Appendix G

Traffic Impact Study

Alpine Community Plan Update

Transportation Impact Study

September 2020

Prepared for

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1.0 Introduction

1.1 Purpose of the Report

This Transportation Impact Study (TIS) serves to identify and document potential California Environmental Quality Act (CEQA) transportation impacts related to buildout of the Alpine Community Plan Update proposed land uses and mobility network (Proposed Project), and alternatives evaluation, as well as to recommend improvements/mitigation measures as appropriate. **Figure 1-1** displays Alpine's location in the County of San Diego Region.

1.2 Background

The Alpine Community Planning Area (CPA) is in the eastern area of the unincorporated region of San Diego County (County), and is bisected by Interstate 8, with the majority of the population concentrated in and around Alpine Blvd, the town center. Alpine is bordered by the Central Mountain community to the north and east, the Jamul-Dulzura community to the south, and the Lakeside and Crest Dehesa-Harbison Canyon-Granite Hills Community to the west. **Figure 1-1** displays the regional location of Alpine.

The Alpine Community Plan Update will revise the current community plan (initially adopted in 1979 and last amended in December 2016) to reflect the character of Alpine and guide the growth and development of the community. The Proposed Project analyzed in the project's Supplemental Environmental Impact Report (SEIR) and this TIS is the Village-Focused Alternative (Proposed Project); however the following five additional alternatives are also evaluated within this TIS to provide additional flexibility to the County's Board of Supervisors in selecting any of the project alternatives when certifying the SEIR:

Proposed Project: Village-Focused Alternative
Alternative 1: Former FCI Lands in Eastern Alpine
Alternative 2: Former FCI Lands in Alpine
Alternative 3: Low Alternative
Alternative 4: Moderate Alternative
Alternative 5: High Alternative

A detailed description of the Proposed Project and each of the five project alternatives listed above are provided in Chapter 3.0.

1.3 Report Organization

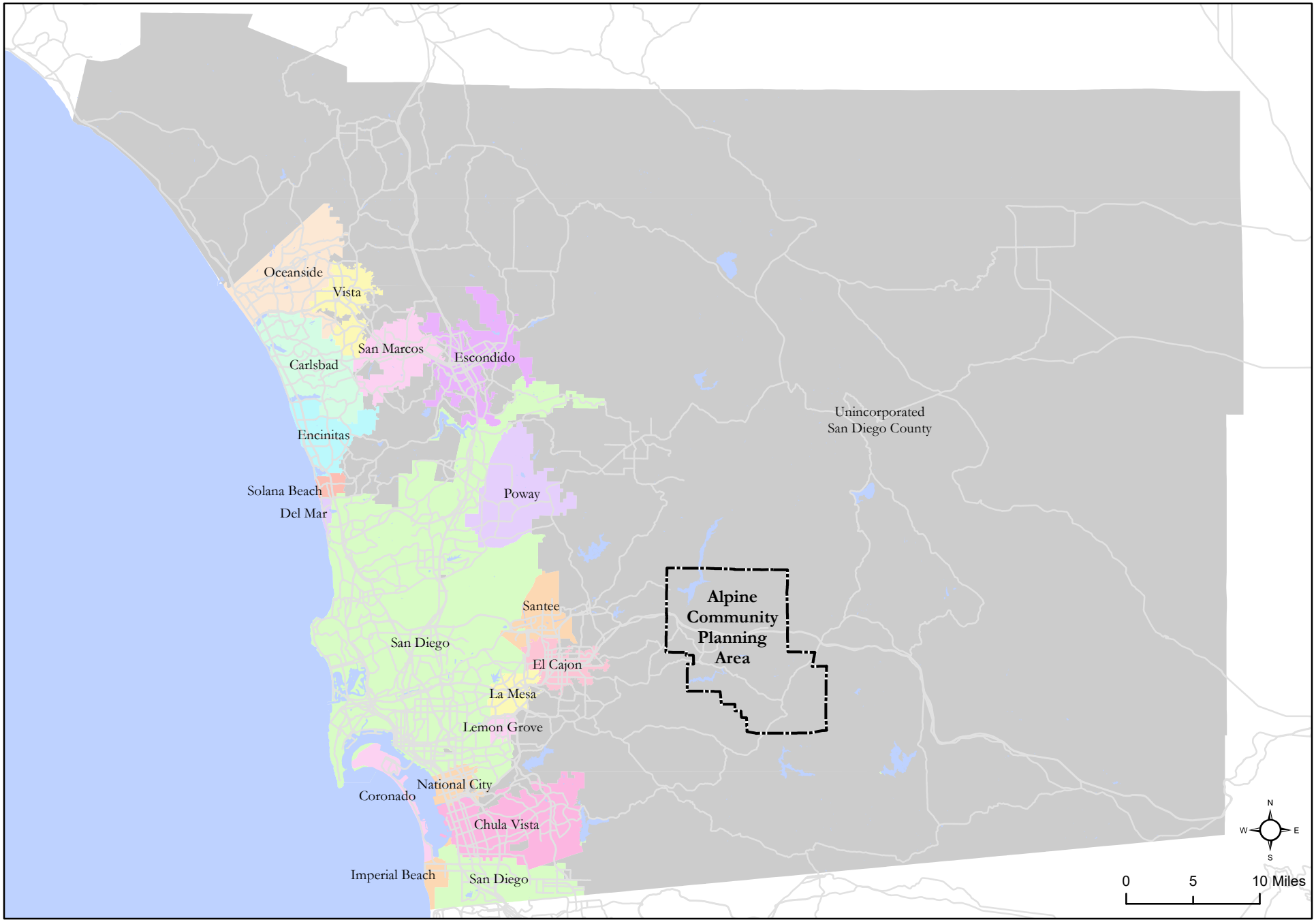
The remainder of this report is organized into the following chapters:

2.0 *Analysis Methodology* – This chapter describes the methodologies and standards utilized to analyze the VMT conditions for all project alternatives.

3.0 Project Description – This chapter summarizes the proposed land uses and transportation network changes for the Proposed Project and each project alternative.

4.0 *Project Impacts* – This chapter discusses the Vehicle Miles Traveled (VMT) analysis and potential CEQA transportation impacts associated with the Proposed Project and each project alternative.

5.0 *Mitigation and Findings* – This chapter identifies potential mitigation measures for the identified impacts associated with the Proposed Project each project alternative. The feasibility of the identified mitigation measures is also evaluated as well as the overall findings of significance are presented.



Alpine Community Plan Update

CHEN RYAN

Figure 1-1
Project Location within the Region

2.0 Analysis Methodology

This chapter describes the CEQA transportation impact analysis methodology that was prepared in accordance with the County's compliance with the Senate Bill (SB) 743 legislation and the CEQA project review process.

2.1 Background

On September 27, 2013, Governor Jerry Brown signed SB 743 into law and started a process intended to fundamentally change transportation impact analysis as part of CEQA compliance. The Office of Planning and Research (OPR) published its latest recommended *Technical Advisory on Evaluating Transportation Impact in CEQA* in December 2018. This Technical Advisory provides a recommendation on how to evaluate transportation impacts under SB 743. The OPR guidance covers specific changes to the CEQA guidelines and requires the elimination of auto delay for CEQA purposes and the use of Vehicle Miles Traveled, or VMT, as the preferred CEQA transportation metric.

VMT is positively correlated with growth and as the region is expected to grow, total VMT is also expected to increase. Where the anticipated growth occurs plays a significant role in determining how much total VMT will increase. Growth in areas with access to high quality transit such as Transit Priority Areas (TPAs),[1] a complete active transportation network, and complementary land use mixes are projected to be more VMT efficient. In their *Technical Advisory on Evaluating Transportation Impacts on CEQA* (December 2018), OPR recommends the use of VMT metrics when analyzing land use projects and plans. For residential uses, the recommended efficiency metric is Resident VMT per Capita; and for employment uses, the recommended efficiency metric is Employee VMT per Employee. However, for retail uses, the recommended metric is a net change of total area (i.e. Alpine) VMT. This is due to the nature of retail trips typically redistributing existing retail trips rather than creating new trips.

To comply with the new legislation, the County of San Diego adopted new *Transportation Study Guidelines* on June 24, 2020 to identify VMT analysis methodologies, establish VMT thresholds for CEQA transportation impacts, and identify initial mitigation strategies. The guidelines focus on the following points for evaluation of a project's potential impact related to VMT significance criteria:

- Enable proposed development projects to comply with current CEQA requirements as a result of the implementation of SB 743.
- Describe the County's CEQA significance thresholds, screening criteria, and methodology for conducting the transportation VMT analysis.
- Determine if mitigation is required to offset a project's significant VMT impacts.
- Identify VMT reduction measures and strategies to mitigate potential impacts below a level of CEQA significance.
- Reduce the need to widen or build roads through effective use of the existing transportation network and maximizing the use of alternative modes of travel throughout the County.

The newly adopted TSG provides the guidance for the methods and thresholds utilized to evaluate transportation related impacts associated with the Proposed Project and various project alternatives.

[1] Transit Priority Areas, within the context of Alpine, include areas within one-half mile of existing or planned trolley stations or the intersection of two or more major bus routes, each having a frequency of service of 15 minutes or less during the morning and afternoon peak commute periods.

2.2 Data Sources and Methods

As noted in Section 3.2 of the TSG, transportation VMT analysis for CEQA should be conducted using the San Diego Association of Governments' (SANDAG) Regional Travel Demand Model.

The following data and metrics were obtained from the SANDAG Series 13 Activity Based Model (ABM), which was calibrated and customized for the Alpine Community Plan Update. The ABM is a travel demand forecasting model that incorporates census data and travel surveys to inform the algorithms of the model's projections. It uses a simulated population based on existing and projected demographics to match residents to employment and forecasts the daily travel on the regional transportation network. In addition, the model is able to track the daily travel of individuals in the simulated population, including origins, destinations, travel distances and mode choices. The Series 13 ABM has four (4) forecast scenarios: 2012, 2020, 2035, and 2050. The regional forecast for the listed years can be found at SANDAG's Transportation Forecast Information Center (http://tfic.sandag.org/).

SANDAG's regional ABM was customized for the Alpine CPA and calibrated at the local level. The 2012 forecast (Base Year) was calibrated using detailed land use inputs obtained from assessor's parcel data within the Alpine community. In addition, the local transportation network was refined to better match ground conditions in 2012. By refining land use and network assumptions, a Base Year scenario was developed that closely matched baseline conditions in 2012. These conditions were assumed to be the baseline conditions for all direct impact analyses (plan to ground) conducted within the study.

With the calibrated base year model as a foundation, the Proposed Project, Current General Plan, and project alternatives scenarios were also developed with a build-out year of 2050. These scenarios provided the relevant traffic data and metrics for the analysis. The Current General Plan scenario derived using this process was used as the baseline conditions for all cumulative analyses (Plan to Plan) conducted within this study.

In consultation with SANDAG modelers, additional model output data was provided to support the Alpine Community Plan Update efforts and some of these methodologies are documented in the *Vehicle Miles Traveled Calculation Using the SANDAG Regional Travel Demand Model – Technical White Paper* (San Diego Institute of Transportation Engineers, May 2013) provided in **Appendix A.** SANDAG produced relevant metrics and reports specific to the Alpine modeling scenarios. These reports include the following:

- Vehicle Miles of Travel Report (SB 743 metrics for residential and employment) – **Appendix B**
- Disaggregated VMT for Alpine Select Zone (VMT for GHG Analysis) – **Appendix C**

Activity Based Model (ABM) Background

The ABM is a complex travel demand model that can track the characteristics of each person and can analyze the travel patterns of a wide area throughout a whole day. When simulating a person's travel patterns, the ABM takes into consideration a multitude of personal and household attributes to ensure that people move from one place to another in a plausible manner. Each model run represents a specific year, land use type, or transportation network type and is considered a "scenario." After a scenario is conducted using the ABM, it produces a loaded roadway network that has the projected daily vehicle traffic (travel) on each link in the network. In addition, the region is geometrically divided into Traffic Analysis Zones (TAZs), and the land uses in these zones generate the traffic that is projected on the roadway network through zone-connectors.

2.3 Determination of Direct CEQA Significant Impacts

As noted in Section 3.3.2 of the TSG, for large land use plans, such as Specific Plans or Community Plan Updates, the land use plan should be compared to the region overall. A comparison to the region is appropriate because large land use plans can affect regional VMT (similar to how a regional retail project affects regional VMT). The following thresholds apply to large land use plans:

- *Residential*: Aggregate all residential land uses for the build-out year of the plan and compared to the existing regional average on a VMT per resident basis. The threshold is 15% below the existing regional average VMT per Resident (Plan to Ground comparison).
- *Employment*: Aggregate all employment land uses for the build-out year of the plan and compared to the existing regional average on a VMT per Employee bases. The threshold is 15% below the existing regional average VMT per Employee (Plan to Ground comparison).
- *Retail/Service*: Evaluate the effect that adding these land uses has on regional VMT. The threshold is any increase in regional VMT (Plan to Ground comparison).

The following definitions describe how VMT is referred to, calculated, and accounted for in this CEQA impact analysis:

- Resident VMT/Capita includes all vehicle-based resident travel grouped and summed to the home location of the individual. It includes *all* resident vehicle travel: home-based and non-home based. The VMT for each individual is then summed for all individuals residing in the community and divided by the population of the community to arrive at Resident VMT/Capita.
- Employee VMT/Employee includes all vehicle-based employee travel grouped and summed to the work location of the individual. This includes *all* employee travel, not just work-related trips. The VMT for each work location is then summed for all work locations in the community and divided by the number of employees within the community to arrive at Employee VMT/Employee. This does not include employees whose work location is specified as home.
- Net Retail VMT Increase Associated with Retail. At this time, the SANDAG model cannot isolate the VMT associated with retail uses in a similar fashion as it does with the VMT associated with residential and employment uses. Therefore, the external VMT associated with the retail uses within the community were isolated outside of the model by subtracting the VMT associated with employees and residents within the community from the total VMT generated within the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the external VMT associated with retail was identified to be higher than baseline (ground conditions) external VMT associated with retail use, then the alternative was considered a significant impact. This is consistent with the retail standards outlined in the County's Transportation Study Guide (TSG) since it measures an increase in the net VMT, which is specifically associated with the proposed retail uses. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and is not anticipated to change the findings. Total VMT is the total daily VMT within the Alpine CPA.
- The total VMT is derived from multiplying the daily volume on everyday roadway segments by the length of every roadway segment within Alpine.

2.4 Determination CEQA Significant Impacts Due to Induced Travel

As noted in Section 3.4 of the TSG, any transportation project that results in an increase in additional motor vehicle capacity (such as constructing a new roadway or adding additional vehicle travel lanes on an existing roadway) has the potential to increase vehicle travel, referred to as "induced vehicle travel."

Appendix 2 of the OPR *Technical Advisory* identifies the following five factors that contribute to overall induced travel:

1. *Changes in Trip Length*: Roadway capacity could result in the ability to travel a longer distance in a shorter period of time, thereby making farther away destinations more attractive and resulting in longer trip lengths and more VMT.
2. *Changes in Mode Choice*: Roadway capacity could result in reduced automobile travel time, causing people to shift to automobile use from other travel modes, resulting in more auto trips and increased VMT.
3. *Route Changes*: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.
4. *Newly Generated Trips*: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.
5. *Land Use Changes*: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

2.5 Determination of Cumulative CEQA Significant Impacts

As noted in Section 3.6 of the County's *Transportation Study Guidelines (June 2020):*

For projects that require GPAs or are inconsistent with the General Plan, a cumulative VMT analysis is required. A project would result in a significant project-generated VMT impact under cumulative conditions if the applicable cumulative project-generated VMT thresholds are exceeded.

Measuring the project's effect on VMT is necessary especially under cumulative conditions to fully explain the project's impact. A project's effect on VMT under cumulative conditions would be considered significant if the cumulative link-level boundary VMT (total VMT, average VMT/Employee, or average VMT/Capita) increases under Proposed Project conditions as compared to Current General Plan conditions (Plan to Plan analysis). Therefore, this analysis assumes that cumulative impacts occur if the Proposed Project or project alternatives increase the regional VMT/Employee, VMT/Capita or total VMT generated within the region when compared to Current General Plan conditions.

Please note that the "cumulative No Project" shall reflect the adopted Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS); as such, if a project is consistent with the regional RTP/SCS, then the cumulative impacts shall be considered less than significant.

2.6 Determination CEQA Significant Impacts to Multi-Modal Facilities

As noted in Appendix G of the *CEQA Guidelines*, the determination of significant hazards to pedestrians or bicyclists shall be on a case-by-case basis, considering the following factors:

- Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities
- Conflict or be inconsistent with CEQA Guidelines Section 15064.3 subdivision (b), which states the following for land use projects:
    - VMT exceeding an applicable threshold of significance may indicate a significant impact.
    - Projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact.
    - Projects that decrease VMT in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

3.0 Project Alternatives

This Chapter provides details and descriptions on the proposed changes to both the land uses and mobility network within the Alpine CPA under the Proposed Project and each project alternative.

3.1 Baseline Conditions

3.1.1 Base Year (Year 2012)

As noted in Section 2.3, the VMT generated under base year conditions establishes the baseline in which the VMT associated with future land use development is compared against to identify direct transportation related impacts. Base year VMT metrics for the San Diego Region, Unincorporated County, and Alpine CPA were derived from the SANDAG Series 13 Regional Model Base Year (2012). Model land use inputs within the community were verified based on assessor parcel data (January 2020), while roadway geometry and speeds were verified through aerial review. The model was also calibrated to reflect the existing average daily traffic (ADT) currently observed on the major roadways within the community.

3.1.2 No Project (Current General Plan)

As noted in Section 2.5, the VMT generated under current General Plan (No Project) conditions establish the baseline in which planned development is compared against to identify cumulative transportation related impacts. The No Project conditions represent buildout of the land uses and mobility network assumed within the County's current General Plan, including those within the Alpine CPA. VMT metrics for the San Diego Region, Unincorporated County, and Alpine CPA were derived from the SANDAG Series 13 Regional Model Year 2050. Model land use inputs within the Alpine CPA were verified based on the County's General Plan Land Use Element, while roadway geometry and speeds were inputted based on those assumed in the County's Mobility Element.

3.2 Detailed Alternative Descriptions

The following sections provide a detailed description of the proposed land use and mobility network changes under each of the planned alternatives. Each alternative focuses the proposed changes within seven subareas of the community (subareas 1-7). **Figure 3-1** displays the location of each subarea within the CPA.

3.2.1 Proposed Project: Village-Focused Alternative

The proposed project consists of a comprehensive update to the existing Alpine Community Plan. Specifically, the proposed project would update and refine the current community plan's goals and policies to reflect the character of Alpine and guide future growth and development within the community. Focused on providing services and residential density close to existing or planned infrastructure, the proposed project concentrates density increases in more developed areas in Alpine within three of the seven subareas (subareas 2,4,and 6) and provides commercial/retail options near existing and planned residential communities (see Tables 3.1 and 3.2). It also decreases density in less developed areas (Subarea 5) without potable water, available infrastructure, and services. Parts of the Village in Subarea 6 and an area near the I-8 freeway in Subarea 4 would be re-designated as to provide greater land use flexibility and promote job-generating uses.

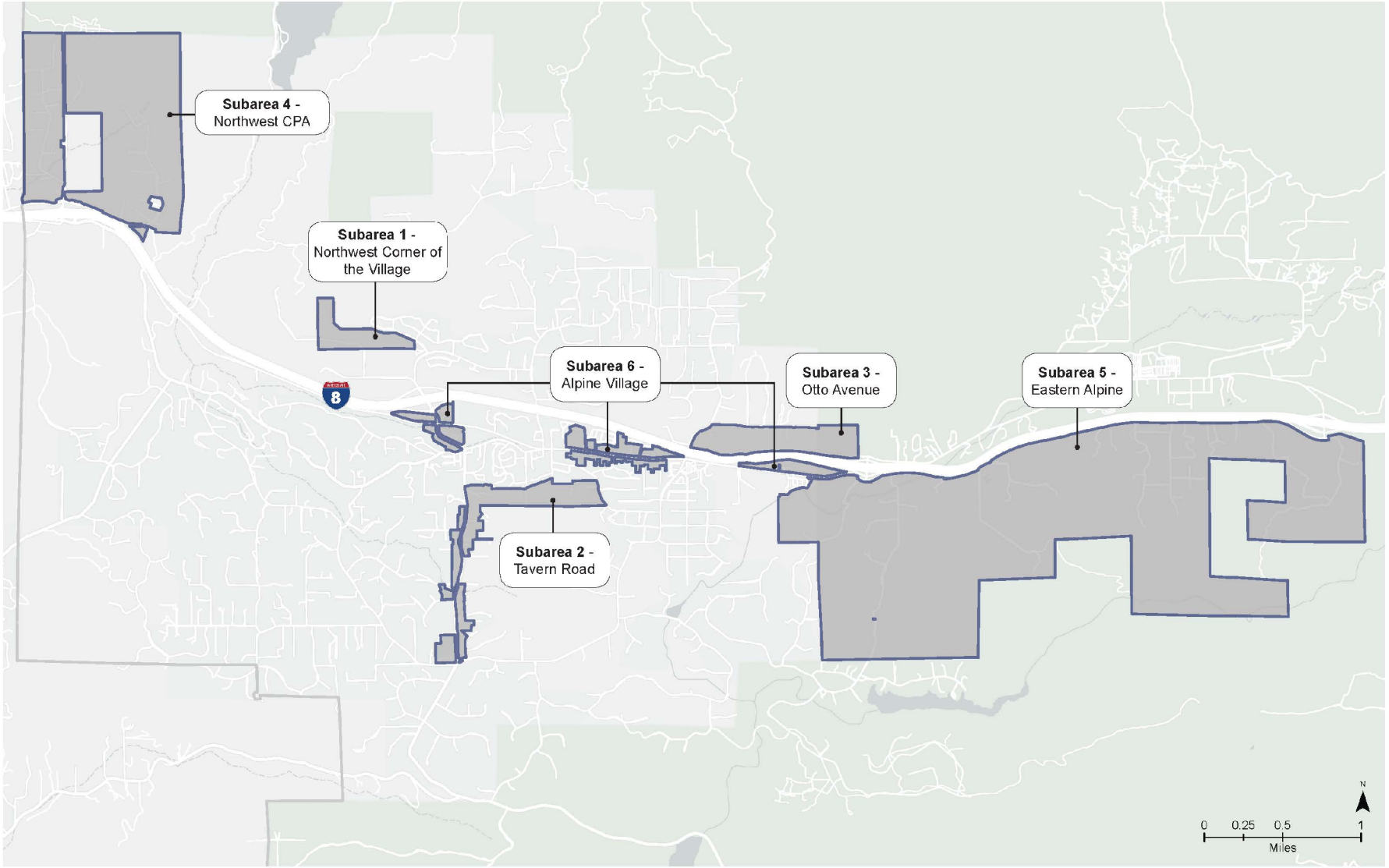


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Figure 3-1
Alpine Subareas
(1 of 2)

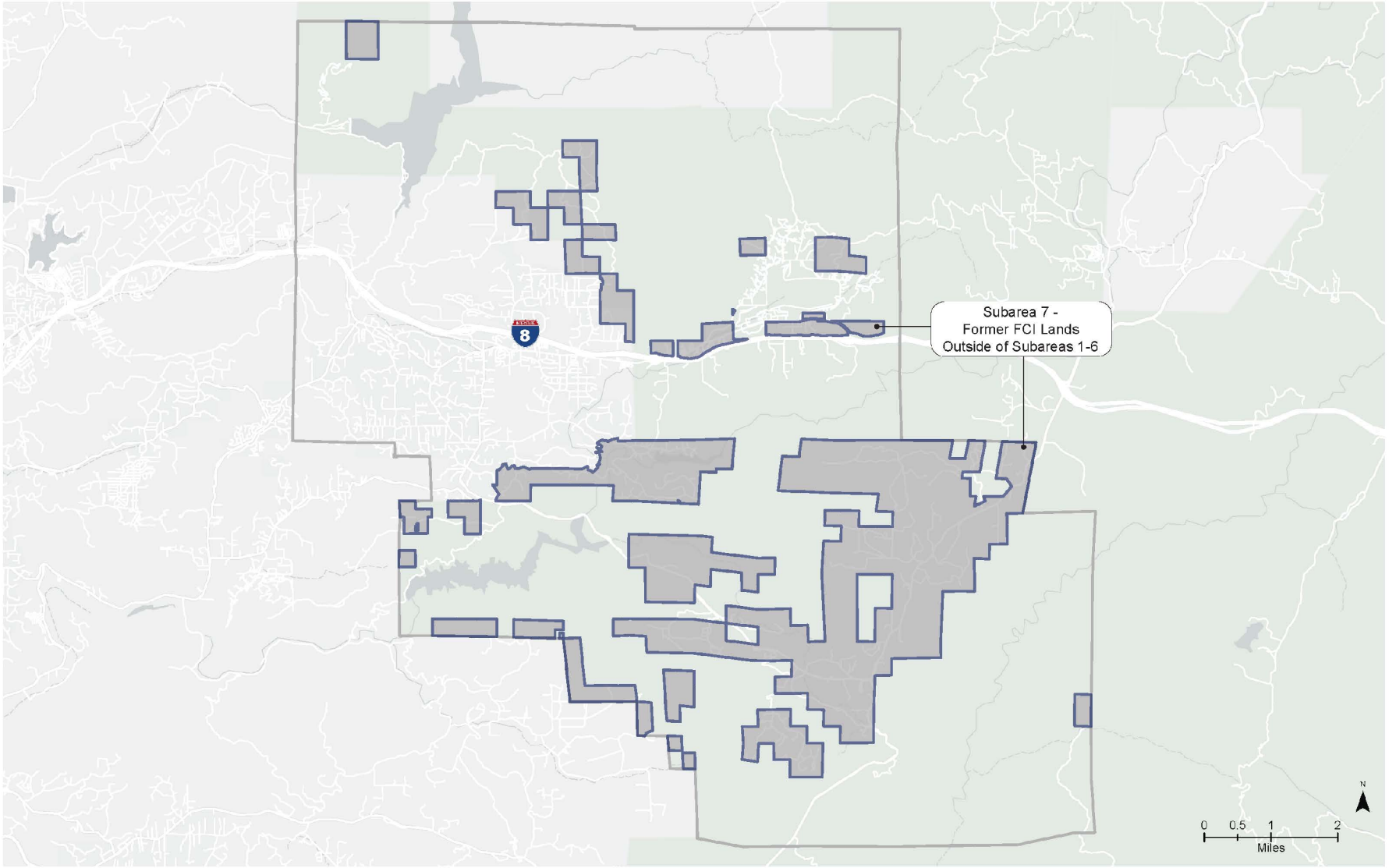

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Figure 3-1
Alpine Subareas
(2 of 2)

The project proposes to increase potential future dwelling unit capacity in the CPA from 6,430 as allowed in the General Plan to 8,443 (see Table 3.1)

- Subarea 2 – Land uses in this area would change from existing SR-1, VR-2, VR-2.9, and VR.4.3 to C-3, VR-7.3 and VR 10.9
- Subarea 4 – Land uses in this area would change from existing VR-2, SR-1, and SR-2 to SR – 0.5, VCMU C-5, and C-3.
- Subareas 5 – Land uses in this area would re-designate residential land uses in Subarea 5 to create a gradual increase in residential density near Alpine Boulevard while maintaining a residential buffer for the Cleveland National Forest (CNF). Several parcels would be re-designated from an existing SR-4 designation to the lower-density RL-20 or RL-40 designation. In addition, an area within the northeastern portion of this subarea, abutting the I-8 corridor, would be re-designated from SR-4 to SR-1, SR-10 and C-1 uses.
- Subarea 6 – The subarea would be re-designated from VR-15, SR-1, C-1, C-4, and P/SP to C-5 to provide high-density residential options and flexibility in commercial options.

In addition to the proposed land use changes, one new roadway is proposed in Subarea 5 (New Road 26), which is a minor collector road from Alpine Boulevard to Via Dieguenos via Viejas Creek Trail (see Table 3.4). The new road would provide a secondary access to Palo Verde Estates, which currently only has one way in and one way out. No other new or expanded Mobility Element roads would be constructed under this alternative as the proposed density does not necessitate any additional new or expanded roadways. In addition, this alternative would not amend the village boundary.

3.2.2 Alternative 1: Former FCI Lands in Alpine

The Former FCI Lands in Alpine Alternative (Alternative 1) would reduce capacity in the CPA by reverting all former FCI lands in the Alpine CPA to RL-40 (one residential dwelling unit per 40 gross acres). The alternative applies to Subareas 3, 5, 6, and 7, which consists of areas south of I-8 roughly between the Alpine Boulevard/I-8 intersection and the East Willows Road/I-8 intersection and a number of parcels north of I-8 and in the southern areas of the Alpine CPA, including areas near Japatul Road, Japatul Valley Road, and Lyons Valley Road. This is the only alternative that proposes a change in Subarea 7, which is currently designated for low-density RL-20 or SR-4 residential uses, and others are designated as Public Agency Lands (PAL) or Tribal lands. This alternative was developed as a response to the FCI settlement and to evaluate the potential outcome of lowering density for former FCI lands . This alternative would result in a reduction of seven dwelling units in Subarea 3; 385 dwelling units in Subarea 5; and 2,703 dwelling units in Subarea 7 compared to the current General Plan. There are no changes in the dwelling units in Subarea 6 compared to the current General Plan. This alternative would result in fewer dwelling units in Subareas 2 through 7 when compared to the proposed project, and the same number of units in Subarea 1.

One new roadway is proposed in Subarea 5 (New Road 26), which is a minor collector road from Alpine Boulevard to Via Dieguenos via Viejas Creek Trail (see Figure 3-2). The new road would provide a secondary access to Palo Verde Estates, which currently only has one way in and one way out. No other new or expanded Mobility Element roads would be constructed under this alternative as the proposed density does not necessitate any additional new or expanded roadways. In addition, this alternative would not amend the village boundary.

As shown in Table 3.1, this alternative would result in approximately 970 future allowable dwelling units in the seven subareas, which is 3,095 fewer units than the current General Plan and 5,108 fewer units than the proposed project. This alternative has a total forecasted population for the CPA of approximately

27,283 residents, which is 8,635 fewer residents than the current General Plan and 14,252 fewer residents than the proposed project.

3.2.3 Alternative 2: Former FCI Lands in Eastern Alpine

The Former FCI Lands in Eastern Alpine Alternative (Alternative 2) would reduce capacity in the CPA by reverting areas within former FCI study areas in Subarea 5 to their former land use designation of RL-40 (one dwelling unit per 40 gross acres). This alternative would involve land use designation changes in the area south of I-8 roughly between the Alpine Boulevard/I-8 intersection and the East Willows Road/I-8 intersection. Like Alternative 1, this alternative was developed as a response to the FCI settlement.

This alternative would change some areas in Subarea 5 from their current General Plan designations of Rural Commercial (C-4), Village Residential 2 (VR-2), and Semi-Rural 4 (SR-4) to Rural Lands 40 (RL-40). Under this alternative, 75 dwelling units could be constructed within these areas instead of the 460 units allowed by the current General Plan. No land use changes to any other subareas would be proposed with this alternative when compared to the current General Plan. This alternative would result in fewer dwelling units in Subareas 1 through 6 when compared to the proposed project, and the same number of units in Subarea 7.

One new roadway is proposed in Subarea 5 (New Road 26), which is a minor collector road running from Alpine Boulevard to Via Dieguenos via Viejas Creek Trail (see Figure 3-2). The new road would provide a secondary access to Palo Verde Estates, which currently only has one way in and one way out. No other new or expanded Mobility Element roads would be constructed under this alternative as the proposed density does not necessitate any additional new or expanded roadways. In addition, this alternative would not amend the village boundary.

As shown in Table 3.1, this alternative would result in approximately 3,680 allowable dwelling units in the seven subareas, which is 385 fewer units than the current General Plan and 2,398 fewer units than the proposed project. This alternative has a total forecasted population for the CPA of approximately 34,844, which is 1,074 fewer residents than the current General Plan and 6,691 fewer residents than the proposed project.

3.2.4 Alternative 3: Low Alternative

The Low Alternative (Alternative 3) would re-designate residential land uses in Subarea 5 only to create a gradual increase in residential density near Alpine Boulevard while maintaining a residential buffer for the Cleveland National Forest (CNF). Under the current General Plan, 460 dwelling units could be built in Subarea 5 while the alternative reduces capacity to a proposed 429 dwelling units. Under Alternative 3, several parcels within Subarea 5 would be re-designated from an existing SR-4 designation, which allows for up to one dwelling unit per 4, 8, or 16 acres depending on slope, to the lower-density RL-20 or RL-40 designation, which allows for one dwelling unit per 20 acres. In addition, an area within the northeastern portion of this subarea, abutting the I-8 corridor, would be re-designated from SR-4 to SR-1 and General Commercial uses. This alternative was proposed as an option for eastern Alpine during the FCI environmental review process. This alternative would result in fewer dwelling units in Subareas 1 through 6 when compared to the proposed project, and the same number of units in Subarea 7.

One new roadway is proposed in Subarea 5 (New Road 26), which is a minor collector road from Alpine Boulevard to Via Dieguenos via Viejas Creek Trail (see Figure 3-2). The new road would provide a secondary access to Palo Verde Estates, which currently only has one way in and one way out. No other new or expanded Mobility Element roads would be constructed under this alternative because the proposed

density does not necessitate any additional new or expanded roadways. In addition, this alternative would not amend the village boundary.

As shown in Table 3.1, this alternative would result in approximately 4,034 allowable dwelling units in the seven subareas, which is 31 units fewer than the current General Plan and 2,044 fewer units than the proposed project. This alternative has a total forecasted population for the CPA of approximately 35,832 residents, which is 86 fewer residents than the current General Plan and 5,703 fewer residents than the proposed project.

3.2.5 Alternative 4: Moderate Alternative

The Moderate Alternative (Alternative 4) would re-designate land uses in Subareas 1 through 5. Subareas 6 and 7 would retain the land use designations assigned in the current General Plan. The Moderate Alternative proposes an increase in density around areas where services, amenities, underutilized land, and freeway access already exist and where planned Mobility Element roads will be developed primarily by Otto Avenue, Tavern Road, and Chocolate Summit. This alternative only proposes residential land use designations and does not include any commercial land use designations. In addition, this alternative would extend the village boundary to the east in portions of Subarea 5 as a result of the proposed village land uses. This alternative would result in fewer dwelling units in Subareas 4 and 6 and a greater number of dwelling units in Subareas 1 through 3 and 5 when compared to the proposed project, and the same number of units in Subarea 7.
Land use designation changes would occur as follows as compared to the current General Plan:

Subarea 1: A portion of this subarea currently designated Limited Impact Industrial (I-1) would be re-designated to VR-7.3 to match existing VR-7.3 land uses to the east.

Subarea 2: Land use designations in this subarea would change from existing designations of VR-2, VR-2.9, VR-4.3, and SR-1 to VR-7.3 and VR-10.9. In addition, a new light collector roadway (New Road 25) is proposed to abut Wright's Field to the north (see Figure 3-2).

Subarea 3: Land use designation changes in this area would increase density slightly from SR-1 to SR-0.5. However, the easternmost portion of this subarea with severe slope constraints would change from SR-1 to the lower-density SR-2.

Subarea 4: The northern and eastern portions of this subarea would be re-designated to SR-1 from SR-2.

Subarea 5: Several land use changes would occur in this subarea. Some parcels adjacent to the I-8 corridor would change from VR-2 and SR-4 designations to VR-4.3 and SR-1. Parcels farther south would be re-designated from SR-4 and RL-40 to SR-1, SR-2, and RL-20. A small area in the northeastern area of this subarea would be re-designated General Commercial and SR-0.5 from SR-4. While a transfer request has not been submitted nor is it the County's intent to submit a request, the alternative includes evaluating the possibility of a land transfer with the CNF. Three new roadways are proposed in this subarea, New Roads 26, 27, and 29. New Road 26 is a minor collector road from Alpine Boulevard to Via Dieguenos via Viejas Creek and would provide a secondary access to Palo Verde Estates. New Roads 27 and 29 are minor collector roads. New Road 27 runs from Alpine Boulevard to cul de sac #2 and New Road 29 runs from Alpine Boulevard to New Road 28 (see Figure 3-2). These two new roads would accommodate increased capacity resulting from higher density in the subarea.

As shown in Table 3.1, this alternative would result in approximately 5,691 allowable dwelling units in the seven subareas, which would result in 1,626 more units than the current General Plan and 387 fewer units than the proposed project. This alternative has a total forecasted population for the CPA of approximately 40,455 residents, which is 4,537 more residents than the current General Plan and 1,080 fewer residents than the proposed project.

3.2.6 Alternative 5: High Alternative

The High Alternative (Alternative 5) would re-designate land uses in Subareas 1 through 6. The High Alternative proposes land use changes that could connect parks, schools, and open space to high-density residential in the Tavern Road community and increase opportunities for high-density residential and new commercial in the Village. In addition, this alternative would extend the village boundary to include Subarea 3 and portions of Subarea 5 as a result of the proposed village land uses. This alternative would result in fewer dwelling units in Subarea 4 and a greater number of dwelling units in Subareas 1 through 3 and 5 when compared to the proposed project, and the same number of units in Subareas 6 and 7.

Land use designation changes would occur as follows as compared to the current General Plan:

Subarea 1: The subarea would be re-designated from VR-7.3 and I-1 to VR-15, similar to the land uses to the south.

Subarea 2: Land use designations in this subarea would change from existing designations of VR-2, VR-2.9, VR-4.3, and SR-1 to VR-10.9, VR-20, and VR-24. In addition, a new light collector roadway (New Road 25) is proposed to abut Wright's Field to the north (see Figure 3-2).

Subarea 3: Existing SR-1 land uses would change to VR-7.3 and VR-10.9.

Subarea 4: The subarea would change from SR-1, SR-2, and VR-2 to SR-0.5.

Subarea 5: Several land use changes would occur in this subarea. Parcels adjacent to the I-8 corridor would be changed from VR-2 and SR-4 designations to VR-4.3, VR-7.3, VR-10.9, and VR-2.9. Parcels farther south would be re-designated from SR-4 and RL-40 to SR-1, SR-10, and RL-20. A small area in the northeastern area of this subarea would be re-designated General Commercial and VR-7.3. While a transfer request has not been submitted nor is it the County's intent to submit a request, the alternative would include evaluating the possibility of land exchanges with the CNF for PAL located in the southwest portion of the subarea.

Eight new roadways are proposed in this subarea, New Roads 26 through 33. New Road 26 is a minor collector road from Alpine Boulevard to Via Dieguenos via Viejas Creek and would provide a secondary access to Palo Verde Estates. New Roads 27 through 33 are minor collector roads off of Alpine Boulevard in this subarea (see Figure 3-2). These roads would accommodate increased capacity resulting from higher density in the subarea.

Subarea 6: The subarea would be re-designated from VR-15, SR-1, C-1, C-4, and P/SP to C-5 to provide high-density residential options and flexibility in commercial options.

As shown in Table 3.1, this alternative would result in approximately 11,498 allowable dwelling units in the seven subareas, which would result in 7,433 more units current General Plan and 5,420 more units than the proposed project. This alternative has a total forecasted population for the CPA of approximately 56,657 residents, which is 20,739 more residents than the current General Plan and 15,122 more residents than the proposed project.

3.3 Alternative Overview

As noted in the previous sections **Table 3.1** provides a summary of the changes in number of dwelling units within the Alpine community, by subarea, under each project alternative.

Table 3.1: Proposed Dwelling Units - By Alternative

Subarea	Proposed Project	No Project alternative (Current General Plan)	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
1– Northwest Village	192	192	192	192	192	411	844
2 – Tavern Road	1,095	315	315	315	315	1,101	2,085
3 – Otto Avenue	31	31	24	31	31	93	838
4 – Northwest Community Plan Area	851	166	166	166	166	289	740
5 – Eastern Alpine	429	460	75	75	429	896	3,511
6 – Alpine Village	617	38	38	38	38	38	617
7 – Former FCI Lands	2,863	2,863	160	2,863	2,863	2,863	2,863
Subareas 1-7 Total	6,078	4,065	970	3,680	4,034	5,691	11,498
Areas outside of Subareas	2,365	2,365	2,365	2,365	2.365	2,365	2,365
Total CPA	8,443	6,430	3,335	6,045	6,399	8,056	13,863

Table 3.2 provides a summary of the changes in acres of commercial retail within the Alpine community, by subarea, under each project alternative.

Table 3.2: Proposed Commercial Retail – By Alternative

	Proposed Project	No Project alternative (Current General Plan)	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
1– Northwest Village	-	-	-	-	-	-	-
2 – Tavern Road	1.02	-	-	-	-	-	-
3 – Otto Avenue	-	-	-	-	-	-	-
4 – Northwest Community Plan Area	8.04	-	-	-	-	-	-
5 – Eastern Alpine	10.95	7.02	-	-	10.95	10.95	7.34
6 – Alpine Village	104.93	85.16	80.82	85.16	85.16	85.16	104.93
7 – Former FCI Lands	268.52	268.52	-	268.52	268.52	268.52	268.52
Total CPA	393.46	360.70	80.82	353.68	364.63	364.63	380.78

Note:
Commercial land uses were coded into the SANDAG model based on assumed square footage assumptions. The detailed assumptions on how the land use acreage provided in Table 3.2 was converted to square footage is provided in **Appendix D**.

Table 3.3 summarizes the changes proposed to the current Mobility Element Roadways within the Alpine community. These changes are assumed under all project alternatives.

As shown in Table 3.3, improvements are recommended to increase the vehicular capacity for some roadways, as compared to what is currently approved in the County's Mobility Element. However, for some roadway segments, the planned vehicular capacity enhancements within the County's adopted Mobility Element are removed and the roadway would keep its existing features. The recommendations outlined in Table 3.3 were made by County Traffic Engineering staff after a thorough review of existing roadway geometries and volumes as well as the adopted Mobility Element.

Table 3.3: Proposed Changes to Roadway Mobility Element Classifications

ME ID	Roadway	From	To	Current ME		Proposed ME		Change in Capacity
				Class	Capacity	Class	Capacity	
1	Old Highway 80	Lakeside CPA Boundary	Chocolate Summit Drive	2.2B	19,000	2.2C	19,000	0
2	Chocolate Summit Drive/Broad Oaks Road	Olde Highway 80	Chocolate Creek Road	2.2E	16,200	2.3B	9,000	-7,200
3	Alpine Boulevard	Dunbar Lane	Arnold Way	4.1B	34,200	2.1C	19,000	-15,200
3	Alpine Boulevard	Arnold Way	Tavern Road	2.1D	19,000	2.1C	19,000	0
3	Alpine Boulevard	Tavern Road	South Grade Road	2.2A	19,000	2.2B	19,000	0
3	Alpine Boulevard	South Grade Road	West Willows Road	2.1D	19,000	2.1C	19,000	0
4	Harbison Canyon Road	Arnold Way	Bridle Run	2.2A	19,000	2.1C	19,000	0
4	Harbison Canyon Road	Bridle Run	Crest/Dehesa CPA Boundary	2.2C	19,000	2.1C	19,000	0
5	Arnold Way	Alpine Boulevard	South Grade Road	2.2C	19,000	2.1C	19,000	0
5	Arnold Way	Tavern Road	Alpine Boulevard	2.2A	19,000	2.2C	19,000	0
7	South Grade Road	Tavern Road	Via Viejas	2.2E	16,500	2.2C	19,000	+2,800
8	Tavern Road	Victoria Park Terrace	Arnold Way	4.1A	37,000	2.2D	19,000	-18,000
11	New Road 11	Victoria Park Terrace	Tavern Road	2.3A	9,000	2.2E	16,200	+7,200
12	Tavern Road	New Road 11	Victoria Park Terrace	4.1A	37,000	2.1A	19,000	-18,000
13	Victoria Park Terrace	Tavern Road (at Tavern Lane)	West Victoria Drive	2.2A	19,000	2.1D	19,000	0
16	North/East Victoria Drive	Victoria Park Terrace	Otto Avenue	2.2F	9,700	2.2D	19,000	+9,300
16	North/East Victoria Drive	Otto Avenue	South Grade Road	2.2C	19,000	2.2D	19,000	0
17	Otto Avenue	East Victoria Road	Willows Road	2.2C	19,000	2.2E	16,200	-2,800
19	Willows Road	Viejas Casino Area	East Willows Road Interchange	4.2A	30,000	2.2E	16,200	-13,800
22	Viejas View Place	Alpine Boulevard	South Grade Road	LPR	N/A	2.3C	8,000	+8,000

Note: LPR = Local Public Road

Table 3.4 and **Figure 3-2** display the new roadway segments that are proposed under each project alternative, as described in the previous sections.

Table 3.4: Summary of Proposed New Roadway Segments

ME ID	Roadway	From	To	Class	Capacity	Proposed Project	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
25	New Road 25	Tavern Road	Eltinge Drive	2.3C	8,000					X	X
26	New Road 26	Alpine Boulevard	Via Dieguenos	2.3C	8,000	X	X	X	X	X	X
27	New Road 27	Alpine Boulevard	Cul-de-Sac #2	2.3C	8,000					X	X
28	New Road 28	Alpine Boulevard	Casa de Roca Way	2.3C	8,000						X
29	New Road 29	Alpine Boulevard	Turnaround	2.3C	8,000					X	X
30	Montecito Vista	Alpine Boulevard	Casa De Roca Way	2.3C	8,000						X
31	New Road 31	Montecito Vista	Farlin Road	2.3C	8,000						X
32	Farlin Road	Alpine Boulevard	Old Ranch Road	2.3C	8,000						X
33	Casa de Roca Way	Alpine Boulevard	Proposed Road 28	2.3C	8,000						X

Table 3.5 and **Figure 3-3** summarize the projected VMT, population, and employment within the Alpine community for the Proposed Project and each project alternative. The data for the Proposed Project and each project alternative was derived from its respective SANDAG Series 13 Model run, as described in Section 2.2.

Table 3.5: VMT Summary Table

Scenario	Population[1]	Employment	Total VMT	VMT/Capita	VMT/ Employee
Base Year	17,988	6,774	947,833	34.23	44.64
No Project (Current General Plan)	33,231	11,855	1,487,583	25.62	33.97
Proposed Project	40,622	12,736	1,724,540	24.41	31.79
Former FCI Lands in Alpine	27,646	8,812	1,277,034	27.71	36.19
Former FCI Lands in Eastern Alpine	34,420	12,731	1,602,905	25.03	33.71
Low Alternative	34,433	12,521	1,618,822	25.31	33.88
Moderate Alternative	39,834	13,145	1,718,623	24.58	32.37
High Alternative	54,425	13,842	1,983,602	24.33	29.20

Note:
[1]Total population within the Alpine community, based on SANDAG Series 13 model projections

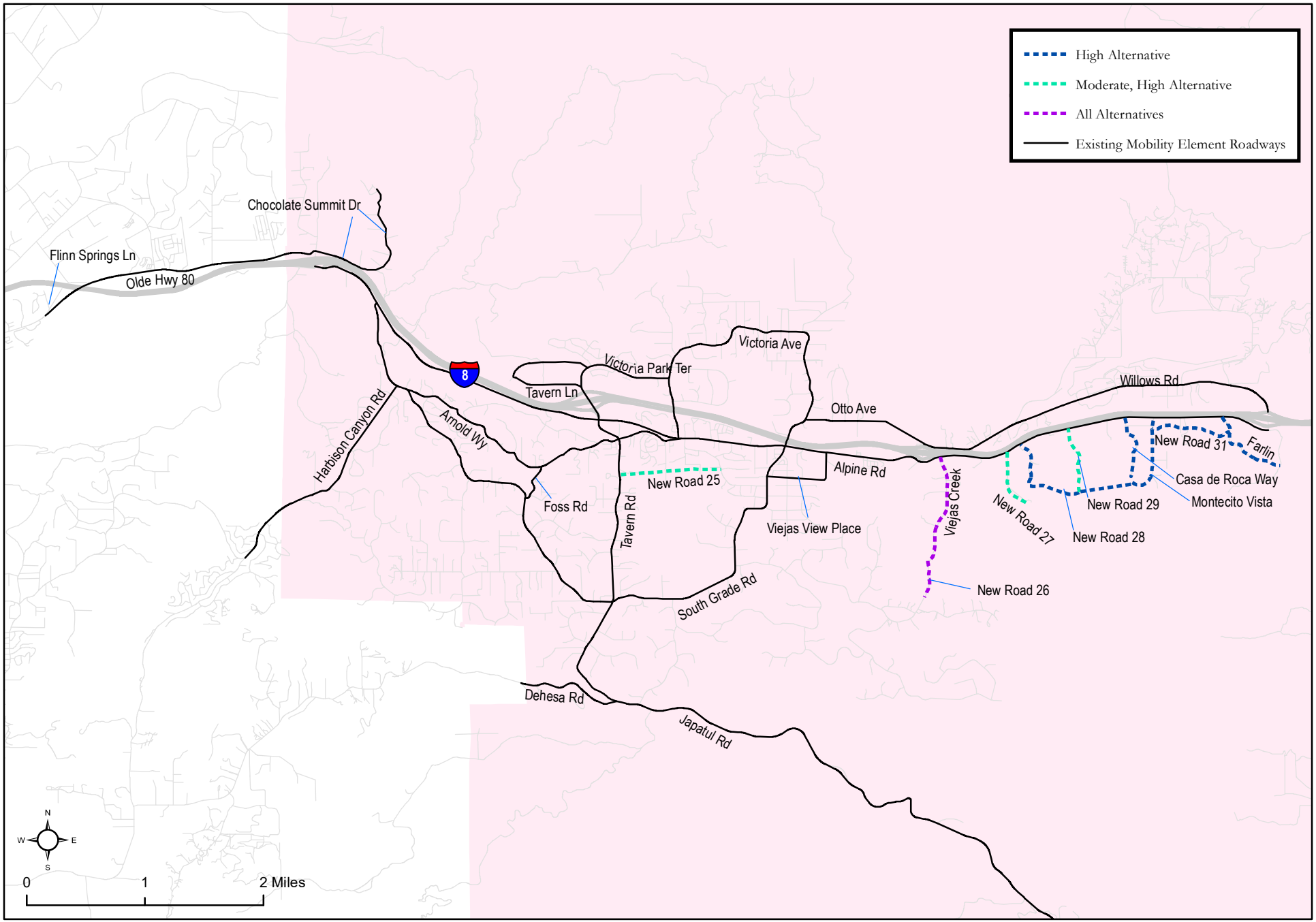

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Figure 3-2
New Roadway Connections

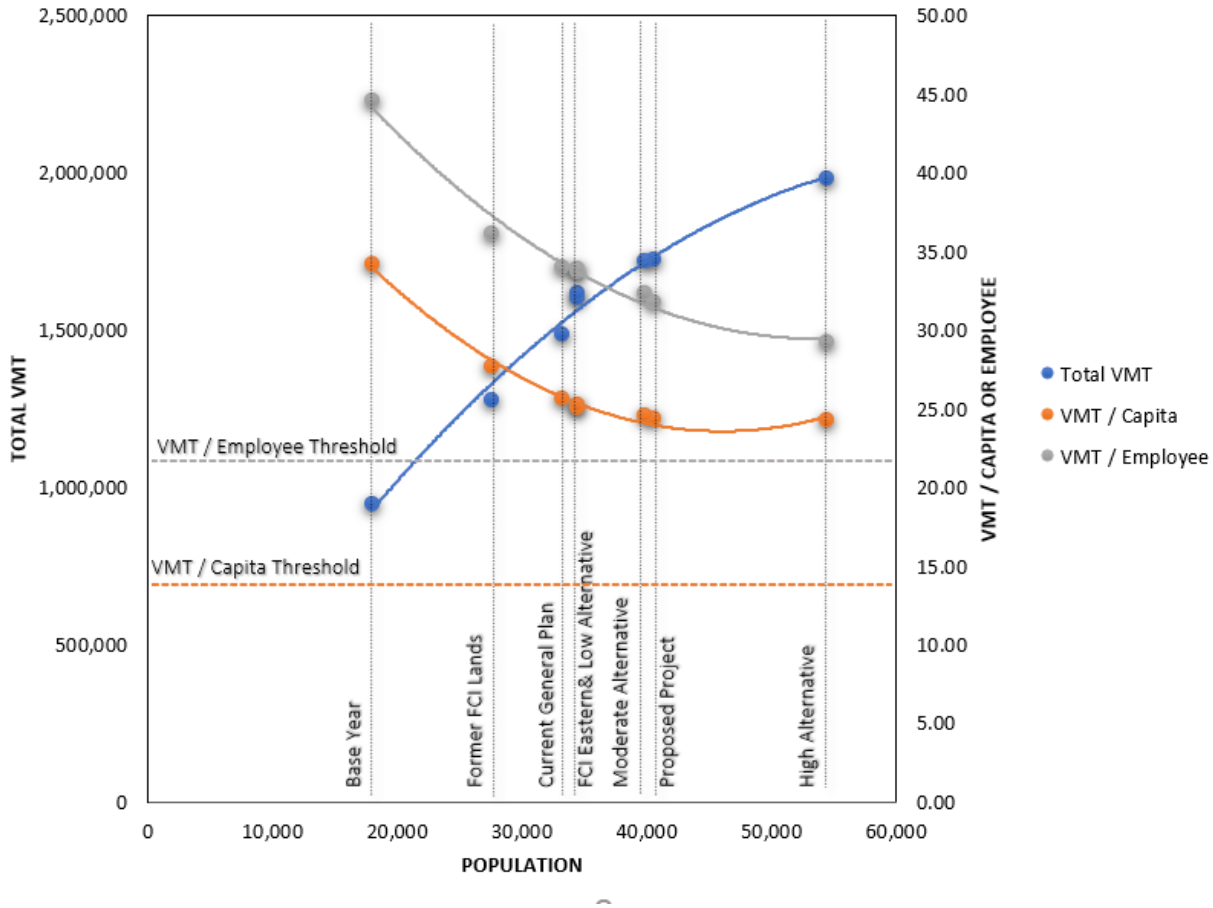

Figure 3-3: VMT Summary by Community Project Alternative

As shown in the figure above, as the population within the community increases, so will the total VMT (blue line). As the density within the community starts to increase, the distance between land uses is reduced resulting in shorter trips. The reduced distances between land uses not only shortens trip length, which ultimately reduces VMT, it also allows residents the opportunity to choose an alternate mode travel to reach their destination, such as walking or biking. This shift in modes can ultimately lower the total number of trips generated within the community, which also reduces VMT. The Total VMT curve in Figure 3-3 illustrates these reductions to a degree as the slope of the curve starts to flatten as population (density) increases. These reductions are clearly shown in the VMT efficiency metrics, VMT/Capita (orange line) & VMT/Employee (grey line), which both decrease significantly as the population of the community increases.

4.0 Impact Analysis

This chapter presents the assessment of transportation related impacts resulting from the five project alternatives. The identification of direct impacts focuses on whether the project alternative would have a significant impact if proposed new residential, employment, or retail land uses would in aggregate exceed the respective VMT by land use thresholds outlined in Section 2.3. Cumulative impacts are analyzed and identified based on how the project alternative will affect the total VMT, VMT/Capita, and VMT/Employee of both the region and the Unincorporated County, when compared to No Project (Current General Plan) conditions. Finally, potential significant impacts to pedestrian, bicycle, and transit facilities are also identified.

4.1 Village-Focused Alternative (Proposed Project)

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the Village-Focused Alternative (Proposed Project). Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.1.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the Proposed Project. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 24.41 miles and an average VMT/Employee of 31.79 miles under the Proposed Project. **Table 4.1** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The Proposed Project is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/ Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

As shown in Table 4.1, the average VMT/Capita and VMT/Employee within Alpine, under the Proposed Project, is anticipated above both the Regional and Unincorporated thresholds (Plan to Ground analysis). As noted, in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the employment and residential land uses proposed within the Proposed Project are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year (year in which buildout is achieved) VMT analysis is not required, the VMT associated with the Proposed Project was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe (Plan to Plan analysis). As shown in the Table 4.1, both the average

VMT/Capita and VMT/Employee within Alpine is still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Table 4.1: Impact of Residential and Employment Land Uses - Direct Impact Analysis - Proposed Project

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	24.41	9.71	141%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		2.14	93%	Yes
	Horizon Year Regional Threshold	14.68	12.48		11.93	166%	Yes
	Horizon Year Unincorporated Threshold	23.31	19.81		4.60	105%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	31.79	10.20	125%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		3.23	95%	Yes
	Horizon Year Regional Threshold	21.75	18.48		13.31	146%	Yes
	Horizon Year Unincorporated Threshold	30.51	25.93		5.86	104%	Yes

Notes:

[1] Average VMT for under the analysis threshold scenario. Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.

[2] As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.

[3] Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.

[4] Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.

[5] Indicates if the project alternative is anticipated to have a significant transportation related impact

[6] As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are greater than 50,000 square feet and considered to be non-locally serving. Therefore, impacts associated with retail land uses are considered to be significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the Proposed Project are anticipated to increase the total VMT in the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. **Table 4.2** isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative's retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and isn't anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.2: Impact of Retail Land Uses on Alpine - Direct Impact Analysis - Proposed Project

Scenario	Total VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	Yes
Proposed Plan	1,724,540	991,602	404,926	328,012	
Change	776,707	375,842	102,550	298,314	

Note:

SI?: Indicates if the project alternative is anticipated to have a significant transportation related impact

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the Proposed Project. Therefore, the retail land uses under this project alternative are anticipated to have a significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the Proposed Project. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the Proposed Project will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Route Changes: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.

Newly Generated Trips: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the Proposed Project would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the Alpine Community Plan Update would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the Proposed Project will include the following new Mobility Element roadway:

- New Road 26

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Land Use Changes: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadway will likely result in a significant impact.

4.1.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the Proposed Project would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the

Proposed Project should be evaluated and disclosed. **Table 4.3** provides a comparison of the Proposed Project total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level, under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

Table 4.3: Cumulative Impact Summary (Buildout Year 2050) - Proposed Project

Metric	Current General Plan	Village-Focused	Δ	Change (%)	SI?[1]
Regional VMT/Capita	14.67	14.68	0.01	0.07%	Yes[2]
Regional VMT/Employee	21.72	21.75	0.03	0.14%	Yes[2]
Total Regional VMT	96,668,603	96,819,000	150,397	0.16%	Yes[2]
Unincorporated VMT/Capita	23.39	23.31	-0.08	-0.34%	No
Unincorporated VMT/Employee	30.76	30.51	-0.25	-0.81%	No
Total Unincorporated VMT	21,600,628	21,669,679	69,051	0.32%	Yes
Alpine VMT/Capita	25.62	24.41	-1.21	-4.71%	No
Alpine VMT/Employee	33.97	31.79	-2.18	-6.41%	No
Total Alpine VMT	1,487,583	1,724,540	236,957	15.93%	Yes

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan) conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

As shown in the table, the Proposed Project is anticipated to slightly increase the regional VMT/Capita, regional VMT/Employee, and the regional total VMT. This would result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to increase; however, both the VMT/Capita and VMT/Employee are anticipated to decrease under the Proposed Project. This indicates that while there will be more growth in vehicular travel within both Alpine and the Unincorporated area as a whole, the travel will be done at a more efficient level than what is projected under No Project (Current General Plan) conditions.

4.1.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflicts with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit
- Conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the Proposed Project will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the Proposed Project will not have a significant impact to any multi-modal facilities.

4.2 Former FCI Lands Alternative

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the Former FCI Lands Alternative. Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.2.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the Former FCI Lands Alternative. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 27.71 miles and an average VMT/Employee of 36.19 miles under the Former FCI Lands Alternative. **Table 4.4** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The alternative is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

As shown in Table 4.4, the average VMT/Capita and VMT/Employee within Alpine, under the Former FCI Lands Alternative, are anticipated above both the Regional and Unincorporated thresholds (Plan to Ground). As noted, in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the employment and residential land uses proposed within the Former FCI Lands Alternative are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Table 4.4: Residential and Employment Land Uses - Direct Impact Analysis - Former FCI Lands Alternative

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	27.71	13.00	160%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		5.44	106%	Yes
	Horizon Year Regional Threshold	14.66	12.46		15.25	189%	Yes
	Horizon Year Unincorporated Threshold	23.44	19.92		7.79	118%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	36.19	14.60	142%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		7.63	108%	Yes
	Horizon Year Regional Threshold	21.72	18.47		17.72	167%	Yes
	Horizon Year Unincorporated Threshold	30.72	26.12		10.07	118%	Yes

Notes:

1 Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.
2 As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.
3 Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.
4 Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.
5 Indicates if the project alternative is anticipated to have a significant transportation related impact
6 As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year VMT analysis is not required, the VMT associated Former FCI Lands Alternative was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe. As shown in the table, both the average VMT/Capita and VMT/Employee within Alpine is still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are non-local serving. Therefore, impacts associated with retail land uses are significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the Former FCI Lands Alternative are anticipated to increase the total VMT within the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. Table 4.5 isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed

to be an insignificant portion of the external VMT and is not anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.5: Retail Land Uses - Direct Impact Analysis - Former FCI Lands Alternative

Scenario	Total Community VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	Yes
Former FCI Lands	1,277,034	765,935	318,943	192,156	
Change	329,201	150,175	16,566	162,459	

Note:
SI?: If the project alternative is anticipated to have a significant transportation related impact?

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the Former FCI Lands Alternative. Therefore, the retail land uses under this project alternative are anticipated to have significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the Former FCI Lands Alternative. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the Former FCI Lands Alternative will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Route Changes: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.

Newly Generated Trips: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the Former FCI Lands Alternative would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the ACPU would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the Former FCI Lands Alternative will include the following new Mobility Element roadway:

- New Road 26

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Land Use Changes: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadway will likely result in a significant impact.

4.2.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the Former FCI Lands Alternative would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the plan should be evaluated and disclosed. Table 4.6 provides a comparison of the Former FCI Lands Alternative total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

Table 4.6: Cumulative Impact Summary (Buildout Year 2050) - Former FCI Lands Alternative

Metric	Current General Plan	Former FCI Lands in Eastern	Change	% Change	SI?[1]
Regional VMT/Capita	14.67	14.66	-0.01	-0.07%	No[2]
Regional VMT/Employee	21.72	21.72	0.00	0.00%	No[2]
Total Regional VMT	96,668,603	96,483,026	-185,577	-0.19%	No[2]
Unincorporated VMT/Capita	23.39	23.44	0.05	0.21%	Yes
Unincorporated VMT/Employee	30.76	30.72	-0.04	-0.13%	No
Total Unincorporated VMT	21,600,628	21,439,112	-161,516	-0.75%	No
Alpine VMT/Capita	25.62	27.71	2.09	8.15%	Yes
Alpine VMT/Employee	33.97	36.19	2.22	6.55%	Yes
Total Alpine VMT	1,487,583	1,277,034	-210,549	-14.15%	No

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan)l conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

As shown in the table, the Former FCI Lands Alternative is anticipated to slightly decrease the regional VMT/Capita and the total regional VMT, with no change to the regional VMT/Employee. Therefore, this would not result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to decrease due to the reduced density associated with this alternative. However, the VMT efficiency is anticipated to increase at the Unincorporated County (residential uses) and Alpine (both use types).

4.2.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the Former FCI Lands Alternative will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the Former FCI Lands Alternative will not have a significant impact to any multi-modal facilities.

4.3 Former FCI Lands in Eastern Alpine

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the Former FCI Lands in Eastern Alpine Alternative. Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.3.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the Former FCI Lands in Eastern Alpine Alternative. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 25.03 miles and an average VMT/Employee of 33.71 miles under the Former FCI Lands in Eastern Alpine Alternative. **Table 4.7** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The alternative is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San

Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

Table 4.7: Impact of Residential and Employment Land Uses - Direct Impact Analysis - Former FCI Lands in Eastern Alpine Alternative

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	25.03	10.32	145%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		2.76	96%	Yes
	Horizon Year Regional Threshold	14.68	12.48		12.55	170%	Yes
	Horizon Year Unincorporated Threshold	23.36	19.85		5.18	107%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	33.71	12.12	133%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		5.15	100%	Yes
	Horizon Year Regional Threshold	21.76	18.49		15.22	155%	Yes
	Horizon Year Unincorporated Threshold	30.78	26.16		7.55	110%	Yes

Notes:

1 Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.

2 As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.

3 Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.

4 Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.

5 Indicates if the project alternative is anticipated to have a significant transportation related impact

6 As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

As shown in the table, the average VMT/Capita and VMT/Employee within Alpine, under the Former FCI Lands in Eastern Alpine Alternative, are anticipated above both the Regional and Unincorporated thresholds (Plan to Ground). As noted in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the employment and residential land uses proposed within the Former FCI Lands in Eastern Alpine Alternative are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year VMT analysis is not required, the VMT associated Former FCI Lands in Eastern Alpine Alternative was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe. As shown in the table, both the average VMT/Capita and VMT/Employee within Alpine are still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are considered to be non-local serving. Therefore, impacts associated with retail land uses are considered to be significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the Former FCI Lands in Eastern Alpine Alternative are anticipated to increase the total VMT within the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. **Table 4.8** isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and is not anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.8: Impact of Retail Land Uses on Alpine - Direct Impact Analysis - Former FCI Lands in Eastern Alpine Alternative

Scenario	Total Community VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	Yes
Former FCI Lands in Eastern	1,602,905	861,363	429,203	312,340	
Change	655,072	245,603	126,826	282,642	

Note:
SI?: If the project alternative is anticipated to have a significant transportation related impact?

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the Former FCI Lands in Eastern Alpine Alternative. Therefore, the retail land uses under this project alternative are anticipated to have significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the Former FCI Lands in Eastern Alpine Alternative. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the Former FCI Lands in Eastern Alpine Alternative will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Route Changes: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.

Newly Generated Trips: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the Former FCI Lands in Eastern Alpine Alternative would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the project alternative would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the Former FCI Lands in Eastern Alpine Alternative will include the following new Mobility Element roadway:

- New Road 26

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Land Use Changes: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadway will likely result in a significant impact.

4.3.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the Former FCI Lands in Eastern Alpine Alternative would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the plan should be evaluated and disclosed. Table 4.9 provides a comparison of the Former FCI Lands in Eastern Alpine Alternative total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

As shown in the Table 4.9, the Former FCI Lands in Eastern Alpine Alternative is anticipated to slightly increase the regional VMT/Capita, VMT/Employee, and the total regional VMT. This would result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to increase; however, the VMT/Capita is anticipated to decrease under the Former FCI Lands in Eastern Alpine Alternative. This indicates that while there will be more growth in residential vehicular travel within both Alpine and the Unincorporated area as a whole and travel will be done at a more efficient level than what is projected under the No Project (Current General Plan) conditions.

Table 4.9: Impacts to the Regional, Unincorporated, and Alpine SCS - Former FCI Lands in Eastern Alpine Alternative

Metric	Current General Plan	Former FCI Lands in Eastern Alpine	Change	% Change	SI[1]
Regional VMT/Capita	14.67	14.68	0.01	0.07%	Yes[2]
Regional VMT/Employee	21.72	21.76	0.04	0.18%	Yes[2]
Total Regional VMT	96,668,603	96,739,498	70,895	0.07%	Yes[2]
Unincorporated VMT/Capita	23.39	23.36	-0.03	-0.13%	No
Unincorporated VMT/Employee	30.76	30.78	0.02	0.07%	Yes
Total Unincorporated VMT	21,600,628	21,638,719	38,091	0.18%	Yes
Alpine VMT/Capita	25.62	25.03	-0.59	-2.31%	25.62
Alpine VMT/Employee	33.97	33.71	-0.26	-0.76%	33.97
Total Alpine VMT	1,487,583	1,602,905	115,322	7.75%	1,487,583

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan)l conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

4.3.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the Former FCI Lands in Eastern Alpine Alternative will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the Former FCI Lands in Eastern Alpine Alternative will not have a significant impact to any multi-modal facilities.

4.4 Low Alternative

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the Low Alternative. Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.4.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the Low Alternative. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 25.31 miles and an average VMT/Employee of 33.88 miles under the Low Alternative. **Table 4.10** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The alternative is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

Table 4.10: Residential and Employment Land Uses - Direct Impact Analysis - Low Alternative

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	25.31	10.60	146%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		3.04	97%	Yes
	Horizon Year Regional Threshold	14.66	12.46		12.85	173%	Yes
	Horizon Year Unincorporated Threshold	23.33	19.83		5.48	108%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	33.88	12.29	133%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		5.32	101%	Yes
	Horizon Year Regional Threshold	21.72	18.46		15.41	156%	Yes
	Horizon Year Unincorporated Threshold	30.78	26.16		7.71	110%	Yes

Notes:

1 Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.

2 As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.

3 Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.

4 Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.

5 Indicates if the project alternative is anticipated to have a significant transportation related impact

6 As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

As shown in the table, the average VMT/Capita and VMT/Employee within Alpine, under the Low Alternative, is anticipated to be above both the Regional and Unincorporated thresholds (plan to ground). As noted, in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the

employment and residential land uses proposed within the Low Alternative are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year VMT analysis is not required, the VMT associated Low Alternative was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe. As shown in the table, both the average VMT/Capita and VMT/Employee within Alpine is still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are considered to be non-local serving. Therefore, impacts associated with retail land uses are considered to be significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the Low Alternative are anticipated to increase the total VMT within the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. Table 4.11 isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and is not anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.11: Retail Land Uses - Direct Impact Analysis - Low Alternative

Scenario	Total Community VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	Yes
Low Alternative	1,618,822	871,424	424,149	323,249	
Change	670,989	255,665	121,773	293,552	

Note:
SI?: If the project alternative is anticipated to have a significant transportation related impact?

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the Low Alternative. Therefore, the retail land uses under this project alternative are anticipated to have significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the Low Alternative. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the Low Alternative will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

> *Route Changes*: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.
>
> *Newly Generated Trips*: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the Low Alternative would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the project alternative would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the Low Alternative will include the following new Mobility Element roadway:

- New Road 26

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

> *Land Use Changes*: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadway will likely result in a significant impact.

4.4.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the Low Alternative would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the plan should be evaluated and disclosed. **Table 4.12** provides a comparison of the Low Alternative total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

Table 4.12: Cumulative Impact Summary (Buildout Year 2050) - Low Alternative

Metric	Current General Plan	Low Alternative	Change	Change	SI[1]
Regional VMT/Capita	14.67	14.66	-0.01	-0.07%	No[2]
Regional VMT/Employee	21.72	21.72	0.00	0.00%	No[2]
Total Regional VMT	96,668,603	96,655,965	-12,638	-0.01%	No[2]
Unincorporated VMT/Capita	23.39	23.33	-0.06	-0.26%	No
Unincorporated VMT/Employee	30.76	30.78	0.02	0.06%	Yes
Total Unincorporated VMT	21,600,628	21,611,354	10,726	0.05%	Yes
Alpine VMT/Capita	25.62	25.31	-0.31	-1.21%	No
Alpine VMT/Employee	33.97	33.88	-0.09	-0.28%	No
Total Alpine VMT	1,487,583	1,618,822	131,239	8.82%	Yes

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan) conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

As shown in the table, the Former FCI Lands in Eastern Alpine Alternative is anticipated to slightly decrease the regional VMT/Capita and the total regional VMT, with no change to the regional VMT/Employee. Therefore, this would not result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to increase; however, the VMT/Capita is anticipated to decrease under the Low Alternative. This indicates that while there will be more residential growth in vehicular travel within both Alpine and the Unincorporated area as a whole and travel will be done at a more efficient level than what is projected under the No Project (Current General Plan) conditions.

4.4.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the Low Alternative will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the Low Alternative will not have a significant impact to any multi-modal facilities.

4.5 Moderate Alternative

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the Moderate Alternative. Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.5.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the Moderate Alternative. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 24.58 miles and an average VMT/Employee of 32.37 miles under the Moderate Alternative. **Table 4.13** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The alternative is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

As shown in the table, the average VMT/Capita and VMT/Employee within Alpine, under the Moderate Alternative, is anticipated to be above both the Regional and Unincorporated thresholds (plan to ground). As noted, in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the employment and residential land uses proposed within the Moderate Alternative are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year VMT analysis is not required, the VMT associated Moderate Alternative was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe. As shown in the table, both the average VMT/Capita and VMT/Employee within Alpine is still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Table 4.13: Residential and Employment Land Uses - Direct Impact Analysis - Moderate Alternative

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	24.58	9.87	142%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		2.31	94%	Yes
	Horizon Year Regional Threshold	14.68	12.48		12.10	167%	Yes
	Horizon Year Unincorporated Threshold	23.36	19.85		4.72	105%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	32.37	10.78	127%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		3.81	96%	Yes
	Horizon Year Regional Threshold	21.74	18.48		13.89	149%	Yes
	Horizon Year Unincorporated Threshold	30.39	25.83		6.54	107%	Yes

Notes:

1 Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.

2 As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.

3 Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.

4 Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.

5 Indicates if the project alternative is anticipated to have a significant transportation related impact

6 As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are non-local serving. Therefore, impacts associated with retail land uses are significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the Moderate Alternative are anticipated to increase the total VMT within the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. **Table 4.14** isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and is not anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.14: Retail Land Uses - Direct Impact Analysis - Moderate Alternative

Scenario	Total Community VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	Yes
Moderate Alternative	1,718,623	978,997	425,498	314,128	
Change	770,790	363,237	123,121	284,431	

Note:
SI?: If the project alternative is anticipated to have a significant transportation related impact?

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the Moderate Alternative. Therefore, the retail land uses under this project alternative are anticipated to have significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the Moderate Alternative. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the Moderate Alternative will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Route Changes: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.

Newly Generated Trips: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the Moderate Alternative would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the project alternative would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the Moderate Alternative will include the following new Mobility Element roadways:

- New Road 25
- New Road 26
- New Road 27
- New Road 29

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

Land Use Changes: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadways will likely result in a significant impact.

4.5.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the Moderate Alternative would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the plan should be evaluated and disclosed. **Table 4.15** provides a comparison of the Moderate Alternative total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

Table 4.15: Cumulative Impact Summary (Buildout Year 2050) - Moderate Alternative

Metric	Current General Plan	Moderate Alternative	Change	% Change	SI?
Regional VMT/Capita	14.67	14.68	0.01	0.07%	Yes[2]
Regional VMT/Employee	21.72	21.74	0.02	0.09%	Yes[2]
Total Regional VMT	96,668,603	96,811,387	142,784	0.15%	Yes[2]
Unincorporated VMT/Capita	23.39	23.36	-0.03	-0.13%	No
Unincorporated VMT/Employee	30.76	30.39	-0.37	-1.20%	No
Total Unincorporated VMT	21,600,628	21,664,185	63,557	0.29%	Yes
Alpine VMT/Capita	25.62	24.58	-1.04	-4.06%	No
Alpine VMT/Employee	33.97	32.37	-1.60	-4.71%	No
Total Alpine VMT	1,487,583	1,718,623	231,040	15.53%	Yes

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan) conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

As shown in Table 4.15, the Moderate Alternative is anticipated to slightly increase the regional VMT/Capita, VMT/Employee, and the total regional VMT. This would result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to increase; however, both the VMT/Capita and VMT/Employee is anticipated to decrease under the High Alternative. This indicates that while there will be more growth in vehicular travel within both Alpine and the Unincorporated area as a whole and travel will be done at a more efficient level than what is projected under the No Project (Current General Plan) conditions.

4.5.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the High Alternative will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the High Alternative will not have a significant impact to any multi-modal facilities.

4.6 High Alternative

This section reviews and identifies the potential direct and cumulative VMT related impacts that may be associated with the High Alternative. Potential impacts to multi-modal facilities (bicycle, pedestrian, and transit) are also evaluated and identified.

4.6.1 Direct Impacts

This section analyzes the direct VMT related impacts that may be associated with the High Alternative. Residential and employment-based land uses, retail land uses, and induced travel related impacts are all evaluated separately below using the methods and standards outlined in Section 2.0.

Residential and Employment

As noted in Table 3.5, Alpine is anticipated to have an average VMT/Capita of 24.33 miles and an average VMT/Employee of 29.20 miles under the High Alternative. **Table 4.16** compares the average VMT efficiency metrics, noted above for Alpine, to the VMT thresholds for both the Unincorporated County and the San Diego Region. The alternative is considered to have a significant transportation related impact at the local and/or regional level if the VMT/Capita or VMT/Employee of the community is at least 15% below the corresponding VMT average of the associated geographic area (San Diego Region or Unincorporated County). The average VMT displayed in the table represents the average VMT generated within the

geographic area and under the time frame listed under the analysis column. VMT analysis worksheets are provided in Attachment B.

As shown in the table, the average VMT/Capita and VMT/Employee within Alpine, under the High Alternative, is anticipated to be above both the Regional and Unincorporated thresholds (plan to ground). As noted, in the County's *Transportation Study Guidelines*, impacts for employment and residential land use are considered significant when they are compared against base year conditions. Therefore, the employment and residential land uses proposed within the High Alternative are anticipated to have a significant impact at the Unincorporated County and Regional (San Diego Region) level.

Buildout of the Plan and its land uses would not occur directly after adoption of the Plan—rather, it will likely take decades for the Plan to be built out. Therefore, a Plan to Plan analysis is also provided, for disclosure purposes, to give a better understanding of how the proposed changes will affect the community in the time frame in which they are going to be experienced.

While a Horizon Year VMT analysis is not required, the VMT associated High Alternative was compared to both the Regional and Unincorporated thresholds for informational and disclosure purposes, since the project alternative is not anticipated to be fully implemented until this timeframe. As shown in the table, both the average VMT/Capita and VMT/Employee within t Alpine is still anticipated to be above both the Regional and Unincorporated thresholds and would continue to have a significant impact under Horizon Year conditions, when assuming the same threshold of 15% below the average VMT.

Table 4.16: Residential and Employment Land Uses - Direct Impact Analysis - High Alternative

Metric	Analysis	Average VMT[1]	Threshold[2]	Project VMT	Δ[3]	%[4]	SI?[5]
Residential (VMT/Capita)	Base Year Regional Threshold	17.30	14.71	24.33	9.62	141%	Yes[6]
	Base Year Unincorporated Threshold	26.20	22.27		2.06	93%	Yes
	Horizon Year Regional Threshold	14.69	12.49		11.84	166%	Yes
	Horizon Year Unincorporated Threshold	23.35	19.84		4.49	104%	Yes
Employee (VMT/Employee)	Base Year Regional Threshold	25.40	21.59	29.20	7.61	115%	Yes[6]
	Base Year Unincorporated Threshold	33.60	28.56		0.64	87%	Yes
	Horizon Year Regional Threshold	21.80	18.53		10.67	134%	Yes
	Horizon Year Unincorporated Threshold	30.27	25.73		3.48	96%	Yes

Notes:

1 Even though the land uses and transportation networks assumed outside of the community are consistent between project alternatives, the average VMT for these larger areas will change slightly between the project alternatives due to the community's influence on the region as a whole.

2 As noted in Section 2.3, the threshold is 15% lower than the Regional or Unincorporated average.

3 Difference between the project alternative average VMT (see Table 3.5) and the Regional or Unincorporated average VMT.

4 Percent of project alternative VMT as compared to the Regional or Unincorporated average VMT.

5 Indicates if the project alternative is anticipated to have a significant transportation related impact

6 As noted in Section 2.3 significant impacts are identified based on a comparison of the build-out year of the plan compared to the resulting the existing regional average. Therefore, this is the key metric in which significant impacts are based on. The other metrics are provided for informational purposes.

Retail

As noted in Section 2.3, retail land uses are considered to have a significant VMT related impact if they are considered to be non-local serving. Therefore, impacts associated with retail land uses are considered to be significant if they are anticipated to increase the net VMT of the community or surrounding area (i.e. attract external patrons). To identify if the retail uses assumed within the High Alternative are anticipated to increase the total VMT within the community, the base year VMT for retail is compared to the retail VMT associated with the project alternative. **Table 4.17** isolates the external VMT associated with the retail uses by subtracting the VMT associated with employees and residents within the community from the total VMT generated by the community. The remaining VMT would be associated with external patrons coming into the community to access retail or other commercial uses. If the project alternative retail VMT is higher than base conditions, then it is considered a significant impact. It should be noted that this is a conservative analysis since it can be assumed that some of the external VMT may not be associated with retail uses; however, this is assumed to be an insignificant portion of the external VMT and is not anticipated to change the findings. VMT analysis worksheets are provided in Attachment B.

Table 4.17: Retail Land Uses - Direct Impact Analysis - High Alternative

Scenario	Total Community VMT	Residential VMT	Employment VMT	Retail VMT	SI?
Base Year	947,833	615,760	302,376	29,697	
High Alternative	1,983,602	1,324,109	404,234	255,258	Yes
Change	1,035,769	708,350	101,858	225,561	

Note:
SI?: If the project alternative is anticipated to have a significant transportation related impact?

As shown, the VMT not associated with employees and residents within the community is anticipated to increase under the High Alternative. Therefore, the retail land uses under this project alternative are anticipated to have significant impact.

Induced Travel

This section identifies the potential impacts associated with induced travel under the High Alternative. Induced travel related impacts are generally associated with vehicular capacity improvements or other changes to the current Mobility Element network.

Mobility Element Roadway Classification Changes

As shown in Table 3.3, the High Alternative will increase the capacity of the following roadways:

- South Grade Road, between Tavern Road and Via Viejas (ME ID 7)
- New Road 11, between Victoria Park Terrace and Tavern Road (ME ID 11)
- North/East Victoria Drive, between Victoria Park Terrace and Otto Avenue (ME ID 16)
- Viejas View Place, between Alpine Boulevard and South Grade Road (ME ID 22)

Based on the impact criteria outlined in Section 2.4, the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

> *Route Changes*: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.
>
> *Newly Generated Trips*: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.

Since some of the roadway network changes included in the High Alternative would most likely induce travel (i.e. those that propose new roadway links or provide additional capacity) the ACPU would result in a significant impact, based on the thresholds outlined in Section 3.5.

New Mobility Element Roadways

As shown in Table 3.4, the High Alternative will include the following new Mobility Element roadways:

- New Road 25 (ME ID 25)
- New Road 26 (ME ID 26)
- New Road 27 (ME ID 27)
- New Road 28 (ME ID 28)
- New Road 29 (ME ID 29)
- Montecito Vista (ME ID 30)
- New Road 31 (ME ID 31)
- Farlin (ME ID 32)
- Casa de Roca Way (ME ID 33)

Based on the impact criteria outlined in Section 2.4 the proposed roadway network improvements outlined above could potentially induce travel based on the following criteria:

> *Land Use Changes*: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

Based on the criteria outlined above, the inclusion of the new roadways will likely result in a significant impact.

4.6.2 Cumulative Impacts

As noted in Section 2.5, the land use and network assumptions under No Project Conditions (Buildout of the Current General Plan) are what are assumed for Alpine within the region's SCS. Therefore, the buildout of the proposed land uses, and transportation network assumed within the High Alternative would be inconsistent with the region's SCS. Due to this inconsistency, the cumulative impacts associated with the plan should be evaluated and disclosed. Table 4.18 provides a comparison of the High Alternative total VMT, average VMT/Capita, and average VMT/Employee compared against those under the Current General Plan at the Regional, Unincorporated, and community level under buildout (Year 2050) conditions. An increase in any of these metrics at the regional level would be considered a cumulative impact to the SCS.

As shown in Table 4.18, the High Alternative is anticipated to slightly increase the regional VMT/Capita, VMT/Employee, and the total regional VMT. This would result in a significant impact to the region's SCS.

For informational purposes, the same comparison was made at the Unincorporated and community level. As shown, the total VMT for both geographic areas are anticipated to increase; however, both the VMT/Capita and VMT/Employee is anticipated to decrease under the High Alternative. This indicates that while there will be more growth in vehicular travel within both Alpine and the Unincorporated area as a whole, and travel will be done at a more efficient level than what is projected under the No Project (Current General Plan) conditions.

Table 4.18: Cumulative Impact Summary (Buildout Year 2050) - High Alternative

Metric	Current General Plan	High Alternative	Change	% Change	SI?[1]
Regional VMT/Capita	14.67	14.69	0.02	0.14%	Yes[2]
Regional VMT/Employee	21.72	21.80	0.08	0.37%	Yes[2]
Total Regional VMT	96,668,603	97,064,573	395,970	0.41%	Yes[2]
Unincorporated VMT/Capita	23.39	23.35	-0.04	-0.17%	No
Unincorporated VMT/Employee	30.76	30.27	-0.49	-1.59%	No
Total Unincorporated VMT	21,600,628	21,857,399	256,771	1.19%	Yes
Alpine VMT/Capita	25.60	24.33	-1.29	-5.03%	No
Alpine VMT/Employee	34.00	29.20	-4.77	-14.03%	No
Total Alpine VMT	1,487,583	1,983,602	496,019	33.34%	Yes

Notes:
[1]If the project alternative is anticipated to have a cumulative significant transportation related impact?
[2]As noted in Section 2.5, cumulative impacts are determined when the project alternative increases the regional VMT efficient metrics, when compared to No Project (Current General Plan)l conditions. Therefore, these are the metrics that determine significant cumulative impacts, the other metrics are provided for information purposes.

4.6.3 Impacts to Multi-Modal Facilities

As noted in Section 2.6, impacts to multi-modal facilities occur if the project alternative triggers one of the following criteria:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Since this plan is being reviewed at a programmatic level, specific design features of the proposed improvements have not yet been developed. Therefore, to ensure that the project alternative would not be associated with a significant impact to a multi-modal facility within the community the following is assumed:

- The transportation facilities proposed within the High Alternative will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

Based on these assumptions the High Alternative will not have a significant impact to any multi-modal facilities.

5.0 Mitigation Measures and Findings

As identified in Chapter 4.0, several VMT related impacts were identified to be associated with the various Alpine Community Plan Update alternatives. The following sections review the impacts identified under the Proposed Project and each alternative and identifies potential mitigation. The feasibility of the identified mitigation measures is evaluated, and the overall findings of significance are presented.

5.1 Direct Land Use Impacts

As outlined in Chapter 4.0, the residential, employment, and retail uses under each of the Alpine Community Plan Update alternatives are anticipated to have significant direct transportation impacts. Table 5.1 summarizes the direct impact findings from Chapter 4.0 and identifies the percent of the total VMT, by land use type, that would need to be reduced to reduce the impact to a less than significant level (85% of the corresponding regional average).

Table 5.1: Summary of Direct Land Use Impacts – VMT Reduction

Impact	Village-Focused	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
Residential Land Uses	56%	75%	60%	61%	57%	56%
Employment Land Uses	40%	57%	48%	48%	42%	30%
Retail Land Uses	91%	85%	90%	91%	91%	88%

As shown, Alpine's VMT would need to be reduced as follows to reduce the identified impacts to less than significant:

- Reduce the average VMT/Capita by a low of 56% to a high of 75%, depending on the alternative
- Reduce the average VMT/Employee by a low of 30% to a high of 57%, depending on the alternative
- Reduce Retail VMT by a low of 85% to a high of 91%, depending on the alternative

5.1.1 Potential Mitigation Assessment

VMT related impacts can be mitigated by reducing the total project VMT, which in turn reduces the generated VMT/Capita, VMT/Employee, and Retail VMT. The following sections identify and evaluate common measures that can be implemented to reduce the overall project VMT and mitigate or reduce the transportation related impacts associated with the Alpine Community Plan Update. Table 5.2 summarizes the findings of each mitigation strategy that was evaluated, including the potential it would have to reduce impacts to less than significant and the overall feasibility of the measure being implemented.

Table 5.2: Summary of Mitigation Strategies

Mitigation Strategy	Potential to Reduce Impacts	Feasibility
Transportation Demand Management	Potential to reduce VMT by up to 15% in suburban portions of community.	The County can require new development within Alpine to implement a TDM Plan. However, this would only provide partial mitigation.
Active Transportation Improvements	Potential to reduce VMT by 1% to 3%	The County can implement the proposed active transportation facilities included in the Active Transportation Plan. However, this will only have a minor effect within the Community.
Transit Route Extensions or Improvements	Can reduce VMT by up to 24.6%	Not a feasible mitigation measures since the County does not operate or control the regions transit services.
VMT Mitigation Fee Program	Potential to reduce impacts to less than significant at the regional level.	A VMT Mitigation Fee program does not currently exist at either the County or Regional level.

Transportation Demand Management

The *California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures* (August 2010) notes the following regarding the use of Transportation Demand Management (TDM) measures to reduce VMT within rural areas, such as the Alpine CPA.

> *Rural Application:* Few empirical studies are available to suggest appropriate VMT reduction caps for strategies implemented in rural areas. Strategies likely to have the largest VMT reduction in rural areas include vanpools, telecommute or alternative work schedules, and master planned communities (with design and land use diversity to encourage intra-community travel). Neighborhood Electric Vehicle (NEV) networks may also be appropriate for larger scale developments. Because of the limited empirical data in the rural context, project-specific VMT reduction estimates should be calculated.

As noted by CAPCOA, within rural areas, project specific TDM measures would need to be identified. Since the Alpine Community Plan Update is a programmatic document and does not provide project specific details, specific TDM measures may be challenging when applied at this level. Additionally, CAPCOA recommends that a maximum VMT reduction cap of 15% be applied within suburban areas (no cap is provided for rural areas). This is far below the 30% to 91% in reductions that would be required to mitigate the identified direct impacts within Alpine under the various alternatives as identified in Table 5.1. For these reasons utilizing TDM measures to reduce VMT at the community level, for Alpine, is not a viable mitigation measure; however, requiring new project developments to develop a TDM plan could result in partial mitigation.

Active Transportation Improvements

Based on the research and analysis methods contained within the *CAPCOA Quantifying Greenhouse Gas Mitigation Measures* (August 2010), the following VMT reductions could be associated with providing an enhanced active transportation network:

- LUT-9 Improve Design of Development - Maximum VMT Reduction 21.3% and minimum reduction of 3%.

  Grouped categories that go along with LUT-9
  - SDT-5: Incorporate Bike Lane Street Design
  - SDT-6: Provide Bike Parking in Non-Residential Projects
  - SDT-7: Provide Bike Parking with Multi-Unit Residential Projects
  - SDT-9: Dedicate Land for Bike Trails

  CAPCOA notes that these strategies have a negligible impact in a rural context, such as the Alpine CPA.

- SDT-1: Provide Pedestrian Network Improvements – Maximum VMT Reduction 2%

- SDT-2 Provide Traffic Calming Measures - Maximum VMT Reduction 1%

As shown above, active transportation facilities were identified as having a very low to negligible impact on reducing VMT within in a rural context. Therefore, the implementation of additional active transportation facilities within Alpine is not a viable mitigation measure to reduce the Alpine Community Plan Update's impacts to less than significant.

Transit Route Extensions or Improvements

Currently, Alpine is served only by Metropolitan Transit System (MTS) Bus Route 838. This route currently operate under limited service with one-hour headways during weekdays and only provide service to the core areas of the community (along Alpine Boulevard and Willows Road). MTS Bus Route 888 is also has stops at the Alpine Creek Shopping Center and Viejas Casino. Route 888 ultimately connects between El Cajon and Jacumba Hot Springs. However, this route only runs one time a day in each direction (eastbound/westbound).

Based on *CAPCOA's Quantifying Greenhouse Gas Mitigation Measures,* the expansion or enhancement of transit services can be an effective measure in reducing VMT, up to 24.6% (LUT-5); however, all public transit within the San Diego Region is operated by either the North County Transit District (NCTD) or MTS. Unfortunately, the County of San Diego does not have the authority to change or expand transit services within Alpine. Therefore, the expansion of transit services within Alpine is not a feasible mitigation measure to reduce the Alpine Community Plan Update's impacts to less than significant.

VMT Mitigation Fee Program

The County of San Diego is currently investigating the potential to implement a VMT mitigation fee program. The fee program would charge new development a fair share-based fee to potentially reduce or fully mitigate the direct VMT related impacts associated with their project. The fees collected from the program would go towards the development of multi-modal facilities or other VMT reducing infrastructure at a countywide or even regional level. However, the County has not developed a program at this time, and it is not certain that the County would adopt such a program in the future. For these reasons, a contribution towards a VMT mitigation fee program is not an option to mitigate the impacts identified in Table 5.1. Should the County ever develop a program, it is recommended that Alpine be included, and new development assumed under the project alternatives participate in the program.

5.1.2 Proposed Mitigation

New development within Alpine should be required to develop a TDM plan to potentially reduce their project's VMT to the extent feasible. Project applicants should be required to include a TDM plan and implementation strategy based on the quantifiable measures outlined in the CAPCOA Guidelines with any subsequent transportation impact studies they are required to conduct. As noted previously, a TDM plan would only provide partial mitigation; therefore, the direct transportation impacts associated with the proposed land uses would remain significant and unavoidable.

5.2 Induced Travel Impacts

As identified in Table 3.3, all the Alpine Community Plan Update alternatives include roadway capacity enhancing improvements to four roadways within the community. As noted in Chapter 4.0, roadway capacity enhancing improvements were identified to potentially induce vehicular travel within the community; therefore, they would be associated with a significant impact. **Table 5.3** summarizes the induced travel related impacts that are associated with roadway capacity enhancing improvements for each community project alternative.

Table 5.3: Summary of Impacts Associated with Induced Travel – Mobility Element Roadway Classification Changes

ME ID	Roadway	Segment	Village-Focused	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
7	South Grade Road	Tavern Road to Via Viejas	X	X	X	X	X	X
11	New Road 11	Victoria Park Terrace to Tavern Road	X	X	X	X	X	X
16	North/East Victoria Drive	Victoria Park Terrace to Otto Avenue	X	X	X	X	X	X
22	Viejas View Place	Alpine Boulevard to South Grade Road	X	X	X	X	X	X

The roadway changes outlined above were identified and recommended by County of San Diego Traffic Engineering staff to safely accommodate both existing and future vehicular traffic within the community. The only way to mitigate these impacts would be to not improve the roadways. However, to ensure the safety of people traveling on these facilities across all modes, the roadways need to be designed and constructed in accordance with the County of San Diego Public Road standards which will increase the capacity and potentially travel speeds along the roadway. For this reason, it cannot be guaranteed through their design that these improvements would not induce travel within Alpine; therefore, these impacts would remain significant and unavoidable.

As identified in Table 3.3, some of the community project alternatives require new roadways to provide access to future land uses. As noted in Chapter 4.0, these new roadways were identified to potentially induce vehicular travel within the community; therefore, they would be associated with a significant impact. **Table 5.4** summarizes the induced travel related impacts that are associated these new roadways.

Table 5.4: Summary of Impacts Associated with Induced Travel – New Roadways

ME ID	Roadway	Segment	Village-Focused	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
25	New Road 25	Tavern Road to Eltinge Drive					X	X
26	New Road 26	Alpine Boulevard to Via Dieguenos	X	X	X	X	X	X
27	New Road 27	Alpine Boulevard to Cul de Sac #2					X	X
28	New Road 28	Alpine Boulevard to Casa de Roca Way						X
29	New Road 29	Alpine Boulevard to Turnaround					X	X
30	Montecito Vista	Alpine Boulevard to Casa De Roca Way						X
31	New Road 30	Montecito Vista to Farlin Road						X
32	Farlin Road	Alpine Boulevard to Old Ranch Road						X
33	Casa de Roca Way	Alpine Boulevard to Proposed Road 28						X

The additional roadways outlined within the Table 5.3 are required to provide safe access to new development under each respective project alternative. If these roadways are not implemented some of the proposed land use development under each project alternative would not be able to develop, ultimately changing the assumptions within the project alternative. The roadways listed in Table 5.3 are required in order to provide safe access to parts of the community. Therefore, it is recommended that they be included within the plan, as proposed, and their impact remain significant and unavoidable.

5.3 Cumulative Impacts

Table 5.5 summarizes the cumulative impacts in which the various project alternatives will have on the San Diego Region and its SCS.

Table 5.5: Summary of Cumulative Impacts

Impact	Village-Focused	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
Increase in Regional VMT/Capita	X		X		X	X
Increase in Regional VMT/Employee	X		X		X	X
Increase in Total Regional VMT	X		X		X	X

Similar to the direct land use impacts, VMT related impacts can be mitigated by reducing the overall project VMT, which in turn reduces the generated VMT/Capita, VMT/Employee, and overall Retail VMT. However, as discussed in Section 5.1 the only feasible mitigation for VMT related impacts is to implement TDM strategies. As such, new development within Alpine should be required to develop a TDM program to potentially reduce their project's VMT to the extent feasible. Project applicants should be required to include a TDM plan and implementation strategy based on the quantifiable measures outlined in the CAPCOA Guidelines with any subsequent transportation impact studies they are required to conduct. As noted previously, at TDM plan would only provide partial mitigation; therefore, the cumulative transportation impacts associated with the proposed land uses would remain significant and unavoidable.

5.4 Multi-Modal Impacts

No impacts to multi-modal facilities were identified under any of the Alpine Community Plan Update alternatives. However, the following is recommended to ensure that impacts do not occur as new development associated with the plan develops:

- The transportation facilities proposed within all the alternatives will be built to the standards outlined in the County of San Diego Public Road standards.
- All new roadways or roadway improvements will be designed to accommodate the multi-modal facilities planned within the County of San Diego's Active Transportation Plan, and in accordance with the relevant policies in the County's Mobility Element.
- All new roadway facility or improvements will be designed to limit conflicts with any transit routes or services within the community.
- Land use developments within the community will be required to provide adequate pedestrian and bicycle access and on-site facilities based on their associated land use needs and features.

5.5 Summary of Findings

Table 5.6 summarizes the impact and mitigation findings from the previous sections.

Table 5.6: Summary of Impact Findings

Impact Type	Impact Cause/Location	Village-Focused	Former FCI Lands in Alpine	Former FCI Lands in Eastern Alpine	Low Alternative	Moderate Alternative	High Alternative
Direct Land Use Impact	Residential Land Uses	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM
	Office Land Uses	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM
	Retail Land Uses	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM	SU-PM
Induced Travel	South Grade Road from Tavern road to Via Viejas	SU	SU	SU	SU	SU	SU
	New Road 11 from Victoria Park Terrace to Tavern Road	SU	SU	SU	SU	SU	SU
	North/East Victoria Drive from Victoria Park Terrace to South Grade Road	SU	SU	SU	SU	SU	SU
	Viejas View Place from Alpine Boulevard to South Grade Road	SU	SU	SU	SU	SU	SU
	New Road 25 from Wrights Field to Northern Terminus					SU	SU
	New Road 26 from Alpine Boulevard to Via Dieguenos	SU	SU	SU	SU	SU	SU
	New Road 27 from Alpine Boulevard to End of Road					SU	SU
	New Road 28 from Alpine Boulevard to proposed road						SU
	New Road 29 from Alpine Boulevard to proposed road					SU	SU
	Montecito Vista from Alpine Boulevard to Casa De Roca						SU
	New Road 30 from New Road 29 to New Road 31						SU
	Farlin from Alpine Boulevard to Old Ranch #7						SU
	Casa de Roca Way from Alpine Boulevard to New Road 28						SU
Cumulative Impacts	Increase in Regional VMT/Capita	SU-PM		SU-PM		SU-PM	SU-PM
	Increase in Regional VMT/Employee	SU-PM		SU-PM		SU-PM	SU-PM
	Increase in Total Regional VMT	SU-PM		SU-PM		SU-PM	SU-PM
Multi-Modal Impacts	N/A	No Impacts Identified					

Notes:
SU: Significant and Unavoidable Impact
SU-PM: Significant Unavoidable Impact with partial mitigation Identified

Appendix A:
Vehicle Miles Traveled Calculation Using the SANDAG Regional Travel Demand Model – Technical White Paper

TECHNICAL WHITE PAPER

VEHICLE MILES TRAVELED CALCULATIONS USING THE SANDAG REGIONAL TRAVEL DEMAND MODEL

San Diego, California
May 2013

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TECHNICAL WHITE PAPER

VEHICLE MILES TRAVELED CALCULATIONS USING THE SANDAG REGIONAL TRAVEL DEMAND MODEL

San Diego, California
May 2013

1.0 INTRODUCTION

In the last six years, the State of California has adopted key legislative bills that address the reduction of greenhouse gas (GHG) emissions. Specifically, Assembly Bill 32 (AB 32, 2006) sets a statewide GHG reduction target to return to the 1990 emissions level by the year 2020. In addition, in 2008, California adopted SB 375 which specifically addresses emissions from transportation. SB 375 directs California's Metropolitan Planning Organizations (MPO's) to meet GHG emission reduction targets established by the California Air Resources Board (CARB) through coordinated land use and transportation planning. Subsequently, Senate Bill 97 (SB 97, 2009) created guidelines for analyzing GHG emissions in environmental documents required under the California Environmental Quality Act (CEQA). For the purpose of this white paper, Vehicle Miles of Travel (VMT) are used as a proxy for greenhouse gases.

The Bureau of Transportation Statistics defines VMT as a unit to measure vehicular travel made by individual vehicles. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle. Total vehicle miles is the aggregated total mileage traveled by all individual vehicles.

As a result of these acts, regional agencies, local governments, and private firms have worked to establish methodologies for analyzing the effects of development projects, climate action plans, and proposed general plan updates on GHG emissions as part of the CEQA process.

At the national-level, the International Council for Local Environmental Initiatives (ICLEI)-Local Governments for Sustainability has recently published a technical paper documenting a new national standard that establishes requirements and recommended best practices for developing local community GHG emissions inventory titled the "U.S. Community Protocol for Accounting and Reporting GHG Emissions (Community Protocol)"[1]. The recommended method presented in this document recognizes that local governments possess the authority to influence GHG emissions from passenger vehicle trips both inside and outside of a community's geographic boundaries. This method also recognizes that local governments cannot influence all passenger vehicle GHG emissions within their boundaries. As such, the recommended origin-destination method (using a travel demand-based model) better captures a local government's ability to affect passenger vehicle emissions than the previous method of using average trip lengths to calculate in-boundary emissions.

[1] **ICLEI-Local Governments for Sustainability US Community Protocol V1, October 2012. Appendix D: Transportation and Other Mobile Emission Activities and Sources.** http://www.icleiusa.org

The approach recommended by this national document discusses why it is important to determine VMT calculations using a large area such as a community's geographic boundaries. One reason to focus on community-wide boundaries is because a high proportion of pass-through traffic can occur in smaller study areas that are outside that area's influence. An example is an Interstate highway that passes through a small city. Another reason is that a low proportion of vehicle miles from trips that terminate or originate in a small study area occur outside the area's geographic boundaries and would be more accurately identified in an expanded community-wide study area.

The ICLEI-recommended method for calculating VMT is to use model data of all travel originating or terminating within the jurisdictional boundaries of a community. Trip tables from either a traditional 4-step travel demand model (trip-based) or from an activity-based travel demand model (tour-based) are required to calculate and extract disaggregated VMT data in this manner.

Congruent with the methodology presented by ICLEI, the SB 375 Regional Targets Advisory Committee, in their September 2009 report to the CARB, recommended the following method for allocating VMT to a study area for the purposes of a GHG analysis:

- Internal-Internal: all VMT should be included in the analysis
- Internal-External or External-Internal: 50% of VMT should be included in the analysis
- External-External: all VMT should be excluded in the analysis

Following these recommended methods of allocation, this white paper describes the analytical approach for disaggregating VMT into these categories using a suite of existing tools. The resulting study area VMT can then be applied to a calculation of transportation emissions for a GHG analysis of the study area.

A glossary of acronyms and terms is provided in ***Appendix A.***

2.0 METHODOLOGY

To date, the methodologies that have been developed focus on specific land uses as well as incorporation of average trip lengths (ATL). The methodology outlined in this paper switches the focus to trip ends (Origin and Destination patterns) with the intent of removing the uncertainty and potential for error in using average trip lengths, as recommended at both the state and national level.

This section of the white paper presents a methodology that utilizes existing tools for VMT and GHG analysis. The three main tools required for the analysis include:

1. A travel demand model
2. A Geographic Information System (GIS)
3. A spread sheet

Note that this method can be applied using any travel demand model software, a GIS that is capable of producing spatial overlays, and any spread sheet software.

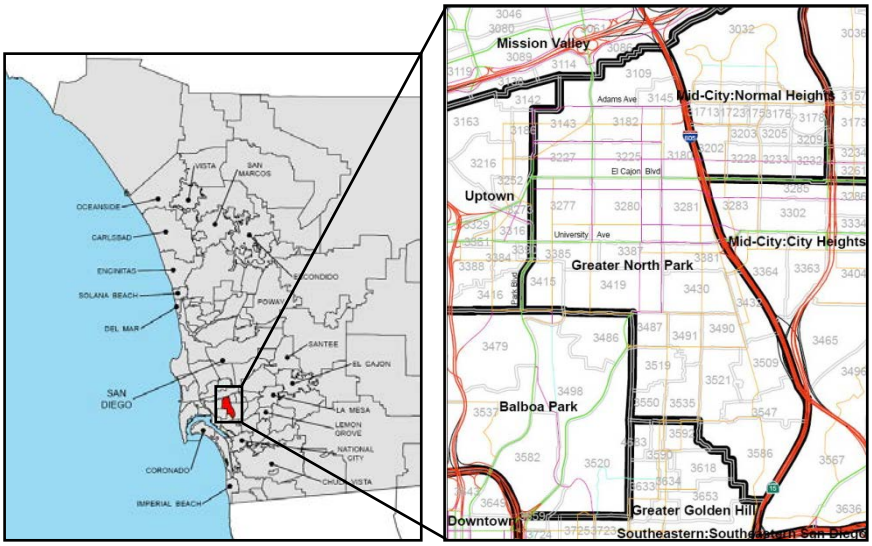
This methodology is intended to be used to analyze whole cities, communities within a large city and/or large-scale developments. The analysis area should include multiple Traffic Analysis Zones (TAZs).

The first step in the process is to define a study area. It should be noted that the size and shape of the study area can affect the analysis, as mentioned in the ICLEI protocol. For example, the larger the study area (community-wide) and the more homogeneous the study area shape, the more Internal-to-Internal trips and VMT will be captured. Conversely, smaller study areas with odd and/or linear shapes tend to have less Internal-to-Internal trip and VMT capture. Therefore it is recommended that a small or linear study area be expanded to a more homogenous study area size and shape, and that a normalized metric of VMT per acre be included in the analysis.

CASE STUDY: THE COMMUNITY OF GREATER NORTH PARK

The community of North Park was chosen as a test study area for this paper. North Park, depicted in ***Figure 2–1***, is located in the central part of the City of San Diego and is defined by the City as a Community Plan Area (CPA). The community of North Park is bound by the other CPAs of Uptown and Balboa Park to the West, Golden Hill to the South, City Heights and Normal Heights to the East and Mission Valley to the North. The community boundary to the east is defined by the freeways I-15 and I-805, and defined by Park Blvd to the west. North Park is subdivided into 27 TAZs, and none of those TAZs overlap into adjacent community plan areas.

Figure 2–1
Study Area Map



Alternatives analysis is a term used to describe the process of incrementally comparing one scenario to another, and travel demand models are one example of a tool used in the planning practice for comparing alternatives. ***Figure 2–2*** shows the four travel demand model land use and network alternatives that were created in support of this white paper:

Figure 2–2
Travel Demand Model Alternatives

ALTERNATIVE	LAND USE	NETWORK
2008	Existing	Existing
2050 A	Adopted General Plan	Adopted Circulation Element
2050 B	Proposed Project	Adopted Circulation Element
2050 C	Proposed Project	Proposed Network Enhancement

The base year scenario was created to ensure consistency throughout the analysis and provides a bench mark for current conditions. The 2050 scenarios were created using SANDAG's "Series 12" Growth Forecast and Travel Demand Model. The three 2050 scenarios are based on the 2050 Revenue Constrained network as defined in the 2011 Regional Transportation Plan. *Alternative A* includes no changes and thus is the Adopted scenario. *Alternative B* adds a proposed development into TAZ 3491 which is located in the middle of the community of North Park. *Alternative C* includes the proposed development in TAZ 3491 plus upgrading 32nd Street

between Redwood Street and University Avenue from a Two-Lane Local Collector to a Four-Lane Collector with a raised median. For the purpose of comparing apples to apples, all four scenarios have consistent TAZ systems. *Alternatives A and B* utilize the same network, however, *Alternative C* includes an upgraded network. To maintain the synonymous comparison, an additional metric of VMT per lane mile has been developed and documented later on in *Section 2.0* of this paper. ***Appendix B*** contains the results of the trip generation model for TAZ 3491 for the four scenarios.

VMT is a straight-forward calculation that includes traffic volume multiplied by the length of the roadway segment. VMT is usually measured on a daily basis or for a 24-hour period for each link in the road network. A network link is a modeling term used to identify road segments between two or more end points where the network might be accessed by vehicular traffic. Twenty-four hour volumes are often referred to as Average Daily Traffic (ADT) volumes. The 24-hour traffic volume and link lengths are the only two variables required to calculate VMT. This calculation can actually be made using any of the three tools previously noted in this paper(GIS, a Travel Demand Model, or a spreadsheet). Depending on how link lengths are stored, either of these two formulas can be applied:

1. Use where link lengths are stored in miles:
   VMT = ADT * LINK LENGTH

2. Use where link lengths are stored in feet:
   VMT = (ADT * LINK LENGTH) / 5,280

The main benefit of this methodology is the ability to define VMT by origin-destination (OD) pairs as well as by functional classification. Functional classifications are coded on a travel demand model network using GIS. VMT by OD pair includes the disaggregation of VMT into the following categories:

1. **Internal-to-Internal (I-I)**

   This category includes trips that have both the Origin and Destination (two trip-ends) within the same city/community/development being analyzed. This, however, is not intra-zonal trips, which is defined as trips that start and end within the same TAZ and discussed later in this paper.

2. **Internal-to-External, and External-to-Internal (I-E, E-I)**

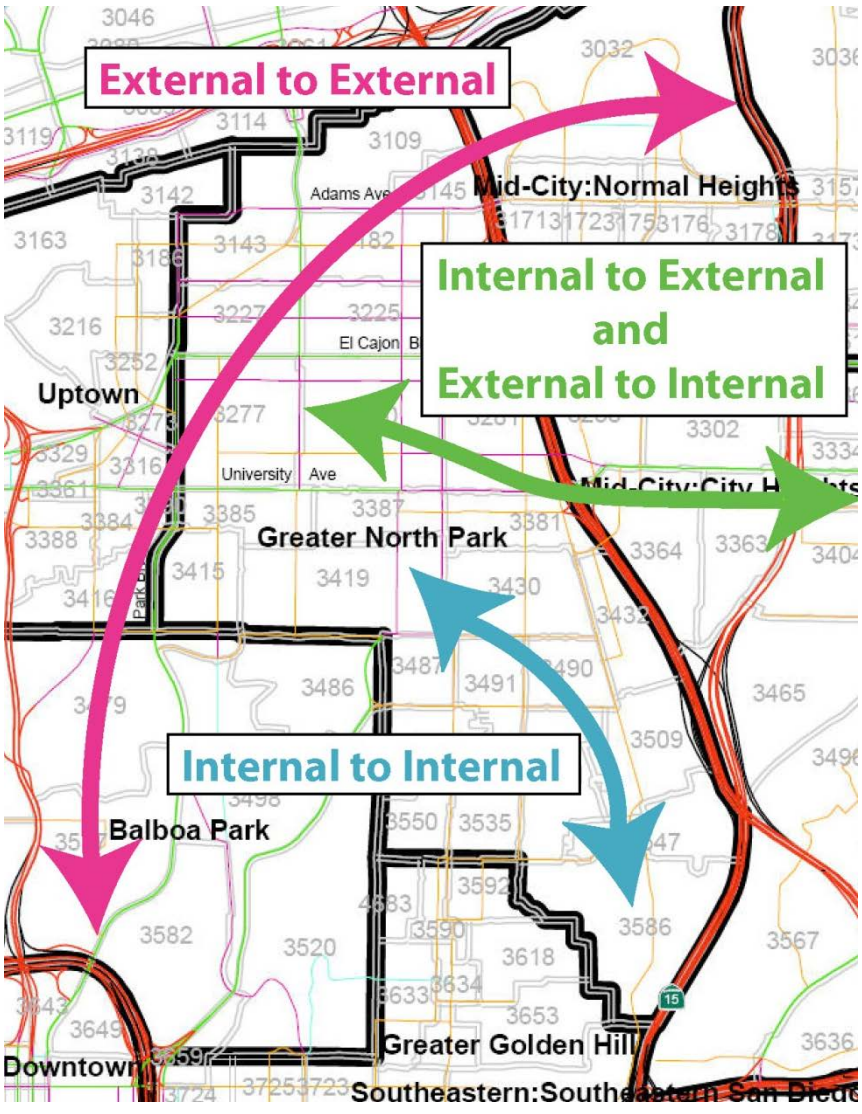
   This category includes trips with either the Origin or Destination (one trip-end) within the city/community/development being analyzed. Internal-to-External and External–to-Internal have been combined into one category as directional VMT is not an important variable when analyzing GHG.

3. **External-to-External (E-E)**

The third category includes trips with neither Origin nor Destination (zero trip-ends) within the city/community/developments being analyzed. These are essentially trips passing through the city/community/development.

Figure 2–3 illustrates the three types of disaggregated VMT.

Figure 2–3
The Three VMT Categories



To disaggregate VMT using the OD methodology, the following detailed steps are recommended:

Step 1. Run a travel demand model on a set of land use / network scenarios. The scenarios will ultimately be compared to one another (alternatives analysis). Ensure there are no errors and the traffic assignment step completed normally.

Step 2. Use the travel demand model to run a "study area" select zone assignment. This includes defining a select zone analysis by combining all TAZs within the study area into one query. Repeat as necessary for each alternative being analyzed.

Step 3. Compress the resulting select zone trip table into two districts: the defined study area is district 2, and the rest of the region is district 1. This step is essential for extracting Internal-to-Internal VMT. Repeat as necessary for each alternative being analyzed. Export the compressed trip tables into a format that can be read by a spread sheet. (See ***Figures 2–4*** through ***2–7***)

Figure 2–4
Base Year 2008 Select Zone Trip Table Before Compression

ORIGINS \ DESTINATIONS	TAZ	1	2	3	4	5	6	7	8	9	…4683
	1	6	0	0	0	0	0	0	0	0	0
	2	4	2	0	0	1	3	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	3	0	0	2	1	0	0
	5	2	1	0	0	2	2	0	0	0	0
	6	6	4	0	0	1	3	0	0	0	0
	7	0	0	0	2	0	0	2	0	0	0
	8	0	0	0	0	0	0	0	101	0	0
	9	0	0	0	0	0	0	0	0	0	0
	…4683	0	0	0	0	0	0	0	0	0	4

Figure 2–5
4683 TAZs Compressed into Two Districts

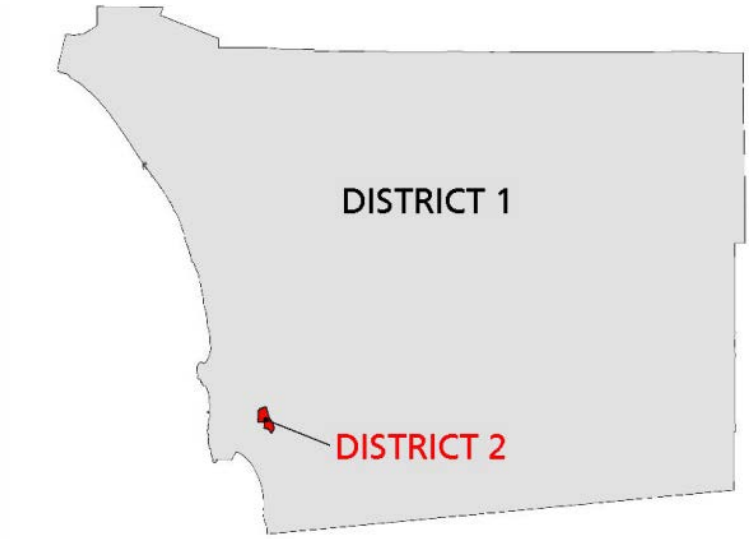


Figure 2–6
Actual Trip Table After Compression

		Destinations	
Origins	District	1	2
	1	0	92970
	2	89154	25319

Figure 2–7
Conceptual Trip Table After Compression

		Destinations	
Origins	District	1	2
	1	Both O&D OUTSIDE of North Park	O OUTSIDE of North Park, D INSIDE of North Park
	2	O INSIDE of North Park, D OUTSIDE of North Park	Both O&D INSIDE of North Park

In summary, this methodology includes creating a study area select zone assignment and compressing the select zone trip table to calculate the number of trips by district and determine the OD breakdown within those districts (I-I, E-I, I-E, and E-E).

The following defines the necessary steps to calculate intra-zonal trips.

Step 4. Extract intra-zonal trips and distance skims for each TAZ within the study area. While intra-zonal VMT will be a very small fraction of the overall region-wide VMT, it is still important to include and document. Intra-zonal trips and distances come from the diagonal rows of vehicular trip tables and distances skim files. Trip tables contain trip flows between TAZs. Skim files usually include travel time, travel distance, and/or travel cost between TAZs.

The distance skim is used to calculate intra-zonal trip distances. Intra-zonal trip distances are calculated by halving the average distance between the TAZ in question and its three nearest TAZ neighbor.

Intra Zonal Distance = $((D_{ij1} + D_{ij2} + D_{ij3}) / 3) / 2$

Where:

D = Distance (in miles)
ij1 = Origin Zone to the first nearest neighbor
ij2 = Origin Zone to the second nearest neighbor
ij3 = Origin Zone to the third nearest neighbor

Or

$0.23 = ((0.40 + 0.56 + 0.42) / 3) / 2$

Figures2–8 and ***2–9*** illustrate the intra-zonal data extracted in spreadsheet-format.

Figure 2–8
Intra-Zonal Cells Within the Base Year 2008 AM Trip Table

ORIGINS \ DESTINATIONS	3486	3487	3488	3489	3490	3491	3492	3493	3494	3495
3486	6	0	0	0	0	0	0	0	0	0
3487	4	2	0	0	1	3	0	0	0	0
3488	0	0	0	0	0	0	0	0	0	0
3489	0	0	0	3	0	0	2	1	0	0
3490	2	1	0	0	2	2	0	0	0	0
3491	6	4	0	0	1	3	0	0	0	0
3492	0	0	0	2	0	0	2	0	0	0
3493	0	0	0	0	0	0	0	101	0	0
3494	0	0	0	0	0	0	0	0	0	0
3495	0	0	0	0	0	0	0	0	0	4

Figure 2–9 Calculated Base Year 2008 Intra-Zonal VMT for North Park						
2008						
TAZ	INTRA DISTANCE	AM	PM	OP	INTRA TRIPS	INTRA VMT
3109	0.23	26	20	92	138	31.74
3143	0.20	17	20	94	131	26.20
3145	0.24	3	4	28	35	8.23
3180	0.25	32	50	302	384	94.08
3182	0.17	55	53	256	364	61.88
3225	0.19	38	50	263	351	64.94
3227	0.20	25	36	210	271	54.20
3277	0.22	124	141	712	977	214.94
3280	0.21	133	172	965	1270	266.70
3281	0.25	82	137	879	1098	269.01
3381	0.23	21	40	282	343	78.89
3385	0.24	13	24	154	191	44.89
3387	0.25	16	20	127	163	40.75
3415	0.19	7	9	49	65	12.35
3419	0.30	20	14	55	89	26.70
3430	0.22	18	14	56	88	18.92
3432	0.23	2	0	3	5	1.13
3487	0.18	2	3	14	19	6.42
3490	0.16	2	1	3	6	0.96
3491	0.14	3	3	17	23	3.22
3509	0.23	3	4	21	28	6.30
3519	0.24	1	2	6	9	2.12
3521	0.22	21	14	68	103	22.15
3535	0.19	2	2	11	15	2.85
3547	0.38	2	0	2	4	1.52
3550	0.26	2	3	11	16	4.16
3586	0.67	7	8	30	45	30.15
TOTAL NORTH PARK INTRA-ZONAL VMT						1392.37

Steps 5 and **6** explain the final steps in calculating the three trip types necessary for calculating total VMT.

Step 5. Use GIS to process the results and export files that can be read by a spread sheet. The main goal of this step is to produce a table with VMT split by jurisdiction and road functional classification. Note that the following process was designed using an AML (Arc Macro Language) script which can be found in ***Appendix C***. AML is the native scripting language of ESRI's Arc/INFO workstation software. This script could be duplicated using the scripting language Python for use in ESRI's ArcMap desktop

software. The results should be the same if AML is used in Arc/INFO or if Python is used in ArcMap. The following nine steps define the activities of the script:

a. Create a network layer with additional attributes for analysis

b. Create a lookup table to store the results of the select zone assignment

c. Join the lookup table with the network layer

d. Overlay the network layer with a polygon layer that represents jurisdictional boundaries

e. Calculate daily VMT (formula above)

f. Calculate select zone VMT using basically the same formula:

g. Select Zone VMT = (Select Zone Query volume * Link Length) / 5280

h. Perform a frequency function of the link attribute table. A frequency function returns the count of values that fall into a specific range. In this example, the values of the link Functional Classifications are used to summarize the daily and select zone query VMT.

i. Output a text or CSV file that can be imported into a spread sheet (This file should have a minimum of 4 columns):

    1. Jurisdiction name
    2. Functional Classification Code
    3. Daily 24-hour VMT
    4. Select zone query VMT

j. This file can have a variable number of rows (records) depending on the number of classifications defined in the network being analyzed as well as the granularity of the jurisdictions to analyze.

k. Clip the network layer with the study area boundary and calculate bi-directional lane miles with the following formula:

    Lane Miles = (Total Lanes * Length) / 5280

    Aggregate the total lane miles within the study area and export one number for use in calculating VMT per Lane Mile in the spread sheet analysis. This step is crucial for the ability to compare network scenarios equitably. ***Figure 2–10*** shows the summarized lanes miles for each alternative analyzed in this paper.

Figure 2–10 Study Area Lane Miles by Scenario	
ALTERNATIVE	LANE MILES
2008	104.0
2050 A	111.5
2050 B	111.5
2050 C	113.0

Step 6. Use a spread sheet to calculate the three categories of VMT.

a. Open the compressed select zone trip table and use it to calculate the internal capture percentage for the district that represents the city/community/ development being studied. The internal capture rate represents the percent of Internal-to-Internal trips relative to the total study area VMT. ***Figure 2–11*** displays the compressed trip table. The formula shown below illustrates the internal capture calculation for the base year.

Internal Capture Rate (%) = I-I VMT (district 2 to 2) ÷ Total VMT ($\sum$ all districts)

Or

25,319 ÷ 207,443 = <u>12.21%</u>

Figure 2–11
Compressed Trip Tables & Calculated Internal Capture Rate

Base Year 2008

Origins \ Destinations	District	1	2	Sum
Origins	1	0	92,970	92,970
	2	89,154	25,319	114,473
Sum		89,154	118,289	**207,443**
Internal Capture Rate				**12.21%**

2050 A

Origins \ Destinations	District	1	2	Sum
Origins	1	0	127,947	127,947
	2	121,689	30,051	151,740
Sum		121,689	157,998	**279,687**
Internal Capture Rate				**10.74%**

2050 B

Origins \ Destinations	District	1	2	Sum
Origins	1	0	131,176	131,176
	2	124,400	31,817	156,217
Sum		124,400	162,993	**287,393**
Internal Capture Rate				**11.07%**

2050 C

Origins \ Destinations	District	1	2	Sum
Origins	1	0	131,215	131,215
	2	124,429	31,799	156,228
Sum		124,429	163,014	**287,443**
Internal Capture Rate				**11.06%**

E-E (Zero Trip-Ends)
I-E and E-I (One Trip-End)
I-I (Two Trip-Ends)
Internal Capture Rate (I-I ÷ Sum)
District 1 = Everything BUT North Park
District 2 = North Park

A value other than zero in the District 1-to-District 1 cell indicates one of the following potential issues: 1) A miss-match between the list of TAZs used for the community-wide select zone assignment compared to the definition of the study area Districts; or 2) one or more of the study area TAZs straddle a community or city boundary.

Analyzing the 2050 No Build scenario (*Alternative A*), the result shows that the model predicts 10.74% of trips with an origin inside of Greater North Park will also have a destination within Greater North Park. This will become the factor to apply to total VMT within Greater North Park to calculate Internal-to-Internal VMT.

a. Open the text or CSV file created from GIS, which will become the main worksheet.

b. Add four columns, one for each of the three VMT categories noted above plus one for intra-zonal VMT. ***Figure 2–12*** shows the column headers for each VMT category.

Figure 2–12
Worksheet Headers

SCENARIO							
JURISDICTION	CLASSIFICATION	TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)

The post-SANDAG forecast process creates a standard report called "postlod2.pr" that summarizes many modeling metrics including VMT. The reports used to validate this methodology can be found in ***Appendix D***. The "Total VMT" column contains 24-hour daily VMT and the "Total North Park VMT" includes the study area select zone assignment VMT.

Calculate the "Two Trip-Ends" category with the following formula, but only for the city/community/development being analyzed as the rest of the two trip end records should all be null. ***Figure 2–13*** shows the spread sheet results.

I-I VMT = (select zone query VMT * internal capture % calculated in **Step 6a**)

Or

212,850 * 12.21% = <u>25,979 I-I VMT</u>

Figure 2–13 Two Trip-Ends VMT Calculations								
BASE YEAR 2008								
JURISDICTION	CLASSIFICATION		TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)
GNC	1	Freeway	327,268	36,989	4,515	32,474	290,279	
GNC	3	Major	67,085	49,701	6,066	43,635	17,384	
GNC	4	Collector	44,221	35,296	4,308	30,988	8,925	
GNC	5	Local Collector	52,603	42,254	5,157	37,097	10,349	
GNC	8	Freeway Ramp	35,242	4,325	528	3,797	30,917	
GNC	9	Local Ramp	8,697	5,837	712	5,125	2,860	
GNC	10	Zone Connector	38,447	38,448	4,693	33,755	(1)	
GNC	11	Intra-Zonal						1,392
GNC		Total	573,563	212,850	25,979	186,871	360,713	1,392

*GNC = Greater North Park

Calculate the "One Trip-End" category with the following formula for all records:

I-E & E-I VMT = (select zone query VMT – I-I VMT)

Or

212,850 – 25,979 = 186,871 I-E & E-I VMT

Figure 2–14 shows the spread sheet results.

Figure 2–14 One Trip-Ends VMT Calculations								
BASE YEAR 2008								
JURISDICTION	CLASSIFICATION		TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)
GNC	1	Freeway	327,268	36,989	4,515	32,474	290,279	
GNC	3	Major	67,085	49,701	6,066	43,635	17,384	
GNC	4	Collector	44,221	35,296	4,308	30,988	8,925	
GNC	5	Local Collector	52,603	42,254	5,157	37,097	10,349	
GNC	8	Freeway Ramp	35,242	4,325	528	3,797	30,917	
GNC	9	Local Ramp	8,697	5,837	712	5,125	2,860	
GNC	10	Zone Connector	38,447	38,448	4,693	33,755	(1)	
GNC	11	Intra-Zonal						1,392
GNC		Total	573,563	212,850	25,979	186,871	360,713	1,392

*GNC = Greater North Park

Calculate the "Zero Trip-End" or "through trips" category with the following formula for all records:

E-E VMT = (24-hour total VMT – select zone query VMT)

Or

573,563 – 212,850 = 360,713 E-E VMT

Figure 2–15 shows the spread sheet results.

Figure 2–15
Zero Trip-Ends VMT Calculations

BASE YEAR 2008

JURISDICTION	CLASSIFICATION	TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)
GNC	1 Freeway	327,268	36,989	4,515	32,474	290,279	
GNC	3 Major	67,085	49,701	6,066	43,635	17,384	
GNC	4 Collector	44,221	35,296	4,308	30,988	8,925	
GNC	5 Local Collector	52,603	42,254	5,157	37,097	10,349	
GNC	8 Freeway Ramp	35,242	4,325	528	3,797	30,917	
GNC	9 Local Ramp	8,697	5,837	712	5,125	2,860	
GNC	10 Zone Connector	38,447	38,448	4,693	33,755	(1)	
GNC	11 Intra-Zonal						1,392
GNC	Total	573,563	212,850	25,979	186,871	360,713	1,392

*GNC = Greater North Park

Cross check each of the last three calculations by comparing the study area total sums with the sum of each functional classification, as shown in ***Figure 2–16.***

Figure 2–16 Cross-Checking of VMT Calculations								
BASE YEAR 2008								
JURISDICTION	CLASSIFICATION		TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)
GNC	1	Freeway	327,268	36,989	4,515	32,474	290,279	
GNC	3	Major	67,085	49,701	6,066	43,635	17,384	
GNC	4	Collector	44,221	35,296	4,308	30,988	8,925	
GNC	5	Local Collector	52,603	42,254	5,157	37,097	10,349	
GNC	8	Freeway Ramp	35,242	4,325	528	3,797	30,917	
GNC	9	Local Ramp	8,697	5,837	712	5,125	2,860	
GNC	10	Zone Connector	38,447	38,448	4,693	33,755	(1)	
GNC	11	Intra-Zonal						1,392
GNC		Total	573,563	212,850	25,979	186,871	360,713	1,392

*GNC = Greater North Park

Incorporate the summary of intra-zonal VMT from **Step 4** as shown in ***Figure 2–17***.

Figure 2–17 Intra-Zonal Trips								
BASE YEAR 2008								
JURISDICTION	CLASSIFICATION		TOTAL VMT	TOTAL NORTH PARK VMT (I-I, I-E, E-I, & E-E)	TWO TRIP-ENDS NORTH PARK VMT (I-I)	ONE TRIP-END NORTH PARK VMT (I-E and E-I)	NON-NORTH PARK VMT (E-E)	NORTH PARK INTRA-ZONAL VMT (INTRA)
GNC	1	Freeway	327,268	36,989	4,515	32,474	290,279	
GNC	3	Major	67,085	49,701	6,066	43,635	17,384	
GNC	4	Collector	44,221	35,296	4,308	30,988	8,925	
GNC	5	Local Collector	52,603	42,254	5,157	37,097	10,349	
GNC	8	Freeway Ramp	35,242	4,325	528	3,797	30,917	
GNC	9	Local Ramp	8,697	5,837	712	5,125	2,860	
GNC	10	Zone Connector	38,447	38,448	4,693	33,755	(1)	
GNC	11	Intra-Zonal						1,392
GNC		Total	573,563	212,850	25,979	186,871	360,713	1,392

*GNC = Greater North Park

Create subtotals for each jurisdiction across all VMT categories and facility types, and compare the region-wide totals, as shown in ***Figure 2–18***.

Figure 2–18
Jurisdictional VMT Summaries

Scenario					
Jurisdiction	Total VMT	Total North Park VMT	Two Trip-Ends North Park VMT	One Trip-End North Park VMT	Non-North Park VMT
CARLSBAD TOTAL	3,344,783	6,864	-	6,864	3,337,919
CHULA VISTA TOTAL	3,944,329	26,635	-	26,635	3,917,694
CORONADO TOTAL	425,415	7,511	-	7,511	417,904
DEL MAR TOTAL	97,997	151	-	151	97,846
EL CAJON TOTAL	2,170,595	13,539	-	13,539	2,157,056
ENCINITAS TOTAL	2,072,646	8,464	-	8,464	2,064,182
ESCONDIDO TOTAL	2,804,158	6,095	-	6,095	2,798,063
External TOTAL	348,011	1,233	-	1,233	346,778
IMPERIAL BEACH TOTAL	118,284	215	-	215	118,069
LA MESA TOTAL	1,816,617	22,479	-	22,479	1,794,138
LEMON GROVE TOTAL	824,528	9,186	-	9,186	815,342
NATIONAL CITY TOTAL	1,637,674	23,317	-	23,317	1,614,357
OCEANSIDE TOTAL	3,187,796	2,198	-	2,198	3,185,598
POWAY TOTAL	1,107,444	2,234	-	2,234	1,105,210
SAN DIEGO TOTAL	38,508,241	983,410	25,979	957,385	37,488,977
SAN MARCOS TOTAL	2,058,102	1,890	-	1,890	2,056,212
SANTEE TOTAL	855,495	2,757	-	2,757	852,738
SOLANA BEACH TOTAL	567,459	3,108	-	3,108	564,351
Unincorporated TOTAL	17,470,189	44,274	-	44,274	17,425,915
VISTA TOTAL	1,712,782	279	-	279	1,712,503
Summary	85,072,545	1,165,839	25,979	1,139,814	83,870,852

Validate the VMT data by summarizing and cross-checking it via other sources such as the post-forecast report "postlod2.pr", previously discussed. ***Figure 2–19*** shows this comparison.

Figure 2–19
Validation by Summary Cross-Check

REGIONAL VALIDATION BY SUMMARY BASE YEAR 2008		
Reported:	Post-forecast VMT report (postlo2.pr)	85,057,878
Assigned:	Assigned sum of all VMT	85,072,545
Disaggregated:	Sum of all VMT using this method	85,036,645
SUMMARY 1: (ASSIGNED – REPORTED)		
Absolute VMT Difference		(15,333)
Percent VMT Difference		-0.01802%
SUMMARY 2: (DISAGGREGATED – REPORTED)		
Absolute VMT Difference		(51,233)
Percent VMT Difference		-0.06021
SUMMARY 3: (DISAGGREGATED – ASSIGNED)		
Absolute VMT Difference		35,900
Percent VMT Difference		-0.04222%

Compare the calculated 24-hour VMT with reports or some metric from the travel demand model. This table, shown above in *Figure 2–19*, compares three levels of VMT calculations: "Reported" VMT is generated after each model scenario and is included in the "postload2.pr" reports provided in *Appendix D*. "Assigned" includes calculating total VMT via a travel demand model, a GIS or a spread sheet. "Disaggregated" is the result of the methodology described in this white paper. If any of these three comparisons result in more than a 0.1% difference, it indicates a typo or an error during this analysis.

Complete statistical results of this methodology shown in graphical format are documented in ***Appendix E.***

Figures 2–20 through ***2–26*** show a summary of the final results of the VMT calculations normalized by different factors: population, employment, dwelling units, person trips, lane miles, and acreage.

Figure 2–20 Final VMT, Population, Employment, Dwelling Units and Person Trips Generated						
Alternative	Total VMT	Total North Park VMT	North Park Population	North Park Jobs	North Park Total Units	North Park Person Trips Generation
2008	573,563	212,850	47,548	8,697	24,795	375,074
2050 A	768,798	282,006	71,777	11,346	35,258	496,800
2050 B	775,137	290,202	73,475	11,614	36,092	519,036
2050 C	775,972	290,707	73,475	11,614	36,092	519,036

Figure 2–21 Final Results of the Methodology Normalized by Population		
Alternative	Total VMT Per Capita	North Park Total VMT Per Capita
2008	12.06	4.48
2050 A	10.71	3.93
2050 B	10.55	3.95
2050 C	10.56	3.96

Figure 2–22 Final Results of the Methodology Normalized by Employment		
Alternative	Total VMT Per Job	North Park Total VMT Per Job
2008	65.95	24.47
2050 A	67.76	24.86
2050 B	66.74	24.99
2050 C	66.81	25.03

Figure 2–23 Final Results of the Methodology Normalized by Dwelling Units		
Alternative	Total VMT Per Dwelling Unit	North Park Total VMT Per Dwelling Unit
2008	23.13	8.58
2050 A	21.80	8.00
2050 B	21.48	8.04
2050 C	21.50	8.05

Figure 2–24 Final Results of the Methodology Normalized by Person Trips Generated		
Alternative	Total VMT Per Person Trips Generated	North Park Total VMT Per Person Trips Generated
2008	1.53	0.57
2050 A	1.55	0.57
2050 B	1.49	0.56
2050 C	1.50	0.56

Figure 2–25 Final Results of the Methodology Normalized by Lane Miles					
Alternative	Lane Miles	Total VMT	Total VMT per Lane Mile	North Park Total VMT	Total North Park VMT per Lane Mile
2008	104.0	573,563	5,515.0	212,850	2,046.6
2050 A	111.5	768,798	6,895.0	282,006	2,529.2
2050 B	111.5	775,137	6,951.9	290,202	2,602.7
2050 C	113.0	775,972	6,867.0	290,707	2,572.6

Figure 2–26 Final Results of the Methodology Normalized by Acreage					
Alternative	Study Area Acreage	Total VMT	Total VMT per Acre	North Park Total VMT	Total North Park VMT per Acre
2008	2257.4	573,563	254.1	212,850	94.3
2050 A	2257.4	768,798	340.6	282,006	124.9
2050 B	2257.4	775,137	343.4	290,202	128.6
2050 C	2257.4	775,972	343.7	290,707	128.8

3.0 APPLICATION

Once all modeling work has been completed to generate disaggregated VMT for the study area, the information produced is then applied to the significance findings of the Environmental Impact Report (EIR) Climate Action Plan (CAP). The CAP focuses on the greenhouse gas (GHG) emissions on a pre- and post-project basis. VMT is a primary factor in measuring GHG as it relates to carbon dioxide emissions and the associated significant environmental impacts. As previously mentioned in the introduction to this paper, VMT is disaggregated in three categories:

- Internal-Internal (I-I): all VMT should be included in the analysis
- Internal-External (I-E) or External-Internal (E-I): 50% of VMT should be included in the analysis
- External-External (E-E): all VMT should be excluded in the analysis

The Methodology section describes the regional traffic modeling software's ability to derive the needed VMT information for a specific study area. The application of the VMT modeling output is covered in this section, with the continued use of North Park as the study area.

The key reasoning for disaggregating VMT into three separate types is to accurately evaluate North Park's estimated VMT, excluding the effect of other nearby jurisdictions. The community-wide inventory includes the VMT for all trips that begin and/or end within the Community limits of which are then split into the three categories. North Park would only be accountable for all trips within the Community limits (I-I), while it would share accountability with other jurisdictions for trips that have only one end point in the Community (I-E & E-I). All pass-through trips (E-E), would be excluded from the VMT results as the trips are not generated by land uses within the Community. This methodology is supported by the SB 375 Regional Targets Advisory Committee and ICLEI-Local Governments for Sustainability.

The current way the I-E and E-I trips are included in the CAP evaluation is by halving the results; North Park would be responsible for generating approximately 50% of the I-E and E-I trips. While this approach may over or under estimate North Park's contribution to Community VMT, it is presently the only viable approach given the difficulty in determining the origin or destination for an externally-oriented trip.

The data results of the I-I trips and half of the I-E and E-I trips are then input into the Urban Emissions Model (URBEMIS) or similar software, along with other determining factors, to estimate the projected emissions generated by North Park VMT. The thresholds set forth by AB 32 are used to measure the significance of emission levels between pre- and post-project conditions.

4.0 CONCLUSION

This paper provides an introduction discussing the recently adopted State legislation to reduce greenhouse gas (GHG) emissions to 1990 levels. As a result of these acts, environmental documents are required to evaluate the GHG levels proposed by projects (large-scale projects such as general plans and specific plans) as part of the CEQA process. As recommended to calculated GHG by the September 2009 Report to CARB by the SB 375 Regional Targets Advisory Committee and ICLEI's Community Protocol, VMT is defined as a unit to measure vehicle travel made by any individual vehicle, as classified by the three types of trips: Internal-Internal, Internal-External or External-Internal, and External-External. In order to disaggregate VMT into such classes, SANDAG has developed a modeling process to generate these results.

The Methodology section of this white paper discusses the technical approach to using the traffic model to generate the three types of VMT trips. Listing of the tools needed, the data input, general assumptions, and the steps required are discussed in detail in this section. The methodology used generates the three VMT trip categories using a select-zone assignment approach to separate out, as accurately as possible, the trips produced by North Park land uses and the trips produced by outside jurisdictions. Observed VMT from the field is extremely difficult to calculate accurately, thus the method outlined in this white paper is compared to other computational methods of calculating VMT. To measure the margin of error for this type of data analysis, comparisons can be drawn between the calculated 24-hour VMT from the assignment, the select-zone assignment and the post-modeling report from the travel demand model. As shown in this paper, the methodology developed by SANDAG results in a 0.06% margin of error, which is well below the 0.1% margin of error threshold set by SANDAG.

The data produced through the SANDAG modeling process are then input into the Urban Emissions Model to conclude whether the project will result in a significant GHG impact.

Environmental documents prepared for the cities of La Mesa and Escondido have found success in implementing the methodology applied by SANDAG through the use of the travel demand model. The Final Environmental Impact Analysis (FEIR) for the Escondido General Plan Update, certified December 2011, utilized this technique for calculating GHG for the entire jurisdiction.

This paper has provided a quantitative approach for disaggregating VMT. The use of this information can be applied toward community-wide GHG inventories as well as at the large- to medium-scale project level (Initial Studies, Mitigated Declarations, Negative-Mitigated Declarations, Environmental Impacts Reports, and Environmental Impact Studies). However, it is recognized that other approaches to VMT calculations are in existence. The goal of this technical paper is to provide a more accurate approach for calculating VMT which would set the standard for VMT analyses in the San Diego Region as well as to influence other State and National agencies and institutions to adopt and utilize this methodology in their long-term VMT/GHG planning efforts.

5.0 NEXT STEPS

1. Validation and refinement: This white paper shall continue to be refined and validated on an as-needed basis in terms of methodology and application. The document shall be updated with data developed in support of General Plan and Community Plan updates for jurisdictions in genuine applications.
2. Travel demand model migration: This method shall remain valid for both a traditional 4-step travel demand model (trip-based) and for an Activity Based Model (tour-based). The primary reason for this methodology being portable is that it utilizes trip tables input into the traffic assignment stage as well as assigned traffic as an output of the traffic assignment stage. Since trip tables and traffic assignment are required steps for either model paradigm, this methodology will remain valid for either generation of travel demand models.
3. GIS migration: The AML script developed for this analysis using Arc/INFO workstation shall be ported to the ArcPy (Python) script language for use in ArcGIS.
4. Publication: This white paper shall continue to be vetted through the ITE Task Force for publication. It shall also be vetted through several of SANDAG's working committees including SANTEC (San Diego Traffic Engineers' Council) and TWG (Regional Planning Technical Working Group). If accepted, it shall be presented at a TRB conference and forwarded to ICLEI for inclusion in the U.S. Community Protocol for Accounting and Reporting GHG Emissions.
5. Directional VMT: This method shall be further developed to allow for the analysis of directional VMT.
6. Trip Purpose VMT: This method shall also be further developed to factor VMT by trip purpose (i.e. home-to-work, home-to-school, etc).

APPENDICES

VEHICLE MILES TRAVELED CALCULATIONS USING THE SANDAG REGIONAL TRAVEL DEMAND MODEL

San Diego, California
May 2013

APPENDIX A

GLOSSARY OF ACRONYMS & TERMS

AB	**Assembly Bill**
ADT	**Average Daily Traffic**
AML	**Arc Macro Language**
ATL	**Average Trip Length**
Caltrans	**California Department of Transportation**
CAP	**Climate Action Plan**
CARB	**California Air Resources Board**
CEQA	**California Environmental Quality Act**
CMP	**Congestion Management Plan**
CPA	**Community Planning Area**
CSV	**Comma Separated Variable**
E-E	**External-to-External Trip Category**
E-I	**External-to-Internal Trip Category**
EIR	**Environmental Impact Report**
GHG	**Green House Gas**
GIS	**Geographic Information Systems**
HHDT	**Heavy-Heavy Duty Truck**
HOV	**High Occupant Vehicle**
I-E	**Internal-to-External Trip Category**
I-I	**Internal-to-Internal Trip Category**
ICLEI	**International Council for Local Environmental Initiatives**
Internal Capture	**Trips with an Origin and Destination within the same study area**
Intra-zonal	**Trips with an Origin and Destination within the same TAZ**
ITE	**Institute of Traffic Engineers**
LHDT	**Light-Heavy Duty Truck**
LOS	**Level of Service**
MHDT	**Medium-Heavy Duty Truck**
MPO	**Metropolitan Planning Organization**
OD	**Origin Destination**
PHT	**Person Hours of Travel**
PMT	**Person Miles of Travel**
RC	**Revenue Constrained**
RTIP	**Regional Transportation Improvement Plan**
RTP	**Regional Transportation Plan**
SANTEC	**San Diego Traffic Engineers' Council**
SB	**Senate Bill**
SOV	**Single Occupant Vehicle**
TAZ	**Traffic Analysis Zone**
TDM	**Travel Demand Management**
TRB	**Transportation Research Board**
TWG	**Regional Planning Technical Working Group**
VHT	**Vehicle Hours of Travel**
VMT	**Vehicle Miles of Travel**

APPENDIX B

SCENARIO TRIP GENERATION REPORTS (TAZ 3491)

Base Year 2008
Trip Generation and land use by zone

Land Use					Trips	
Zone	Code	Name	Type	Amount	Person	Vehicle
3491	101	SINGLE FAMILY	du	342.0	3409	2460
3491	102	MULTI-FAMILY	du	189.0	1590	1113
3491	1409	GROUP QUARTERS	acre	0.2	1	1
3491	4112	RIGHT-OF-WAY	acre	12.8	0	0
3491	5007	STREETFRONT COMM	acre	0.6	759	550
3491	5009	OTHER COMMERCIAL	acre	0.5	59	43
3491	6102	CHURCH	acre	0.4	21	17
3491	9101	INACTIVE USE	acre	5.4	0	0
3491	**TOTAL**				**5839**	**4184**

2050 A
Trip Generation and land use by zone

Land Use					Trips	
Zone	Code	Name	Type	Amount	Person	Vehicle
3491	101	SINGLE FAMILY	du	335.0	3529	2549
3491	102	MULTI-FAMILY	du	231.0	2039	1425
3491	1409	GROUP QUARTERS	acre	0.2	1	0
3491	4112	RIGHT-OF-WAY	acre	12.8	0	0
3491	6102	CHURCH	acre	0.4	23	18
3491	9101	INACTIVE USE	acre	4.9	0	0
3491	9702	MIXED USE (67% COM)	acre	1.8	1647	1194
3491	**TOTAL**				**7239**	**5186**

2050 B
Trip Generation and land use by zone

Land Use					Trips	
Zone	Code	Name	Type	Amount	Person	Vehicle
3491	101	SINGLE FAMILY	du	200.0	2440	1703
3491	102	MULTI-FAMILY	du	1200.0	10440	7329
3491	4112	RIGHT-OF-WAY	acre	12.8	0	0
3491	6002	LOW RISE OFFICE	acre	6.0	1753	1350
3491	6102	CHURCH	acre	0.4	21	16
3491	9101	INACTIVE USE	acre	4.9	0	0
3491	9702	MIXED USE (67% COM)	acre	8.8	7582	5504
3491	**TOTAL**				**22236**	**15903**

2050 C
Trip Generation and land use by zone

Land Use					Trips	
Zone	Code	Name	Type	Amount	Person	Vehicle
3491	101	SINGLE FAMILY	du	200.0	2440	1703
3491	102	MULTI-FAMILY	du	1200.0	10440	7329
3491	4112	RIGHT-OF-WAY	acre	12.8	0	0
3491	6002	LOW RISE OFFICE	acre	6.0	1753	1350
3491	6102	CHURCH	acre	0.4	21	16
3491	9101	INACTIVE USE	acre	4.9	0	0
3491	9702	MIXED USE (67% COM)	acre	8.8	7582	5504
3491	**TOTAL**				**22236**	**15903**

APPENDIX C

GIS SCRIPT (AML)

```
/* VMT.AML FOR SERIES 12
/* MCA 08/05/11 FOR USE WITH ARC Workstation 9.X on the PC
/*
/* RUN THIS AML AFTER A SELECT ZONE ASSIGNMENT TO PRODUCE VMT.TXT
/* MODIFIED TO INCLUDE CITY CPA's
/* REQUIRED LIST OF GIS LAYERS:
/*    A Loaded network (line)layer:  HWYCOV2
/*    A jurisdiction/City Boundary (polygon)layer:  JURCOV

/*
/* CREATE HWVMT
/*
&if [exists hwyvmt -cover] &then kill hwyvmt all
copy hwycov2 hwyvmt
additem hwyvmt.aat hwyvmt.aat avmt 12 12 i
additem hwyvmt.aat hwyvmt.aat uvmt 12 12 i
additem hwyvmt.aat hwyvmt.aat szvmt 12 12 i
&data arc info
ARC
SEL HWYVMT.AAT
CALC TMP1 = 0
Q STOP
&end

/*
/* CREATE INFO LOOKUP TABLE FOR SELECT LINK VOLUMES
/*
&if [exists info.slk -info] &then &s x = [delete info.slk -info]
&data arc info
ARC
DEFINE INFO.SLK
HWYVMT-ID,6,6,I
LENGTHX,10,10,N,3
Q1,10,10,N,3
PCT1,9,9,N,2
PCT2,1,1,C

GET ../lodselk.prn COPY ASCII
Q STOP
&end

/*
/* JOIN INFO TABLE TO HWYVMT
/*
&if [exists hwyvmt2 -cover] &then kill hwyvmt2 all
joinitem hwyvmt.aat INFO.SLK hwyvmt.aat hwyvmt-id # ordered

/*
/* OVERLAY WITH JURCOV
/*
```

```
identity hwyvmt T:\data\GIS\covs\admin\jurcov hwyvmt2 line

/*
/* CALC VMT
/*
&data arc info
ARC
SEL HWYVMT2.AAT
CALC TMP1 = 0
CALC AVMT = ( AVOL * LENGTH ) / 5280
CALC UVMT = ( UVOL * LENGTH ) / 5280
CALC SZVMT = ( Q1 * LENGTH ) / 5280
RESEL JUR1 = 0
MOVEIT 'External' TO NAME1
ASEL
RESEL JUR1 = 14
CALC JUR1 = JUR2
MOVEIT NAME2 TO NAME1
Q STOP
&end

/*
/* CREATE REPORT
/*
frequency hwyvmt2.aat hwyvmt2.tab
name1
ifc
end
avmt
uvmt
szvmt
end
&if [exists vmt.txt -file] &then &s x = [delete vmt.txt -file]
&data ARC INFO
ARC
SEL HWYVMT2.TAB
OUTPUT ../vmt.txt INIT
PRINT NAME1,IFC,AVMT,UVMT,SZVMT
Q STOP
&end

/*
/* CALC STUDY AREA LANE MILES
/*
&if [exists hwyvmtlm -cover] &then kill hwyvmtlm all
&if [exists hwyvmtlm.tab -info] &then &s x = [delete hwyvmtlm.tab -
info]
clip hwyvmt ../covs/sacov hwyvmtlm line
additem hwyvmtlm.aat hwyvmtlm.aat lanes 3 3 i
additem hwyvmtlm.aat hwyvmtlm.aat lm 12 12 n 1
&data arc info
ARC
```

```
SEL HWYVMTLM.AAT
CALC TMP2 = 1
CALC LANES = ABLNA + BALNA
CALC LM = ( LANES * LENGTH ) / 5280
Q STOP
&end
frequency hwyvmtlm.aat hwyvmtlm.tab
tmp2
end
lm
end
&if [exists lm.txt -file] &then &s x = [delete lm.txt -file]
&data ARC INFO
ARC
SEL HWYVMTLM.TAB
OUTPUT ../lm.txt INIT
PRINT LM
Q STOP
&end
&ret
```

APPENDIX D

VALIDATION FILE
POSTLOD2.PR

Base Year 2008

regionwide vehicle miles of travel

unadjusted daily vmt summary

functional class	vmt	vht	speed
freeway	42208325.	696965.	60.6
prime	7140439.	252908.	28.2
major	14410458.	530715.	27.2
collector	6127093.	216715.	28.3
local collector	4125602.	169530.	24.3
rural collector	1369462.	38736.	35.4
local	1267527.	53968.	23.5
fwy-fwy ramp	1675286.	41245.	40.6
ramp	2364372.	132575.	17.8
access	4399313.	188322.	23.4
total	85087878.	2321678.	36.6

11may12/07:11:25/postlod.pr

2050 A

regionwide vehicle miles of travel

unadjusted daily vmt summary

functional class	vmt	vht	speed
freeway	62128817.	1128115.	55.1
prime	9690714.	354408.	27.3
major	20762024.	776996.	26.7
collector	7547287.	283855.	26.6
local collector	7063388.	273276.	25.8
rural collector	786225.	20439.	38.5
local	1855548.	80234.	23.1
fwy-fwy ramp	2446217.	65814.	37.2
ramp	3175523.	204872.	15.5
access	6086573.	258336.	23.6
total	121542317.	3446344.	35.3

23mar12/14:22:53/postlod.pr

2050 B

regionwide vehicle miles of travel

unadjusted daily vmt summary

functional class	vmt	vht	speed
freeway	62107542.	1128811.	55.0
prime	9691910.	354366.	27.4
major	20764961.	777157.	26.7
collector	7541346.	283810.	26.6
local collector	7079767.	273990.	25.8
rural collector	785301.	20423.	38.5
local	1855127.	80239.	23.1
fwy-fwy ramp	2445554.	65740.	37.2
ramp	3177989.	205365.	15.5
access	6088362.	258414.	23.6
total	121537859.	3448315.	35.2

15may12/21:01:45/postlod.pr

2050 C

regionwide vehicle miles of travel

unadjusted daily vmt summary

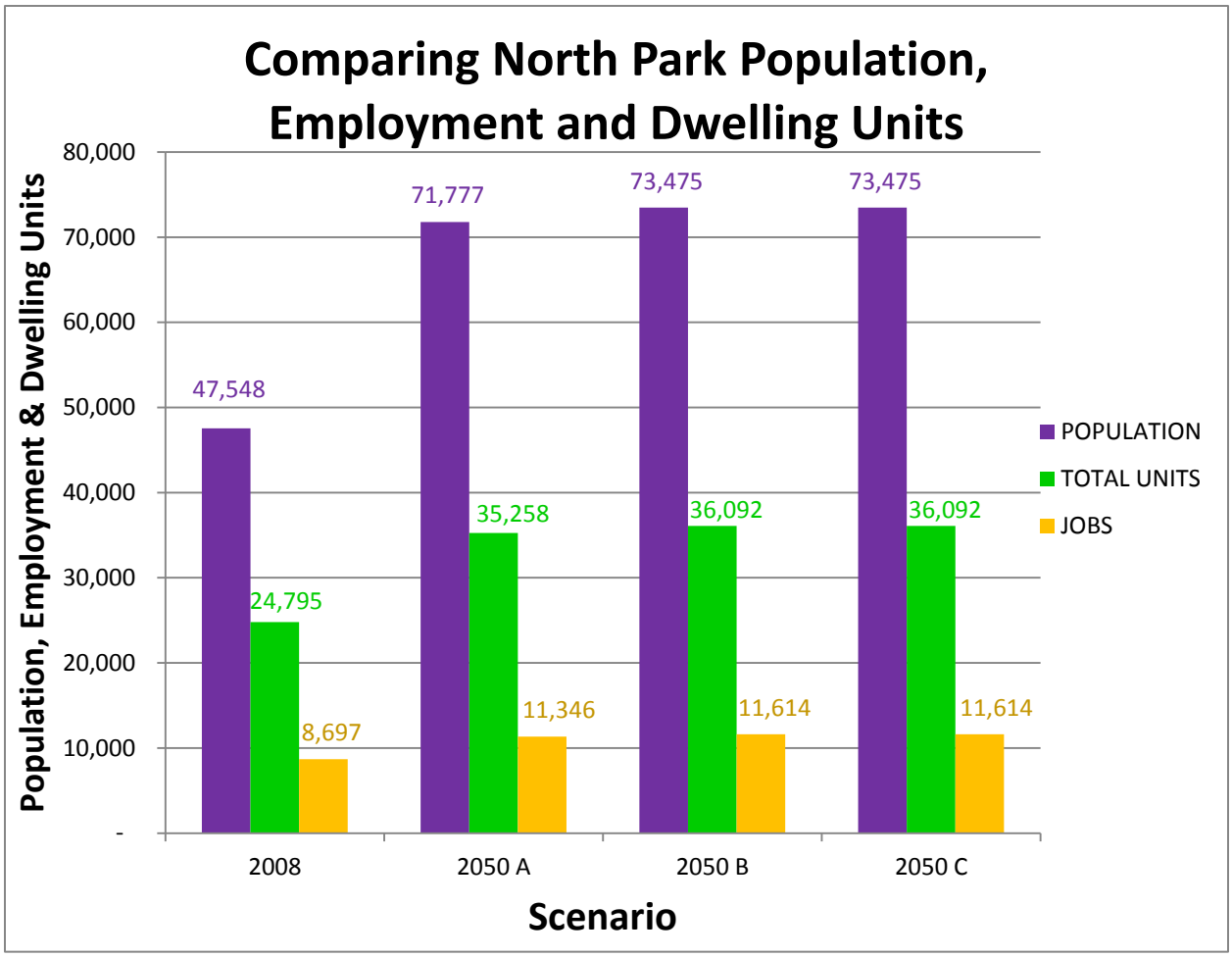
functional class	vmt	vht	speed
freeway	62111222.	1127726.	55.1
prime	9694188.	354474.	27.3
major	20761508.	776979.	26.7
collector	7557465.	284332.	26.6
local collector	7064862.	273231.	25.9
rural collector	786022.	20431.	38.5
local	1853098.	80104.	23.1
fwy-fwy ramp	2447395.	65877.	37.2
ramp	3176285.	205169.	15.5
access	6087108.	258359.	23.6
total	121539153.	3446684.	35.3

9sep12/01:30:11/postlod.pr

APPENDIX E

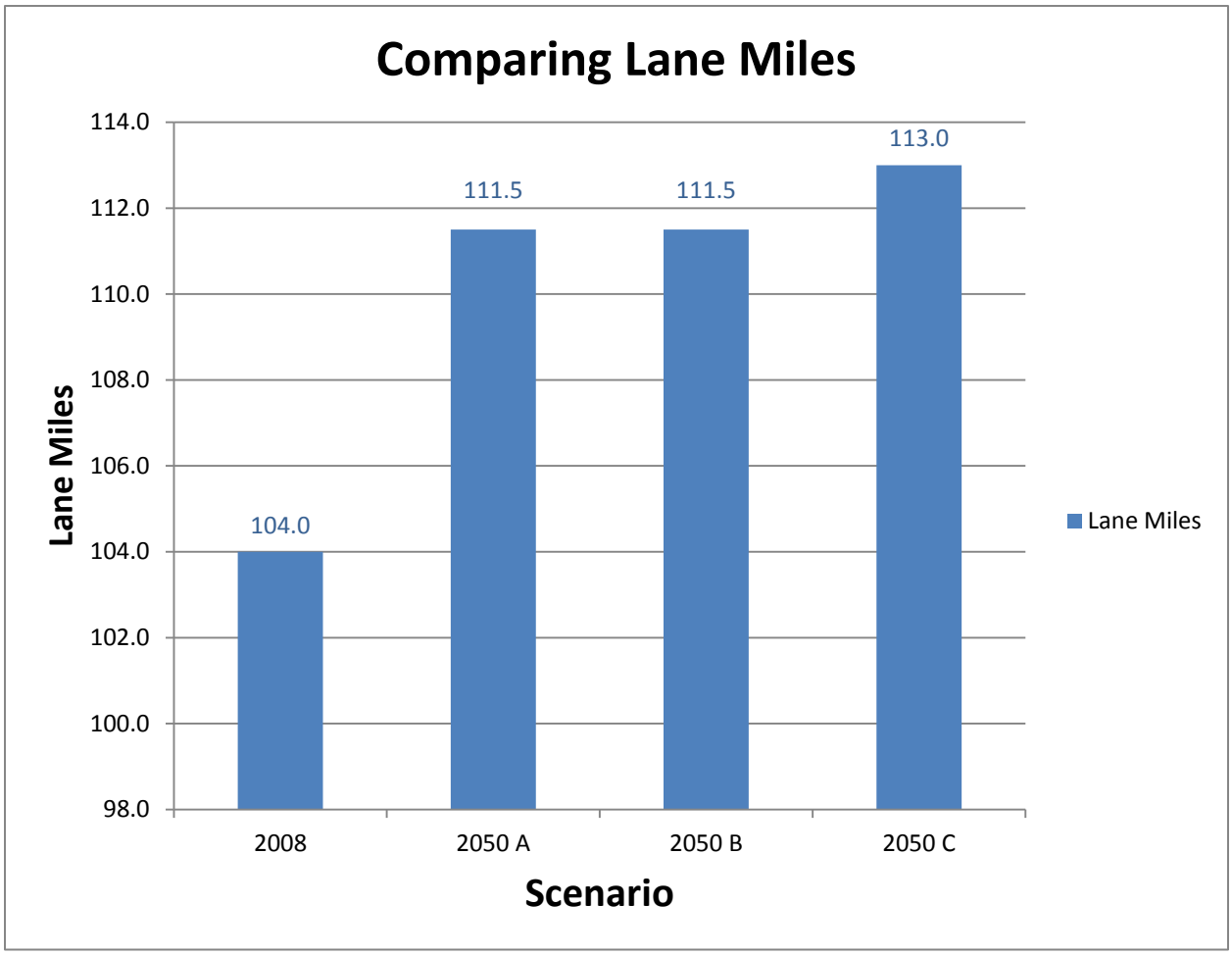
STATISTICAL RESULTS IN GRAPHICAL FORMAT

1) **Demographics**



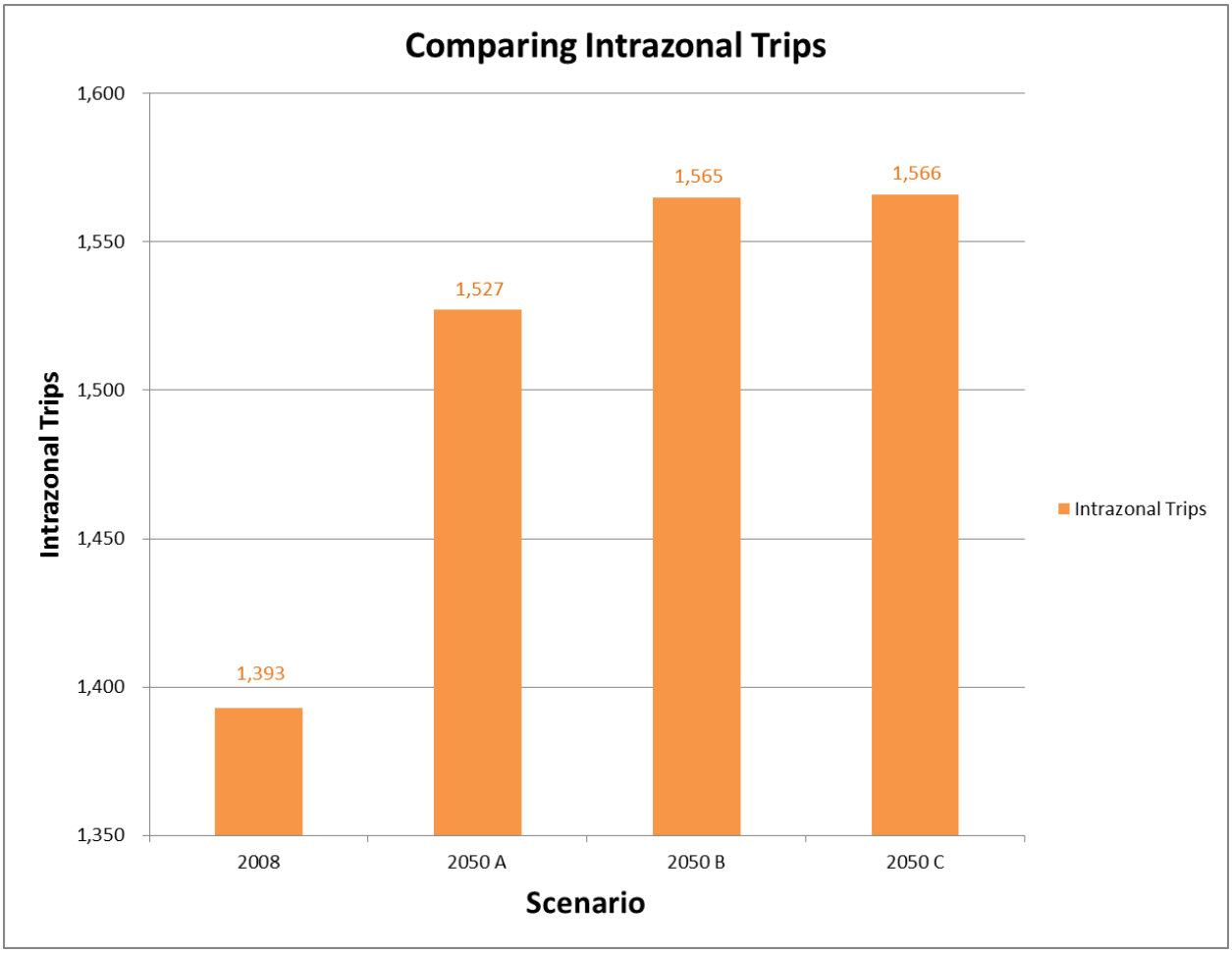
This chart displays the Population, Employment and total Dwelling Units for the four scenarios.

2) **Lane Miles**



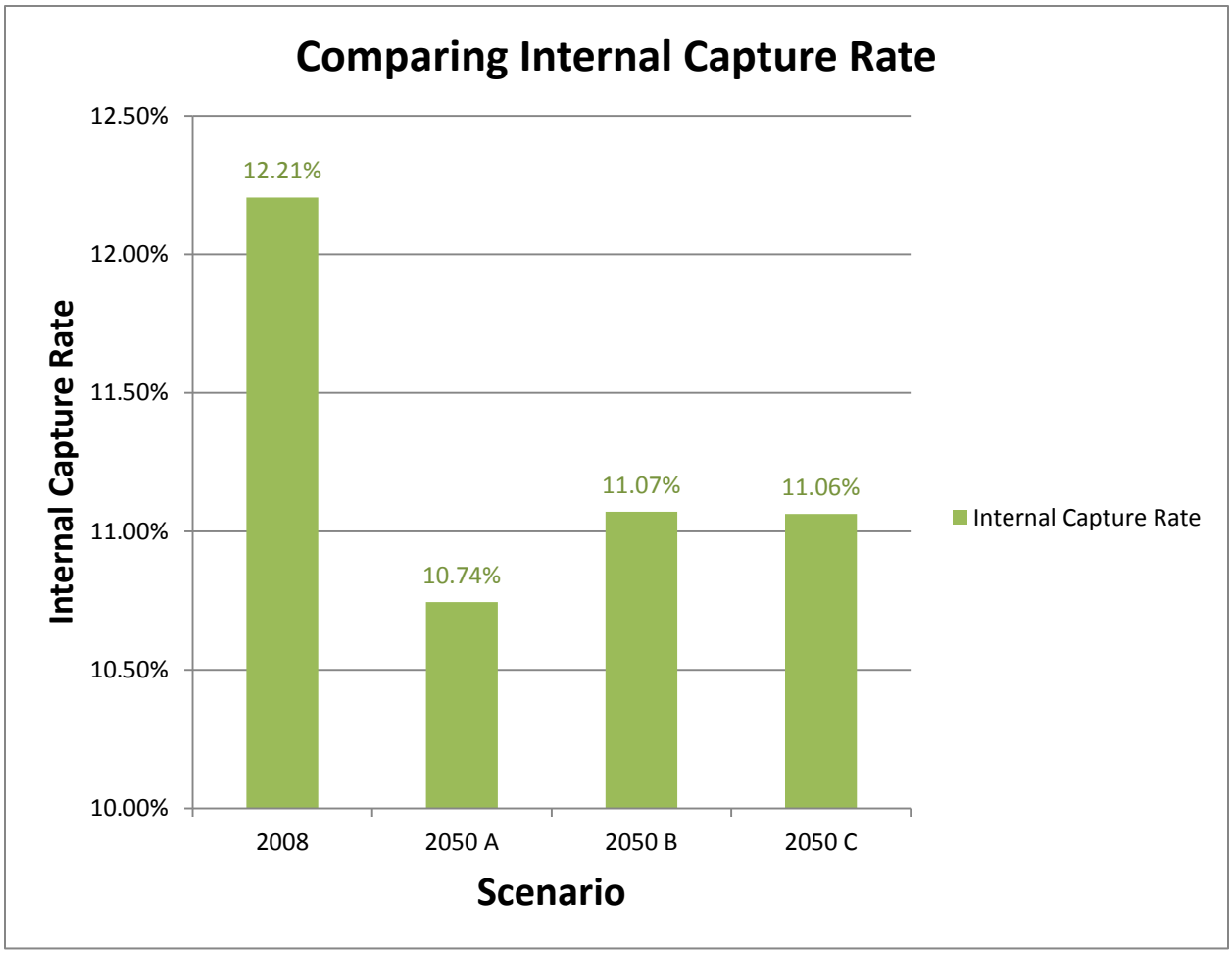
This chart shows the calculated Lane Miles for the four scenarios.

3) **Intra-Zonal Trips**



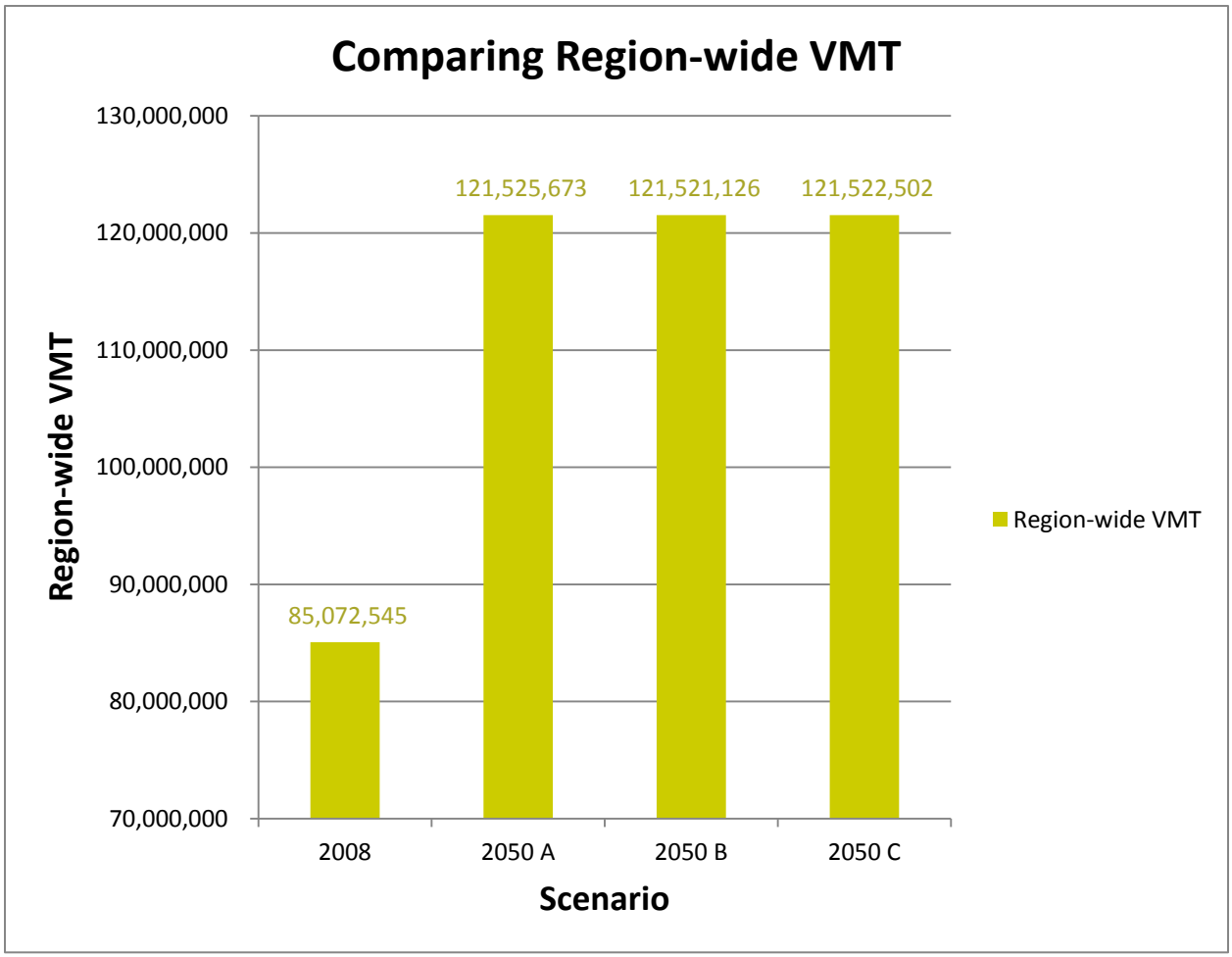
This chart compares the Intra-Zonal trips for the four scenarios.

4) **Internal Capture Rate**



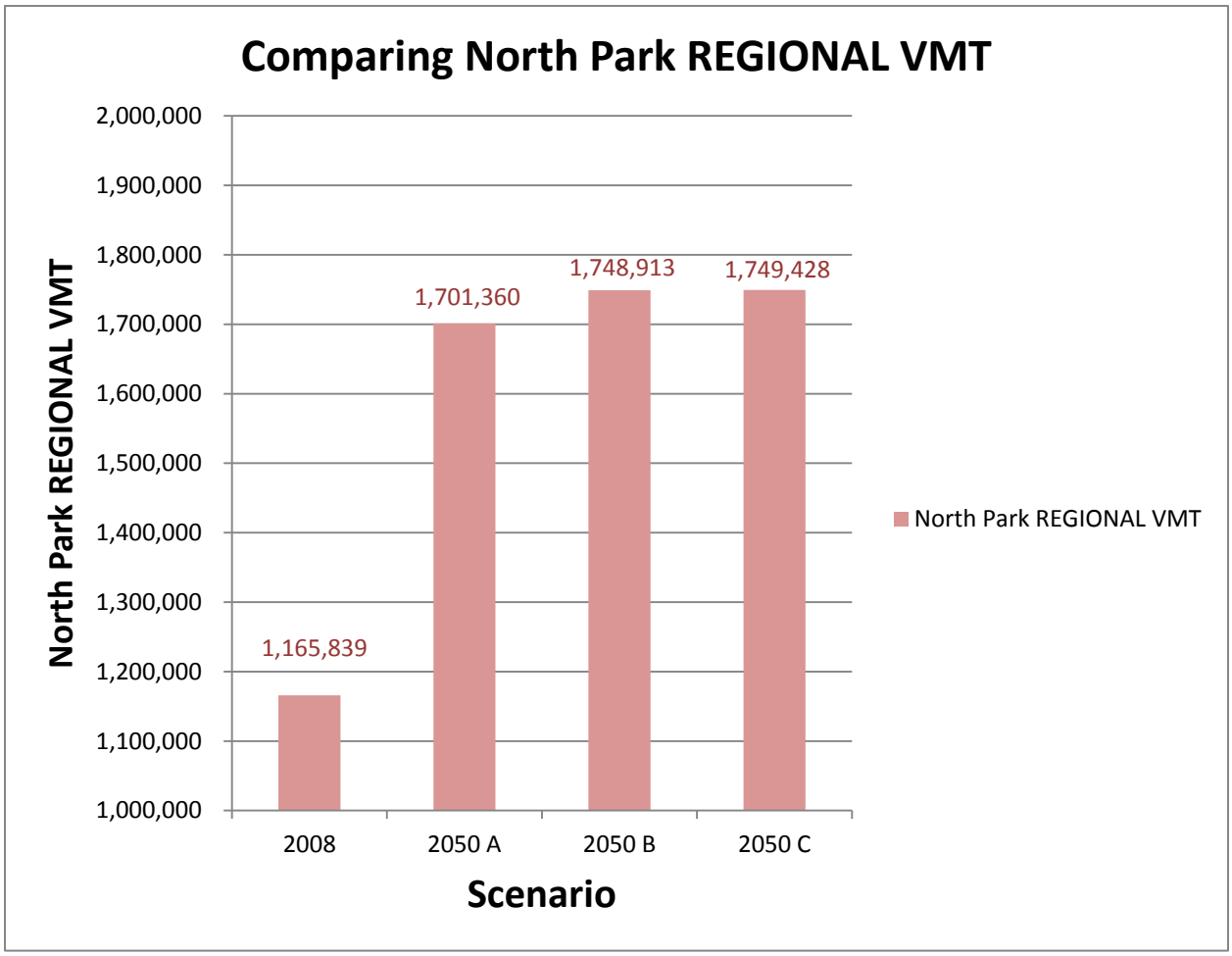
This chart relates the derived Internal Capture Rate for the four scenarios.

5) **Region-wide VMT**



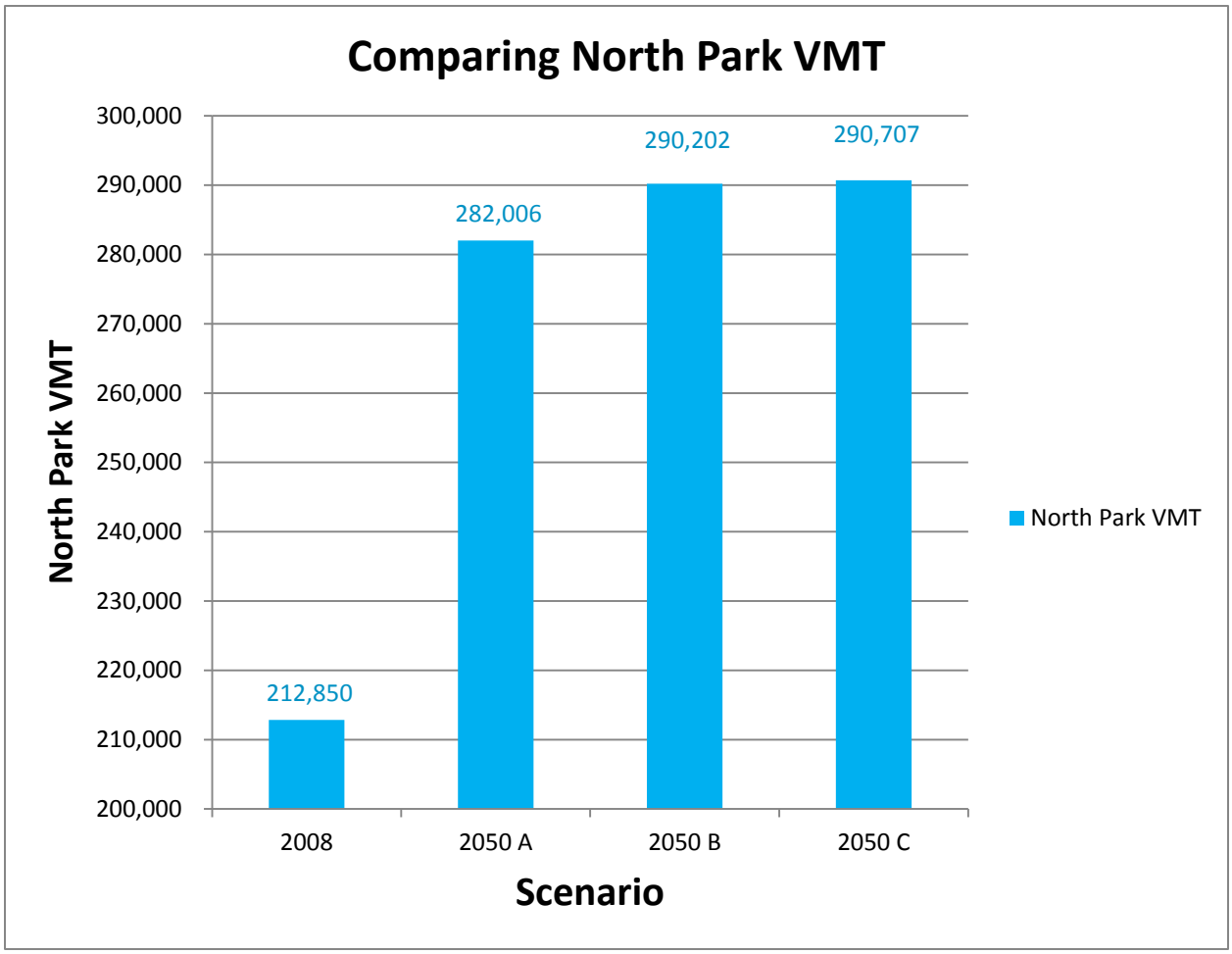
This chart compares the Vehicle Miles of Travel for the four scenarios for the whole San Diego region.

6) **North Park Regional VMT**



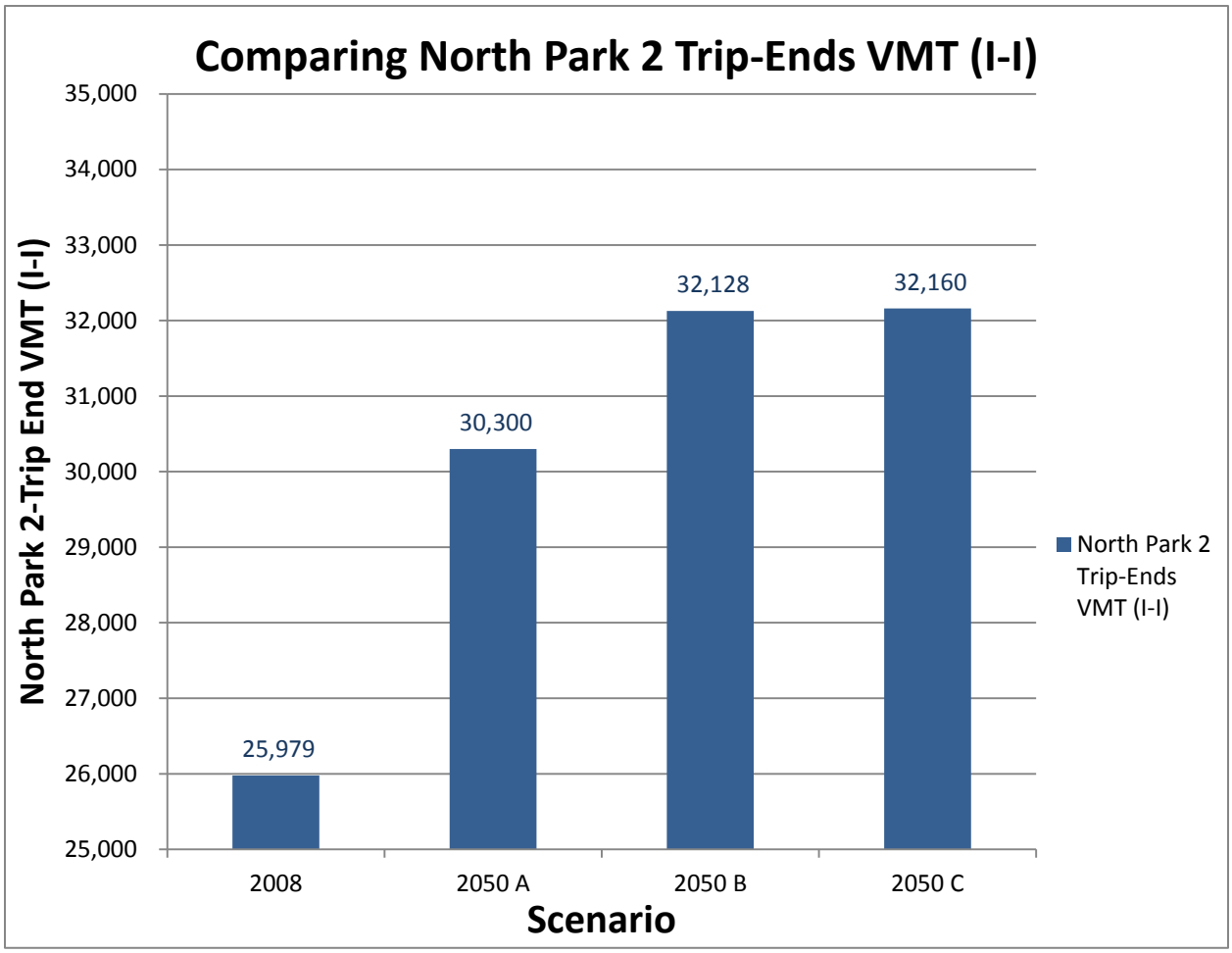
This chart tracks the North Park 1 trip-end Vehicle Miles of Travel throughout the whole San Diego region for the four scenarios.

7) **North Park VMT**



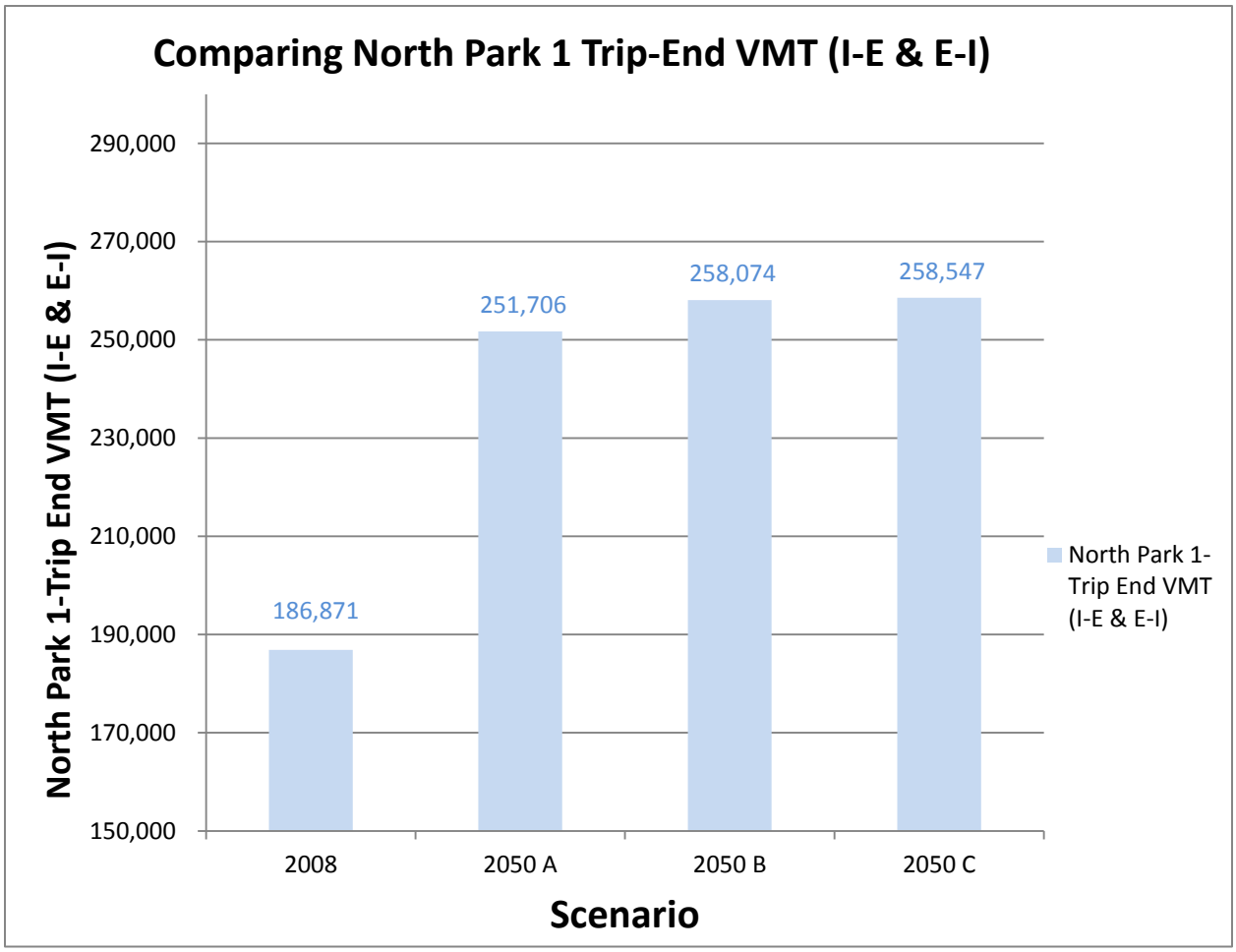
This chart compares all North Park Vehicle Miles of Travel in North Park only for the four scenarios.

8) **North Park Two (2) Trip-Ends VMT (I-I)**



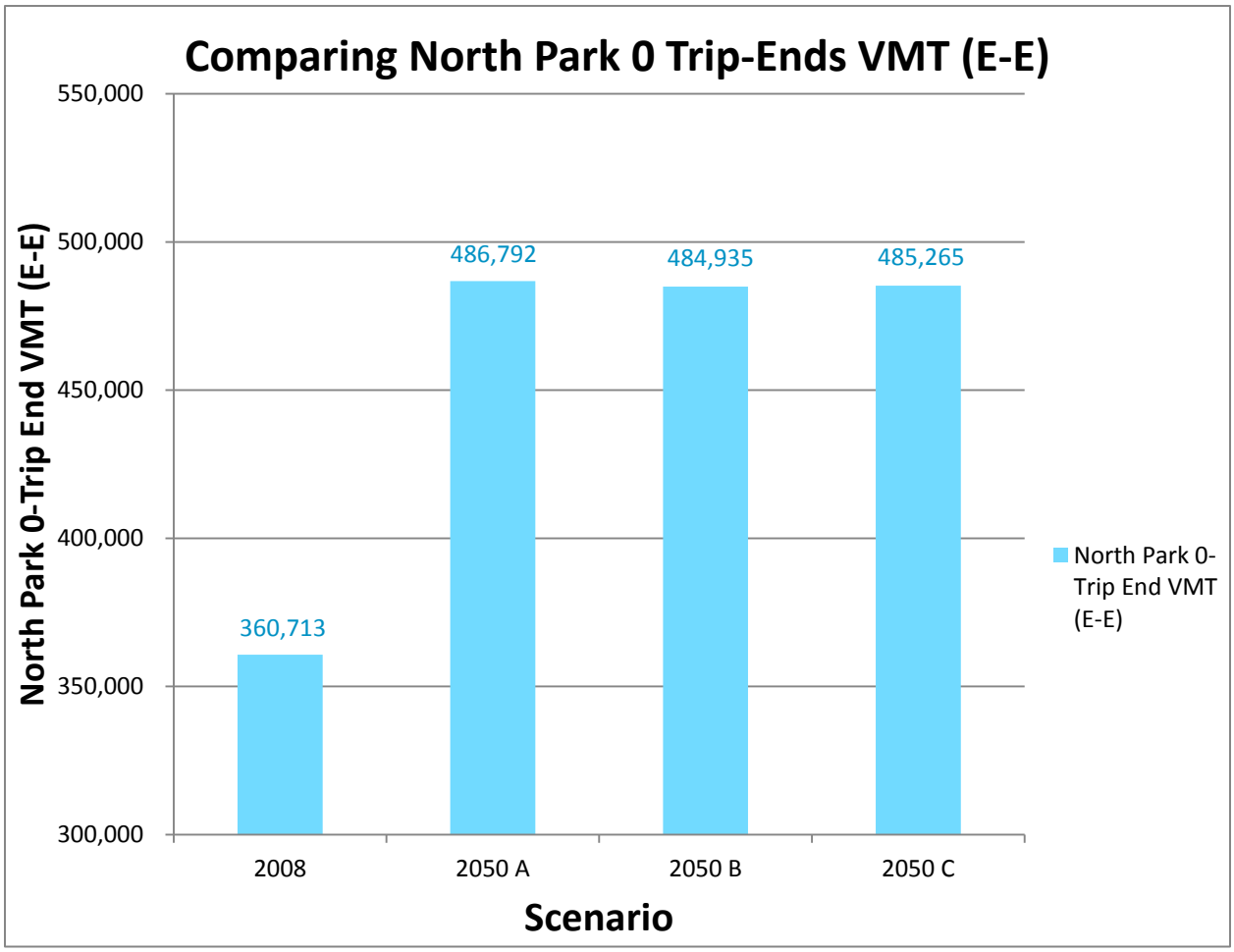
This chart compares North Park Vehicle Miles for trips where both the Origin and Destination are within North Park for the four scenarios.

9) **North Park One (1) Trip-End VMT (I-E & E-I)**



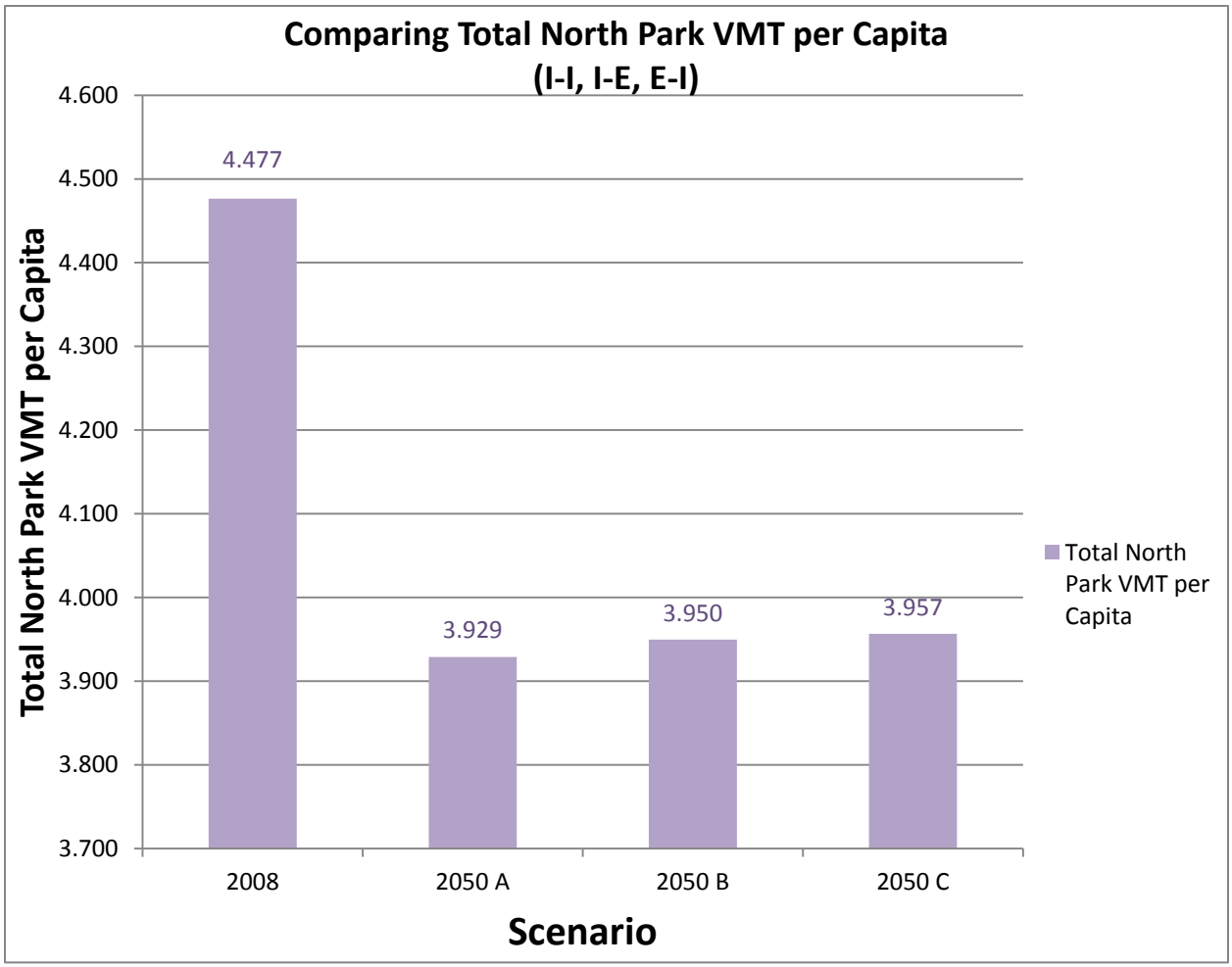
This chart compares North Park Vehicle Miles for trips where either the Origin or the Destination is within North Park for the four scenarios.

10) **North Park Zero(0) Trip-Ends VMT (E-E)**



This chart compares North Park Vehicle Miles for through trips where neither the Origin nor the Destination is within North Park for the four scenarios.

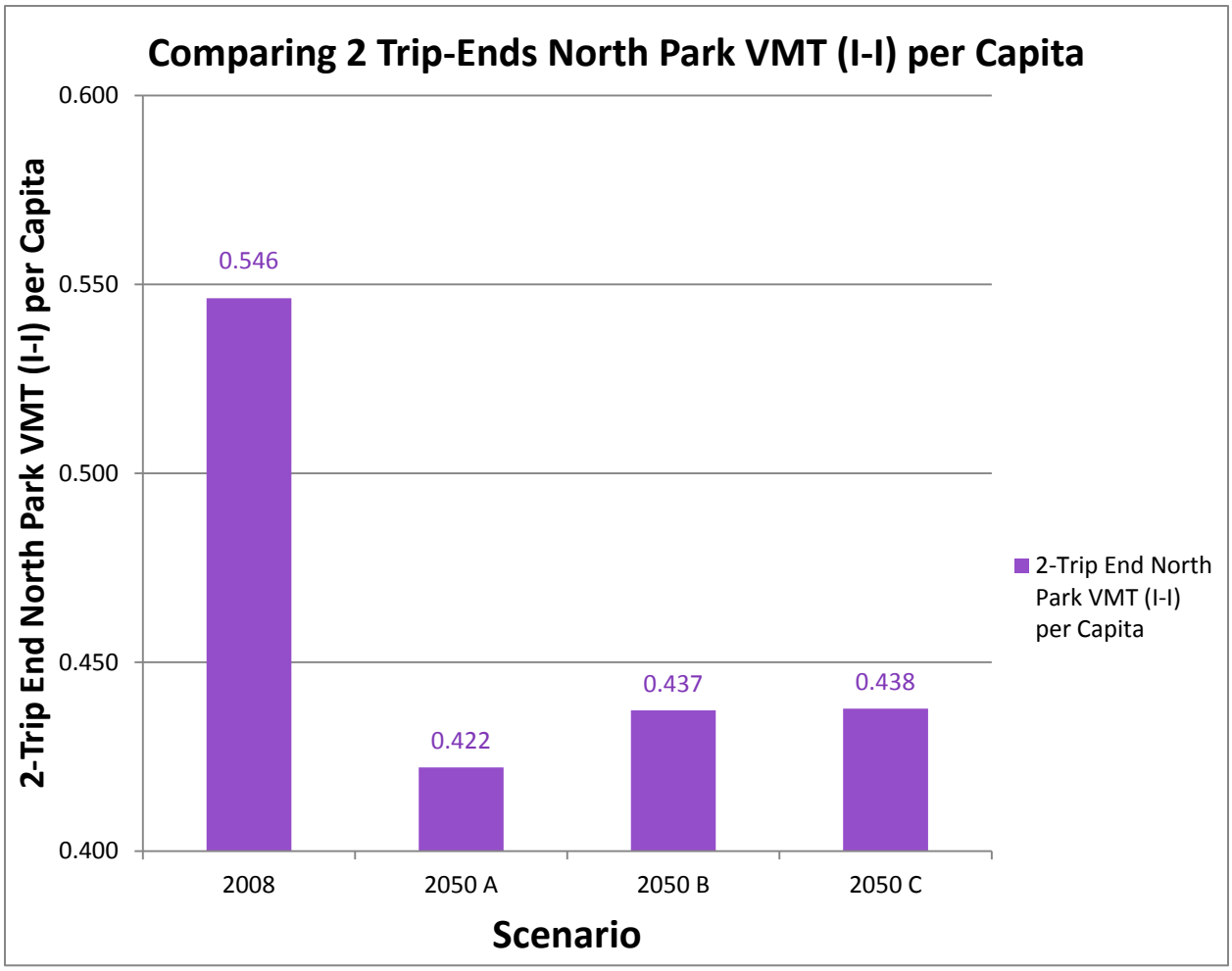
11) **Total North Park VMT per Capita**



This chart displays total North Park Vehicle Miles per Capita for the four scenarios by dividing the total North Park VMT by the North Park population.

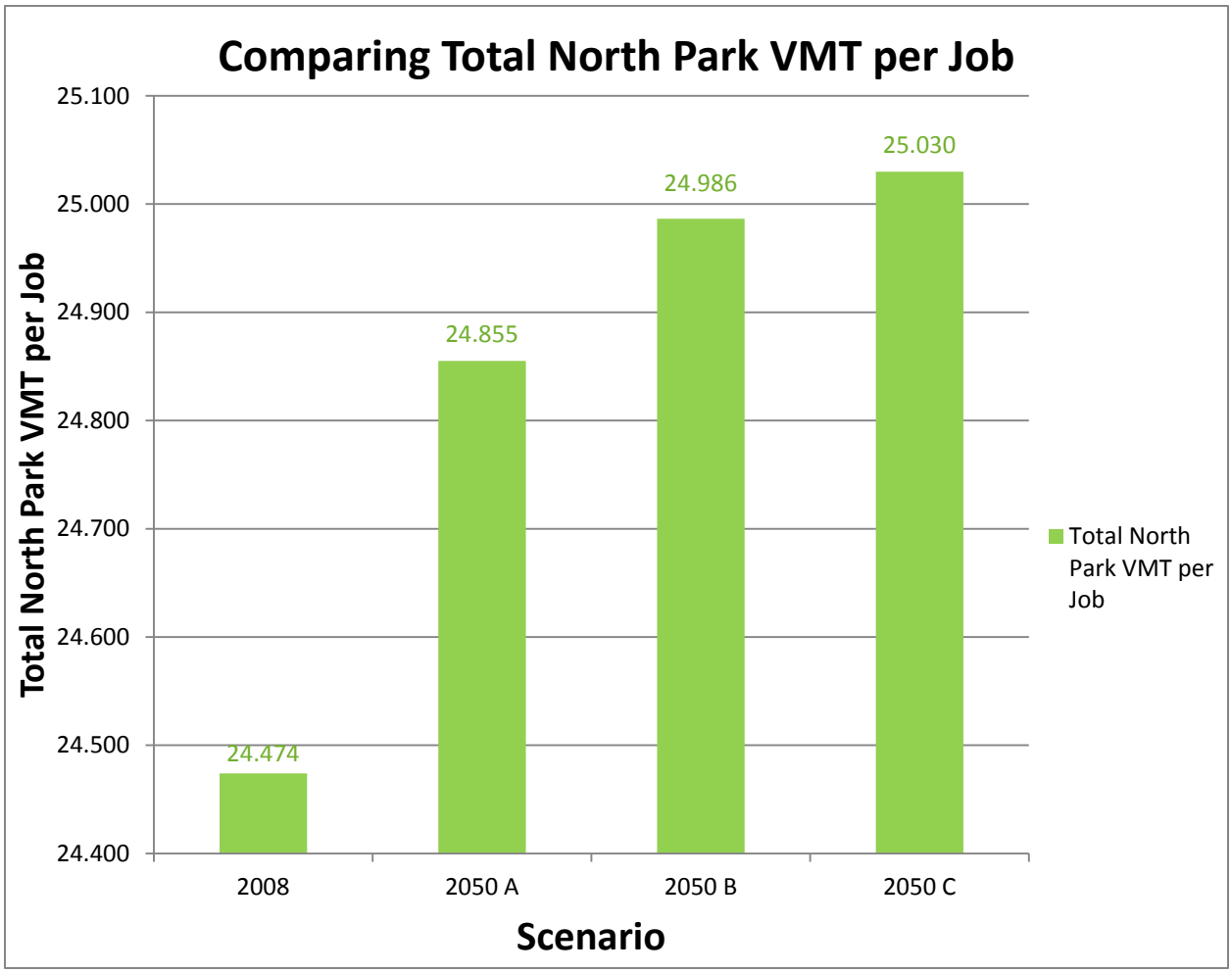
*Total North Park VMT = I-I, I-E, E-I trips

12)**2 Trip-Ends North Park VMT (I-I) per Capita**



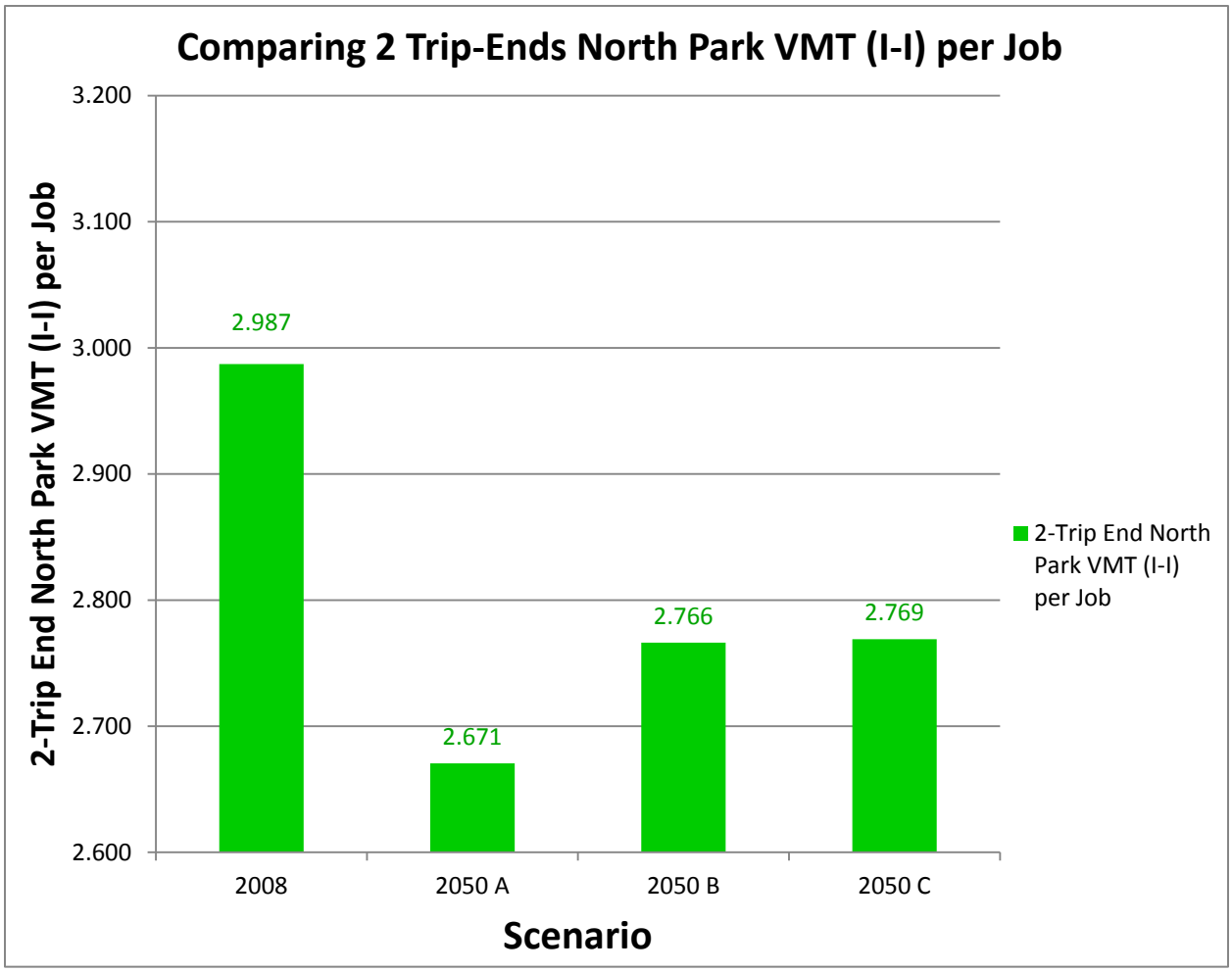
This chart reveals 2 trip-ends in North Park Vehicle Miles per Capita for the four scenarios by dividing the 2 trip-ends North Park VMT by the North Park population.

13) **Total North Park VMT per Employee**



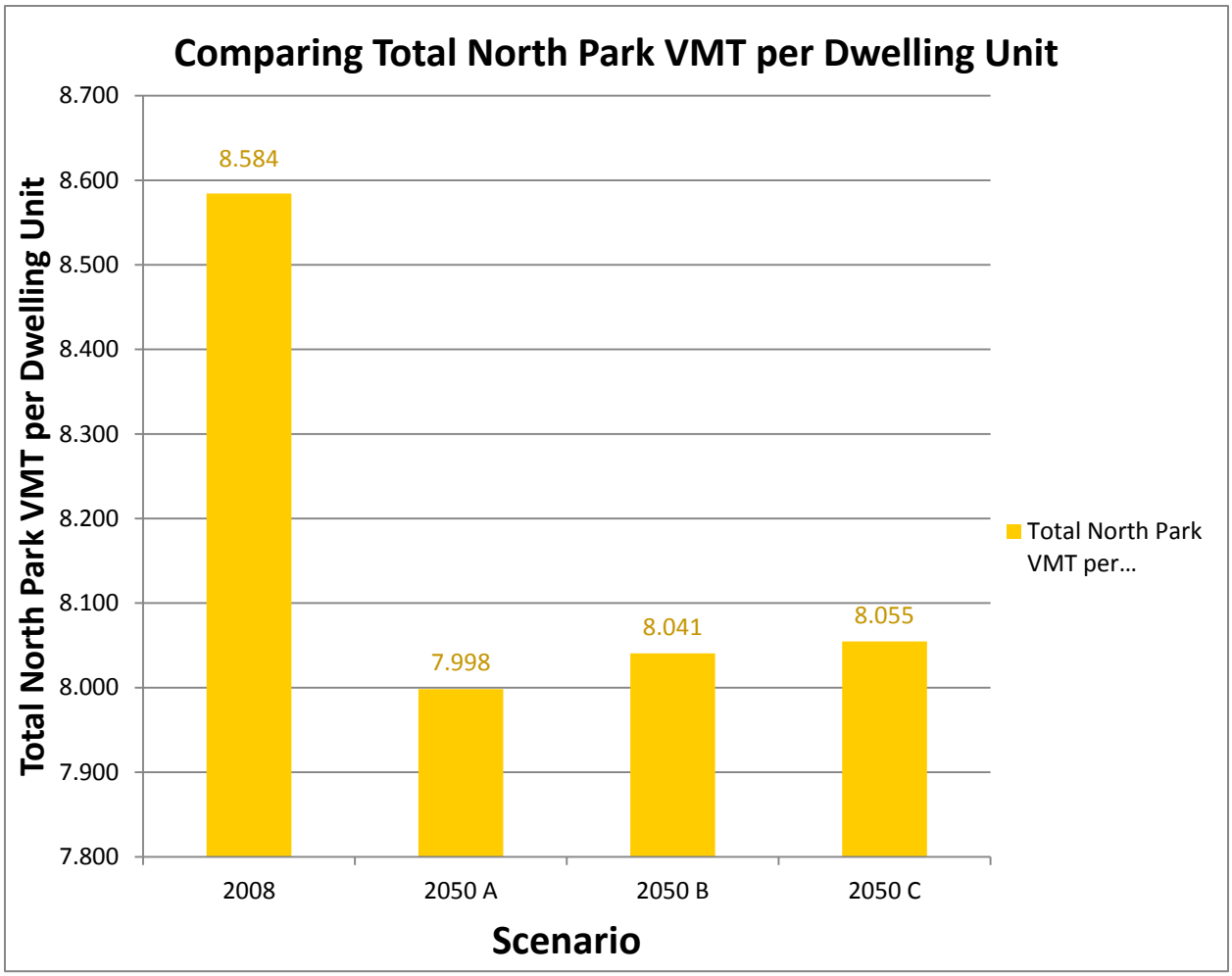
This chart displays total North Park Vehicle Miles per job for the four scenarios by dividing the total North Park VMT by the North Park employment.

14)**2 Trip-Ends North Park VMT (I-I) per Employee**



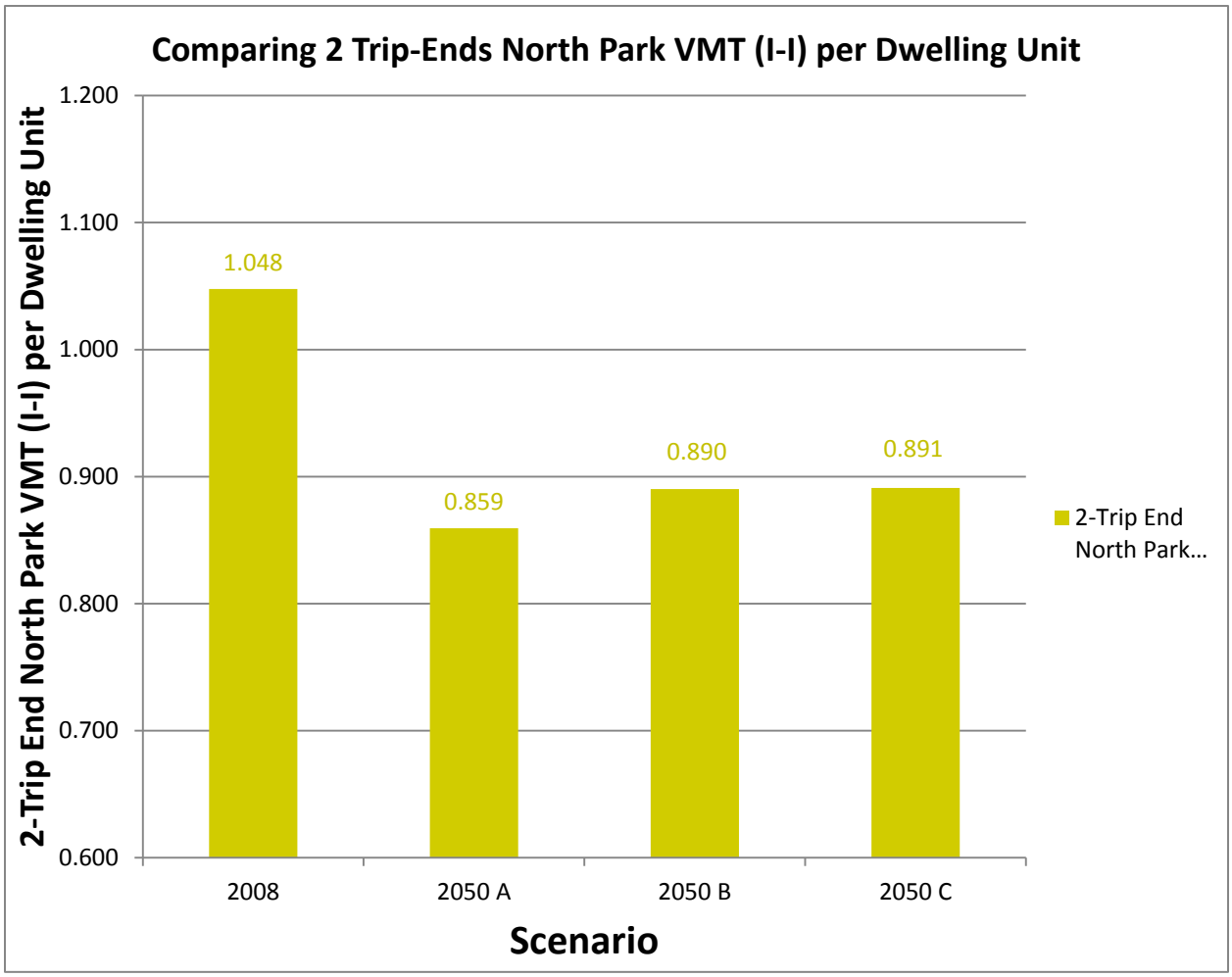
This chart reveals 2 trip-ends North Park Vehicle Miles per job for the four scenarios by dividing the 2 trip-ends North Park VMT by the North Park employment.

15) **Total North Park VMT per Dwelling Unit**



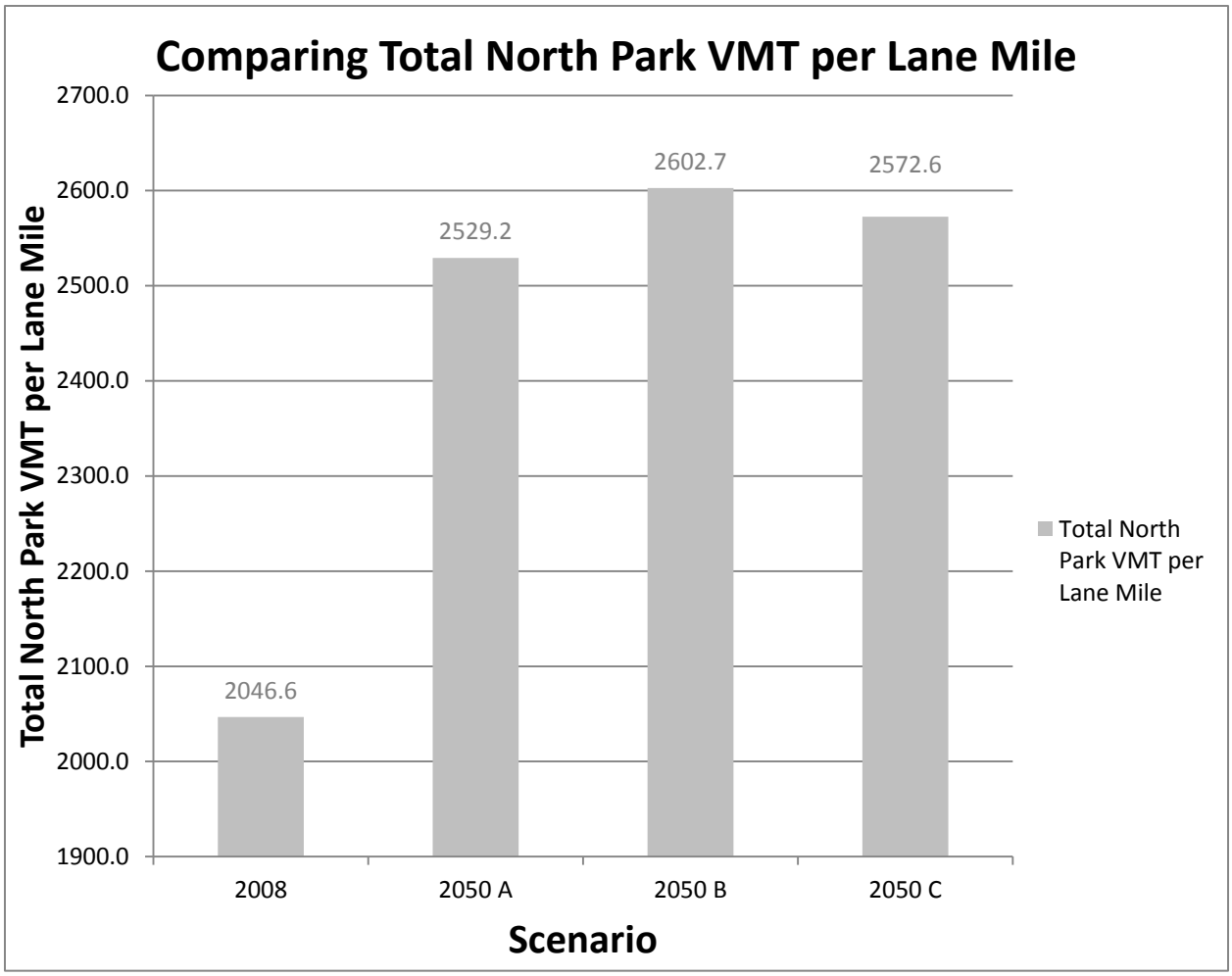
This chart shows total North Park Vehicle Miles per dwelling unit for the four scenarios by dividing the total North Park VMT by the number of dwelling units in North Park.

16)**2 Trip-Ends North Park VMT (I-I) per Dwelling Unit**



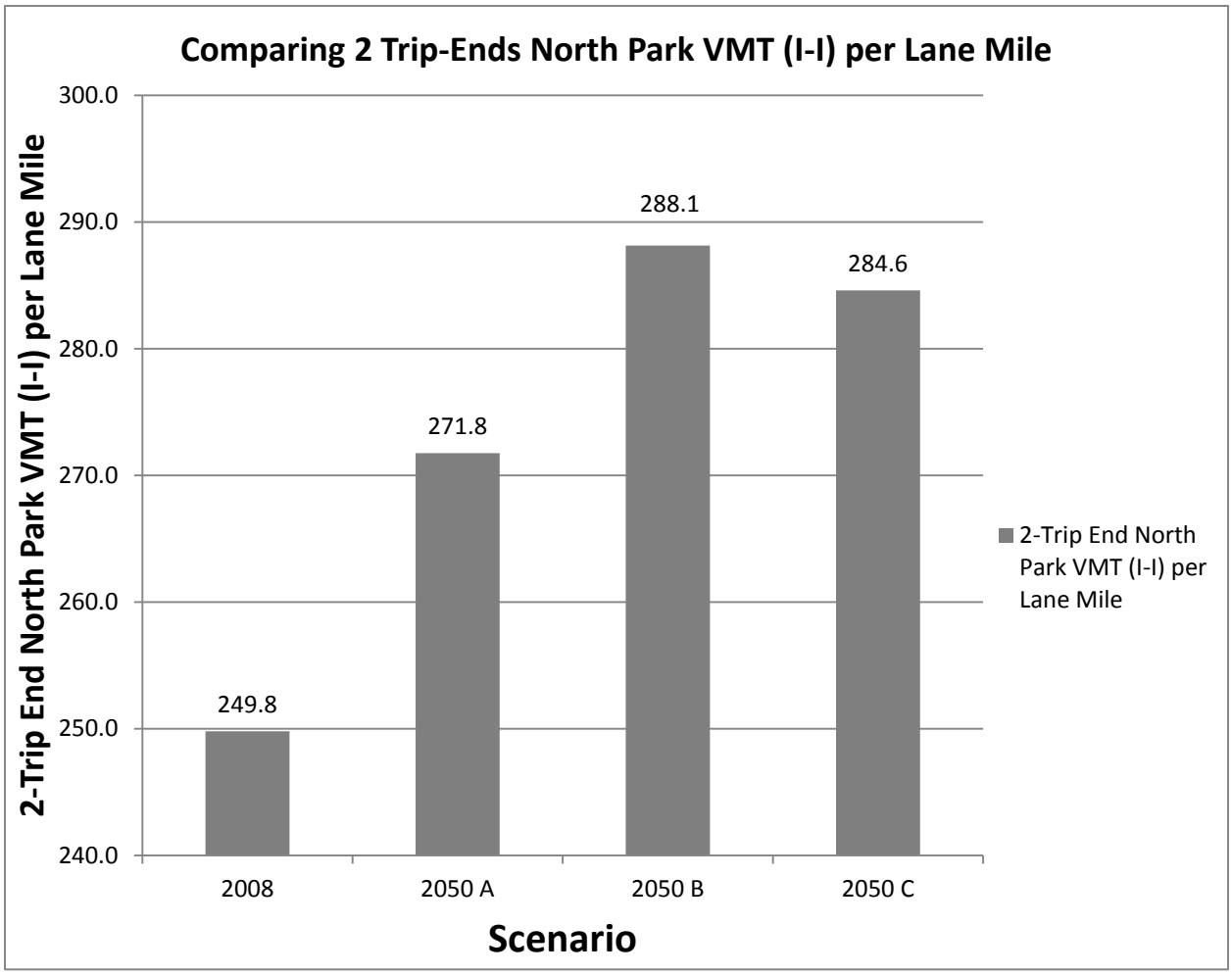
This chart displays 2 trip-ends North Park Vehicle Miles per dwelling unit for the four scenarios by dividing the 2 trip-ends North Park VMT by the number of dwelling units in North Park.

17) **Total North Park VMT per Lane Mile**



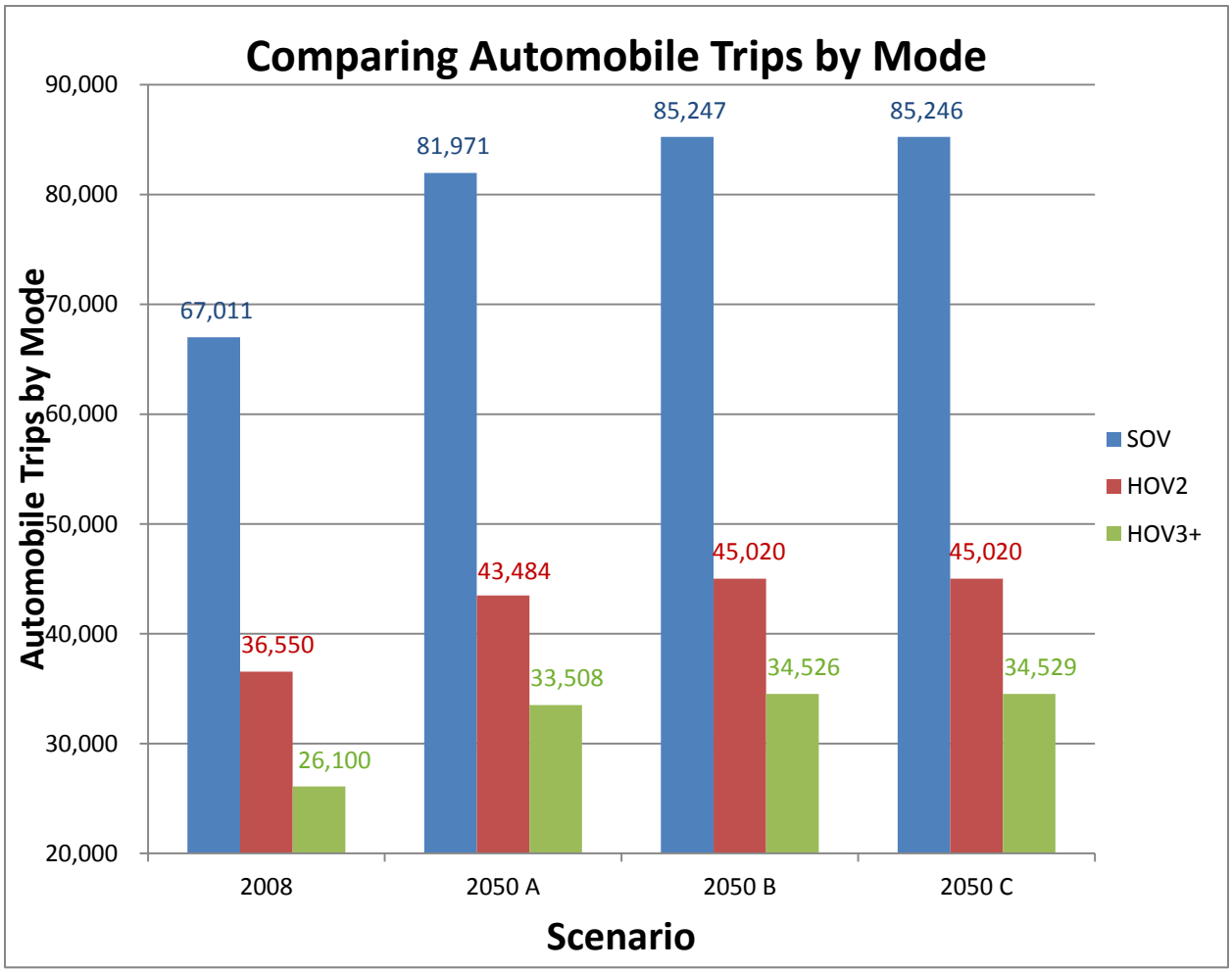
This chart demonstrates total North Park Vehicle Miles per lane mile for the four scenarios by dividing the total North Park VMT by the number of lane miles in North Park.

18)**2 Trip-Ends North Park VMT (I-I) per Lane Mile**



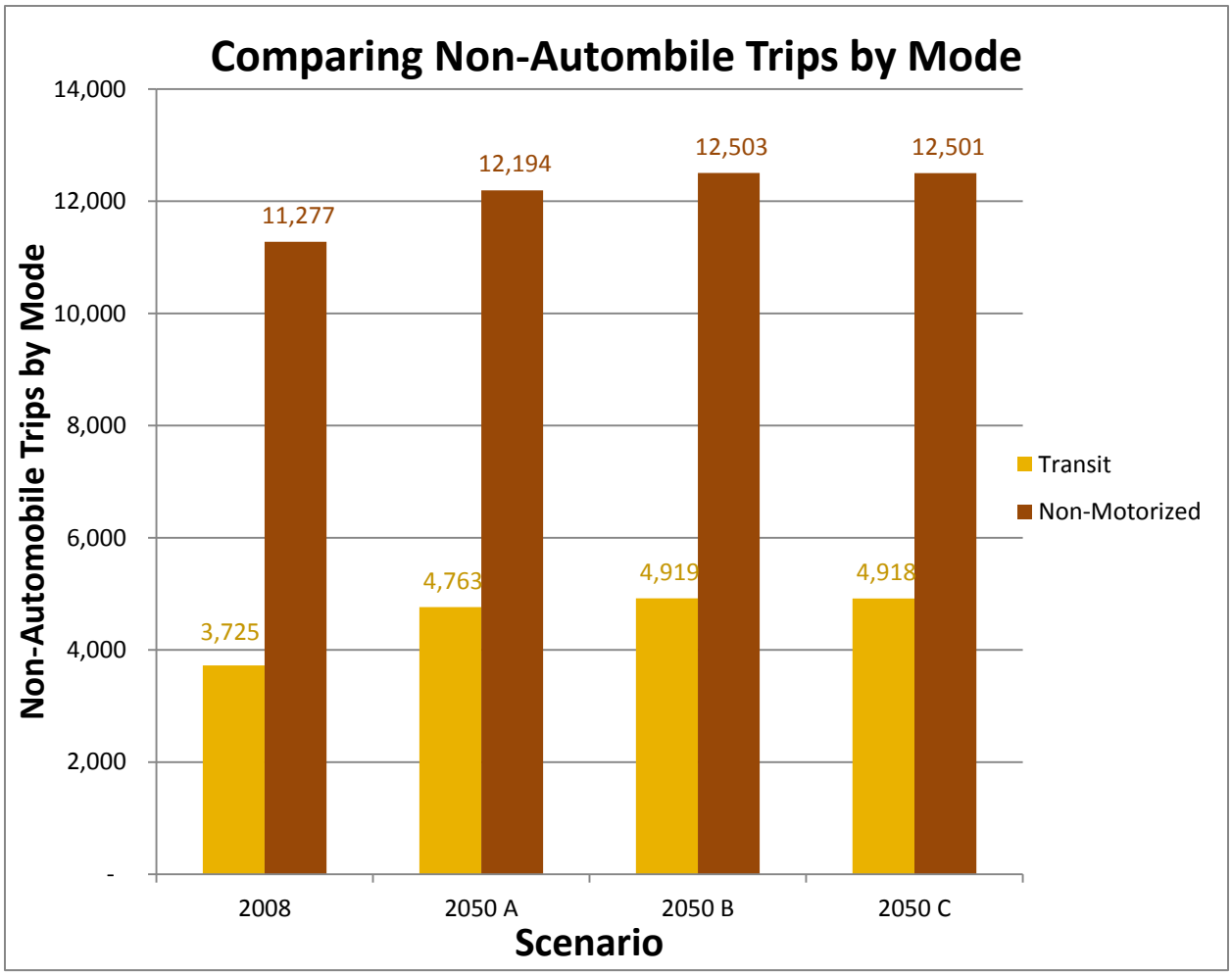
This chart illustrates 2 trip-ends North Park Vehicle Miles per lane mile for the four scenarios by dividing the 2 trip-ends North Park VMT by the number of lane miles in North Park.

19) **Automobile Trips by Mode**



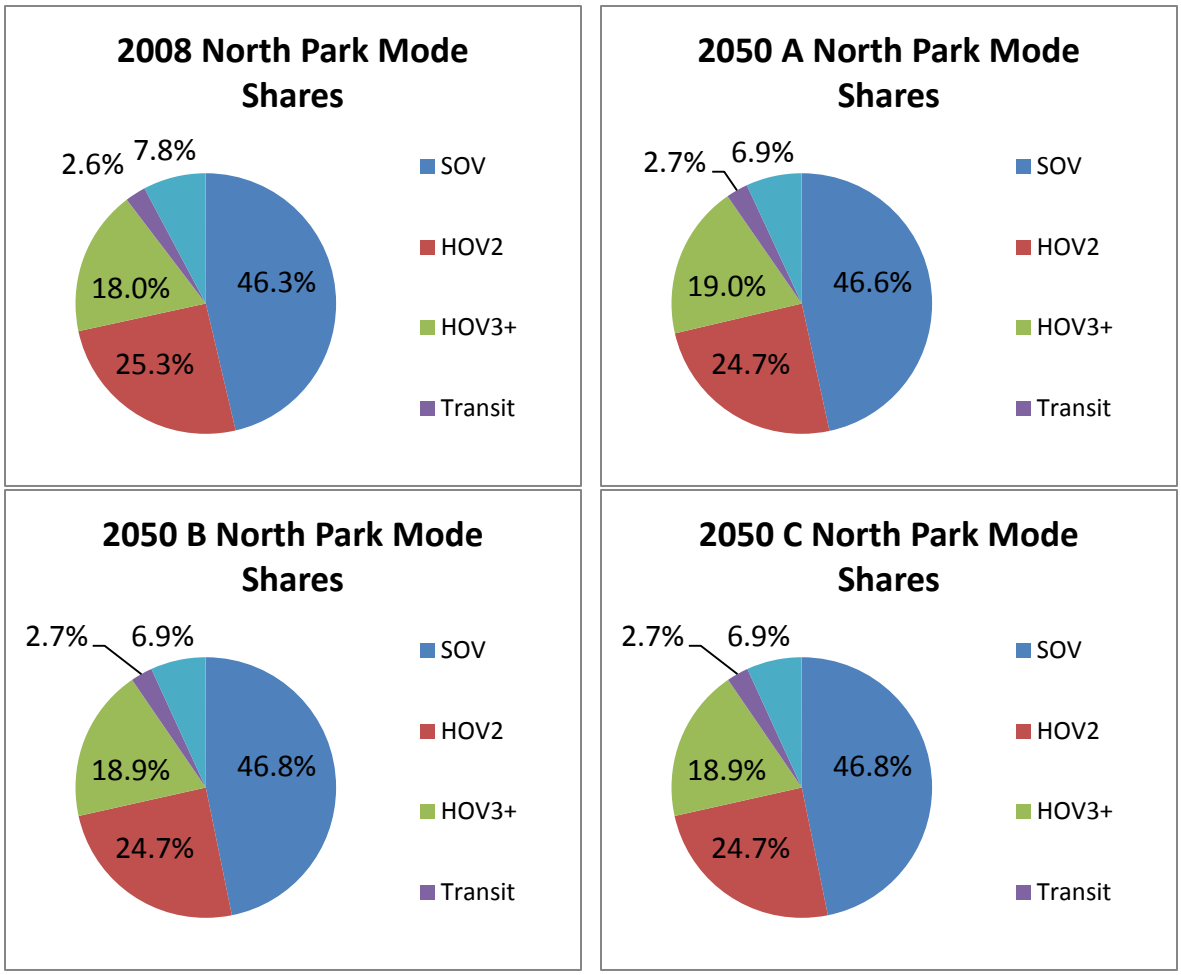
This chart displays the total number of automobile trips generated in North Park the four scenarios.

20) **Non-Automobile Trips by Mode**



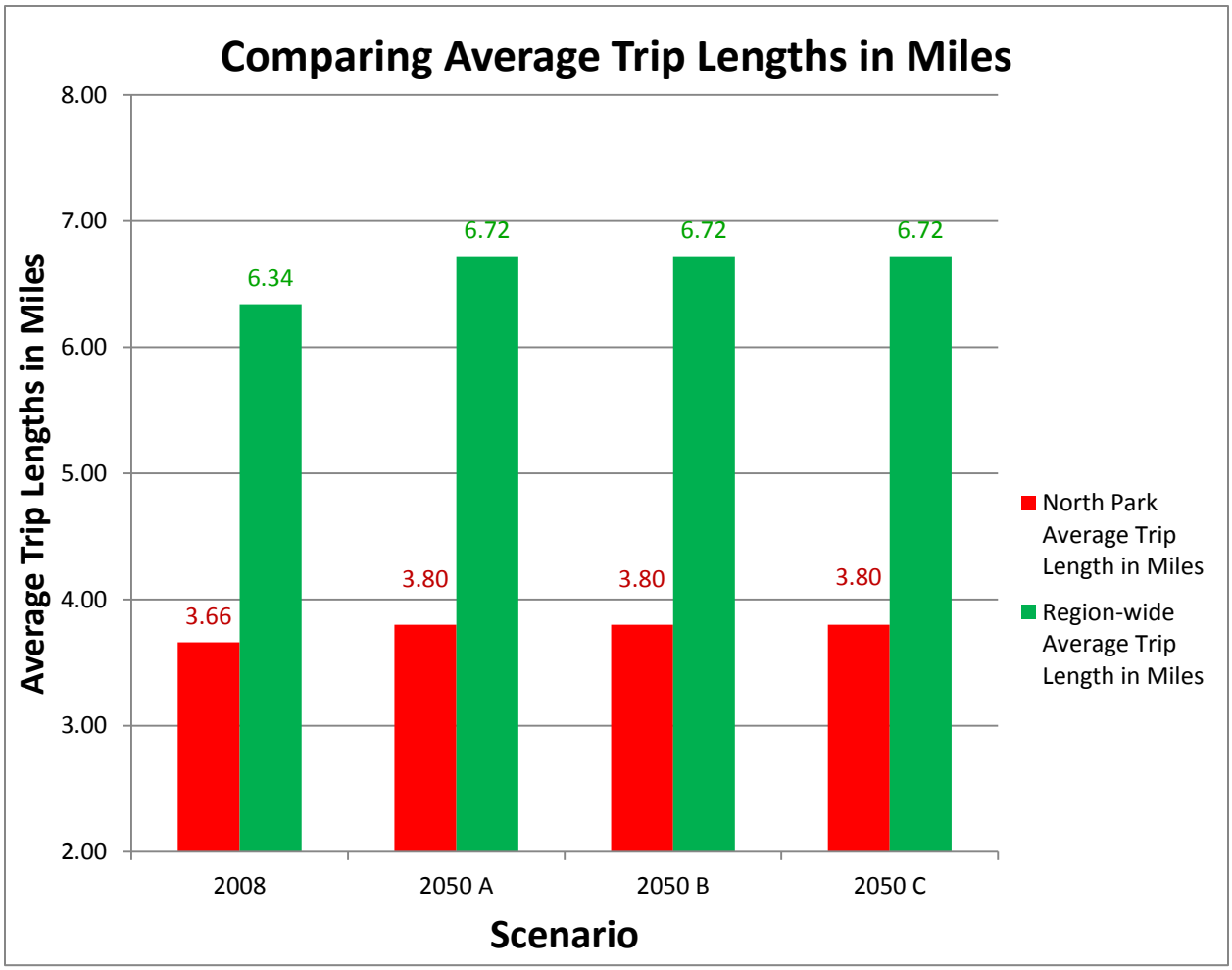
This chart displays the total number of non-automobile trips generated in North Park the four scenarios.

21) **Mode Shares**



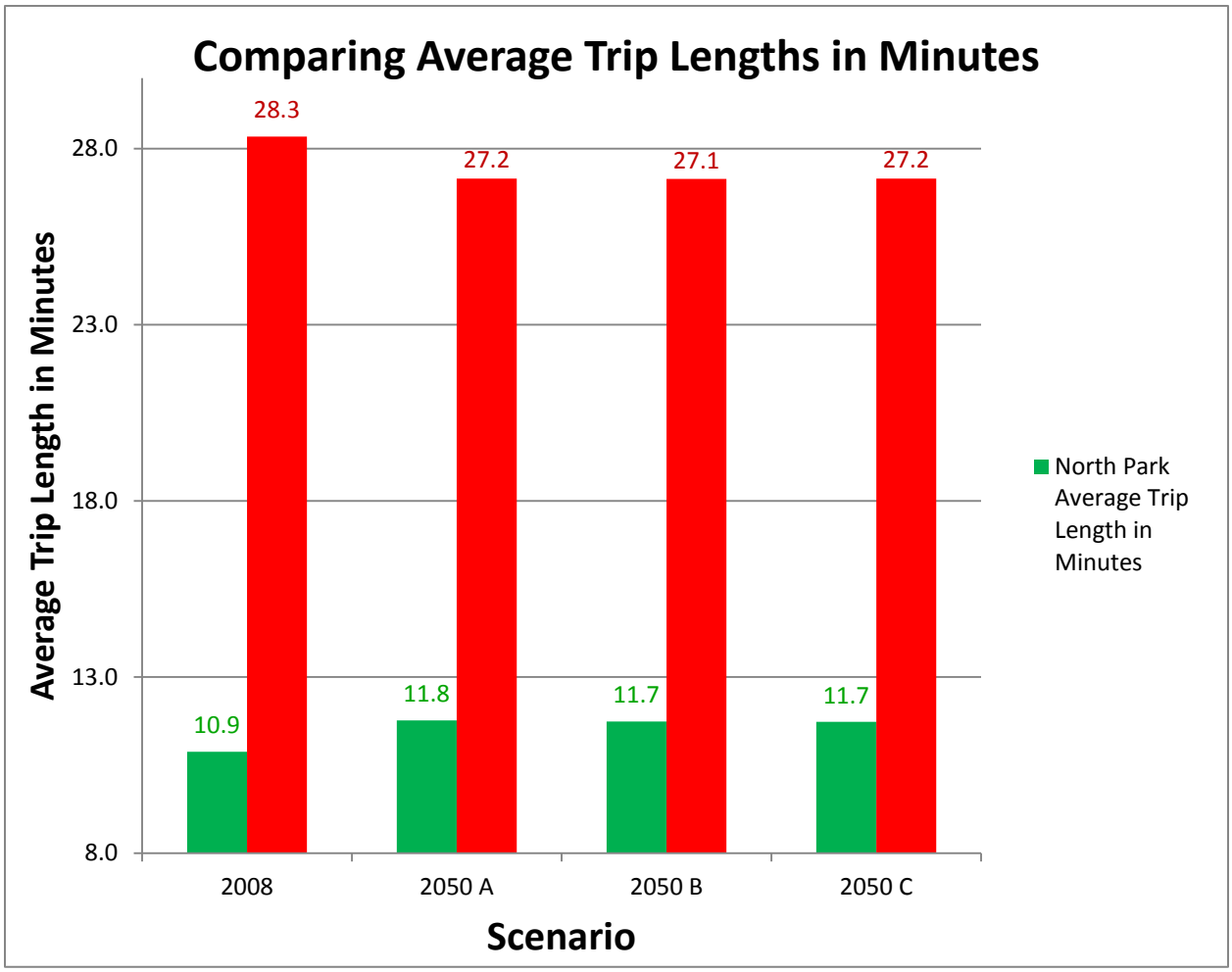
These charts depict the mode shares of all trips generated in North Park the four scenarios.

22) **Average Trip Lengths in Distance**



This chart displays average trip lengths in distance for the Region and for North Park for the four scenarios.

23) **Average Trip Lengths in Time**



This chart displays average trip lengths in time for the Region and for North Park for the four scenarios.

Appendix B:
Vehicle Miles Travel Report for Transportation Impact Analysis (SB 743 metrics for residential and employment)

Vehicle Miles of Travel Report

Scenario ID 1189 — **Alpine CPU - 2012 Calibration - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		79,460,302
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		919,095
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1189	3,128,615	11,190,200	72,835,975	54,146,860	17.3
Jurisdiction	Unincorporated	1189	487,068	1,760,083	16,947,973	12,785,082	26.2
CPA	Alpine	1189	17,988	67,532	820,914	615,760	34.2
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1189	1,490,964	5,226,428	43,222,568	37,862,078	25.4
Jurisdiction	Unincorporated	1189	142,445	517,822	5,481,471	4,787,551	33.6
CPA	Alpine	1189	6,774	26,950	348,047	302,376	44.6
Site							

Report Generated: 05/14/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1204** **Alpine CPU - 2050 Adopted - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,676,531
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,490,131
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1204	4,076,260	14,575,098	86,339,217	59,786,832	14.7
Jurisdiction	Unincorporated	1204	654,831	2,358,248	21,013,881	15,313,957	23.4
CPA	Alpine	1204	33,231	123,645	1,184,531	851,314	25.6
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1204	1,712,990	5,603,209	43,469,479	37,201,798	21.7
Jurisdiction	Unincorporated	1204	188,748	672,216	6,864,443	5,805,118	30.8
CPA	Alpine	1204	11,855	45,985	475,746	402,712	34.0
Site							

Report Generated: 05/14/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1208** **Alpine CPU - 2050 Village Focus - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,828,268
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,646,925
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1208	4,083,649	14,601,678	86,502,621	59,937,626	14.7
Jurisdiction	Unincorporated	1208	662,220	2,384,545	21,172,123	15,436,847	23.3
CPA	Alpine	1208	40,622	150,340	1,373,503	991,602	24.4
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1208	1,715,901	5,613,024	43,595,928	37,315,694	21.7
Jurisdiction	Unincorporated	1208	189,946	676,320	6,855,200	5,795,378	30.5
CPA	Alpine	1208	12,736	48,956	481,042	404,926	31.8
Site							

Report Generated: 05/15/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1211** **Alpine CPU - Very Low Density (Optional) - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,748,674
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		-
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1211	4,077,448	14,576,576	86,366,095	59,846,917	14.7
Jurisdiction	Unincorporated	1211	656,019	2,361,380	21,000,047	15,321,919	23.4
CPA	Alpine	1211	34,420	127,612	1,200,974	861,363	25.0
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1211	1,713,454	5,603,681	43,534,960	37,281,731	21.8
Jurisdiction	Unincorporated	1211	188,793	672,118	6,859,839	5,810,143	30.8
CPA	Alpine	1211	12,731	48,839	504,182	429,203	33.7
Site							

Report Generated: 05/29/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1210** **Alpine CPU - Very Low Density + FCI - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,489,026
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,646,925
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1210	4,070,675	14,544,848	86,098,850	59,668,323	14.7
Jurisdiction	Unincorporated	1210	649,246	2,334,276	20,839,670	15,218,828	23.4
CPA	Alpine	1210	27,646	101,715	1,046,217	765,935	27.7
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1210	1,710,815	5,589,171	43,405,389	37,165,966	21.7
Jurisdiction	Unincorporated	1210	186,454	661,690	6,769,207	5,728,570	30.7
CPA	Alpine	1210	8,812	34,296	374,825	318,943	36.2
Site							

Report Generated: 05/18/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1213** **Alpine CPU - Low Density (Optional) - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,665,187
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,547,676
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1213	4,077,460	14,572,909	86,268,916	59,775,315	14.7
Jurisdiction	Unincorporated	1213	656,031	2,360,821	20,992,746	15,304,214	23.3
CPA	Alpine	1213	34,433	127,285	1,208,029	871,424	25.3
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1213	1,713,474	5,597,335	43,473,957	37,218,667	21.7
Jurisdiction	Unincorporated	1213	188,318	669,200	6,844,366	5,796,614	30.8
CPA	Alpine	1213	12,521	48,554	500,977	424,149	33.9
Site							

Report Generated: 05/29/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1215** **Alpine CPU - Moderate Density - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		96,820,652
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,640,744
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1215	4,082,862	14,594,397	86,513,687	59,932,147	14.7
Jurisdiction	Unincorporated	1215	661,433	2,380,754	21,181,599	15,448,021	23.4
CPA	Alpine	1215	39,834	147,148	1,365,191	978,997	24.6
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1215	1,715,645	5,606,685	43,565,768	37,303,180	21.7
Jurisdiction	Unincorporated	1215	189,756	674,800	6,818,091	5,766,814	30.4
CPA	Alpine	1215	13,145	50,641	504,416	425,498	32.4
Site							

Report Generated: 06/08/20

SANDAG

Vehicle Miles of Travel Report

Scenario ID **1207** **Alpine CPU - 2050 High Density - Community Plan Area**

Aggregate VMT

Gross VMT

Geography		VMT
Regionwide		97,074,021
Clip 1	Unincorporated	
Clip 2	Alpine	

Distribution VMT

Query	Type	Description		VMT
1	Zone	Alpine CPA		1,911,281
2	0		0	-
3	0		0	-
4	0		0	-

SB-743 VMT

VMT per Resident

	Geography	Scenario ID	Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide		1207	4,097,456	14,646,110	86,855,034	60,210,739	14.7
Jurisdiction	Unincorporated	1207	676,027	2,432,805	21,598,559	15,782,071	23.3
CPA	Alpine	1207	54,425	199,864	1,817,860	1,324,109	24.3
Site							

VMT per Employee

	Geography	Scenario ID	Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide		1207	1,721,262	5,631,135	43,804,759	37,523,345	21.8
Jurisdiction	Unincorporated	1207	193,414	687,908	6,919,489	5,853,816	30.3
CPA	Alpine	1207	13,842	53,360	488,081	404,234	29.2
Site							

Report Generated: 05/14/20

SANDAG

Appendix C:
Disaggregated VMT for Alpine Select Zone (VMT for GHG Analysis)

Initial 2012 Base Year

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	495,810	249,917	58,334	191,583	245,893	624
Barona TOTAL	81,955	1,481	-	1,481	80,474	
Bonsall TOTAL	1,398,440	1,094	-	1,094	1,397,346	
CARLSBAD TOTAL	3,132,771	1,835	-	1,835	3,130,936	
CHULA VISTA TOTAL	3,582,072	4,878	-	4,878	3,577,194	
CORONADO TOTAL	325,904	207	-	207	325,697	
CORONADO TOTAL	325,904	207	-	207	325,697	
Central Mountainh TOTAL	463,481	46,822	-	46,822	416,659	
County Islands TOTAL	246,502	454	-	454	246,048	
Crest-Dehesa TOTAL	131,933	20,089	-	20,089	111,844	
DEL MAR TOTAL	73,667	11	-	11	73,656	
Desert TOTAL	148,740	2,188	-	2,188	146,552	
EL CAJON TOTAL	1,923,243	145,386	-	145,386	1,777,857	
ENCINITAS TOTAL	1,695,238	1,939	-	1,939	1,693,299	
ESCONDIDO TOTAL	2,637,702	2,073	-	2,073	2,635,629	
External TOTAL	172,706	81	-	81	172,625	
Fallbrook TOTAL	1,144,108	631	-	631	1,143,477	
IMPERIAL BEACH TOTAL	91,832	18	-	18	91,814	
Jamul-Dulzura TOTAL	331,166	7,689	-	7,689	323,477	
Julian TOTAL	118,249	2,842	-	2,842	115,407	
LA MESA TOTAL	1,578,893	32,906	-	32,906	1,545,987	
LEMON GROVE TOTAL	808,589	9,808	-	9,808	798,781	
Lakeside TOTAL	1,430,559	236,717	-	236,717	1,193,842	
Mountain Empire TOTAL	515,044	16,810	-	16,810	498,234	
NATIONAL CITY TOTAL	1,530,105	1,756	-	1,756	1,528,349	
North County Metro TOTAL	1,649,484	1,391	-	1,391	1,648,093	
North Mountain TOTAL	254,410	1,154	-	1,154	253,256	-
OCEANSIDE TOTAL	2,722,781	592	-	592	2,722,189	
Otay TOTAL	64,752	595	-	595	64,157	
POWAY TOTAL	874,669	6,896	-	6,896	867,773	
Pala-Pauma TOTAL	254,513	54	-	54	254,459	
Pendleton-De Luz TOTAL	3,169,353	2,284	-	2,284	3,167,069	
Rainbow TOTAL	408,103	408	-	408	407,695	
Ramona TOTAL	628,240	1,729	-	1,729	626,511	
SAN DIEGO TOTAL	37,228,758	104,724	-	104,724	37,124,034	
SAN MARCOS TOTAL	1,952,840	506	-	506	1,952,334	
SANTEE TOTAL	966,248	20,639	-	20,639	945,609	
SOLANA BEACH TOTAL	581,164	887	-	887	580,277	
San Diwguito TOTAL	582,245	170	-	170	582,075	
Spring Valley TOTAL	796,194	6,381	-	6,381	789,813	
Sweetwater TOTAL	698,750	4,824	-	4,824	693,926	
VISTA TOTAL	1,643,247	90	-	90	1,643,157	
Valle De Oro TOTAL	467,505	6,652	-	6,652	460,853	
Valley Center TOTAL	339,690	18	-	18	339,672	
REGIONWIDE TOTAL	79,667,559	947,833	58,334	889,499	78,719,726	624
	15,819,226					
Use this line for GHG	**503,708.01**					

Adopted (A)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	817,825	410,828	158,020	252,808	406,997	3,938
Barona TOTAL	96,764	2,368	-	2,368	94,396	
Bonsall TOTAL	1,896,371	3,781	-	3,781	1,892,590	
CARLSBAD TOTAL	3,645,474	3,862	-	3,862	3,641,612	
CHULA VISTA TOTAL	5,207,992	10,988	-	10,988	5,197,004	
CORONADO TOTAL	297,720	239	-	239	297,481	
CORONADO TOTAL	297,720	239	-	239	297,481	
Central Mountainh TOTAL	702,483	107,885	-	107,885	594,598	
County Islands TOTAL	273,399	747	-	747	272,652	
Crest-Dehesa TOTAL	149,911	33,630	-	33,630	116,281	
DEL MAR TOTAL	72,666	17	-	17	72,649	
Desert TOTAL	220,352	5,024	-	5,024	215,328	
EL CAJON TOTAL	2,332,723	202,565	-	202,565	2,130,158	
ENCINITAS TOTAL	1,883,032	3,560	-	3,560	1,879,472	
ESCONDIDO TOTAL	3,069,177	5,547	-	5,547	3,063,630	
External TOTAL	279,104	281	-	281	278,823	
Fallbrook TOTAL	1,560,035	2,410	-	2,410	1,557,625	
IMPERIAL BEACH TOTAL	95,147	53	-	53	95,094	
Jamul-Dulzura TOTAL	426,072	8,684	-	8,684	417,388	
Julian TOTAL	143,967	7,059	-	7,059	136,908	
LA MESA TOTAL	1,920,000	45,978	-	45,978	1,874,022	
LEMON GROVE TOTAL	1,006,561	16,735	-	16,735	989,826	
Lakeside TOTAL	1,934,060	330,841	-	330,841	1,603,219	
Mountain Empire TOTAL	916,658	35,800	-	35,800	880,858	
NATIONAL CITY TOTAL	1,772,769	2,455	-	2,455	1,770,314	
North County Metro TOTAL	2,176,967	4,358	-	4,358	2,172,609	
North Mountain TOTAL	336,160	3,098	-	3,098	333,062	-
OCEANSIDE TOTAL	3,128,969	1,362	-	1,362	3,127,607	
Otay TOTAL	521,762	917	-	917	520,845	
POWAY TOTAL	1,013,131	9,319	-	9,319	1,003,812	
Pala-Pauma TOTAL	319,817	314	-	314	319,503	
Pendleton-De Luz TOTAL	3,985,090	5,737	-	5,737	3,979,353	
Rainbow TOTAL	622,927	1,521	-	1,521	621,406	
Ramona TOTAL	775,150	3,552	-	3,552	771,598	
SAN DIEGO TOTAL	42,891,642	154,804	-	154,804	42,736,838	
SAN MARCOS TOTAL	2,404,694	1,178	-	1,178	2,403,516	
SANTEE TOTAL	1,161,984	28,568	-	28,568	1,133,416	
SOLANA BEACH TOTAL	658,106	1,560	-	1,560	656,546	
San Diwguito TOTAL	667,960	272	-	272	667,688	
Spring Valley TOTAL	998,047	11,377	-	11,377	986,670	
Sweetwater TOTAL	1,077,613	8,386	-	8,386	1,069,227	
VISTA TOTAL	1,929,364	164	-	164	1,929,200	
Valle De Oro TOTAL	514,259	9,367	-	9,367	504,892	
Valley Center TOTAL	466,979	153	-	153	466,826	
REGIONWIDE TOTAL	96,668,603	1,487,583	158,020	1,329,563	95,181,020	3,938
	21,600,628					
	826,739.53					

Village Focus (C2)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	853,938	512,418	205,538	306,880	341,520	4,514
Barona TOTAL	96,048	2,344	-	2,344	93,704	
Bonsall TOTAL	1,892,749	4,223	-	4,223	1,888,526	
CARLSBAD TOTAL	3,642,322	4,136	-	4,136	3,638,186	
CHULA VISTA TOTAL	5,194,203	12,567	-	12,567	5,181,636	
CORONADO TOTAL	296,257	390	-	390	295,867	
CORONADO TOTAL	296,257	390	-	390	295,867	
Central Mountainh TOTAL	702,466	116,008	-	116,008	586,458	
County Islands TOTAL	273,270	852	-	852	272,418	
Crest-Dehesa TOTAL	156,292	41,690	-	41,690	114,602	
DEL MAR TOTAL	72,507	7	-	7	72,500	
Desert TOTAL	222,678	6,060	-	6,060	216,618	
EL CAJON TOTAL	2,347,499	226,615	-	226,615	2,120,884	
ENCINITAS TOTAL	1,885,807	3,999	-	3,999	1,881,808	
ESCONDIDO TOTAL	3,067,835	6,145	-	6,145	3,061,690	
External TOTAL	279,249	337	-	337	278,912	
Fallbrook TOTAL	1,555,726	2,613	-	2,613	1,553,113	
IMPERIAL BEACH TOTAL	94,802	55	-	55	94,747	
Jamul-Dulzura TOTAL	426,935	9,297	-	9,297	417,638	
Julian TOTAL	145,690	7,501	-	7,501	138,189	
LA MESA TOTAL	1,920,846	51,202	-	51,202	1,869,644	
LEMON GROVE TOTAL	1,008,912	19,029	-	19,029	989,883	
Lakeside TOTAL	1,978,955	374,584	-	374,584	1,604,371	
Mountain Empire TOTAL	919,711	40,923	-	40,923	878,788	
NATIONAL CITY TOTAL	1,772,646	2,858	-	2,858	1,769,788	
North County Metro TOTAL	2,171,023	4,880	-	4,880	2,166,143	
North Mountain TOTAL	335,601	3,479	-	3,479	332,122	-
OCEANSIDE TOTAL	3,134,924	1,476	-	1,476	3,133,448	
Otay TOTAL	523,219	1,178	-	1,178	522,041	
POWAY TOTAL	1,020,158	10,676	-	10,676	1,009,482	
Pala-Pauma TOTAL	321,037	268	-	268	320,769	
Pendleton-De Luz TOTAL	3,974,759	6,168	-	6,168	3,968,591	
Rainbow TOTAL	621,975	1,610	-	1,610	620,365	
Ramona TOTAL	770,608	3,806	-	3,806	766,802	
SAN DIEGO TOTAL	42,950,450	175,234	-	175,234	42,775,216	
SAN MARCOS TOTAL	2,408,382	1,278	-	1,278	2,407,104	
SANTEE TOTAL	1,163,385	32,296	-	32,296	1,131,089	
SOLANA BEACH TOTAL	659,232	1,781	-	1,781	657,451	
San Diwguito TOTAL	669,435	326	-	326	669,109	
Spring Valley TOTAL	996,775	12,791	-	12,791	983,984	
Sweetwater TOTAL	1,075,801	9,265	-	9,265	1,066,536	
VISTA TOTAL	1,933,648	172	-	172	1,933,476	
Valle De Oro TOTAL	516,530	11,435	-	11,435	505,095	
Valley Center TOTAL	468,458	178	-	178	468,280	
REGIONWIDE TOTAL	96,819,000	1,724,540	205,538	1,519,002	95,094,460	4,514
	21,669,679					
	969,552.85					

Very Low Density +FCI (d)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	707,127	352,450	119,374	233,076	354,677	1,196
Barona TOTAL	97,064	1,770	-	1,770	95,294	
Bonsall TOTAL	1,893,352	2,695	-	2,695	1,890,657	
CARLSBAD TOTAL	3,635,249	2,823	-	2,823	3,632,426	
CHULA VISTA TOTAL	5,188,577	9,022	-	9,022	5,179,555	
CORONADO TOTAL	299,578	199	-	199	299,379	
CORONADO TOTAL	299,578	199	-	199	299,379	
Central Mountainh TOTAL	683,102	78,768	-	78,768	604,334	
County Islands TOTAL	273,260	609	-	609	272,651	
Crest-Dehesa TOTAL	150,280	32,892	-	32,892	117,388	
DEL MAR TOTAL	73,600	13	-	13	73,587	
Desert TOTAL	223,548	4,699	-	4,699	218,849	
EL CAJON TOTAL	2,318,022	178,647	-	178,647	2,139,375	
ENCINITAS TOTAL	1,882,186	2,736	-	2,736	1,879,450	
ESCONDIDO TOTAL	3,066,696	4,156	-	4,156	3,062,540	
External TOTAL	279,176	223	-	223	278,953	
Fallbrook TOTAL	1,550,800	1,717	-	1,717	1,549,083	
IMPERIAL BEACH TOTAL	94,662	27	-	27	94,635	
Jamul-Dulzura TOTAL	426,058	8,205	-	8,205	417,853	
Julian TOTAL	144,205	5,367	-	5,367	138,838	
LA MESA TOTAL	1,914,860	40,143	-	40,143	1,874,717	
LEMON GROVE TOTAL	1,008,907	14,467	-	14,467	994,440	
Lakeside TOTAL	1,914,406	298,130	-	298,130	1,616,276	
Mountain Empire TOTAL	916,041	27,646	-	27,646	888,395	
NATIONAL CITY TOTAL	1,775,355	1,977	-	1,977	1,773,378	
North County Metro TOTAL	2,168,972	3,167	-	3,167	2,165,805	
North Mountain TOTAL	334,008	2,275	-	2,275	331,733	-
OCEANSIDE TOTAL	3,135,862	1,018	-	1,018	3,134,844	
Otay TOTAL	520,659	812	-	812	519,847	
POWAY TOTAL	1,017,458	8,135	-	8,135	1,009,323	
Pala-Pauma TOTAL	317,869	226	-	226	317,643	
Pendleton-De Luz TOTAL	4,005,401	4,203	-	4,203	4,001,198	
Rainbow TOTAL	620,296	1,064	-	1,064	619,232	
Ramona TOTAL	772,460	2,739	-	2,739	769,721	
SAN DIEGO TOTAL	42,905,772	131,718	-	131,718	42,774,054	
SAN MARCOS TOTAL	2,399,369	929	-	929	2,398,440	
SANTEE TOTAL	1,159,252	24,258	-	24,258	1,134,994	
SOLANA BEACH TOTAL	657,423	1,259	-	1,259	656,164	
San Diwguito TOTAL	667,321	222	-	222	667,099	
Spring Valley TOTAL	998,120	9,551	-	9,551	988,569	
Sweetwater TOTAL	1,076,538	6,838	-	6,838	1,069,700	
VISTA TOTAL	1,932,332	103	-	103	1,932,229	
Valle De Oro TOTAL	512,257	8,823	-	8,823	503,434	
Valley Center TOTAL	465,968	114	-	114	465,854	
REGIONWIDE TOTAL	96,483,026	1,277,034	119,374	1,157,660	95,205,992	1,196
	21,439,112					

699,400.02

Very Low Density (e)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	822,996	479,864	185,920	293,944	343,132	3,654
Barona TOTAL	96,807	2,700	-	2,700	94,107	
Bonsall TOTAL	1,897,255	3,691	-	3,691	1,893,564	
CARLSBAD TOTAL	3,651,705	3,973	-	3,973	3,647,732	
CHULA VISTA TOTAL	5,190,339	11,616	-	11,616	5,178,723	
CORONADO TOTAL	296,470	272	-	272	296,198	
CORONADO TOTAL	296,470	272	-	272	296,198	
Central Mountainh TOTAL	703,194	113,692	-	113,692	589,502	
County Islands TOTAL	273,365	771	-	771	272,594	
Crest-Dehesa TOTAL	154,487	36,742	-	36,742	117,745	
DEL MAR TOTAL	73,172	15	-	15	73,157	
Desert TOTAL	228,696	5,675	-	5,675	223,021	
EL CAJON TOTAL	2,336,822	209,660	-	209,660	2,127,162	
ENCINITAS TOTAL	1,885,893	3,555	-	3,555	1,882,338	
ESCONDIDO TOTAL	3,078,129	5,665	-	5,665	3,072,464	
External TOTAL	279,639	311	-	311	279,328	
Fallbrook TOTAL	1,555,782	2,323	-	2,323	1,553,459	
IMPERIAL BEACH TOTAL	94,788	40	-	40	94,748	
Jamul-Dulzura TOTAL	429,410	10,573	-	10,573	418,837	
Julian TOTAL	144,738	7,234	-	7,234	137,504	
LA MESA TOTAL	1,916,677	47,881	-	47,881	1,868,796	
LEMON GROVE TOTAL	1,008,589	17,501	-	17,501	991,088	
Lakeside TOTAL	1,947,544	343,612	-	343,612	1,603,932	
Mountain Empire TOTAL	919,202	39,961	-	39,961	879,241	
NATIONAL CITY TOTAL	1,773,798	2,605	-	2,605	1,771,193	
North County Metro TOTAL	2,178,136	4,356	-	4,356	2,173,780	
North Mountain TOTAL	340,211	3,067	-	3,067	337,144	-
OCEANSIDE TOTAL	3,130,568	1,439	-	1,439	3,129,129	
Otay TOTAL	522,532	1,096	-	1,096	521,436	
POWAY TOTAL	1,014,918	9,416	-	9,416	1,005,502	
Pala-Pauma TOTAL	320,059	274	-	274	319,785	
Pendleton-De Luz TOTAL	3,979,608	5,920	-	5,920	3,973,688	
Rainbow TOTAL	621,930	1,450	-	1,450	620,480	
Ramona TOTAL	770,312	3,913	-	3,913	766,399	
SAN DIEGO TOTAL	42,913,079	158,798	-	158,798	42,754,281	
SAN MARCOS TOTAL	2,407,068	1,148	-	1,148	2,405,920	
SANTEE TOTAL	1,162,571	29,059	-	29,059	1,133,512	
SOLANA BEACH TOTAL	658,212	1,561	-	1,561	656,651	
San Diwguito TOTAL	666,735	279	-	279	666,456	
Spring Valley TOTAL	998,918	12,013	-	12,013	986,905	
Sweetwater TOTAL	1,074,588	8,596	-	8,596	1,065,992	
VISTA TOTAL	1,931,872	79	-	79	1,931,793	
Valle De Oro TOTAL	514,280	10,028	-	10,028	504,252	
Valley Center TOTAL	477,934	209	-	209	477,725	
REGIONWIDE TOTAL	96,739,498	1,602,905	185,920	1,416,985	95,136,593	3,654
	21,638,719					

898,066.63

Low Density (f)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	829,725	489,089	189,675	299,414	340,636	3,936
Barona TOTAL	96,996	2,271	-	2,271	94,725	
Bonsall TOTAL	1,890,843	3,625	-	3,625	1,887,218	
CARLSBAD TOTAL	3,644,758	4,043	-	4,043	3,640,715	
CHULA VISTA TOTAL	5,190,360	11,926	-	11,926	5,178,434	
CORONADO TOTAL	296,397	230	-	230	296,167	
CORONADO TOTAL	296,397	230	-	230	296,167	
Central Mountainh TOTAL	702,131	117,783	-	117,783	584,348	
County Islands TOTAL	273,063	769	-	769	272,294	
Crest-Dehesa TOTAL	149,250	35,966	-	35,966	113,284	
DEL MAR TOTAL	72,704	7	-	7	72,697	
Desert TOTAL	224,660	6,675	-	6,675	217,985	
EL CAJON TOTAL	2,327,955	209,324	-	209,324	2,118,631	
ENCINITAS TOTAL	1,889,164	3,708	-	3,708	1,885,456	
ESCONDIDO TOTAL	3,063,721	5,450	-	5,450	3,058,271	
External TOTAL	279,052	344	-	344	278,708	
Fallbrook TOTAL	1,556,381	2,319	-	2,319	1,554,062	
IMPERIAL BEACH TOTAL	94,537	35	-	35	94,502	
Jamul-Dulzura TOTAL	425,054	9,621	-	9,621	415,433	
Julian TOTAL	147,468	7,718	-	7,718	139,750	
LA MESA TOTAL	1,913,611	47,610	-	47,610	1,866,001	
LEMON GROVE TOTAL	1,005,973	17,594	-	17,594	988,379	
Lakeside TOTAL	1,942,676	344,761	-	344,761	1,597,915	
Mountain Empire TOTAL	919,284	40,598	-	40,598	878,686	
NATIONAL CITY TOTAL	1,773,208	2,685	-	2,685	1,770,523	
North County Metro TOTAL	2,169,016	4,226	-	4,226	2,164,790	
North Mountain TOTAL	335,601	3,090	-	3,090	332,511	-
OCEANSIDE TOTAL	3,125,887	1,406	-	1,406	3,124,481	
Otay TOTAL	521,559	1,098	-	1,098	520,461	
POWAY TOTAL	1,018,398	9,606	-	9,606	1,008,792	
Pala-Pauma TOTAL	320,510	252	-	252	320,258	
Pendleton-De Luz TOTAL	3,994,864	5,793	-	5,793	3,989,071	
Rainbow TOTAL	621,370	1,457	-	1,457	619,913	
Ramona TOTAL	774,341	3,727	-	3,727	770,614	
SAN DIEGO TOTAL	42,894,862	160,478	-	160,478	42,734,384	
SAN MARCOS TOTAL	2,408,522	1,172	-	1,172	2,407,350	
SANTEE TOTAL	1,158,781	29,167	-	29,167	1,129,614	
SOLANA BEACH TOTAL	658,937	1,650	-	1,650	657,287	
San Diwguito TOTAL	667,949	341	-	341	667,608	
Spring Valley TOTAL	994,290	12,005	-	12,005	982,285	
Sweetwater TOTAL	1,074,891	8,753	-	8,753	1,066,138	
VISTA TOTAL	1,931,387	116	-	116	1,931,271	
Valle De Oro TOTAL	510,351	9,972	-	9,972	500,379	
Valley Center TOTAL	469,081	132	-	132	468,949	
REGIONWIDE TOTAL	96,655,965	1,618,822	189,675	1,429,147	95,037,143	3,936
	21,611,354					

908,184.17

Moderate Density (g)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	862,721	521,768	213,143	308,625	340,953	4,584
Barona TOTAL	95,820	2,420	-	2,420	93,400	
Bonsall TOTAL	1,892,155	3,850	-	3,850	1,888,305	
CARLSBAD TOTAL	3,639,420	4,043	-	4,043	3,635,377	
CHULA VISTA TOTAL	5,195,683	12,240	-	12,240	5,183,443	
CORONADO TOTAL	296,397	230	-	230	296,167	
CORONADO TOTAL	299,467	275	-	275	299,192	
Central Mountainh TOTAL	704,639	120,346	-	120,346	584,293	
County Islands TOTAL	273,434	795	-	795	272,639	
Crest-Dehesa TOTAL	156,948	41,035	-	41,035	115,913	
DEL MAR TOTAL	73,735	16	-	16	73,719	
Desert TOTAL	225,551	6,699	-	6,699	218,852	
EL CAJON TOTAL	2,346,096	223,086	-	223,086	2,123,010	
ENCINITAS TOTAL	1,881,033	3,758	-	3,758	1,877,275	
ESCONDIDO TOTAL	3,071,835	5,880	-	5,880	3,065,955	
External TOTAL	279,061	357	-	357	278,704	
Fallbrook TOTAL	1,555,159	2,400	-	2,400	1,552,759	
IMPERIAL BEACH TOTAL	95,074	43	-	43	95,031	
Jamul-Dulzura TOTAL	424,215	10,074	-	10,074	414,141	
Julian TOTAL	142,627	7,856	-	7,856	134,771	
LA MESA TOTAL	1,919,142	51,016	-	51,016	1,868,126	
LEMON GROVE TOTAL	1,010,374	18,630	-	18,630	991,744	
Lakeside TOTAL	1,962,541	365,018	-	365,018	1,597,523	
Mountain Empire TOTAL	917,079	43,923	-	43,923	873,156	
NATIONAL CITY TOTAL	1,776,903	2,718	-	2,718	1,774,185	
North County Metro TOTAL	2,174,011	4,567	-	4,567	2,169,444	
North Mountain TOTAL	333,975	3,387	-	3,387	330,588	
OCEANSIDE TOTAL	3,135,724	1,429	-	1,429	3,134,295	
Otay TOTAL	520,887	1,133	-	1,133	519,754	
POWAY TOTAL	1,016,019	10,733	-	10,733	1,005,286	
Pala-Pauma TOTAL	318,690	321	-	321	318,369	
Pendleton-De Luz TOTAL	3,992,545	6,259	-	6,259	3,986,286	
Rainbow TOTAL	622,347	1,524	-	1,524	620,823	
Ramona TOTAL	767,267	3,854	-	3,854	763,413	
SAN DIEGO TOTAL	42,941,785	169,536	-	169,536	42,772,249	
SAN MARCOS TOTAL	2,410,768	1,217	-	1,217	2,409,551	
SANTEE TOTAL	1,163,443	30,531	-	30,531	1,132,912	
SOLANA BEACH TOTAL	659,117	1,699	-	1,699	657,418	
San Diwguito TOTAL	668,918	391	-	391	668,527	
Spring Valley TOTAL	999,301	12,660	-	12,660	986,641	
Sweetwater TOTAL	1,077,083	9,116	-	9,116	1,067,967	
VISTA TOTAL	1,936,126	153	-	153	1,935,973	
Valle De Oro TOTAL	513,113	11,441	-	11,441	501,672	
Valley Center TOTAL	463,159	196	-	196	462,963	
REGIONWIDE TOTAL	96,811,387	1,718,623	213,143	1,505,480	95,092,764	4,584
	21,664,185					

970,467.33

High Density (B)

JURISDICTION	TOTAL VMT	TOTAL Series 13 VMT	Two Trip End Series 13 VMT	One Trip End Series 13 VMT	NON-Series 13 VMT	Series 13 Intra-Zonal VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E	INTRA
Alpine TOTAL	965,204	592,457	255,555	336,902	372,747	7,908
Barona TOTAL	96,789	2,754	-	2,754	94,035	
Bonsall TOTAL	1,894,323	4,167	-	4,167	1,890,156	
CARLSBAD TOTAL	3,634,151	4,453	-	4,453	3,629,698	
CHULA VISTA TOTAL	5,187,452	14,254	-	14,254	5,173,198	
CORONADO TOTAL	296,257	390	-	390	295,867	
CORONADO TOTAL	299,441	437	-	437	299,004	
Central Mountainh TOTAL	703,197	121,831	-	121,831	581,366	
County Islands TOTAL	273,070	930	-	930	272,140	
Crest-Dehesa TOTAL	169,801	54,276	-	54,276	115,525	
DEL MAR TOTAL	73,198	31	-	31	73,167	
Desert TOTAL	228,308	8,143	-	8,143	220,165	
EL CAJON TOTAL	2,379,776	263,491	-	263,491	2,116,285	
ENCINITAS TOTAL	1,883,061	4,257	-	4,257	1,878,804	
ESCONDIDO TOTAL	3,067,346	6,715	-	6,715	3,060,631	
External TOTAL	279,087	327	-	327	278,760	
Fallbrook TOTAL	1,555,749	2,675	-	2,675	1,553,074	
IMPERIAL BEACH TOTAL	94,742	56	-	56	94,686	
Jamul-Dulzura TOTAL	430,425	10,291	-	10,291	420,134	
Julian TOTAL	148,728	9,057	-	9,057	139,671	
LA MESA TOTAL	1,930,985	61,712	-	61,712	1,869,273	
LEMON GROVE TOTAL	1,010,699	22,390	-	22,390	988,309	
Lakeside TOTAL	2,022,011	424,606	-	424,606	1,597,405	
Mountain Empire TOTAL	920,050	42,972	-	42,972	877,078	
NATIONAL CITY TOTAL	1,771,670	3,384	-	3,384	1,768,286	
North County Metro TOTAL	2,175,936	5,035	-	5,035	2,170,901	
North Mountain TOTAL	335,960	3,807	-	3,807	332,153	
OCEANSIDE TOTAL	3,126,270	1,585	-	1,585	3,124,685	
Otay TOTAL	525,638	1,077	-	1,077	524,561	
POWAY TOTAL	1,022,407	13,455	-	13,455	1,008,952	
Pala-Pauma TOTAL	322,628	312	-	312	322,316	
Pendleton-De Luz TOTAL	3,964,097	6,322	-	6,322	3,957,775	
Rainbow TOTAL	621,666	1,641	-	1,641	620,025	
Ramona TOTAL	774,885	4,502	-	4,502	770,383	
SAN DIEGO TOTAL	42,986,427	208,881	-	208,881	42,777,546	
SAN MARCOS TOTAL	2,403,167	1,536	-	1,536	2,401,631	
SANTEE TOTAL	1,168,106	36,977	-	36,977	1,131,129	
SOLANA BEACH TOTAL	658,992	1,902	-	1,902	657,090	
San Diwguito TOTAL	667,767	381	-	381	667,386	
Spring Valley TOTAL	999,904	14,965	-	14,965	984,939	
Sweetwater TOTAL	1,075,918	10,678	-	10,678	1,065,240	
VISTA TOTAL	1,933,940	194	-	194	1,933,746	
Valle De Oro TOTAL	517,763	14,091	-	14,091	503,672	
Valley Center TOTAL	467,582	205	-	205	467,377	
REGIONWIDE TOTAL	97,064,573	1,983,602	255,555	1,728,047	95,080,971	7,908
	21,857,399					
	1,127,486.65					

Appendix D:
Commercial Acreage to Square Footage Assumptions

Alpine Community Plan Update – Retail Square Footage Calculation Methodology
September 4, 2020

Given the rural nature of the Alpine community, it is assumed that the Floor to Area Ratio (FAR) maximums associated with countywide land use zoning would not be reasonable and foreseeable within the Alpine Community. Additionally, providing unrealistic or unbalanced land use assumptions within the SANDAG model can cause the model to fail as a whole or provide unreliable data. Therefore, the existing retail FARs within the community were assumed to be carried forward into the project alternatives and would be applied to the new areas in which commercial retail would be developed. This assumption provides a realistic idea of how retail in the community will continue to develop, based on the historically established trends and needs observed within the community.

To calculate the anticipated retail square footage within the Alpine Community, under each project alternative, the following methodology was utilized:

1. *Establish the existing retail Floor to Area Ratio (FAR) within the Alpine community* – Existing retail FARs (outlined in the table below) within the Alpine community were calculated based on Assessor's Record Parcel data. The total building square footage identified in the data was divided by the total square footage of the parcel to calculate the parcel's FAR. The parcels where then categorized by land use type based on the Assessors Record land use codes provided. The existing FARs where then averaged across all of the parcels with each specific land use code. Based on the Assessor's Parcel data, it was found that the following retail uses currently exist within the Alpine community; therefore, an average FAR could be calculated.

Use	FAR
Community Shopping Center	0.306091215
Neighborhood Shopping Center	0.167976886
Service Station	0.065525518
Restaurant (High Turnover sit-down)	0.089638975
Drugstore (Standalone)	0.35061493
Financial Institution (without a drive-through)	0.143995413

2. *Calculate square footage for future retail uses* – The County provided future land uses, by alternative, in acres (see Table 3.2 of the Transportation Impact Study). As shown in Table 3.2 of the Transportation Impact Study, the commercial uses identified for future scenarios are for Rural Commercial, General Commercial, Neighborhood Commercial, and Village Core Mixed Use. As shown in the table above the closest corresponding uses within the community today are Community Shopping Center and Neighborhood Shopping Center. To be conservative the current Community Shopping Center FAR (0.3) was applied to all additional commercial acreage translated to square feet (1 acre = 43,560) within the community for each Project Alternative. It should be noted that the FARs for Service Station, Restaurant, Drugstore, Financial Institution where not used because the proposed land uses within each alternative do not identify the retail uses at the granular level; therefore, the FAR for the more general use (Community Shopping Center) was utilized.

For areas that were identified as and Village Core Mixed Use, it was assumed that a portion of the land would be designated for residential and the remain land would be designated towards commercial uses. To be conservative it was assumed that only 30% of the land area would be designated solely towards residential use, while the remaining 70% would be designated towards commercial uses. This assumption was based on the number of units allowed per acre within these zones and the typical FAR associated with residential uses. The remaining area was assumed to be used for commercial retail uses (which was around 70%). Therefore, the existing FAR established for Community Shopping Centers (0.3) was applied to the commercial designated areas (70%) of the areas designated as Village Core Mixed Use.

This methodology was utilized to convert the acreage-based commercial data provided by the County into "reasonable and foreseeable" square feet so that the land uses could be coded in the SANDAG model for all project alternatives. Existing uses that were not identified to be changed by the Project Alternatives were kept in place as is, based on the Assessors Parcel data. The net change was then added to the existing use. It should be noted, due to model SANDAG Series 13 model constraints, some commercial uses within Sub-Area 5 were coded into model based on employment projections from the Current General Plan model.