

**Evaluating Infill Housing Opportunities to  
Reduce Inyo County per Capita VMT**

Prepared for:  
Helix Environmental Planning, and  
Inyo County, California

Prepared By



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## REVISION HISTORY

Description	Date	Notes
Draft Final report.	Nov 22, 2022	

## FUNDING AND ACKNOWLEDGEMENTS

Funds for this analysis were provided through the first round of the Regional Early Action Grant Program (REAP 1, or REAP 2019) provided to Inyo County from the California Department of Housing and Community Development. The Author wishes to thank:

- Kathryn Murph and Kalin Pacheco at Caltrans for their support in framing the scope of CSF2TDM model analysis used herein, and for providing access to the model scripts and data;
- Cathreen Richards at Inyo County for her insights on local needs and conditions; and
- Robert Edgerton at Helix Environmental. Helix Environmental was the prime contractor for this analysis.

## EXECUTIVE SUMMARY

An Analysis of existing and future VMT per service population (residents plus employment) was performed for Inyo County to support the Counties housing needs. The Analysis is based on the California Statewide Freight Forecasting and Travel Demand Model (CSF2TDM) which is maintained by Caltrans, with post model adjustments to account for density based on the “5-D” methodologies from the literature.

Key findings based on this analysis include:

- County-wide Average VMT per service population is estimated to be 36.4 in 2020 and 39.5 in 2040.
- VMT in the “community regions” along 395 (Lone Pine, Independence, Big Pine, West Bishop, Bishop, and the unincorporated areas next to bishop are anticipated to have VMT per service Population that is about 6.5% below the Inyo County Average. Areas specifically effected by the proposed project of 492 additional housing units are anticipated to see an additional 8% reduction in VMT per service population.
- That 8% additional reduction with the proposed additional housing units translates to an assumed density of about four dwelling units per acre. Development at higher densities can assume a greater VMT reduction per service population. (Note: to be conservative, it is assumed here that the increased density assumed in the travel demand model is correlated with the increased densities plotted in **Figure ES-1.**) Given the potential for overlap between this D and the 8% reduction shown in the CSF2TDM, off-model

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### Inyo County

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reductions for this D should not be taken until densities are at or above four dwelling units per Acre.

- Prior to density adjustments, the proposed VMT per service population for the proposed 492 additional dwelling units is 14.5% below the Inyo County average. A 15% reduction is necessary to make a less-than-significant finding for VMT impacts under CEQA. To achieve that reduction densities greater than 4.5 dwelling units per acre are required.

Therefore, housing projects with a density higher than five dwelling units per acre along 395 are anticipated to have a less than significant impact on VMT under CEQA.

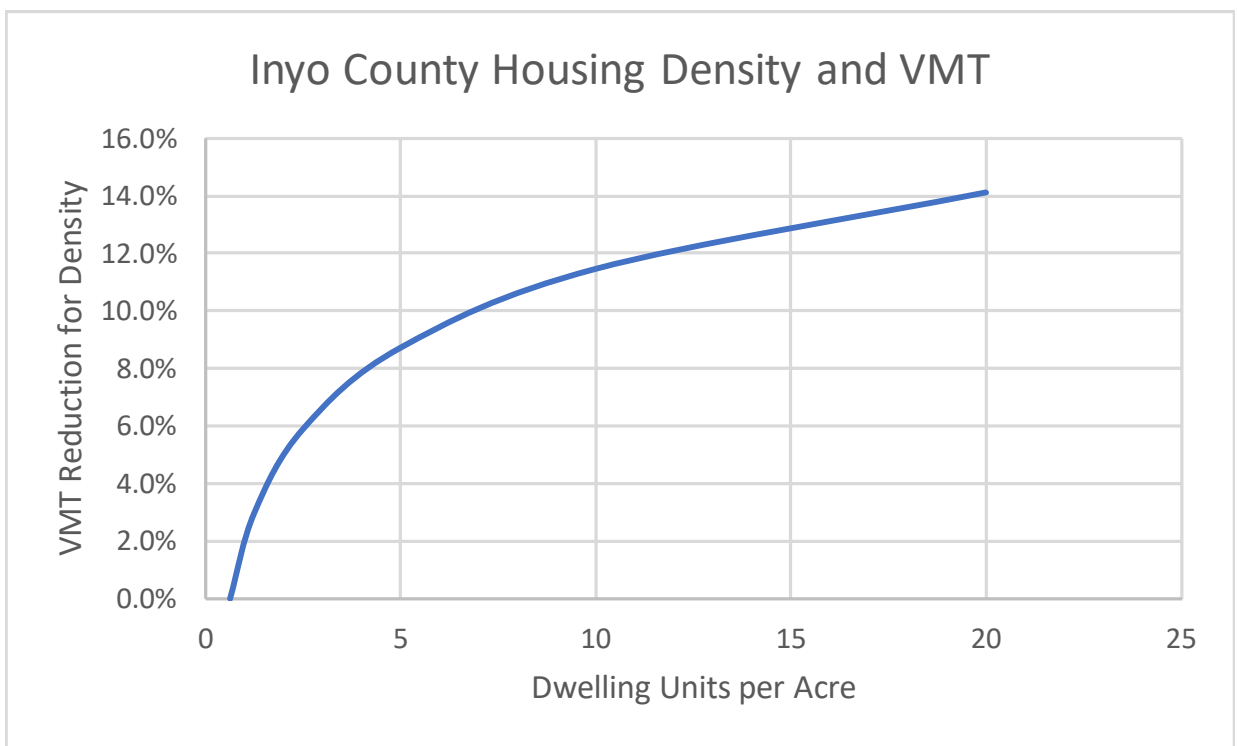


Figure ES-1. Anticipated Inyo County VMT Reductions with Increased Density

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## 1. INTRODUCTION AND PROJECT DESCRIPTION

### Inyo County REAP Grant

The availability of affordable homes statewide is critical to improving the quality of life of all Californians and working toward reducing homelessness. The California Department of Housing and Community Development provided Inyo County with a Regional Early Action Planning (REAP) grant. That Grant funded several areas of work:

- Planning Coordination with the City of Bishop to augment the City’s planning under SB2 to prepare a Specific Plan and the associated California Environmental Quality Act document. (REAP Grant Eligible Activity 4.)
- Technical Assistance associated with updating local planning and zoning documents. Inyo County was awarded SB2 funding to conduct a thorough vacant lands inventory and zoning and General Plan review of properties located in the County and the associated California Environmental Quality Act document. (REAP Grant Eligible Activity 5.)
- Covering Grant administration costs. (REAP Grant Eligible Activity 6.)

This report provides regional vehicle miles traveled (VMT) per capita estimates under REAP Eligible Activity 5 for County wide planning activities that accelerate infill housing to facilitate housing supply, choice, and affordability while reducing VMT per capita from new development. This goal is met in two parts:

- Anticipated per Capita VMT for suburban development near established Inyo County communities based on an adaptation of California’s statewide travel demand model<sup>1</sup>. Specifically, unincorporated lands adjacent to the City of Bishop, and the unincorporated areas of Independence, and Lone Pine<sup>2</sup>.
- Specification of a rubric implementing “5-D elasticities” for the evaluation of specific land development proposals.

Because the underlying modeling tools are not specific to any given development, the approaches laid out herein are qualitative in nature rather than purely quantitative. Where we report numerical results, those results should not be considered quantitative.

### Vacant Lands EIR

In 2020 the County initiated a vacant lands inventory and zoning review to identify parcels that may be appropriate for General Plan (GP) land use designation and zoning changes to promote housing opportunities. This analysis will support that EIR. Inyo County proposes to amend General Plan land use designations and zoning for 8 parcels to promote housing opportunities:

- Primarily infill housing opportunities.
- Parcels located in Lone Pine (4), Bishop (3), Independence (1).

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<sup>1</sup> Caltrans (2022) California Statewide Freight Forecasting and Travel Demand Modeling (CSF2TDM), available through the Caltrans Statewide Modeling Branch, <https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/data-analytics-services/statewide-modeling>.

<sup>2</sup> The unincorporated area of Big Pine was not isolated in the analysis but is anticipated to have VMT attributes similar to the unincorporated areas near Bishop and the unincorporated areas of Independence and Lone Pine.

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### Inyo County

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- Could allow for a combined 492 residential dwelling units (344 near Bishop, 128 in Independence, and 20 in Lone Pine).

The County conducted a vacant lands inventory and General Plan/zoning designations review of private properties located throughout the County (largely a GIS exercise). That work has identified land that may be appropriate for zoning changes to promote housing opportunities, primarily by increasing allowable residential density, which may also include increasing the amount of multi-family zoning available in the County and additional zoning for mobile home parks. Areas near public transportation and other services are considered prime (due to the County's rural nature, transit opportunities are limited). The Draft EIR is scheduled to be released for public review in fall 2022, incorporating material from this analysis to support its findings relative to VMT. General Plan Amendment and zoning changes would be presented to the Planning Commission and Board of Supervisors for consideration. Adoption of the updates would result in permitting-by-right for multi-family housing to promote housing opportunities.

### Study Purpose

Lowering VMT is a State goal. Affordable housing is an important factor in VMT reduction. The VMT goals/programs addressed herein will help the County better identify areas where affordable housing is most appropriate especially with regard to transportation opportunities and areas that are not as well suited due to VMT constraints.

The purpose of the VMT feasibility study is to qualitatively determine baseline per capita VMT conditions across the County using an evaluation rubric that considers:

- Vacant land availability;
- VMT outputs from state modeling tools; and,
- “5D” VMT elasticities (density, design, destination access, distance to transit, and land use diversity).

The result of the feasibility study includes VMT reduction strategies/goals aimed at promoting:

- The State's mandates on equitable housing solutions and environmental justice;
- Mitigating/reducing greenhouse gas emissions; and,
- Promoting housing opportunities across the socioeconomic spectrum.

This study establishes criteria that the County may use to support exemptions for some residential land development projects from VMT analysis under the California Environmental Quality Act (CEQA).

### Report Content and Organization

This analysis includes three sections, each reported on below: Public Outreach; VMT estimates (and the effect of additional housing on VMT); and, findings and recommendations. The findings of this analysis will be presented to the Inyo County Planning Commission and the Board of Supervisors as part of the Vacant Lands EIR project discussed above.



## 2. OUTREACH

Two community workshops were held to solicit stakeholder feedback in Inyo County:

- Lone Pine – Wednesday July 27, 2022: Stratham Town Hall, 138 North Jackson Street, Lone Pine, CA 93545, 6-7:30 PM; and,
- Bishop – Thursday July 28, 2022: City Hall, 377 West Line Street, Bishop, CA 93514, 6-7:30 PM.

Workshops were announced and advertised by Inyo County. Attendance was light, consisting mainly of existing County staff. The Power Point presentation for the public workshops is provided in appendix A, that presentation includes graphics showing the specific parcels identified through the Vacant Lands EIR study. This analysis is not specific to those parcels. Although the analysis assumed those specific developments, the results are more generalized and can be used to exempt projects with certain characteristics from CEQA VMT analysis.

The three principle take-aways from the community outreach sessions were:

- While transit service along Highway 395 is limited, there is both transit and car pooling along the 395 corridor for commute trips;
- Large shopping areas and supermarkets are limited in Inyo County, with most shopping either occurring in the Bishop area, and in Ridgecrest (northern San Bernardino County);
- Housing supply limits the choice of communities where people live, creating an observable AM peak and PM peak period commute between communities along Highway 395.

### 3. VMT ESTIMATES

#### Method

It is not possible to directly measure VMT, it is typically a derived performance measure, estimated from travel demand models or “big data” approaches such as analysis cell phone geolocation data. Both of those approaches are exceedingly resource and time intensive for a rural county such as Inyo which do not have their own regional travel demand models or standing contracts for access to cell phone geolocation data.

For this analysis the California Statewide Freight Forecasting and Travel Demand Model (CSF2TDM) was used in a multistep process:

- The model produced estimates of 2020 and 2040 average per capita VMT for all of Inyo County. Those estimates were used as a starting point.
- The relative difference in per capita VMT between the TAZs where the increased housing density is proposed, and the remainder of Inyo County, was estimated by tracking all VMT to and from each Inyo County TAZ for calendar year 2020.
- The original County level per Capita VMT estimates (2020 and 2040) were then disaggregated using that relative difference so that per capita VMT from TAZs reflecting the community areas likely to see increased density could be compared to per capita VMT for the remainder of Inyo County.
- Relative VMT differences with and without the increased density were also estimated to assess VMT reduction benefits from the proposed densification.
- Estimates were disaggregated into VMT per capita from three new model TAZs added to reflect proposed land use changes and the original five model TAZs representing Inyo County for 2020.

To estimate baseline (2020) and horizon year (2040) VMT per capita, for the County as a whole the CSF2TDM is utilized because rural counties such as Inyo County do not have their own models. CSF2TDM was developed to forecast interregional freight and passenger movements. Its roadway networks and land use detail is relatively coarse<sup>3</sup>. Rather than amending CSTDM data to reflect the increased housing density in the community regions, existing model results and changes to the land use forecast were used to estimate the plan’s impact on VMT and VMT per service population (residents plus employees). For Inyo County, CSF2TDM includes the main highway network (routes 6, 127, 136, 168, 178, 190, 395), State Line Rd (between Death Valley Junction and the California-Nevada State Line), Scotty’s Castle Rd, and a handful of “centroid connectors” that represent the local road connections between the highway network and the center of each TAZ (where vehicle trips are assumed to start or end). CSF2TDM included five original TAZs for Inyo County (**Table 1, Figure 1**). As part of this exercise three new TAZs were added to the trip origin-destination tables and final assignment to better capture the proposed housing changes (labeled in **Table 1 and Figure 1**).

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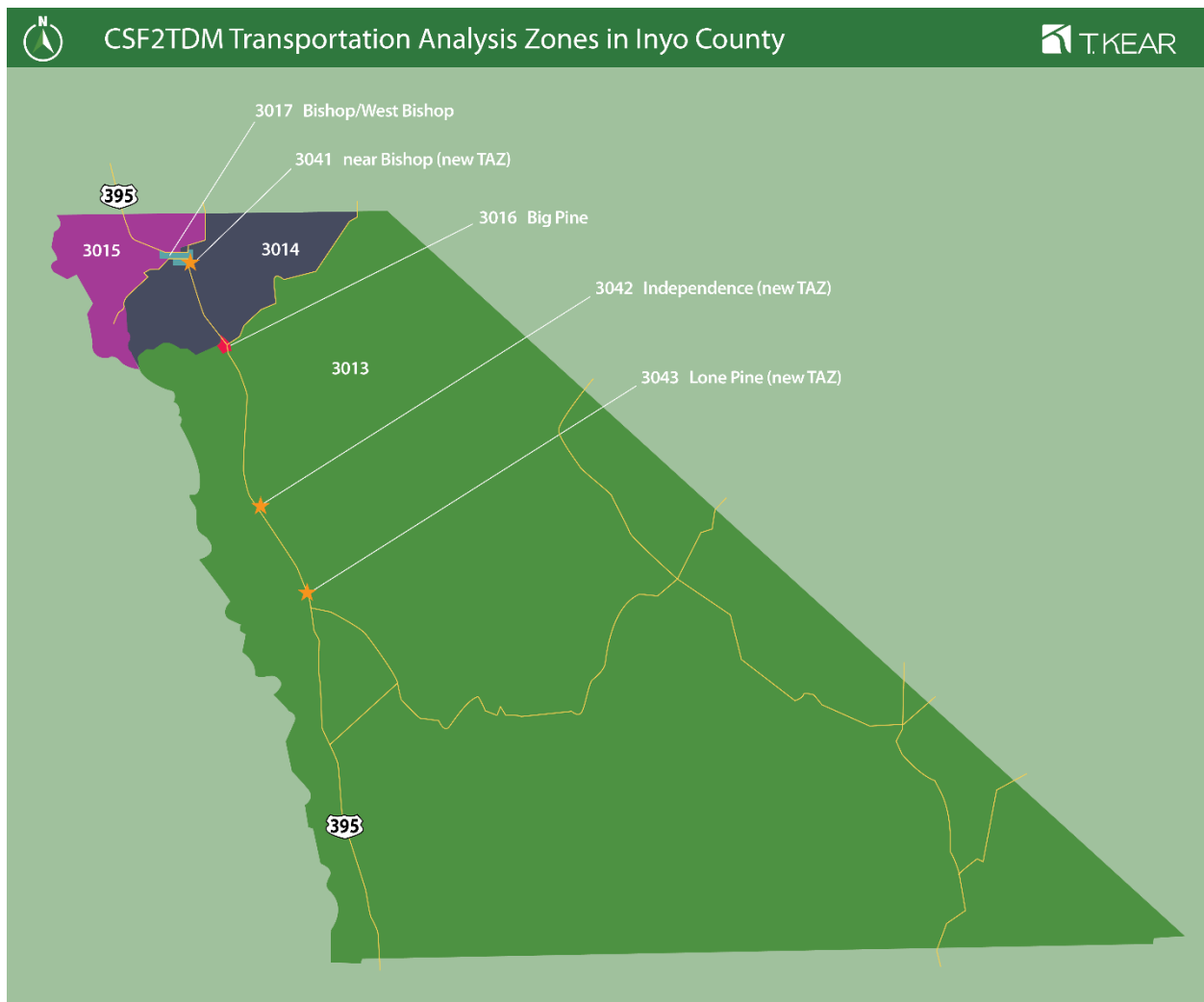
<sup>3</sup> Travel demand models are complex, computationally demanding tools that run on proprietary modeling platforms using scripts. For reference CFS2TDM requires in excess of 500 gigabytes of disk space and takes weeks to run. Most applications require multiple runs. Whenever changes are made to the model, multiple runs are required for quality control to ensure that the results are reasonable.

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Inyo County

**Table 1. CSF2TDM Model Inyo County TAZs**

TAZ	Description
3013	Inyo County south of Big Pine (including Homewood Canyon, Valley Wells, and Death Valley National Park)
3014	Inyo County, generally south and east of Bishop (Wilkerson, Paleta, etc.)
3015	Inyo County, generally north and west of Bishop (Round Valley, Mesa, etc.)
3016	Big Pine
3017	Bishop and West Bishop
3041 (new TAZ)	Unincorporated Inyo County near Bishop (split from TAZ 3017)
3042 (new TAZ)	Independence (split from TAZ 3013)
3043 (new TAZ)	Lone Pine (split from TAZ 3013)



**Figure 1. Inyo County representation in the CSF2TDM**

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The three new zones were added to the model by splitting the trip tables based on the 2019 population data for Census Designated Places (CDP) in Inyo County<sup>4</sup>. For “with Project” conditions the number of trips to and from these new zones was then increased based on Institute of Transportation Engineers trip generation estimates using a FRATAR process (a matrix adjustment algorithm used to scale origin-destination tables).

- For TAZ 3041 (“near Bishop”) without the project, 10% of TAZ 3017 population (and thus travel) was assumed to be in the new TAZ. Taz 3017 reflects the Bishop CDP and West Bishop CDP. Results are not sensitive to the amount of land use shifted to the new TAZ as they are adjacent to each other, but, having the new TAZ is important for isolating changes in VMT with the 344 additional dwelling units that are anticipated to be added to that zone.
- Similarly, TAZ 3042 (Independence) received 10% of the travel originally assigned to TAZ 3013, and TAZ 3043 (Lone Pine) received 30% of the travel originally assigned to TAZ 3013. 60% of the original TAZ 3013 travel remained in TAZ 3013. This disaggregation was based on the 2019 population estimates for Inyo County CDPs.

As mentioned above. The trip tables were then factored up using FRATAR, assuming 344 additional dwelling units in TAZ 3041 (adding 2,319 daily trips), 128 additional dwelling units in TAZ 3042 (adding 863 trips), and 20 dwelling units in TAZ 3043 (adding 135 daily trips). This zone-split and FRATAR approach forgoes the need to adjust parcel level population and employment data used in the core of the CSF2TDM model and is a widely used technique. (The CSF2TDM is an “activity-based model” utilizing a trip/activity simulation step with parcel level population and employment data inputs to estimate trip-changing for transit ridership and revenue, and toll road revenue estimates. That level of detail is not needed for Inyo County.)

### Base CSF2TDM Inyo County VMT Estimates

The CSFTDM estimates that Inyo County as a whole has VMT per service population of a little less than 40 miles traveled per day in 2020 and a little more than 40 miles travel per day in 2040 (**Table 2**). VMT per service population near Bishop, Independence and Lone Pine will be shown to be lower in the next analysis step.

**Table 2. Estimated Inyo County, County-wide, VMT Statistics from CSF2TDM (without New Development)**

Year	CSF2TDM Total VMT	CSFTEM Population	CFS2TDM Employment	Service Population (Population + Employment)	Resulting VMT per Service Population
2020	1,004,223	18,711	8,860	27,571	36.4
2040	1,120,647	19,274	9,127	28,401	39.5

Notes:

- (1) 2040 employment estimated from 2020 employment and scaled by relative change in population.
- (2) 2040 employment estimated from 2020 employment and scaled by relative change in population from 2020 to 2040.
- (3) Service population is the sum of population and employment.

<sup>4</sup> Helix (2022) Vacant Lands Inventory EIR, Section 4.

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Inyo County

### Effect On Regional VMT From Growth Near Existing Communities

County-wide VMT per service population estimates are disaggregated and scaled using 2020 model results tracking the VMT associated with the “community zones” along highway 395 (TAZ 3016, 3017, 3041, 3042, 3043) and the VMT associated with the “rural regions” (TAZ 3013, 3014 and 3015). Service population for use in these calculations is estimated in **Table 3** below.

**Table 3. 2020 CSFTDM Inyo County, Population and Employment by TAZ**

Inyo County Area	TAZ	Emp	POP (without Additional housing)	Service POP (without Additional housing)	POP (with Additional housing)	Service POP (with Additional housing)
below Bishop	3014	601	2,717	3,318	2,717	3,318
above Bishop	3015	379	2,587	2,966	2,587	2,966
Big Pine	3016	171	1,692	1,863	1,692	1,863
Bishop & West Bishop	3017	4,803	7,213	12,016	7,213	12,016
"Near Bishop"	3041	534	801	1,335	1,514	2,048
Independence	3042	237	370	607	635	872
Lone Pine	3043	712	1,110	1,822	1,151	1,863
Inyo (Remainder)	3013	1,423	2,220	3,643	2,220	3,643
<b>Total</b>		<b>8,860</b>	<b>18,711</b>	<b>27,571</b>	<b>19,729</b>	<b>28,589</b>
Community Regions (Bishop, W. Bishop, "Near Bishop", Big Pine, Independence, Lone Pine)				17,643	12,205	18,662
Rural Region (below Bishop, above Bishop, Remainder)				9,928	7,524	9,927

For illustrative purposes **Figure 2** is a bandwidth plot showing all vehicle trips to, from (and between) the “Inyo County community regions. The tracked “community region” VMT from each road segment is summed to estimate total daily VMT associated with the community regions. That tracking exercise was done for:

- 2020 community regions, without proposed additional housing
- 2020 community regions, with proposed additional housing
- 2020 all Inyo County TAZs, without proposed additional housing
- 2020 all Inyo County TAZs, with proposed additional housing

The resulting model outputs allow the **Table 2** VMT estimates to be disaggregated to estimate “community region” VMT and VMT per service population.

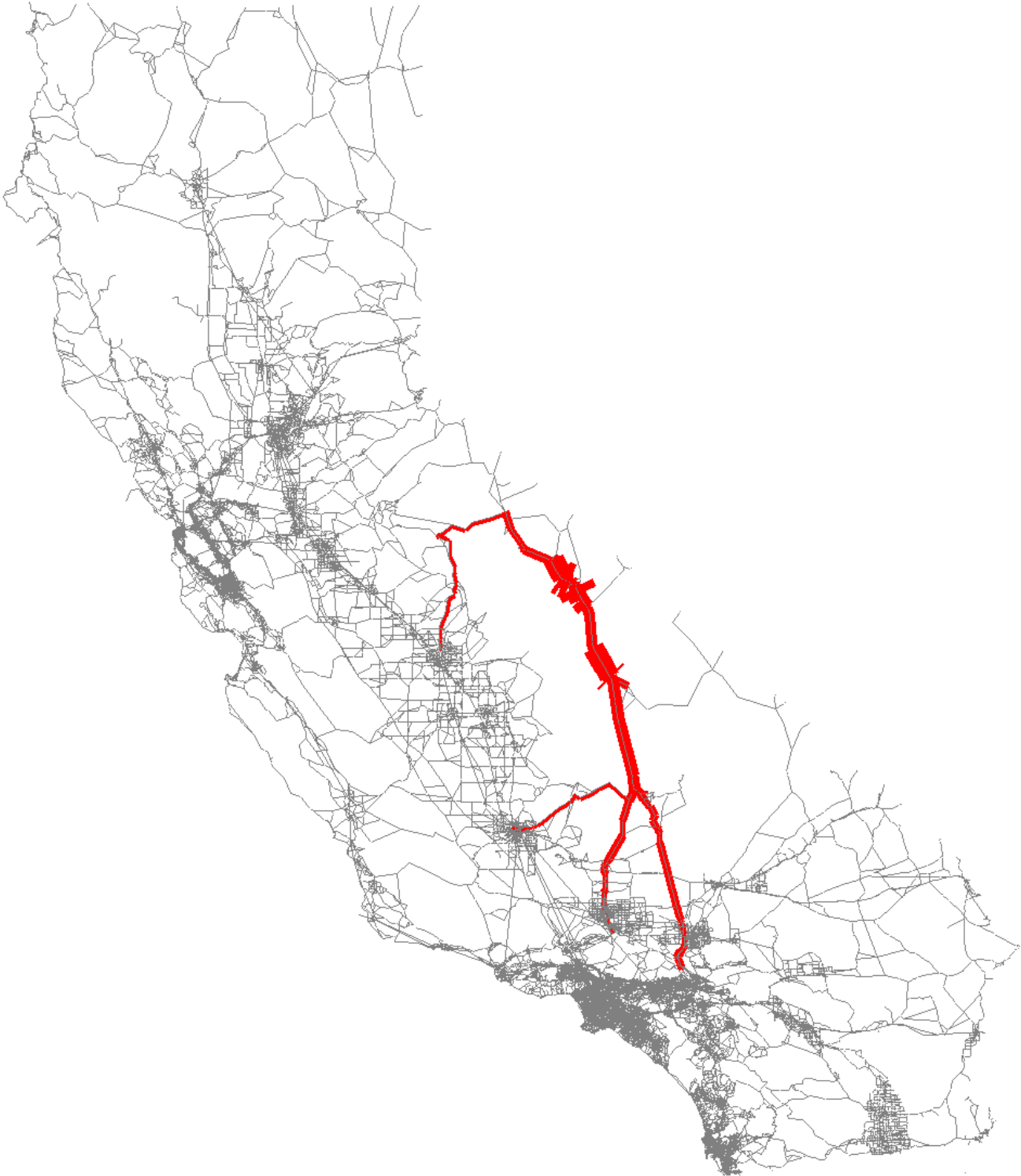


Figure 2. Example bandwidth plot of 2020 “community region” trips (only links with higher bandwidth plotted).

## Evaluating Infill Housing Opportunities to Reduce Inyo County per Capita VMT

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These ratios and their implied affect on VMT per service population are as follows:

- The ratio of community region to County-wide VMT per service population without additional housing (i.e., current conditions) is **1:1.07**, allowing estimation of community region per service population VMT of **34.0** under existing conditions, which implies VMT per service population of **41.4** in the rural portions of the County.
- For the TAZs effected by the 492 additional dwelling units proposed, per capita VMT is reduced by 8%, implying that the average VMT per service population in Lone Pine, Independence, and “near Bishop) would be **31.2**.

Note that Community Region VMT per service population with the project is estimated to be approximately 85.6% of the county wide VMT per service population. That is just over the 85% of regional average for County wide average VMT per service population that is a commonly used CEQA threshold for VMT impacts<sup>5</sup>. This implies that without additional VMT reductions, the additional housing would have a significant Impact under CEQA. “5-D” elasticities, discussed below account for benefits of VMT efficient planning that can reduce the impact for housing growth in the community zones to a less-than-significant level under CEQA.

### 5-D Elasticities

Travel Demand Models as applied above provide estimates of travel by leveraging typical behavior across a region. There are location specific interactions with the built environment which travel demand models do not capture well without post processing. These are the “5-D” adjustments, which are elasticities that reduce trip generation to account for:

- Density (Service population/area);
- Diversity of land uses;
- Destination access (distance to employment or central business district);
- Distance to transit; and,
- Design (street network characteristics such as urban grids vs suburban cul-de-sacs).

There is a wealth of peer reviewed literature on this topic (for example: Ewing and Cervero (2010)<sup>6</sup>, and Lee and Lee (2020)<sup>7</sup>). 5-D elasticities are often built into many regional travel demand models such as the SACOG, MTC, SCAG, LA-Metro, and SANDAG models.

This discussion focuses on just one of the 5-Ds, density, which can be easily implemented. The other D’s require specific knowledge about uses on nearby parcels and/or the characteristics of local street networks.

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<sup>5</sup> OPR (2018) Technical Advisory on Evaluating Transportation Impacts Under CEQA, Governor’s Office of Planning and Research, December 2018, Sacramento, CA.

<sup>6</sup> Ewing, R., Cervero, R. (2010) Travel and the built environment – A meta-analysis, J. of the American Planning Association, 76, 265-294.

<sup>7</sup> Lee, S., Lee, B., (2020) Comparing the impacts of local land use and urban spatial structure on household VMT and GHG emissions, J. of Transport Geography, <https://doi.org/10.1016/j.jtrangeo.2020.102694>.

## Evaluating Infill Housing Opportunities to Reduce Inyo County per Capita VMT

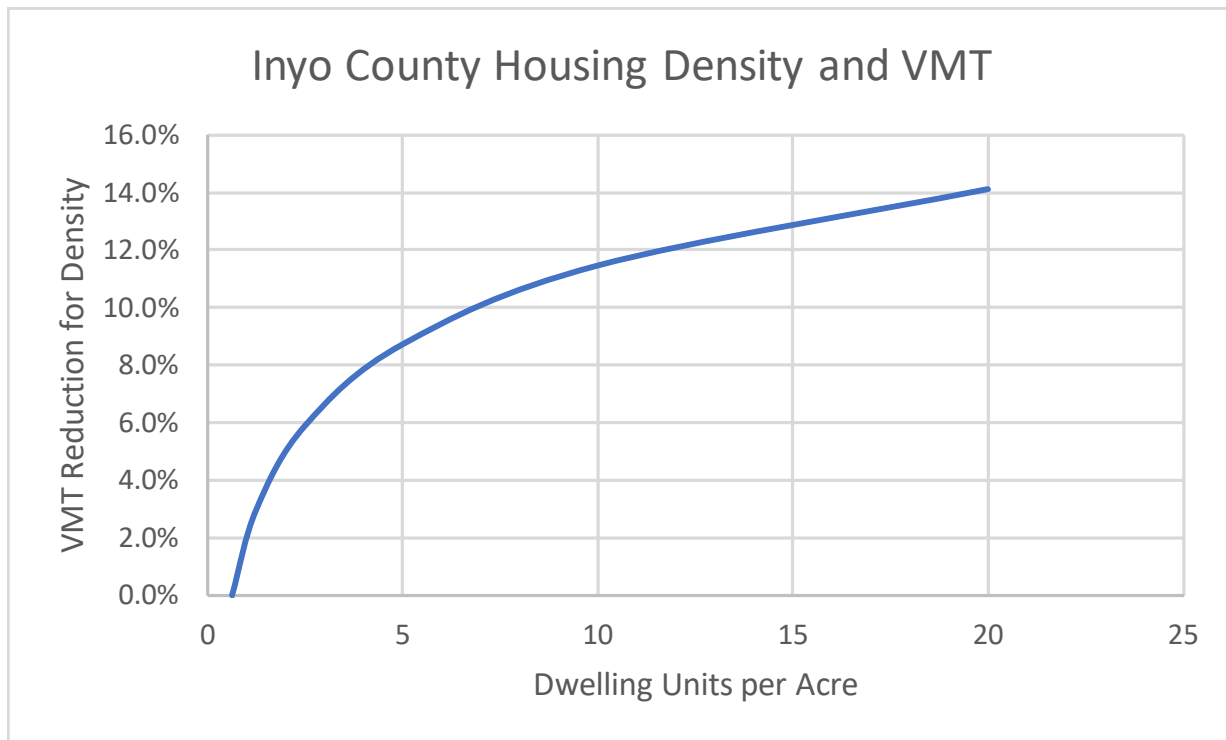
Inyo County

### Density

Density (population per square Mile) has an elasticity of -3.1%. On average VMT per service population will drop by about 3.1% with a doubling of population density<sup>8</sup>. Population densities in communities across the United States are typically greater than 2,500 people per square mile. Inyo County has much lower densities:

- Population density for the County as a whole is less three people per square mile (accounting for both residents and employment);
- Population density for TAZ 3015 (Round Valley and Mesa) is approximately 10 people per square mile (accounting for both residents and employment);
- Population density for Big Pine and Bishop range from about 700 to 1,400 people per square mile (accounting for both residents and employment).

The overall population weighted density for Inyo County is approximately 800 people per square mile (reflecting that most residents do not live in the more rural portions of the county). 800 persons per acre equates to about 1.25 persons per acre or an average residential partial size of more than 1.6 (assumes about 2.1 persons per household). Each doubling of density is anticipated to reduce VMT per capita by 3%, which results in the following curve (**Figure 3**).



**Figure 3. Anticipated Inyo County VMT reductions with increased density**

<sup>8</sup> Lee, S., Lee, B., (2020) Comparing the impacts of local land use and urban spatial structure on household VMT and GHG emissions, *J. of Transport Geography*, <https://doi.org/10.1016/j.jtrangeo.2020.102694>.



### 4 FINDINGS AND RECOMENDATIONS

Key findings based on this analysis include:

- County-wide average VMT per service population is estimated to be 36.4 in 2020 and 39.5 in 2040.
- VMT in the “community regions” along 395 (Lone Pine, Independence, Big Pine, West Bishop, Bishop, and the unincorporated areas next to bishop are anticipated to have VMT per service population that is about 6.5% below the Inyo county average. Areas specifically effected by the proposed project of 492 additional housing units are anticipated to see an additional 8% reduction in VMT per service population.
- That 8% additional reduction with the proposed additional housing units translates to an assumed density of about four dwelling units per acre. Development at higher densities can assume a greater VMT reduction per service population. (Note: to be conservative, it is assumed here that the increased density assumed in the travel demand model is correlated with the increased densities plotted in **Figure 3.**) Given the potential for overlap between this D and the 8% reduction shown in the CSF2TDM, off-model reductions for this D should not be taken until densities are at or above four dwelling units per Acre.
- Prior to density adjustments, the proposed VMT per service population for the proposed 492 additional dwelling units is 14.5% below the Inyo County average. A 15% reduction is necessary to make a less-than-significant finding for VMT impacts under CEQA. To achieve that reduction densities greater than 4.5 dwelling units per acre are required.

Therefore, housing projects with a density higher than five dwelling units per acre along 395 are anticipated to have a less than significant impact on VMT under CEQA.

APPENDIX A – PRESENTATION FROM JULY PUBLIC WORKSHOPS

**Vacant Lands Inventory and Zoning Evaluations for Possible Housing Opportunities Environmental Impact Report (EIR)**

Public Outreach for Vehicle Miles Traveled Assessment

Inyo County Planning Department

July 27, 2022



**Introductions**

Inyo County Planning Department

- Cathreen Richards, Planning Director

HELIX Environmental Planning, Inc.

- Robert Edgerton, Principal Planner

T. Kear Transportation Planning & Management, Inc.

- Tom Kear, PhD, President

Funding Source: Regional Early Action Planning (REAP) Grant from Housing and Community Development Department (State of CA).



## Vacant Lands EIR

- In 2020 the County initiated a vacant lands inventory and zoning review to identify parcels that may be appropriate for General Plan (GP) land use designation and zoning changes to promote housing opportunities.
- County proposes to amend GP land use designations and zoning for 8 parcels to promote housing opportunities:
  - Primarily infill housing opportunities
  - Parcels located in Lone Pine (4), Bishop (3), Independence (1).
  - Could allow for a combined 492 residential dwelling units.

*Draft EIR to be released for public review in fall 2022.*



## Proposed Project Summary

- Project proposes to conduct a vacant lands inventory and General Plan/zoning designations review of private properties located throughout the County (GIS exercise).
- Information to be used identify land that may be appropriate for designation changes to promote housing opportunities, primarily by increasing allowable residential density.
- May include increasing the amount of multi-family zoning available in the County and/or additional zoning areas with principal permitting for mobile home parks.
- Review of the County's current zoning would focus on commercial zones for opportunities for infill (residential) development.
- Areas near public transportation and other services would be considered prime, but due to the County's rural nature, other properties located in remote communities without these services might also be identified for potential zone changes.



## Proposed Project Summary (cont'd)

- A review of the zoning code language addressing accessory dwelling units also to be conducted for infill opportunities.
- County has undertaken public outreach and communication with potentially affected property owners.
- Proposed project may result in changes from single-family to multi-family, and changes to ministerially allow for mobile home parks, as well as allowing for multi-family residential uses in certain commercial zones without requiring discretionary approval.
- Amendment to General Plan designations may be necessary to allowed density by district and the potential/proposed (or "up-zoning").
- General Plan Amendment and zoning changes would be presented to the Planning Commission and Board of Supervisors for consideration. Adoption of the updates would result in permitting-by-right for multi-family housing to promote housing opportunities.



## VMT Assessment

- EIR will include a regional Vehicle Miles Traveled (VMT) assessment and a goals/programs component for lowering VMT.
- Lowering VMT is a State goal; Affordable housing is an important factor in VMT reduction.
- The VMT goals/programs will help the County better identify areas where affordable housing is most appropriate especially with regard to transportation opportunities, and areas that are not as well suited due to VMT constraints.



## VMT Assessment

- The purpose of the VMT feasibility study will be to qualitatively determine baseline per capita VMT conditions across the County using an evaluation rubric that may consider, but would not be limited to:
  - vacant land availability;
  - 5D VMT elasticities (density; design, destination access; distance to transit; and land use diversity);
  - active transportation options.
  - VMT outputs from state modeling tools.
- The result of the feasibility study would be VMT reduction strategies/goals aimed at promoting:
  - State's mandates on equitable housing solutions and environmental justice;
  - Mitigating/reducing greenhouse gas emissions;
  - promoting housing opportunities across the socioeconomic spectrum.



## VMT Approach

- Travel demand models are used to estimate regional VMT and anticipate effects from programmatic land use plans.
- Inyo County does not have its own travel demand model, and this study will rely on the California Statewide Travel Demand Model (CSTDm) for VMT estimates.
- Analysis shall include a base-year VMT estimate (either 2017 or 2020) and a horizon-year VMT estimates (2040) with and without the land use changes anticipated by the Inyo County vacant lands inventory, rezoning, and General Plan review.



## VMT Approach

- CSTDM was developed to forecast interregional freight and passenger movements. Its roadway networks and land use detail is relatively coarse.
- The County and the City of Bishop each envision adding about 475 dwelling units by 2040, primarily through multifamily housing developments.
- Rather than amending CSTDM data to reflect the Plan, existing model results and changes to the land use forecast will be used to estimate the Plan's impact on VMT and VMT per service population (residents plus employees).
- Either a quantitative "FRATAR" process will be used to post-process CSTDM results, or a more qualitative approach may be taken using VMT elasticities.



## VMT Approach

- Exact details of the approach will be coordinated with Caltrans' Statewide Modeling Branch, with consideration to the available budget.
- Land use assumptions embedded into the CSTDM itself will not be updated.
- The resulting post processing procedures will be documented and available for use in future County projects.





## Next Steps

- Average Inyo County base year VMT per service population will be estimated based on the California Statewide travel demand model, along with subarea VMT per service population.
  - Question: what subareas do stakeholders anticipate are relevant?
- Off model VMT per service population adjustments will be estimated based on four of the “D’s”:
  - Density (Service population/area).
  - Diversity (measured as “entropy”:  $-1 \times \{[\sum(p_i) \ln(p_i)] / \ln(k)\}$ ).
    - $p_i$  = land use % of total land area;  $k = 4$  (land use category: residential, commercial, industrial, and office).
  - Destination access:
    - Distance to employment or central business district.
    - Distance to commercial.
  - Distance to transit.
  - Question: are there other measures that should be considered (distance to recreation? Parallel access that avoids 395? Others?)



## Community Input

- Please help identify community priorities when considering land use policies that might reduce the reliance on private vehicles.
- How extensive is the daily commute perceived between Inyo County communities? (i.e., is the only central business district in Bishop, or do Lone Pine and Independence have their own?)
- Are there known commercial land use deserts?
- What is the community impression regarding the viability of transit?
- Specific desires or concerns that the study should attempt to address?

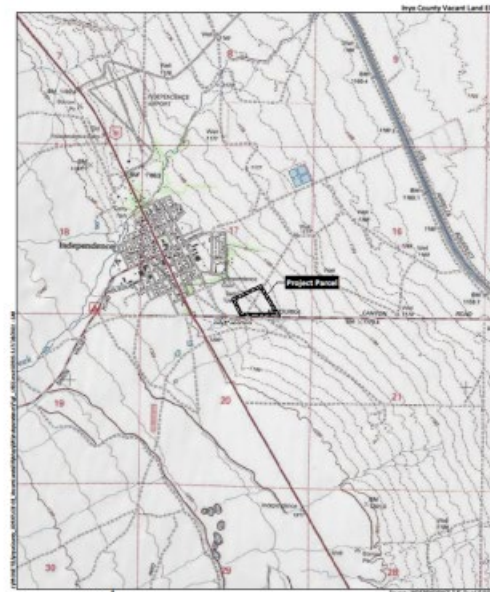




## Comments and Questions

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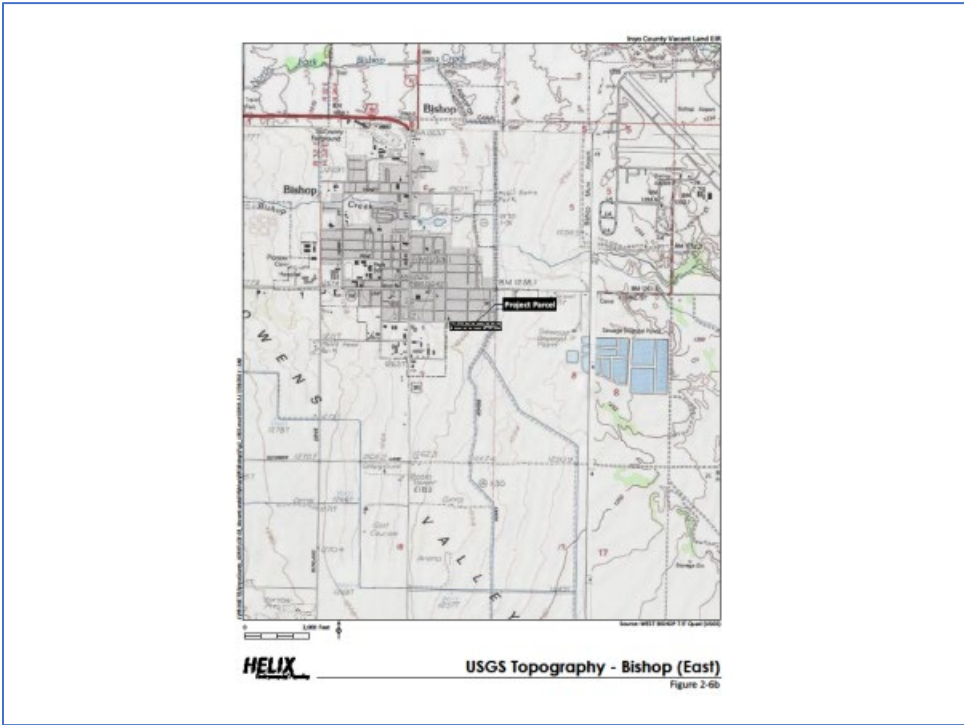
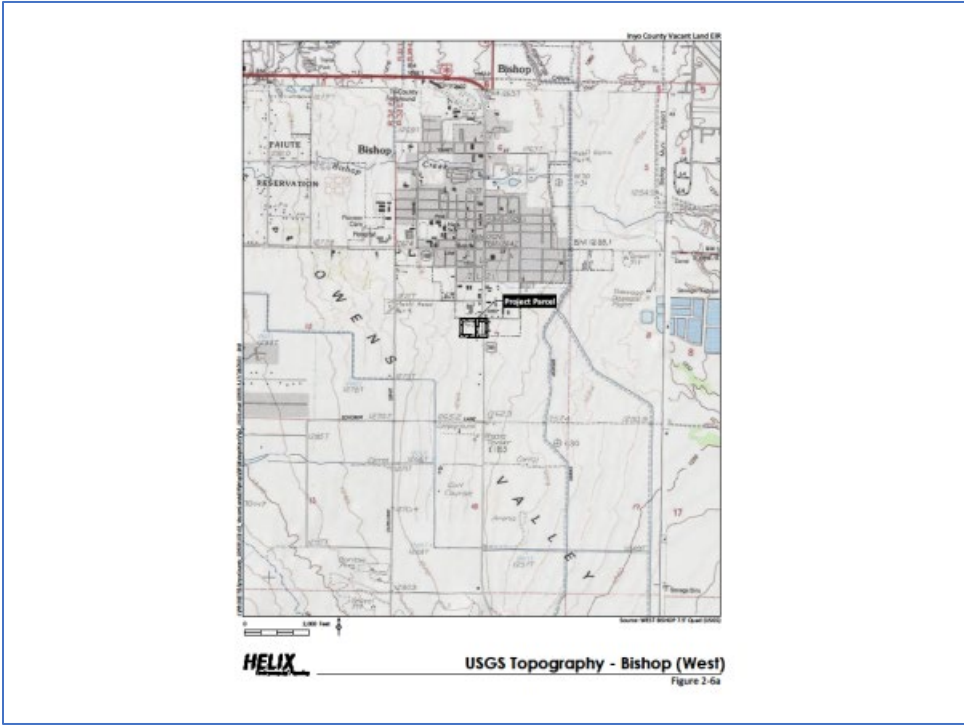
*Thank you for your time and input!*



USGS Topography - Independence  
Figure 2-2

# Evaluating Infill Housing Opportunities to Reduce Inyo County per Capita VMT

## Inyo County



**Evaluating Infill Housing Opportunities to Reduce Inyo County per Capita VMT**  
Inyo County

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