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1535	-	-	-	741	997
Mov Cap-2 Maneuver	-	-	-	-	741	-
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	851	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1535	-	-	-	790
HCM Lane V/C Ratio	-	-	-	-	0.04
HCM Control Delay (s)	0	-	-	-	9.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

ATTACHMENT B

Year 2019 + Project and Year 2019 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	41	45	76	5	5
Future Vol, veh/h	10	41	45	76	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	45	49	83	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	132	0	-	0	158	91
Stage 1	-	-	-	-	91	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1453	-	-	-	833	967
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1453	-	-	-	826	967
Mov Cap-2 Maneuver	-	-	-	-	826	-
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1453	-	-	-	891
HCM Lane V/C Ratio	0.007	-	-	-	0.012
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	37	0	1	74	0	12	1	1	0	0	58
Future Vol, veh/h	1	37	0	1	74	0	12	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	40	0	1	80	0	13	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	80	0	0	40	0	0	156	124	40	125	124	80
Stage 1	-	-	-	-	-	-	42	42	-	82	82	-
Stage 2	-	-	-	-	-	-	114	82	-	43	42	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1518	-	-	1570	-	-	810	766	1031	849	766	980
Stage 1	-	-	-	-	-	-	972	860	-	926	827	-
Stage 2	-	-	-	-	-	-	891	827	-	971	860	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1518	-	-	1570	-	-	757	764	1031	846	764	980
Mov Cap-2 Maneuver	-	-	-	-	-	-	757	764	-	846	764	-
Stage 1	-	-	-	-	-	-	971	859	-	925	826	-
Stage 2	-	-	-	-	-	-	833	826	-	968	859	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.8	8.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	772	1518	-	-	1570	-	-	980
HCM Lane V/C Ratio	0.02	0.001	-	-	0.001	-	-	0.064
HCM Control Delay (s)	9.8	7.4	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	38	123	22	0	0
Future Vol, veh/h	7	38	123	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	41	134	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	158	0	-	0	203	146
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	57	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1422	-	-	-	786	901
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	966	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1422	-	-	-	781	901
Mov Cap-2 Maneuver	-	-	-	-	781	-
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	966	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1422	-	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-	-
HCM Control Delay (s)	7.5	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	3	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	3	0	0	10	10	3	57	10	1
Stage 1	-	-	-	-	-	-	3	3	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	50	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1619	-	-	1008	885	1081	940	885	1084
Stage 1	-	-	-	-	-	-	1020	893	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	963	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1619	-	-	1006	883	1081	857	883	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1006	883	-	857	883	-
Stage 1	-	-	-	-	-	-	1020	893	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	880	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1081	1622	-	-	1619	-	-	857
HCM Lane V/C Ratio	0.086	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	57	35	13	78	9
Future Vol, veh/h	0	57	35	13	78	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	62	38	14	85	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	52	0	-	0	107	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	62	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1554	-	-	-	891	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1554	-	-	-	891	1025
Mov Cap-2 Maneuver	-	-	-	-	891	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	961	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1554	-	-	-	903
HCM Lane V/C Ratio	-	-	-	-	0.105
HCM Control Delay (s)	0	-	-	-	9.5
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	100	0	0	38	0	0	0	1	0	0	2
Future Vol, veh/h	58	100	0	0	38	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	109	0	0	41	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	109	0	0	277	276	109	277	276	41
Stage 1	-	-	-	-	-	-	235	235	-	41	41	-
Stage 2	-	-	-	-	-	-	42	41	-	236	235	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1481	-	-	675	632	945	675	632	1030
Stage 1	-	-	-	-	-	-	768	710	-	974	861	-
Stage 2	-	-	-	-	-	-	972	861	-	767	710	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1568	-	-	1481	-	-	651	605	945	652	605	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	651	605	-	652	605	-
Stage 1	-	-	-	-	-	-	735	679	-	932	861	-
Stage 2	-	-	-	-	-	-	970	861	-	733	679	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.7	0	8.8	8.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	945	1568	-	-	1481	-	-	1030
HCM Lane V/C Ratio	0.001	0.04	-	-	-	-	-	0.002
HCM Control Delay (s)	8.8	7.4	0	-	0	-	-	8.5
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	136	40	0	22	7
Future Vol, veh/h	0	136	40	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	148	43	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	191	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1566	-	-	-	798	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	880	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1566	-	-	-	798	1027
Mov Cap-2 Maneuver	-	-	-	-	798	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	880	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1566	-	-	-	843
HCM Lane V/C Ratio	-	-	-	-	0.037
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	89	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	97	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	2	0	0	285	285	2	287	285	97
Stage 1	-	-	-	-	-	-	2	2	-	283	283	-
Stage 2	-	-	-	-	-	-	283	283	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1496	-	-	1620	-	-	667	624	1082	665	624	959
Stage 1	-	-	-	-	-	-	1021	894	-	724	677	-
Stage 2	-	-	-	-	-	-	724	677	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1496	-	-	1620	-	-	636	586	1082	631	586	959
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	586	-	631	586	-
Stage 1	-	-	-	-	-	-	1021	894	-	724	636	-
Stage 2	-	-	-	-	-	-	680	636	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.6	9.4	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	826	1496	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.007	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.4	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	63	49	103	7	5
Future Vol, veh/h	10	63	49	103	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	68	53	112	8	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	165	0	-	0	199	109
Stage 1	-	-	-	-	109	-
Stage 2	-	-	-	-	90	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1413	-	-	-	790	945
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	934	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1413	-	-	-	784	945
Mov Cap-2 Maneuver	-	-	-	-	784	-
Stage 1	-	-	-	-	909	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1413	-	-	-	844
HCM Lane V/C Ratio	0.008	-	-	-	0.015
HCM Control Delay (s)	7.6	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	61	0	1	105	0	12	1	1	0	0	58
Future Vol, veh/h	1	61	0	1	105	0	12	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	66	0	1	114	0	13	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	114	0	0	66	0	0	216	184	66	185	184	114
Stage 1	-	-	-	-	-	-	68	68	-	116	116	-
Stage 2	-	-	-	-	-	-	148	116	-	69	68	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1475	-	-	1536	-	-	740	710	998	776	710	939
Stage 1	-	-	-	-	-	-	942	838	-	889	800	-
Stage 2	-	-	-	-	-	-	855	800	-	941	838	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1475	-	-	1536	-	-	689	709	998	773	709	939
Mov Cap-2 Maneuver	-	-	-	-	-	-	689	709	-	773	709	-
Stage 1	-	-	-	-	-	-	941	837	-	888	799	-
Stage 2	-	-	-	-	-	-	797	799	-	938	837	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	10.2	9.1
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	706	1475	-	-	1536	-	-	939
HCM Lane V/C Ratio	0.022	0.001	-	-	0.001	-	-	0.067
HCM Control Delay (s)	10.2	7.4	0	-	7.3	0	-	9.1
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	62	154	22	0	0
Future Vol, veh/h	7	62	154	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	67	167	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	191	0	-	0	262	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1383	-	-	-	727	864
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1383	-	-	-	723	864
Mov Cap-2 Maneuver	-	-	-	-	723	-
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	940	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1383	-	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	-
HCM Control Delay (s)	7.6	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	91	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	99	0	0	106	106	99	153	106	1
Stage 1	-	-	-	-	-	-	99	99	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	146	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1494	-	-	873	784	957	814	784	1084
Stage 1	-	-	-	-	-	-	907	813	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	857	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1494	-	-	871	782	957	733	782	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	871	782	-	733	782	-
Stage 1	-	-	-	-	-	-	907	813	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	773	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.6	9.2	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	957	1622	-	-	1494	-	-	733
HCM Lane V/C Ratio	0.098	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	9.2	0	-	-	7.4	0	-	9.9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	62	57	14	105	9
Future Vol, veh/h	0	62	57	14	105	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	67	62	15	114	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	77	0	-	0	137	70
Stage 1	-	-	-	-	70	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1522	-	-	-	856	993
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1522	-	-	-	856	993
Mov Cap-2 Maneuver	-	-	-	-	856	-
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1522	-	-	-	865
HCM Lane V/C Ratio	-	-	-	-	0.143
HCM Control Delay (s)	0	-	-	-	9.9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	132	0	0	61	0	0	0	1	0	0	2
Future Vol, veh/h	58	132	0	0	61	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	143	0	0	66	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	66	0	0	143	0	0	336	335	143	336	335	66
Stage 1	-	-	-	-	-	-	269	269	-	66	66	-
Stage 2	-	-	-	-	-	-	67	66	-	270	269	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1536	-	-	1440	-	-	618	585	905	618	585	998
Stage 1	-	-	-	-	-	-	737	687	-	945	840	-
Stage 2	-	-	-	-	-	-	943	840	-	736	687	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1536	-	-	1440	-	-	596	559	905	596	559	998
Mov Cap-2 Maneuver	-	-	-	-	-	-	596	559	-	596	559	-
Stage 1	-	-	-	-	-	-	704	656	-	902	840	-
Stage 2	-	-	-	-	-	-	941	840	-	702	656	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0	9	8.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	905	1536	-	-	1440	-	-	998
HCM Lane V/C Ratio	0.001	0.041	-	-	-	-	-	0.002
HCM Control Delay (s)	9	7.4	0	-	0	-	-	8.6
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	168	63	0	22	7
Future Vol, veh/h	0	168	63	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	183	68	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	68	0	-	0	251	68
Stage 1	-	-	-	-	68	-
Stage 2	-	-	-	-	183	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1533	-	-	-	738	995
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	848	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1533	-	-	-	738	995
Mov Cap-2 Maneuver	-	-	-	-	738	-
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1533	-	-	-	787
HCM Lane V/C Ratio	-	-	-	-	0.04
HCM Control Delay (s)	0	-	-	-	9.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

ATTACHMENT C

Year 2027 + Project and Year 2027 + Project + Cumulative LOS Calculations

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Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Future Vol, veh/h	0	1	1	86	1	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	1	93	1	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	2	0	0	189	189	2	191	189	1
Stage 1	-	-	-	-	-	-	2	2	-	187	187	-
Stage 2	-	-	-	-	-	-	187	187	-	4	2	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1620	-	-	771	706	1082	769	706	1084
Stage 1	-	-	-	-	-	-	1021	894	-	815	745	-
Stage 2	-	-	-	-	-	-	815	745	-	1018	894	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1620	-	-	737	666	1082	732	666	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	737	666	-	732	666	-
Stage 1	-	-	-	-	-	-	1021	894	-	815	703	-
Stage 2	-	-	-	-	-	-	769	703	-	1014	894	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.3	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	888	1622	-	-	1620	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	46	51	77	5	6
Future Vol, veh/h	11	46	51	77	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	50	55	84	5	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	139	0	-	0	171	97
Stage 1	-	-	-	-	97	-
Stage 2	-	-	-	-	74	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1445	-	-	-	819	959
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	949	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1445	-	-	-	812	959
Mov Cap-2 Maneuver	-	-	-	-	812	-
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	949	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1445	-	-	-	886
HCM Lane V/C Ratio	0.008	-	-	-	0.013
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	1	43	0	1	80	0	14	1	1	0	0	58
Future Vol, veh/h	1	43	0	1	80	0	14	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	47	0	1	87	0	15	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	87	0	0	47	0	0	170	138	47	139	138	87
Stage 1	-	-	-	-	-	-	49	49	-	89	89	-
Stage 2	-	-	-	-	-	-	121	89	-	50	49	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1509	-	-	1560	-	-	794	753	1022	831	753	971
Stage 1	-	-	-	-	-	-	964	854	-	918	821	-
Stage 2	-	-	-	-	-	-	883	821	-	963	854	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1509	-	-	1560	-	-	742	751	1022	828	751	971
Mov Cap-2 Maneuver	-	-	-	-	-	-	742	751	-	828	751	-
Stage 1	-	-	-	-	-	-	963	853	-	917	820	-
Stage 2	-	-	-	-	-	-	825	820	-	960	853	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.9	9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	756	1509	-	-	1560	-	-	971
HCM Lane V/C Ratio	0.023	0.001	-	-	0.001	-	-	0.065
HCM Control Delay (s)	9.9	7.4	0	-	7.3	0	-	9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	44	131	22	0	0
Future Vol, veh/h	7	44	131	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	48	142	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	166	0	-	0	218	154
Stage 1	-	-	-	-	154	-
Stage 2	-	-	-	-	64	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1412	-	-	-	770	892
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1412	-	-	-	765	892
Mov Cap-2 Maneuver	-	-	-	-	765	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1412	-	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-	-
HCM Control Delay (s)	7.6	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	4	0	3	1	0	0	0	86	1	0	0
Future Vol, veh/h	0	4	0	3	1	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	4	0	3	1	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	4	0	0	11	11	4	58	11	1
Stage 1	-	-	-	-	-	-	4	4	-	7	7	-
Stage 2	-	-	-	-	-	-	7	7	-	51	4	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1622	-	-	1618	-	-	1007	884	1080	939	884	1084
Stage 1	-	-	-	-	-	-	1018	892	-	1015	890	-
Stage 2	-	-	-	-	-	-	1015	890	-	962	892	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1618	-	-	1005	882	1080	856	882	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1005	882	-	856	882	-
Stage 1	-	-	-	-	-	-	1018	892	-	1015	888	-
Stage 2	-	-	-	-	-	-	1013	888	-	879	892	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.4	8.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1080	1622	-	-	1618	-	-	856
HCM Lane V/C Ratio	0.087	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.6	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	66	39	15	79	9
Future Vol, veh/h	0	66	39	15	79	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	42	16	86	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	58	0	-	0	122	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1546	-	-	-	873	1018
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1546	-	-	-	873	1018
Mov Cap-2 Maneuver	-	-	-	-	873	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	951	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1546	-	-	-	886
HCM Lane V/C Ratio	-	-	-	-	0.108
HCM Control Delay (s)	0	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	110	0	0	44	0	0	0	1	0	0	2
Future Vol, veh/h	58	110	0	0	44	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	120	0	0	48	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	120	0	0	295	294	120	295	294	48
Stage 1	-	-	-	-	-	-	246	246	-	48	48	-
Stage 2	-	-	-	-	-	-	49	48	-	247	246	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1468	-	-	657	617	931	657	617	1021
Stage 1	-	-	-	-	-	-	758	703	-	965	855	-
Stage 2	-	-	-	-	-	-	964	855	-	757	703	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1559	-	-	1468	-	-	634	590	931	635	590	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	634	590	-	635	590	-
Stage 1	-	-	-	-	-	-	725	673	-	924	855	-
Stage 2	-	-	-	-	-	-	962	855	-	724	673	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0	8.9	8.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	931	1559	-	-	1468	-	-	1021
HCM Lane V/C Ratio	0.001	0.04	-	-	-	-	-	0.002
HCM Control Delay (s)	8.9	7.4	0	-	0	-	-	8.5
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	146	46	0	22	7
Future Vol, veh/h	0	146	46	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	159	50	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	209	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	159	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1557	-	-	-	779	1018
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	870	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1557	-	-	-	779	1018
Mov Cap-2 Maneuver	-	-	-	-	779	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	870	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1557	-	-	-	826
HCM Lane V/C Ratio	-	-	-	-	0.038
HCM Control Delay (s)	0	-	-	-	9.5
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2	1	86	2	0	1	1	3	0	0	0
Future Vol, veh/h	0	2	1	86	2	0	1	1	3	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2	1	93	2	0	1	1	3	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2	0	0	3	0	0	191	191	3	193	191	2
Stage 1	-	-	-	-	-	-	3	3	-	188	188	-
Stage 2	-	-	-	-	-	-	188	188	-	5	3	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1620	-	-	1619	-	-	769	704	1081	767	704	1082
Stage 1	-	-	-	-	-	-	1020	893	-	814	745	-
Stage 2	-	-	-	-	-	-	814	745	-	1017	893	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1620	-	-	1619	-	-	735	663	1081	730	663	1082
Mov Cap-2 Maneuver	-	-	-	-	-	-	735	663	-	730	663	-
Stage 1	-	-	-	-	-	-	1020	893	-	814	702	-
Stage 2	-	-	-	-	-	-	767	702	-	1013	893	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	7.2	9.1	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	886	1620	-	-	1619	-	-	-
HCM Lane V/C Ratio	0.006	-	-	-	0.058	-	-	-
HCM Control Delay (s)	9.1	0	-	-	7.4	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	46	51	78	5	6
Future Vol, veh/h	11	46	51	78	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	50	55	85	5	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	140	0	-	0	172	98
Stage 1	-	-	-	-	98	-
Stage 2	-	-	-	-	74	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1443	-	-	-	818	958
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	949	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1443	-	-	-	811	958
Mov Cap-2 Maneuver	-	-	-	-	811	-
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	949	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1443	-	-	-	885
HCM Lane V/C Ratio	0.008	-	-	-	0.014
HCM Control Delay (s)	7.5	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	43	0	1	81	0	14	1	1	0	0	58
Future Vol, veh/h	1	43	0	1	81	0	14	1	1	0	0	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	47	0	1	88	0	15	1	1	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	47	0	0	171	139	47	140	139	88
Stage 1	-	-	-	-	-	-	49	49	-	90	90	-
Stage 2	-	-	-	-	-	-	122	90	-	50	49	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1560	-	-	792	752	1022	830	752	970
Stage 1	-	-	-	-	-	-	964	854	-	917	820	-
Stage 2	-	-	-	-	-	-	882	820	-	963	854	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1508	-	-	1560	-	-	740	750	1022	827	750	970
Mov Cap-2 Maneuver	-	-	-	-	-	-	740	750	-	827	750	-
Stage 1	-	-	-	-	-	-	963	853	-	916	819	-
Stage 2	-	-	-	-	-	-	824	819	-	960	853	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.9	9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	754	1508	-	-	1560	-	-	970
HCM Lane V/C Ratio	0.023	0.001	-	-	0.001	-	-	0.065
HCM Control Delay (s)	9.9	7.4	0	-	7.3	0	-	9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	44	132	22	0	0
Future Vol, veh/h	7	44	132	22	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	48	143	24	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	167	0	-	0	219	155
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	64	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1411	-	-	-	769	891
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1411	-	-	-	764	891
Mov Cap-2 Maneuver	-	-	-	-	764	-
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1411	-	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-	-
HCM Control Delay (s)	7.6	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	5	0	3	2	0	0	0	86	1	0	0
Future Vol, veh/h	0	5	0	3	2	0	0	0	86	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	5	0	3	2	0	0	0	93	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2	0	0	5	0	0	13	13	5	60	13	2
Stage 1	-	-	-	-	-	-	5	5	-	8	8	-
Stage 2	-	-	-	-	-	-	8	8	-	52	5	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1620	-	-	1616	-	-	1004	881	1078	936	881	1082
Stage 1	-	-	-	-	-	-	1017	892	-	1013	889	-
Stage 2	-	-	-	-	-	-	1013	889	-	961	892	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1620	-	-	1616	-	-	1002	879	1078	854	879	1082
Mov Cap-2 Maneuver	-	-	-	-	-	-	1002	879	-	854	879	-
Stage 1	-	-	-	-	-	-	1017	892	-	1013	887	-
Stage 2	-	-	-	-	-	-	1011	887	-	878	892	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4.3	8.7	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1078	1620	-	-	1616	-	-	854
HCM Lane V/C Ratio	0.087	-	-	-	0.002	-	-	0.001
HCM Control Delay (s)	8.7	0	-	-	7.2	0	-	9.2
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	66	39	15	80	9
Future Vol, veh/h	0	66	39	15	80	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	42	16	87	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	58	0	-	0	122	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1546	-	-	-	873	1018
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1546	-	-	-	873	1018
Mov Cap-2 Maneuver	-	-	-	-	873	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	951	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1546	-	-	-	886
HCM Lane V/C Ratio	-	-	-	-	0.109
HCM Control Delay (s)	0	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	111	0	0	44	0	0	0	1	0	0	2
Future Vol, veh/h	58	111	0	0	44	0	0	0	1	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	121	0	0	48	0	0	0	1	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	121	0	0	296	295	121	296	295	48
Stage 1	-	-	-	-	-	-	247	247	-	48	48	-
Stage 2	-	-	-	-	-	-	49	48	-	248	247	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1467	-	-	656	616	930	656	616	1021
Stage 1	-	-	-	-	-	-	757	702	-	965	855	-
Stage 2	-	-	-	-	-	-	964	855	-	756	702	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1559	-	-	1467	-	-	633	590	930	634	590	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	633	590	-	634	590	-
Stage 1	-	-	-	-	-	-	724	672	-	924	855	-
Stage 2	-	-	-	-	-	-	962	855	-	723	672	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.5	0	8.9	8.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	930	1559	-	-	1467	-	-	1021
HCM Lane V/C Ratio	0.001	0.04	-	-	-	-	-	0.002
HCM Control Delay (s)	8.9	7.4	0	-	0	-	-	8.5
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	147	46	0	22	7
Future Vol, veh/h	0	147	46	0	22	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	160	50	0	24	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	50	0	-	0	210	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	160	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1557	-	-	-	778	1018
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	869	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1557	-	-	-	778	1018
Mov Cap-2 Maneuver	-	-	-	-	778	-
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	869	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1557	-	-	-	825
HCM Lane V/C Ratio	-	-	-	-	0.038
HCM Control Delay (s)	0	-	-	-	9.5
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1