I-11 and Intermountain West Corridor Study

Technical Memorandum: Level 2 Evaluation Results Summary

Prepared for

Nevada DOT and ADOT

June 2014

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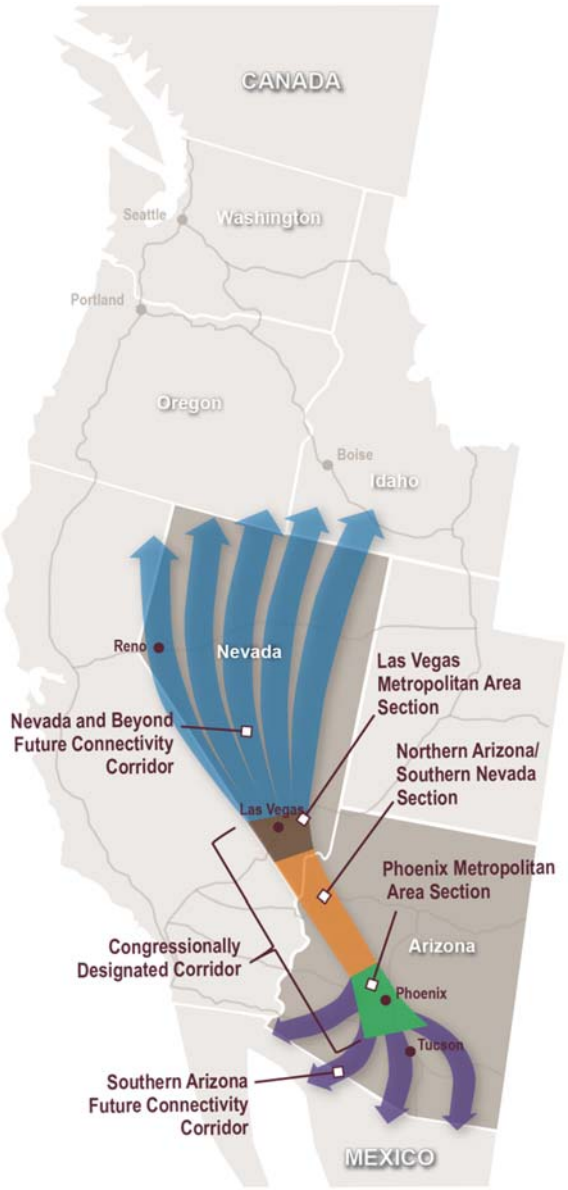
Evaluation Process, Criteria and Summary Results

The Arizona Department of Transportation (ADOT) and Nevada Department of Transportation (NDOT), in consultation with the Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA), and in partnership with the Maricopa Association of Governments (MAG) and the Regional Transportation Commission of Southern Nevada (RTCSNV) referred to as Core Agency Partners, are conducting the Interstate 11 (I-11) and Intermountain West Corridor Study. The study is the latest action in a decades-long effort by Arizona, Nevada, and other Intermountain West states and the federal government to develop a transportation corridor between the Rocky Mountains and the Cascade Range/Sierra Nevada Mountains linking Mexico and Canada. The two-year study includes detailed corridor planning of a possible high-capacity transportation link connecting Phoenix and Las Vegas and high-level visioning for extending the corridor north of Las Vegas to Canada and south of Phoenix to Mexico.

This document presents the procedure and results for the second level of evaluation for alternatives in the *I-11 and Intermountain West Corridor Study*. **Figure 1** illustrates the corridor study area. The central segment, extending between the greater Phoenix and Las Vegas Metropolitan Areas, is known as the Congressionally Designated Corridor because Congress designated this segment as future I-11. This Congressionally Designated Corridor, in turn, consists of three sections, designated from south to north as Phoenix Metropolitan Area, Northern Arizona/Southern Nevada, and Las Vegas Metropolitan Area. To the south of the Congressionally Designated Corridor lies the Southern Arizona Future Connectivity Segment, extending from the southern fringe of metropolitan Phoenix to the Mexican border. Similarly, the Northern Future Connectivity Segment extends from the north edge of metropolitan Las Vegas to the northern border of Nevada and beyond.

Figure 1. Study Area Segmentation



Evaluation Process

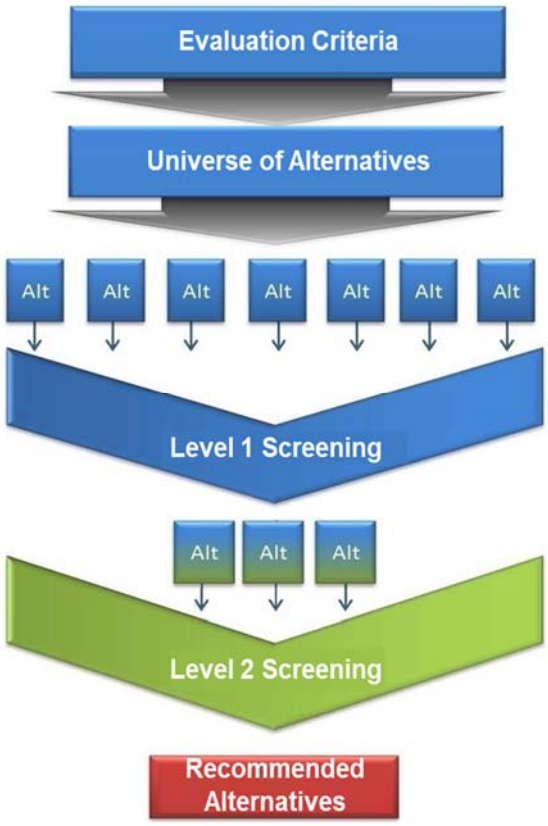
For purposes of this study, an alternative is defined as a planning-level corridor that could contain one or more modes (e.g., highway, rail, utilities) within one or more of the study area segments. Part or all of a corridor may consist of, or contain, an existing transportation facility as well as other infrastructure, such as utilities. The evaluation process consists of two levels of evaluation (**Figure 2**). Stakeholder input was received at each stage of the evaluation process, as shown in **Table 1,** and will continue to be solicited throughout the study process.

Table 1. Stakeholder Evaluation Process Input Meetings

Date	Meeting	Purpose
June 27, 2013	Core Agency Partners	Discuss the Goals and Objectives, and Evaluation process and criteria
July 16, 17, 22, 2013	Stakeholder Partner meetings with all 5 geographic segments (175 participants)	Discuss the Goals and Objectives, and Evaluation process and criteria
July 30, 2013	Core Agency Partners	Discuss the Universe of Alternatives
August 12-15, 2013	Stakeholder Partner meetings with all 5 geographic segments (193 participants)	Discuss the Universe of Alternatives
September 24, 2013	Core Agency Partners	Discuss Level 1 screening results and Level 2 screening criteria
October 8-10 and 16-17, 2013	Stakeholder Partner meetings with all 5 geographic segments (166 participants)	Discuss Level 1 screening results and Level 2 screening criteria
October 8-10 and 16-17, 2013	Public meetings in all 5 geographic segments (274 participants)	Discuss Level 1 screening results and Level 2 screening criteria
January 15, 2014	Core Agency Partners	Discuss Level 2 screening results for Congressionally Designated sections
January 21-23, 2014	3 separate Congressionally Designated Corridor section Geographic Stakeholder Partner meetings	Discuss Level 2 screening results for Congressionally Designated sections
February 10 – March 11, 2014	Joint virtual public meeting in all 5 geographic segments	Discuss preliminary Recommended Alternatives
March 12, 2014	Core Agency Partners	Discuss Recommended Alternatives
March 19, 2014	Joint Stakeholder Partner meeting with all 5 geographic segments	Discuss Recommended Alternatives

The evaluation was conducted by a multidisciplinary consultant team, with input from the Project Sponsors (NDOT and ADOT), Core Agency Partners, Stakeholder Partners, and the general public. The alternatives are mapped in several places in this document illustrating the corridors and recommendations through the different phases of the evaluation process. Different colors have been used to depict alternatives corresponding to the two screening stages of the process. The purple alternatives maps refer to corridors evaluated in Level 1 screening, the multi-colored segment maps refer to corridors evaluated in the Level 2 screening, and the orange alternatives maps show the recommended reasonable and feasible corridors.

Figure 2. Evaluation Process

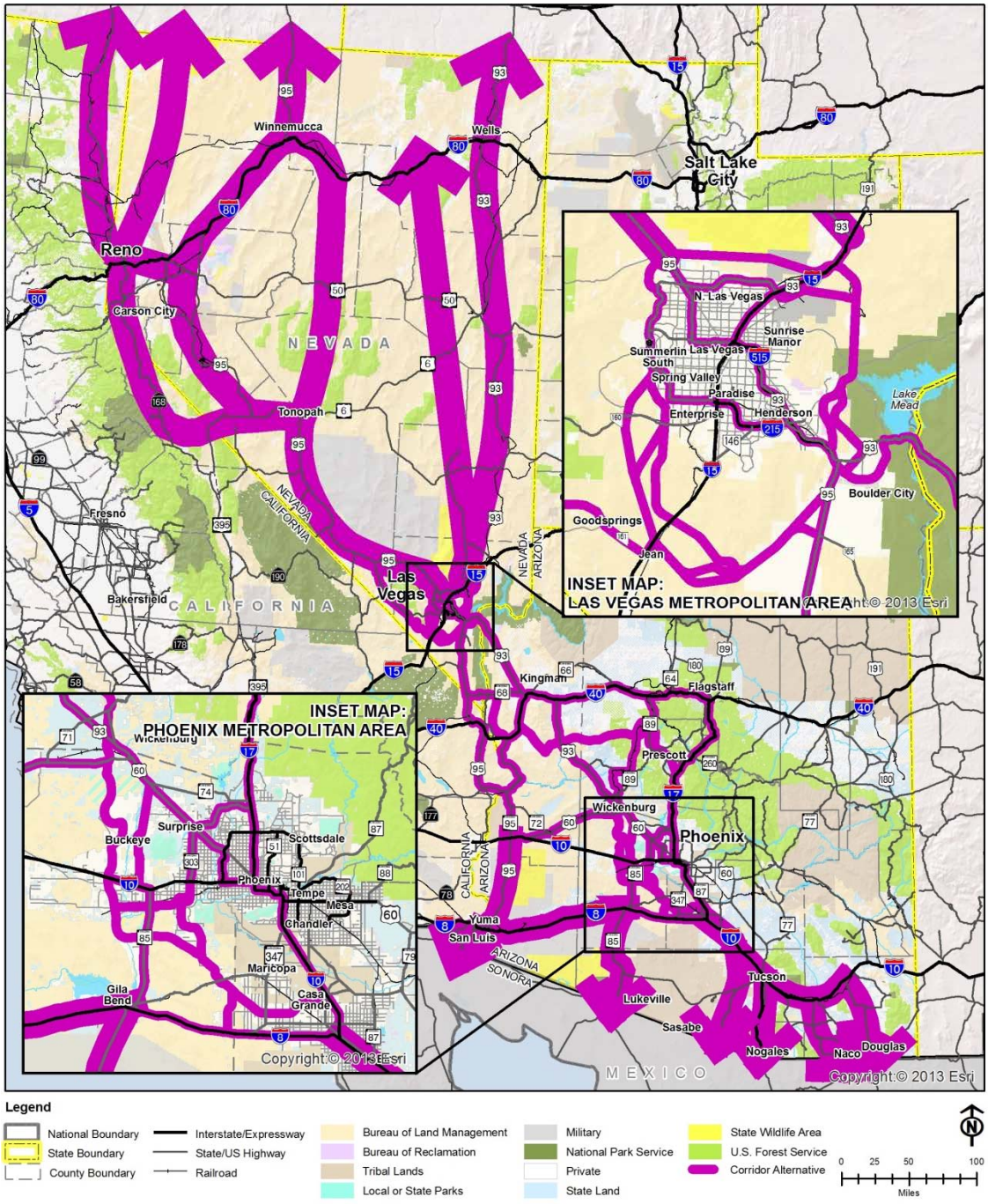


Level 1 Analysis and Criteria

The Level 1 analysis applied to the entire corridor including the three Congressionally Designated Corridor Sections as well as the Southern and Northern Future Connectivity Segments.

Figure 3 illustrates the universe of alternatives that were evaluated as a part of the Level 1 analysis.

Figure 3. Level 1 Universe of Alternatives



As shown in **Table 2**, the Level 1 evaluation applied a number of qualitative criteria to a comprehensive universe of alternatives. The purpose of this first level of evaluation was to assess whether an alternative met the Goals and Objectives of the project in order to:

- Reduce the number of alternatives in the Congressionally Designated Corridor Sections to a reasonable range of alternatives for more detailed evaluation, and
- Help identify which corridor options (routes and modes) in the Future Connectivity Segments are the most promising candidates for long-term connections to the Congressionally Designated Corridor.

Table 2. Level 1 Evaluation Criteria

For use in all corridor segments.

Each criteria was rated on a qualitative scale of "least favorable" to "most favorable."

Evaluation Category		Criteria
Legislation	1	How well does the alternative meet the intent of legislative actions, including MAP-21 and the 1995 National Highway Systems Designation Act?
System Linkage	2	How well does this alternative connect major national and international activity centers from Mexico to Canada through the Intermountain West?
	3	How well does this alternative most directly close gaps and/or develop missing linkages in the regional and national transportation network?
	4	How well does this alternative connect with adjacent segments/sections?
Trade Corridor	5	How well does this alternative connect major freight hubs and high-capacity transportation corridors?
Modal Interrelationships	6	How well does this alternative maximize opportunities for intermodal connectivity (highway, rail/transit, aviation)?
	7	How well does this alternative accommodate multiple modes in a shared corridor footprint (highway and rail)?
Capacity/Congestion	8	How well does this alternative relieve existing and projected congestion between and within the major activity centers in Nevada and Arizona?
	9	How well does this alternative align with existing conditions or proposed improvements at land ports of entry (as appropriate)?
Economic Vitality	10	How well does this alternative support regional, state and national economic development goals?
Project Status/ Transportation Policy	11	How well does this alternative comply with corridor-related actions taken to date?
	12	How well does this alternative conform to locally adopted transportation plans?
Environmental Sustainability	13	How compatible is this alternative with regional open space, conservation, and land management agency planning?
	14	How well does this alternative minimize environmental impacts (such as drainage, topography, species, and biological connectivity)?
Land Use and Ownership	15	How consistent is this alternative with regional land use and growth strategies?
	16	How compatible is this alternative with major land ownership patterns?
Community Acceptance	17	How well is this alternative accepted by the local communities?
Cost	18	What is the overall relative cost of this alternative, where "least favorable" is the highest relative cost and "most favorable" the lowest?

Table 3 lists the total number of alternatives evaluated in each segment and which alternatives were recommended to (a) move forward for further study (Future Connectivity Areas), or (b) move into the Level 2 evaluation (Congressionally Designated Corridor). These alternatives are shown on **Figure 4** through **Figure 6**.

For full documentation of the process and the results of the Level 1 analysis, please see the *Technical Memorandum: Level 1 Evaluation Results Summary*, January 2014.

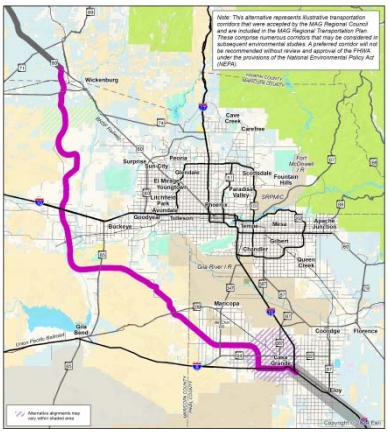
Table 3. Level 1 Corridor Alternatives and Recommendations

Segment	Level 1 Universe of Alternatives	Level 1 Recommended Alternatives
Southern Arizona Future Connectivity Segment	7 alternatives	1 corridor for further study*
Phoenix Metropolitan Area Section	11 alternatives	5 alternatives for Level 2 analysis
Northern Arizona/ Southern Nevada Section	11 alternatives	2 alternatives for Level 2 analysis
Las Vegas Metropolitan Area Section	11 alternatives	4 alternatives for Level 2 analysis
Northern Nevada Future Connectivity Segment	7 alternatives	2 corridors for further study*

**Alternatives recommended in Future Connectivity Areas will not undergo Level 2 analysis; the reasonable range of alternatives are recommended for further study in future work efforts.*

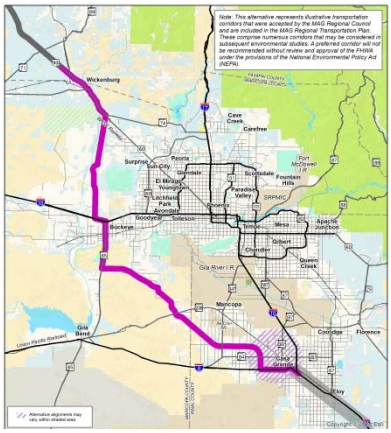
Figure 4. Phoenix Metropolitan Area Section Level 1 Recommended Alternatives

Alternative G

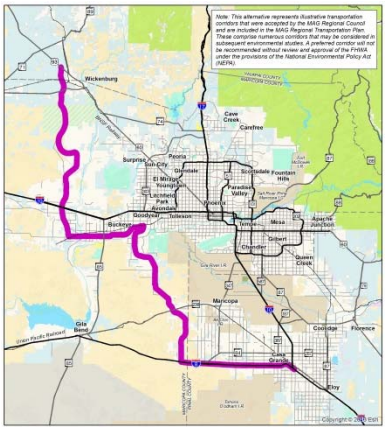


Alternative H

Alternative I



Alternative LL



Alternative MM

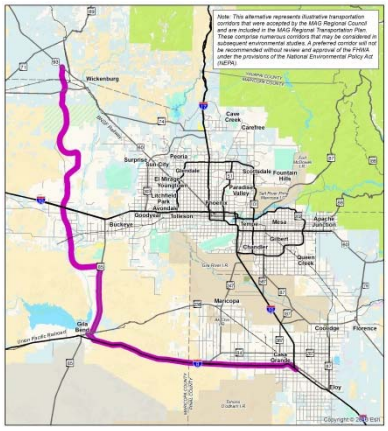


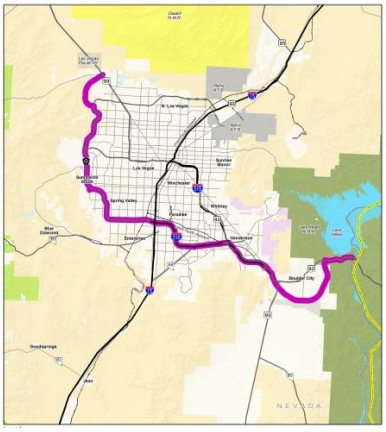
Figure 5. Northern Arizona/Southern Nevada Section Level 1 Recommended Alternatives

Alternative Q

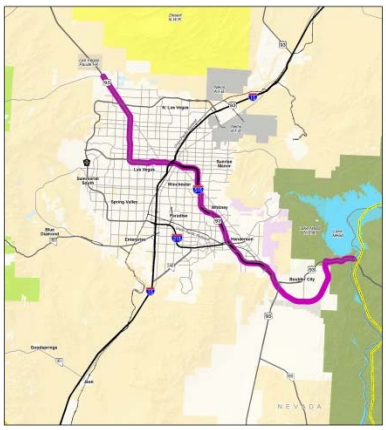
Alternative UU

Figure 6. Las Vegas Metropolitan Area Section Level 1 Recommended Alternatives

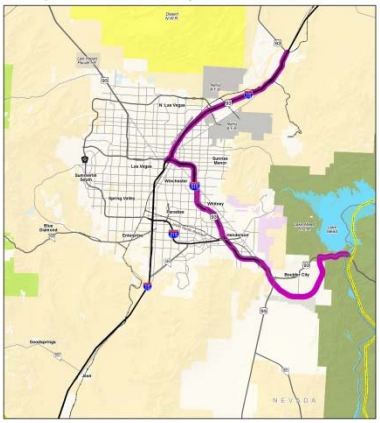
Alternative Y



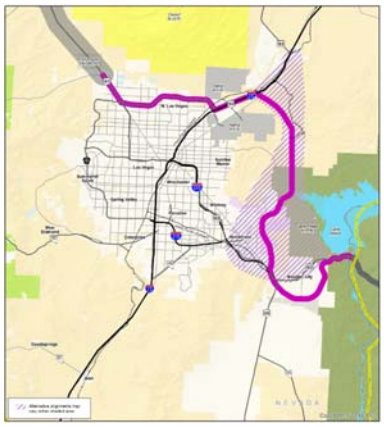
Alternative Z



Alternative AA



Alternative BB-QQ



Level 2 Process and Criteria

The Level 2 analysis process further evaluated Congressionally Designated Corridor section alternatives that have been shown in Level 1 to be feasible and potentially beneficial to the two states. The analysis occurred in two phases:

1. **Finalize Congressionally Designated Corridor Level 2 Alternatives**
   a. Evaluate Level 2 alternatives for their connectivity to adjacent segments. If an alternative did not connect to any alternatives in the adjacent segment, it was removed for further consideration.
2. **Conduct Level 2 Analysis using Detailed Evaluation Criteria**

The Level 2 evaluation criteria were developed to utilize many of the same categories as those used for the Level 1 screening (Table 3). Three evaluation categories were removed after the Level 1 screening (legislation; system linkage; trade corridor) because they simply served to evaluate whether or not an alternative met the study's Goals and Objectives. Alternatives that did not meet the Goals and Objectives were screened out and not carried forward into Level 2. Furthermore, the third criterion of the Level 1 "system linkage" criteria: "connectivity to adjacent segments," was applied to the Level 2 alternatives before the full evaluation commenced to eliminate alternatives that did not contribute to a corridor that might traverse the Intermountain West. These corridors are likely important to statewide transportation network connectivity, but do not serve Intermountain West regional needs.

Table 4 lists the proposed Level 2 criteria. These criteria are based on further development and elaboration of the Level 1 screening criteria. Some, but not all, of the evaluation criteria were amenable to quantitative measurement in Level 2. Those for which suitable numerical data was not available were assessed using professional planning or engineering judgment. The purpose of this evaluation was to identify the reasonable and feasible range of alternatives for further planning and environmental work (in future work efforts) as part of the I-11 project development process.

This technical memorandum documents the results of the analysis including written explanations of results for each alternative, translated into a simple five-tiered comparative rating scale (from least to most favorable). Just as in the Level 1 screening, the evaluation rating scale is strictly relative – alternatives will be considered in relation to each other in the same project segment. If an alternative receives the highest rating, it may still face issues or obstacles with respect to that criterion. The following sections describe how each approach was applied to each section of the Congressionally Designated Corridor.

Table 4. Level 2 Evaluation Criteria
For use in Congressionally Designated Corridor only.
Each criterion was rated on a qualitative scale of "least favorable" to "most favorable."

Evaluation Category		Criteria	Approach
Modal Interrelationships	1A	How well does this corridor provide sufficient opportunity for a multi-use corridor?	1. Identify if multiple modes can be accommodated within the current corridor 2. If not, identify alternate rail corridors that will meet the same need for future modal implementation 3. Identify implications of each multimodal corridor option
Capacity/Congestion	2A	What are the estimated travel time savings over No-Build (2035)?	Quantitative analysis: based on travel times for each corridor using regional models compared to No-Build

Table 4. Level 2 Evaluation Criteria

For use in Congressionally Designated Corridor only.

Each criterion was rated on a qualitative scale of "least favorable" to "most favorable."

Evaluation Category		Criteria	Approach
Capacity/Congestion	2B	What are the total long distance vehicles miles traveled (VMT)?	Quantitative analysis: based on corridor VMT using statewide model for long distance trips (>50 miles)
	2C	What are the total vehicle hours of delay (VHD)?	Quantitative analysis based on a comparison of corridor VHD between alternatives
	2D	What is the average travel speed on the corridor?	Quantitative analysis: based on estimated 2035 corridor average PM peak period peak direction travel speeds
Economic Vitality	3A	What are the expected short-term impacts to the regional economy, as measured by the number of jobs (direct, indirect and induced) and economic output from construction related activities?	Quantitative analysis: based on input from IMPLAN model
	3B	What is the cost of delay?	Quantitative analysis: based on delay from the regional model multiplied by nationally accepted factor for cost of delay
Transportation Plans and Policies	4A	How well is this alternative consistent with funded transportation projects?	Qualitative analysis: based on how much of the alternative is documented in transportation plans
	4B	How well is this alternative consistent with long-term transportation visions and plans?	
Environmental Sustainability	5A	What is the impact to wildlife corridors and/or habitat blocks?	Quantitative analysis: based on GIS data layers and environmental data availability
	5B	What is the impact to land managed for conservation or wildlife purposes?	
	5C	How many linear miles of undisturbed waterways/ floodplains are impacted?	
	5D	What is the general impact to air quality conditions with this alternative?	Qualitative analysis: high-level, based on quantitative factors such as vehicle miles traveled and congestion
	5E	What additional environmental concerns were identified by stakeholders?	Qualitative analysis: based on data or input received from resource agencies.
Land Use and Ownership	6A	How consistent is this alternative with regional and local land use plans (including tribal plans, if available)?	Qualitative analysis: based on consistency with land use and resource plans
	6B	How compatible is this alternative with major land ownership patterns and resource plans?	Qualitative analysis: based on compatibility with land ownership patterns using GIS data layers
Community Acceptance	7A	How well is this alternative accepted by the Core Agency Partners?	Qualitative analysis: based on review of comments received on the alternative corridors.
	7B	How well is this alternative accepted by the Stakeholder Partners?	
	7C	How well is this alternative accepted by the general public?	
Cost	8A	What is the order of magnitude cost for this alternative, including construction, maintenance/operations, and right-of-way?	Quantitative analysis: based on NDOT cost estimating tools plus an order of magnitude cost for right-of-way and a factor for operations and maintenance

Step 1: Finalization of Congressionally Designated Corridor Level 2 Alternatives

Upon completion of the Level 1 evaluation process, the universe of alternatives was narrowed down to a focused list that meets the corridor's Goals and Objectives and contains no fatal flaws, as identified in the Level 1 qualitative screening. These alternatives included the following (please see "Level 1 Evaluation Results Summary" for more information):

- Phoenix Metropolitan Area Section – Alternatives G, H, I, LL, and MM (see Figure 4)
- Northern Arizona/Southern Nevada Section – Alternatives Q and UU (see Figure 5)
- Las Vegas Metropolitan Area Section – Alternatives Y, Z, AA, BB-QQ (see Figure 6)

These Level 1 recommended alternatives formed the preliminary Level 2 alternatives and were evaluated first for their connectivity to adjacent segments. This is a critical element in creating an international trade corridor throughout the Intermountain West. Therefore, any alternative that did not form a direct connection with an alternative in an adjacent segment was removed from further Level 2 evaluation. **Alternative AA in the Las Vegas Metropolitan Area was the only alternative removed per this evaluation measure.** Alternative AA was planned to utilize I-15/US-93 to make an easterly connection into Northern Nevada. Core components of the alternative (using I-515 through the core of the metropolitan area) are present in other alternatives; therefore a hybridization of this alternative was not determined necessary.

The finalization of Level 2 alternatives resulted in modifications to the total number of alternatives only for the Las Vegas Metropolitan Area. **Figure 7** illustrates the universe of alternatives that were evaluated as a part of the Level 2 analysis.

Step 2: Level 2 Analysis

The study team conducted the Level 2 evaluation of all the alternatives presented above using the evaluation criteria presented in Table 4. The rating system consisted of a qualitative (from least to most favorable) scale, with "most favorable" relative rating representing the best performance, and "least favorable" relative rating representing the worst performance.

Just as in the Level 1 screening, the evaluation rating scale is strictly relative – alternatives were considered in relation to each other in the same project segment. If an alternative receives the highest rating, it may still face issues or obstacles with respect to that criterion.

Multi-Use Evaluation

As the Goals and Objectives for the I-11 Corridor recognize the importance and need for accommodating multiple modes and multiple uses within the Corridor's footprint, per criteria 1A each alternative was rated based on its ability to accommodate multiple modes and uses to help distinguish those alternatives that have the greatest potential as a multi-use corridor. More detailed information on the Multi-Use Evaluation is provided in **Appendix A**. Several possible footprints for the I-11 Corridor were developed and include accommodating multiple uses and modes (800-foot width), highway and utilities (700-foot width), or highway only (400-foot width) are shown in **Figure 8**. It may be possible to accommodate multiple modes in a smaller ROW, but this is the ideal width used for consistent analysis for the entire corridor. **Figure 9** indicates the portions of the Level 2 alternatives that are suitable for multiple uses and modes, highway and utilities, or highway only.

Through this analysis, it was discovered that the majority of the alternatives are not able to accommodate multiple modes, specifically rail, throughout the entire length of the corridor due to right-of-way or terrain constraints. Therefore, alternate rail corridors have been proposed for possible consideration in on-going and future planning studies conducted by public agencies and private sector stakeholders. Other uses within the corridor, such as transmission of energy and communications, are feasible through most of the alternatives, and continue to be a priority for consideration as the corridor is refined and developed.

Figure 10 shows the existing rail network within the study region and suggests possible new rail corridors that could close north-south gaps in the existing rail network. Closing these gaps could provide an alternate modal

facility to the proposed highway corridors. These suggestions will require detailed analyses, and are intended here primarily to illustrate the possibilities for rail enhancements in the region that are complimentary with an I-11 Corridor. While private rail owners are responsible for decisions regarding their networks, it is hoped that the analyses and recommendations proposed in this study will offer support for those decisions.

Figure 7. Level 2 Universe of Alternatives

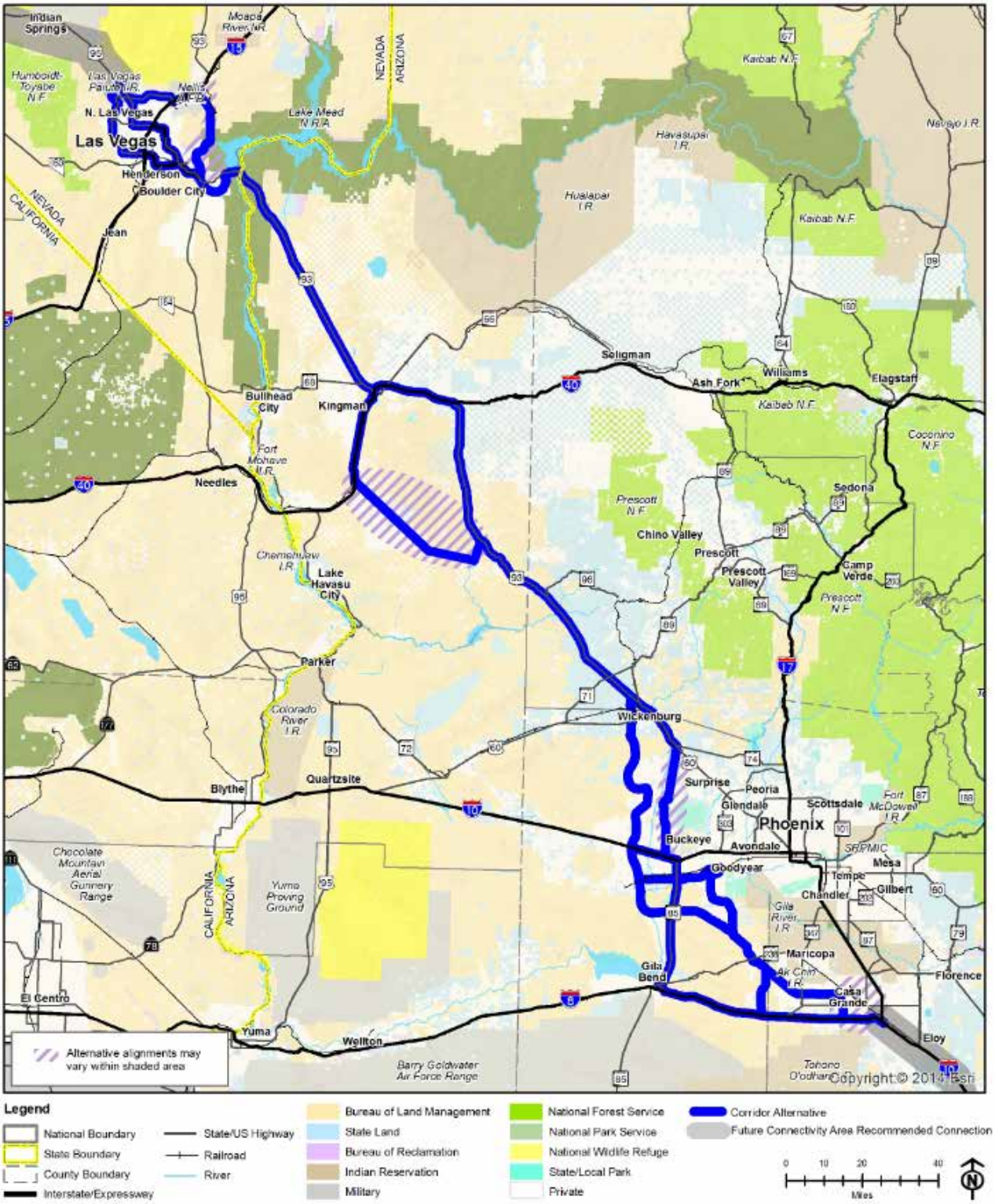
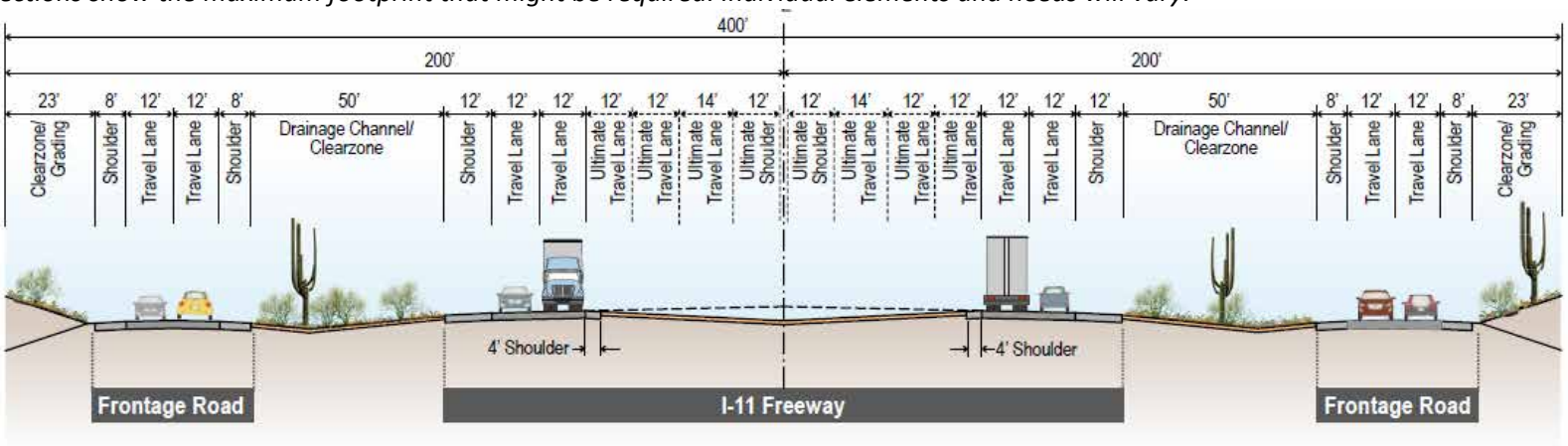
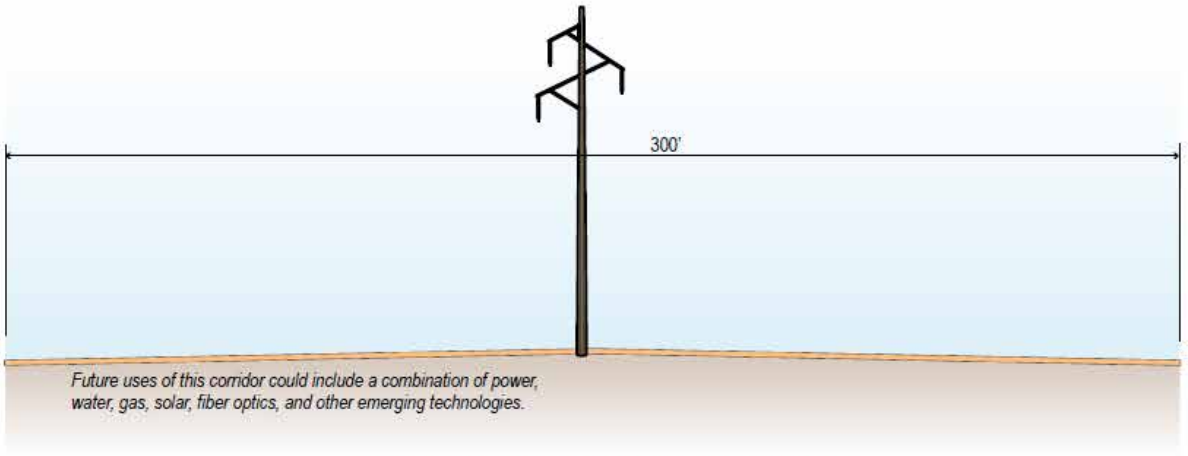


Figure 8. I-11 Potential Cross-sections Accommodating Multiple Uses and Modes

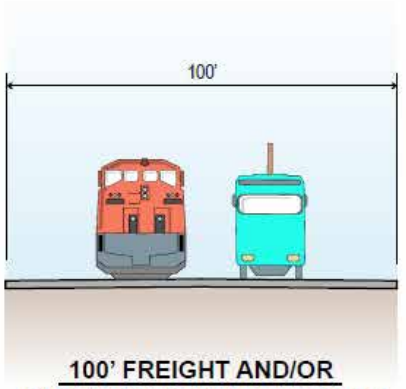
Typical sections show the maximum footprint that might be required. Individual elements and needs will vary.



400' HIGHWAY SECTION: 4 LANE (10 LANE ULTIMATE)



300' CORRIDOR FOR MULTIPLE UTILITIES



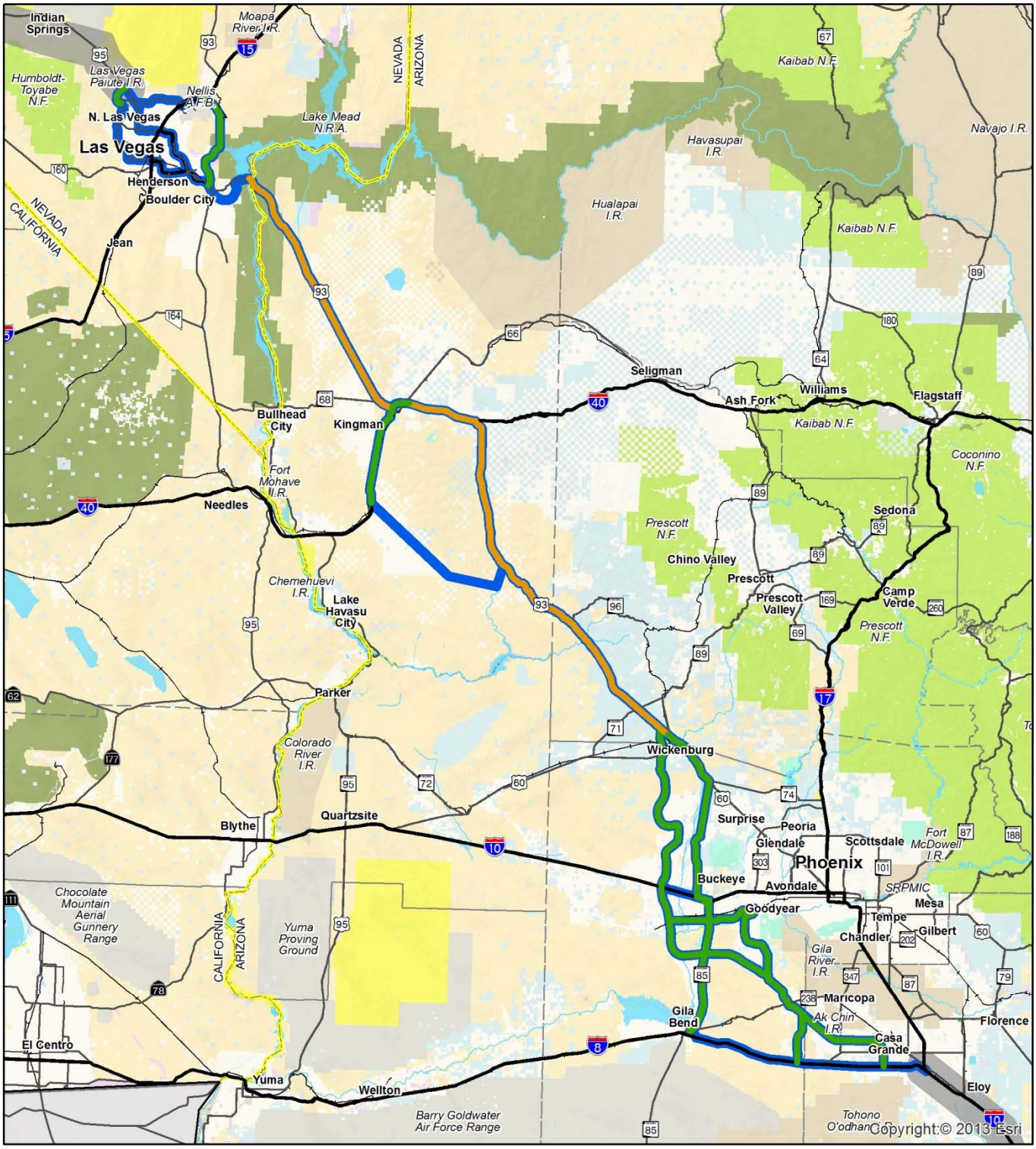
100' FREIGHT AND/OR PASSENGER RAIL CORRIDOR

Note:

400' Highway Section + 300' Utility Corridor + 100' Rail Corridor = 800' Right-of-Way

400' Highway Section + 300' Utility Corridor = 700' Right-of-Way

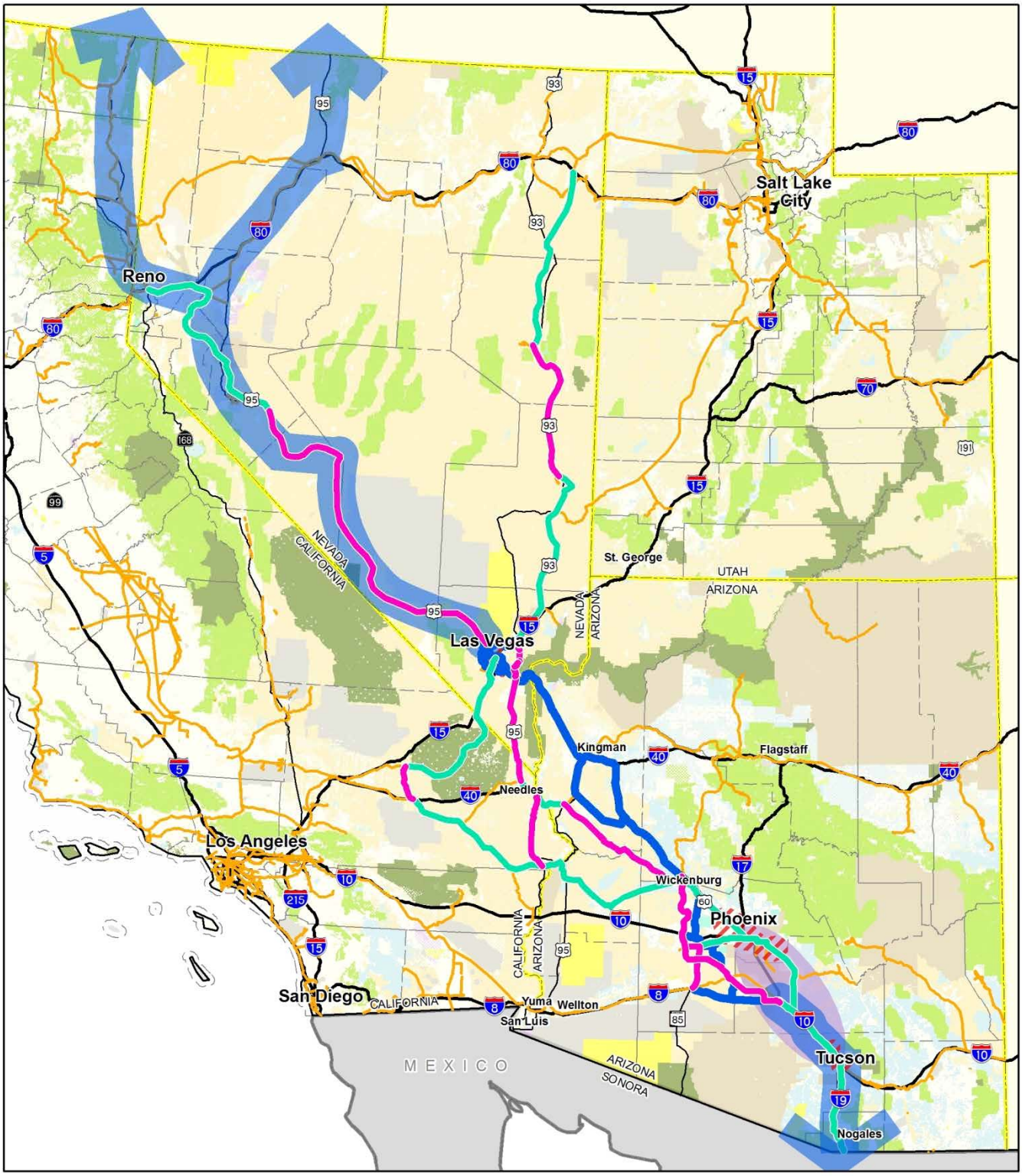
Figure 9. Combined Highway, Rail and Utility Corridor Assessment



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Maps identify desired connections between metropolitan areas. Alternatives do not identify specific alignments, nor preclude multiple alignments within each alternative.

Figure 10. Multimodal Evaluation



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Maps identify desired connections between metropolitan areas. Alternatives do not identify specific alignments, nor preclude multiple alignments within each alternative.

Level 2 Evaluation Results

A summary of the evaluation results are presented in **Table 5**, listing each alternative evaluated in Level 2 and its summary rating for each evaluation category. The summary rating for each evaluation category is an average of the ratings for each criteria under that category. This process was supported by an external outreach process and the full documentation is provided in the February 2014 Virtual Meeting Results Report. Detailed evaluation results are presented later in this report.

Due to the similarities and shared segments in the corridors in the Phoenix Metropolitan Area, the alternatives were split north and south of I-10 (west of Phoenix) to perform a more focused evaluation that allowed the identification of targeted issues areas.

Table 5. Summary of Level 2 Evaluation Results by Category

Alternative	Evaluation Category							
	Modal Interrelationships	Capacity/ Congestion	Economic Vitality	Transportation Plans / Policies	Environmental Sustainability	Land Use and Ownership	Community Acceptance	Cost
Phoenix Metropolitan Area								
G/H/LL/MM - North								
I-North								
G - South								
H - South								
I - South								
LL - South								
MM - South								
Northern Arizona/Southern Nevada								
Q								
UU								
Las Vegas Metropolitan Area								
Y								
Z								
BB-QQ								

Legend:

Most Favorable	Somewhat Favorable	Moderately Favorable	Less Favorable	Least Favorable

The following sections, divided out by Congressionally Designated Corridor Section, contain more detailed information on the Level 2 evaluation, including large maps of each alternative. Corridor segments shaded in purple hatching remain as areas that will require further analysis and refinement of the specific corridor. The different colors on these maps represent the various segments that make up each alternative (identified with segment numbers). The segmentation was used to allow identification of specific areas of constraints/impacts

during the evaluation process and are also referenced in the detailed analysis conducted by Arizona Game and Fish Department (AGFD) and The Nature Conservancy (TNC). The AGFD, TNC and the Sonoran Institute completed their own analyses (included in **Appendices B, C** and **D**, respectively) using geographic information systems (GIS) data layers to provide input on which alternatives and/or segments had significant environmental impacts, specifically noting those where mitigation was feasible (or not). These analyses also noted alternatives that provided opportunities to improve wildlife linkages.

For Nevada, the Nevada Department of Wildlife (NDOW), Bureau of Reclamation – Lower Colorado Regional Office, and BLM – Southern Nevada District provided detailed information that was used in the Level 2 analysis (see **Appendices E, F** and **G**).

Each section includes an explanation of the evaluation approach for each criterion for that section, and detailed summary sheets for each alternative, including a map of the alternative, major opportunities/constraints, followed by the detailed evaluation rating scales and notes.

Evaluation Results: Phoenix Metropolitan Area

The Phoenix Metropolitan Area section includes the greater metropolitan Phoenix area, spanning from the northwest at Wickenburg to the southeast near Casa Grande.

Due to the similarities and shared segments in the corridors in the Phoenix Metropolitan Area, the alternatives were split north and south of I-10 (west of Phoenix) to perform a more focused evaluation that allowed the identification of targeted issues areas. Under this approach, there are two corridor alternatives north of I-10 (four of the five alternatives utilize the same corridor north of I-10) and five corridor alternatives south of I-10. By identifying more specific areas of impact, this allows the process to form hybrid alternatives, if appropriate, that minimize anticipated impacts. The study team conducted the Level 2 evaluation of the following alternatives in the Phoenix Metropolitan Area based on the recommendations from the Level 1 analysis (see the *Technical Memorandum: Level 1 Evaluation Results Summary*, January 2014):

- Alternative G/H/LL/MM North
- Alternative I North
- Alternative G South
- Alternative H South
- Alternative I South
- Alternative LL South
- Alternative MM South

Each alternative was rated with respect to each of the Level 2 evaluation criteria. The rating system consisted of a qualitative (from least to most favorable) scale, with "most favorable" relative rating representing the best performance and "least favorable" relative rating representing the worst performance. An explanation of the evaluation approach for each criterion for the Phoenix Metropolitan Area follows.

Modal Interrelationships

1A: How well does this corridor provide sufficient opportunity for a multi-use corridor?

Each alternative is rated based on its ability to accommodate multiple modes and multiple uses, as noted below. A description of the multi-use evaluation process and results is included at the end of this document under the Summary of Recommended Reasonable and Feasible Corridors section.

- Least favorable: Cannot accommodate multiple modes due to constraints along the corridor, and alternate corridors cannot be developed to accommodate other modes.
- Less favorable: Cannot accommodate multiple modes due to constraints along the corridor, and less reasonable alternate corridors can be developed to accommodate other modes.
- Moderately favorable: Cannot accommodate multiple modes due to significant constraints along the corridor, however reasonable alternate corridors can be developed to accommodate other modes. Such alternate corridors would be relatively direct, with reasonable implementation.
- Somewhat favorable: Can accommodate multiple modes and uses through most of the corridor, with minor exceptions and where a reasonable deviation could be found.

- Most favorable: Can fully accommodate multiple uses and rail throughout the entire length and within the same footprint rated most favorable for the following reasons: it is likely to be the most direct route, right-of-way could be preserved over the long-term, implementation would be maximized and flexibility preserved for future uses or technologies.

Capacity/Congestion

The I-11 study team used the September 2011 version of Arizona Statewide Travel Demand Model, which is maintained by ADOT. The I-11 study team coded the corridor alternatives into the statewide travel demand model's 2035 model network, which includes existing and planned facilities as reflected in the adopted regional transportation plans. The ADOT travel demand modeling group used these model networks to conduct model runs using the 2035 population and employment projections, and provided the results of these model runs to the I-11 study team for evaluation. The study team evaluated each corridor for overall travel time savings compared to a no-build condition. Other criteria included corridor vehicle miles of travel and corridor vehicle hours of delay. The Arizona Statewide Model also provided measures for long distance travel. More detailed information on the travel demand modeling methodology and approach is provided in **Appendix H**.

2A: What are the estimated travel time savings over No-Build (2035)?

A comparative analysis of the alternatives was calculated for travel time savings compared to the No-Build option using the Arizona statewide travel demand model. The 2035 No Build model network includes existing and planned facilities as reflected in the adopted regional transportation plans. The travel time for the No-Build network was estimated based on the shortest path between the shared endpoints of the alternatives. In response to the narrow range of differences between the alternatives in the Phoenix Metropolitan Area, the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Less than 5 minutes savings over No-Build
- Moderately favorable: 5 – 10 minutes savings over No-Build
- Somewhat favorable: Greater than 10 minutes savings over No-Build
- Most favorable: n/a

2B: What are the total long distance vehicles miles traveled (VMT)?

A comparative analysis of the alternatives was calculated for total long distance VMT for long distance trips (>50 miles) using the Arizona statewide travel demand model. Each alternative was compared against the alternative with the lowest VMT. In response to the narrow range of differences between the alternatives in the Phoenix Metropolitan Area, the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Lowest long distance VMT alternative
- Moderately favorable: 10 – 20% greater VMT than the lowest long distance VMT alternative
- Somewhat favorable: 20 – 40% greater VMT than the lowest long distance VMT alternative
- Most favorable: n/a

2C: What are the total vehicle hours of delay (VHD)?

A comparative analysis of the alternatives was calculated for total VHD using the Arizona statewide travel demand model. Each alternative was compared against the alternative with the highest total VHD. In response to the narrow range of differences between the alternatives in the Phoenix Metropolitan Area the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Alternative with the highest total VHD
- Moderately favorable: 10 – 20% less delay than the alternative with the highest total VHD
- Somewhat favorable: 20 – 40% less delay than the alternative with the highest total VHD
- Most favorable: n/a

2D: What is the average travel speed on the corridor?

The estimated 2035 average PM peak period, peak direction, travel speed for each alternative is derived from the Arizona statewide travel demand model. The Highway Capacity Manual was referenced to develop the rating scale, which states that 60 miles per hour (mph) or greater is considered Level of Service A. Therefore, alternatives with an average travel speed of 60 mph or greater received the highest rating, and the lower speeds were defined based on engineering judgment. The rating scale is as follows:

- Least favorable: Less than 30 mph
- Less favorable: 31 – 45 mph
- Moderately favorable: 46 – 54 mph
- Somewhat favorable: 55 – 60 mph
- Most favorable: Greater than 60 mph

Economic Vitality

3A: What are the expected short-term impacts to the regional economy, as measured by the number of jobs (direct, indirect and induced) and economic output from construction related activities?

Quantitative analysis was conducted based on input from the IMPLAN Version 3.0 model. IMPLAN is an econometric software program utilizing input-output analysis by applying trade flow data and multipliers to investigate the consequences of projected economic transactions in a geographic region. The underlying information is gathered from federal data sets and used to develop custom models for each individual study region. IMPLAN is the most widely employed and accepted regional economic analysis software in the U.S. for predicting economic impacts. An econometric trade flow model was created Arizona utilizing the IMPLAN software and the most recent 2011 state data package available. The economic impact findings are measured by the number of jobs, labor income, and economic output from construction related activities:

- Jobs include the full and part time jobs, including self-employed.
- Labor income represents the wages paid to personnel associated with the industry. Includes total wage and salary including benefits of the direct, indirect and induced employees.
- Economic output represents the spending or gross receipts for goods or services generated.

The direct construction spending for each alternative was used to estimate the indirect and induced impacts that would accrue to each state, as described below:

- Indirect economic impacts are those economic activities undertaken by vendors and suppliers within the supply chain of the direct activity as a result of the initial economic activity. For example, suppliers of goods, materials, and services used in the direct activities produce indirect economic impacts.
- Induced economic impacts result from the spending of wages paid to employees in local industries involved in direct and indirect activities. These wages, which are analogous to household spending, support additional local activities, such as the purchase of goods and services within the region. In turn, that portion of spending that accrues to local businesses and employees is once again re-circulated within the local economy, producing additional activity.

The rating scale as it relates to **total economic output** is as follows:

- Least favorable: Less than $1,700,000,000
- Less favorable: $1,700,000,000 - $3,400,000,000
- Moderately favorable: $3,400,000,001 - $5,100,000,000
- Somewhat favorable: $5,100,000,001 - $6,800,000,000
- Most favorable: Greater than $6,800,000,001

3B: What is the cost of delay?

The Texas A&M Transportation Institute publishes an annual *Urban Mobility Report* that summarizes the impacts of congestion on our economy (http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/mobility-report-2012.pdf). A few excerpts from the 2012 report include:

> "In many regions, traffic jams can occur at any daylight hour, many nighttime hours and on weekends. The problems that travelers and shippers face include extra travel time, unreliable travel time and a system that is vulnerable to a variety of irregular congestion-producing occurrences…. Congestion wastes a massive amount of time, fuel and money…. [It] affects people who travel during the peak period….[and] is also a problem at other hours…. Trucks become a mobile warehouse; and if their arrival times are missed, production lines can be stopped, at a cost of many times the value of the truck delay times."

According to the Texas A&M Transportation Institute, the value of travel time delay is estimated at $16.79 per hour of person travel and $86.81 per hour of truck time. The total vehicle hours of delay (from Criterion 2C) is directly proportional to the cost of delay. In response to the narrow range of differences between the alternatives in the Phoenix Metropolitan Area, the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Alternative with the highest total cost of delay
- Moderately favorable: 10 – 20% less cost of delay than the alternative with the highest total cost of delay
- Somewhat favorable: 20 – 40% less cost of delay than the alternative with the highest total cost of delay
- Most favorable: n/a

Transportation Plans and Policies

4A: How well is this alternative consistent with funded transportation projects?

In the Phoenix Metropolitan Area, the alternatives that rated most favorable are funded in the Maricopa Association of Governments' (MAG) Regional Transportation Plan (RTP) for a minimum of a 4-lane high capacity, access-controlled facility, or if the facility already exists, it has excess capacity to handle I-11 trade corridor-level traffic without improvements. Those that rated least favorable have nothing funded, or the funded improvements are not consistent with a 4-lane high capacity, access-controlled facility. The rating for each alternative is based on the percentage of the alternative that is consistent with MAG's RTP, as described above. The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with funded transportation projects
- Less favorable: Approximately 25% of the alternative is consistent with funded transportation projects
- Moderately favorable: Approximately 50% of the alternative is consistent with funded transportation projects
- Somewhat favorable: Approximately 75% of the alternative is consistent with funded transportation projects
- Most favorable: All of the alternative is consistent with funded transportation projects

4B: How well is this alternative consistent with long-term transportation visions and plans?

In the Phoenix Metropolitan Area, the alternatives included as "illustrative projects" in the MAG RTP as a high capacity, access-controlled facility rated most favorable as being consistent with this long-term transportation vision; those not included as such rated least favorable (**Figure 11** and **Figure 12**). The rating for each alternative is based on the percentage of the alternative that is consistent with the MAG RTP. The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with long-term transportation visions and plans
- Less favorable: Approximately 25% of the alternative is consistent with long-term transportation visions and plans
- Moderately favorable: visions Approximately 50% of the alternative is consistent with long-term transportation and plans
- Somewhat favorable: visions Approximately 75% of the alternative is consistent with long-term transportation and plans
- Most favorable: All of the alternative is consistent with long-term transportation visions and plans

Environmental Sustainability

The Environmental Sustainability category was evaluated based on input received from the AGFD, TNC, the Sonoran Institute, Archaeology Southwest, the Arizona Department of Environmental Quality, Sonoran Audubon Society, Maricopa County Parks and Recreation, Arizona Wildlife Federation, and Sierra Club - Grand Canyon Chapter. **Figure 13** illustrates the major environmental constraints in the Phoenix Metropolitan Area, shown in green shading and labeled accordingly. Please note that this map does not illustrate all environmental layers available, but rather provides context to specific environmental constraints noted in the evaluation matrix, including such elements as designated AGFD habitat areas, Bureau of Land Management's (BLM's) areas of critical environmental concern (ACEC), wilderness areas, national monuments, designated Important Bird Areas, and others.

Figure 11. MAG RTP Illustrative Corridors: Hassayampa

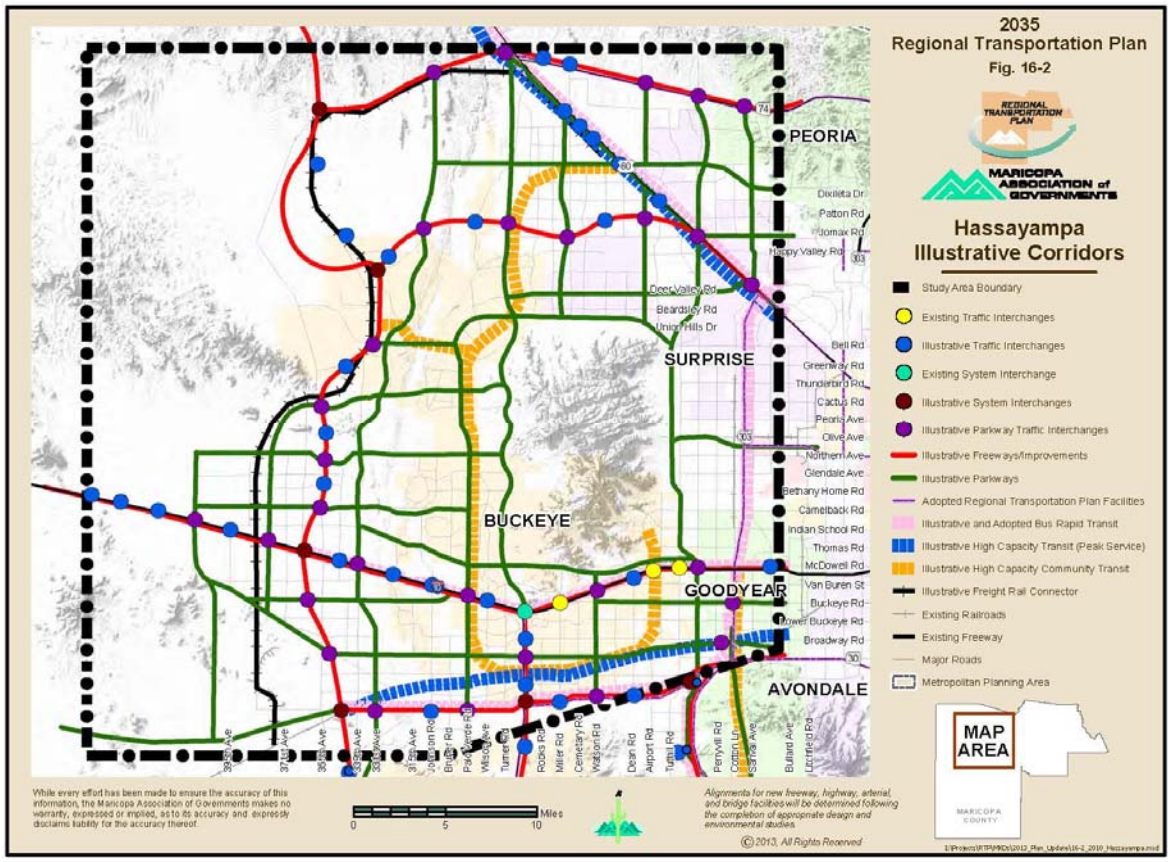


Figure 12. MAG RTP Illustrative Corridors: Hidden Valley

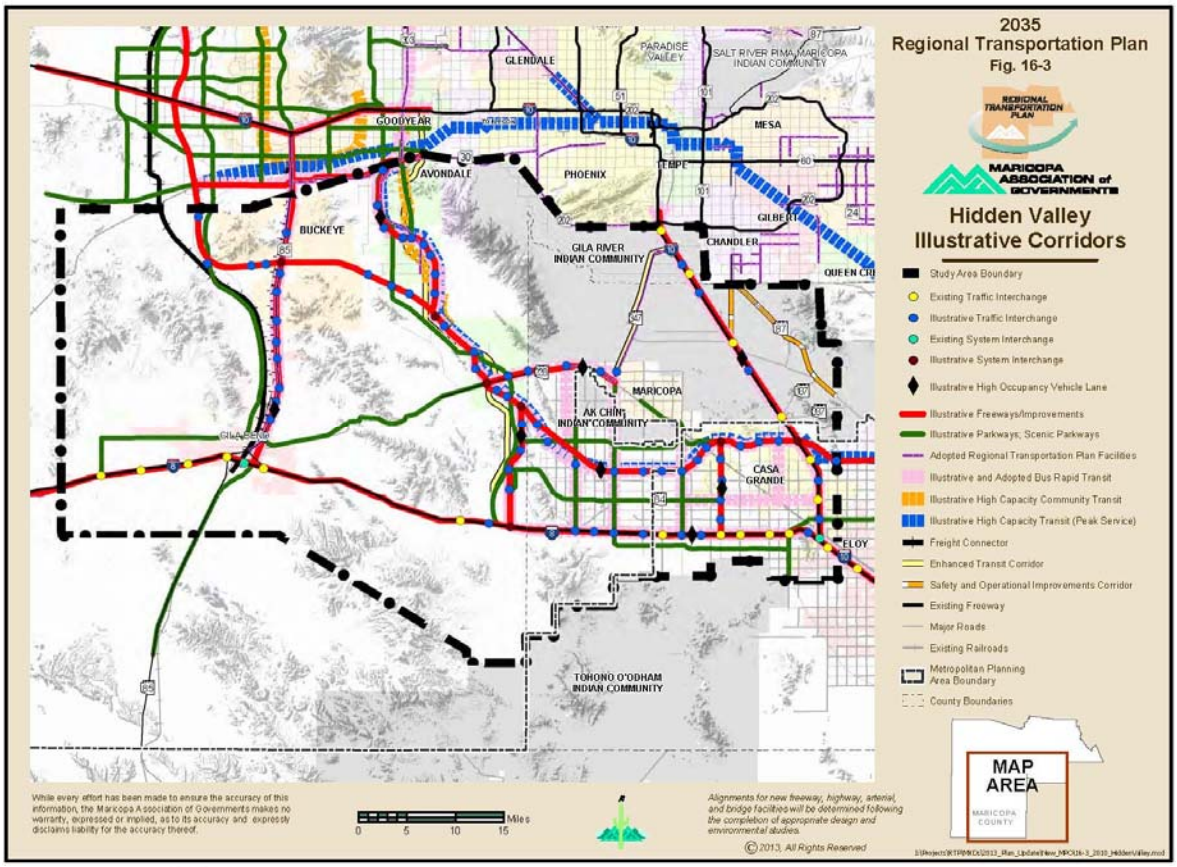
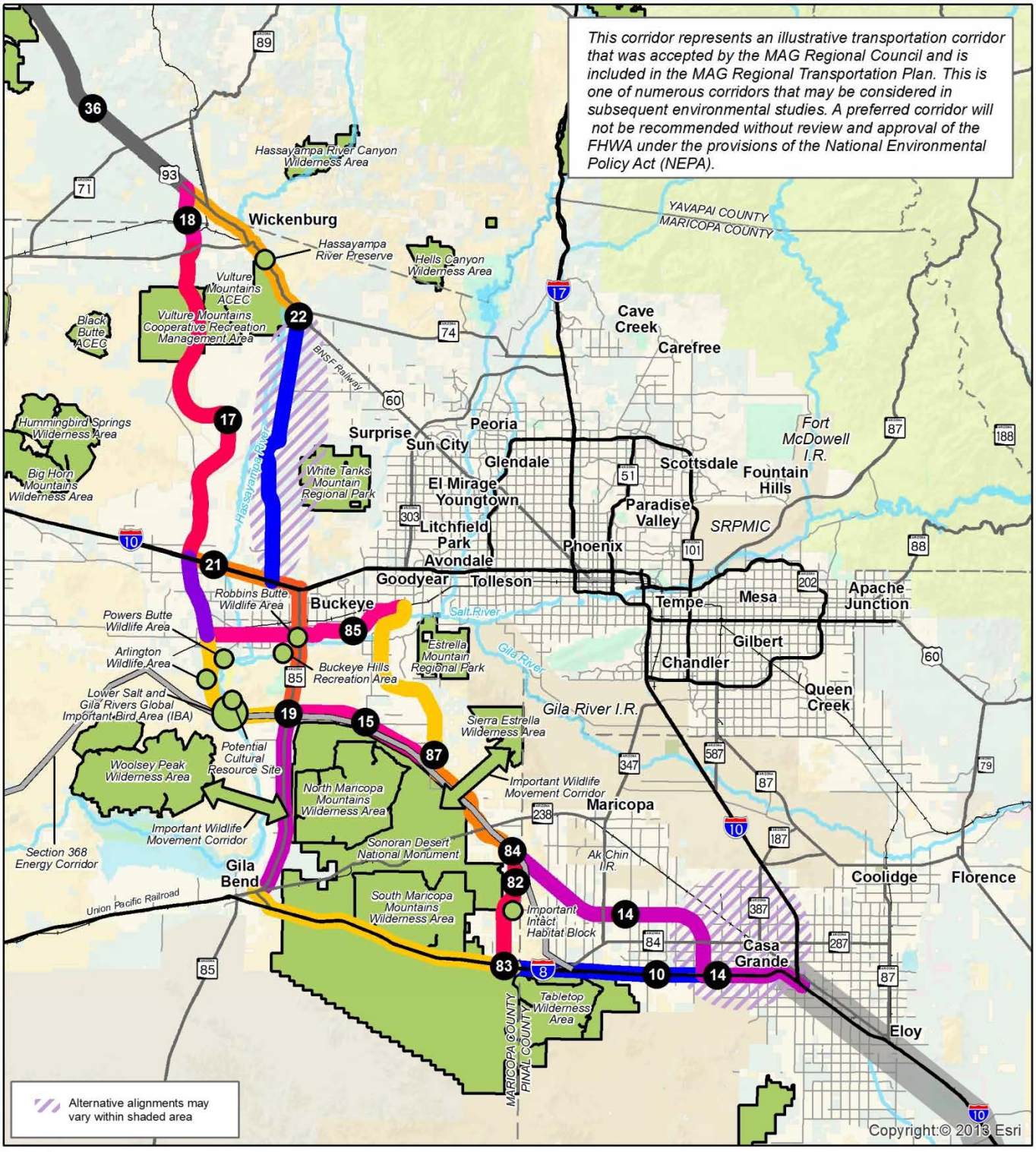


Figure 13. Phoenix Metropolitan Area: Key Environmental Constraints



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

AGFD and TNC completed their own analyses using geographic information systems (GIS) data layers to provide input on which alternatives and/or segments had significant environmental impacts, specifically noting those where mitigation was feasible (or not). These analyses also noted alternatives that provided opportunities to improve wildlife linkages. These detailed analyses are provided in Appendix B and Appendix C.

5A: What is the impact to wildlife corridors and/or habitat blocks?

Each alternative is rated based on the degree to which a corridor impacts various wildlife corridors and/or habitat blocks, as shown on Figure 13, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

5B: What is the impact to land managed for conservation or wildlife purposes?

Each alternative is rated based on the degree to which a corridor impacts land managed for conservation or wildlife purposes, as shown on Figure 13, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

5C: How many linear miles of undisturbed waterways/ floodplains are impacted?

The linear miles of undisturbed floodplains that each alternative traverses were calculated by overlaying the alternatives onto Federal Emergency Management Agency (FEMA) 100-year floodplain data. Existing roadways with drainage infrastructure already in place received the highest rating, as these are not considered undisturbed. The number of linear miles of each alternative impacted by floodplains in the Phoenix metropolitan area ranges from 0 to 12, therefore the ratings for this criteria range as follows:

- Least favorable: The alternative impacts over 9 miles of currently undisturbed waterways/ floodplains
- Less favorable: 6.1 to 9 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Moderately favorable: 3.1 to 6 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Somewhat favorable: 0.1 to 3 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Most favorable: The alternative impacts less than 0.1 miles of currently undisturbed waterways/ floodplains

5D: What is the general impact to air quality conditions with this alternative?

Based upon the relative quantity of emissions, duration of emissions from different activities, and potential air quality health impacts to the greatest number of people, the following assumptions were used to evaluate the alternatives:

- Short-term impacts from construction were considered to have a lower impact than long-term impacts from construction vehicle emissions and road dust from roadway use
- Impacts in less densely populated areas as compared with other alternatives were considered to have a lower impact that impacts in more densely populated areas as compared with the other alternatives
- Impacts from alternatives with steeper grades were considered to have higher impacts than alternatives at grade
- If all other factors were essentially the same, the amount of construction needed was used to distinguish between alternatives

In summary, relatively low impacts in less densely populated areas as compared with other alternatives were considered better than relatively high impacts in the relatively more densely populated areas. The rating scale is as follows:

- Least favorable: Construction impacts in a populated area and/or relatively higher long-term operational impacts in a relatively more densely populated area
- Less favorable: Construction impacts in a populated area and/or relatively lower long-term operational impacts in a relatively densely populated area
- Moderately favorable: Relatively low construction impacts and/or relatively lower long-term operational impacts in a relatively less densely populated area
- Somewhat favorable: Relatively low construction impacts and/or lower long-term operational impacts than other alternatives in a sparsely populated area
- Most favorable: Relatively equal or lower construction impacts and/or relatively lower long-term operational impacts

5E: What additional environmental concerns were identified by stakeholders?

Various resource agencies and stakeholder partners identified additional potential environmental concerns such as impacts to environmental justice communities, recreational and visual impacts. Each alternative is rated based on the degree to which a corridor impacts known additional environmental factors, as provided by various resource agencies and stakeholder partners on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

Land Use and Ownership

6A: How consistent is this alternative with regional and local land use plans (including tribal plans, if available)?

Land use maps and information from comprehensive/general/master plans along the corridor were reviewed for consistency with a high capacity, access-controlled transportation facility. Supportive land uses near the corridor were considered to be industrial, regional commercial, business park, employment, and others that would denote clustered activity center development. In addition, proximity to multimodal and freight and logistics-related facilities was considered consistent land use.

- Least favorable: No part of the alternative is consistent with land use plans
- Less favorable: Approximately 25% of the alternative is consistent with land use plans

- Moderately favorable: Approximately 50% of the alternative is consistent with land use plans
- Somewhat favorable: Approximately 75% of the alternative is consistent with land use plans
- Most favorable: All of the alternative is consistent with land use plans

6B: How compatible is this alternative with major land ownership patterns and resource plans?

Alternatives were evaluated based on the compatibility of a major transportation infrastructure facility to traverse land under state or federal ownership, including such landowners as BLM, Bureau of Reclamation, U.S. Military, National Park Service, state land departments, state parks, tribal communities, U.S. Fish and Wildlife, and U.S. Forest Service. Built private lands were considered less compatible than undeveloped private lands.

- Least favorable: No part of the alternative is compatible with land ownership patterns
- Less favorable: Approximately 25% of the alternative is compatible with land ownership patterns
- Moderately favorable: Approximately 50% of the alternative is compatible with land ownership patterns
- Somewhat favorable: Approximately 75% of the alternative is compatible with land ownership patterns
- Most favorable: All of the alternative is compatible with land ownership patterns

Community Acceptance

7A: How well is this alternative accepted by the Core Agency Partners (CAP)?

Input received from the CAP at the January 2014 CAP meeting, as well as input received during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a "moderately favorable" rating. Alternatives that received mostly supportive comments received the "somewhat favorable" rating, and alternatives that received mostly non-supportive comments received the "less favorable" rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7B: How well is this alternative accepted by the Stakeholder Partners?

Input received from Stakeholder Partners and their constituents at the January 2014 stakeholder partner meetings, as well as input received via the online comment form and via phone/email during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a "moderately favorable" rating. Alternatives that received mostly supportive comments received the "somewhat favorable" rating, and alternatives that received mostly non-supportive comments received the "less favorable" rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7C: How well is this alternative accepted by the general public?

Input received from the virtual public outreach effort that was conducted from 4 p.m. February 10 through 8 a.m. March 11, 2014, was considered in determining the degree of acceptance by the public at large of an alternative. This was conducted through an online survey system, where the public was asked to rate their impression of each corridor alternative in the five study area segments. The surveys did not ask for preference of one alternative over another, but asked for general opinion/support of each alternative independently. The feedback received was not statistically valid; the data might have included sample validity, non-responsive bias, stakeholder bias, and unverified respondents. The feedback received was reviewed on a qualitative rating scale that included five categories ranging from strongly opposed to strongly prefer.

- Least favorable: Mostly strongly oppose
- Less favorable: Mostly oppose
- Moderately favorable: Neutral
- Somewhat favorable: Mostly prefer
- Most favorable: Mostly strongly prefer

Cost

8A: What is the order of magnitude cost for this alternative, including construction and right-of-way?

Cost estimates were based on the NDOT cost estimating tool, Project Estimation Wizard, plus an order of magnitude cost for right-of-way. Assumptions used to develop these cost estimates are summarized in Appendix I. Alternative were rated based on the following scale:

- Least favorable: Greater than $4,700,000,000
- Less favorable: $3,600,000,000 - $4,700,000,000
- Moderately favorable: $2,400,000,000 - $3,600,000,000
- Somewhat favorable: $1,200,000,000- $2,400,000,000
- Most favorable: Less than $1,200,000,000

Level 2 Evaluation Results

Just as in the Level 1 screening, the evaluation rating scale is strictly relative – alternatives were considered in relation to each other in the same project segment. If an alternative receives the highest rating, it may still face issues or obstacles with respect to that criterion. The color scheme for the qualitative rating scale is as follows:

Most Favorable	Somewhat Favorable	Moderately Favorable	Less Favorable	Least Favorable

The following summary sheets provide an overview of the Level 2 evaluation for each alternative in the Phoenix Metropolitan Area, including a map of the alternative, major opportunities/constraints, followed by the detailed evaluation rating scales and notes.

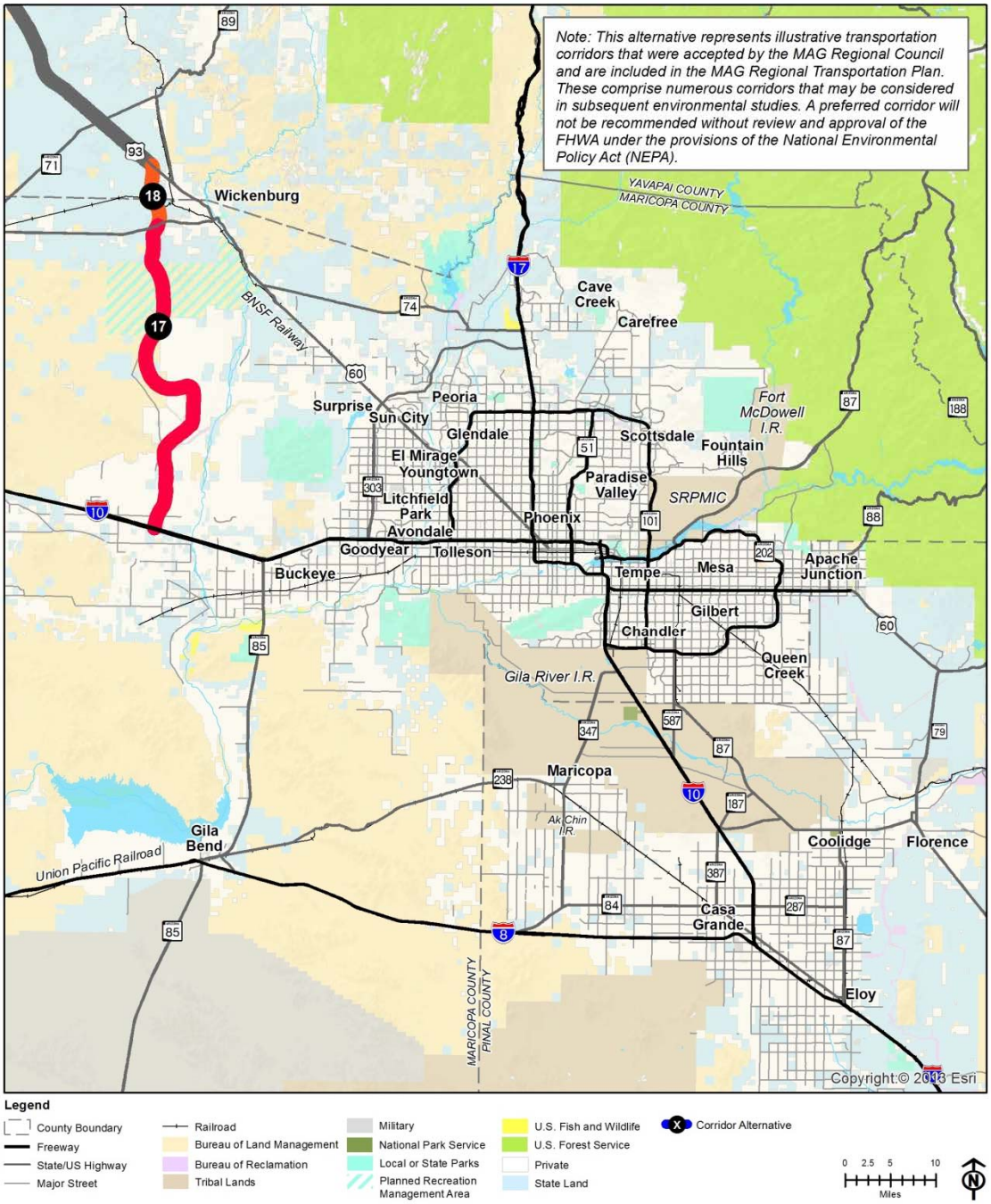
Alternative G/H/LL/MM - North

Opportunities

- Entire corridor included as a future freeway/multimodal corridor in the bqAZ Statewide Transportation Framework Study; reflected in consistency of local transportation and land use plans
- Ability to accommodate multiple modes and uses through all of corridor
- Planned land uses are generally compatible with implementation of a major trade corridor

Constraints

- Potential habitat and land ownership constraints because corridor traverses the planned BLM Vulture Mountains Cooperative Recreation Area
- High Impact anticipated to sensitive species, habitat, wildlife movement and land managed for conservation



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Alternative G/H/LL/MM – North			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through all of the corridor.
Capacity/ Congestion	2A Travel time savings over No-Build?		Less than 5 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Less than 10 percent greater long distance VMT than Alternative LL.
	2C Total VHD?		10 - 20 percent less delay than Alternative I.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $3,400,000,001 - $5,100,000,000.
	3B Cost of delay?		10 - 20 percent less cost of delay than Alternative I.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Entire corridor (proposed Hassayampa Freeway) not funded in MAG 2035 RTP (included as an “illustrative corridor “) - not consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeway in the bqAZ Statewide Framework Study. Majority of corridor defined as proposed Hassayampa Freeway and “potential future Interstate “ - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, the majority of the corridor is seen to have potentially high impact to wildlife corridors and habitat blocks (proposed Hassayampa Freeway corridor through Maricopa County). Per TNC, this corridor could cause habitat loss or degradation to Sonoran Desert Tortoise, although mitigation opportunities are available.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, a small portion of this corridor is seen to have potentially high impact to land managed for conservation due to the traversal of the planned BLM Vulture Mountain Cooperative Management Recreation Area. Per TNC, the same applies - this corridor would impact the Vulture Mountains ACEC unless altered.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 5.6 miles of undisturbed floodplains.
	5D General impact to air quality?		Higher short-term operational impacts from construction than Alternative MM.
	5E Additional environmental concerns identified by stakeholders?		Potential impact to outdoor recreational opportunities, including access.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses are generally compatible with implementation of a major trade corridor throughout this alternative, including the development of several master plans in Buckeye and Maricopa County oriented toward freeway development (business park, industrial), the proximity of the corridor to the Wickenburg Airport, and growth nodes, as identified by the Town of Wickenburg.
	6B Compatible with major land ownership patterns and resource plans?		Mostly compatible with land ownership patterns (undeveloped private, State Land, and BLM). Corridor portion through planned Vulture Mountain Cooperative Recreation Management Area still under consideration and coordination (BLM, MAG, Maricopa County Parks and Recreation, and Maricopa County Department of Transportation).
Community Acceptance	7A Core Agency Partners?		Mostly supportive comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $2,708,000,000.

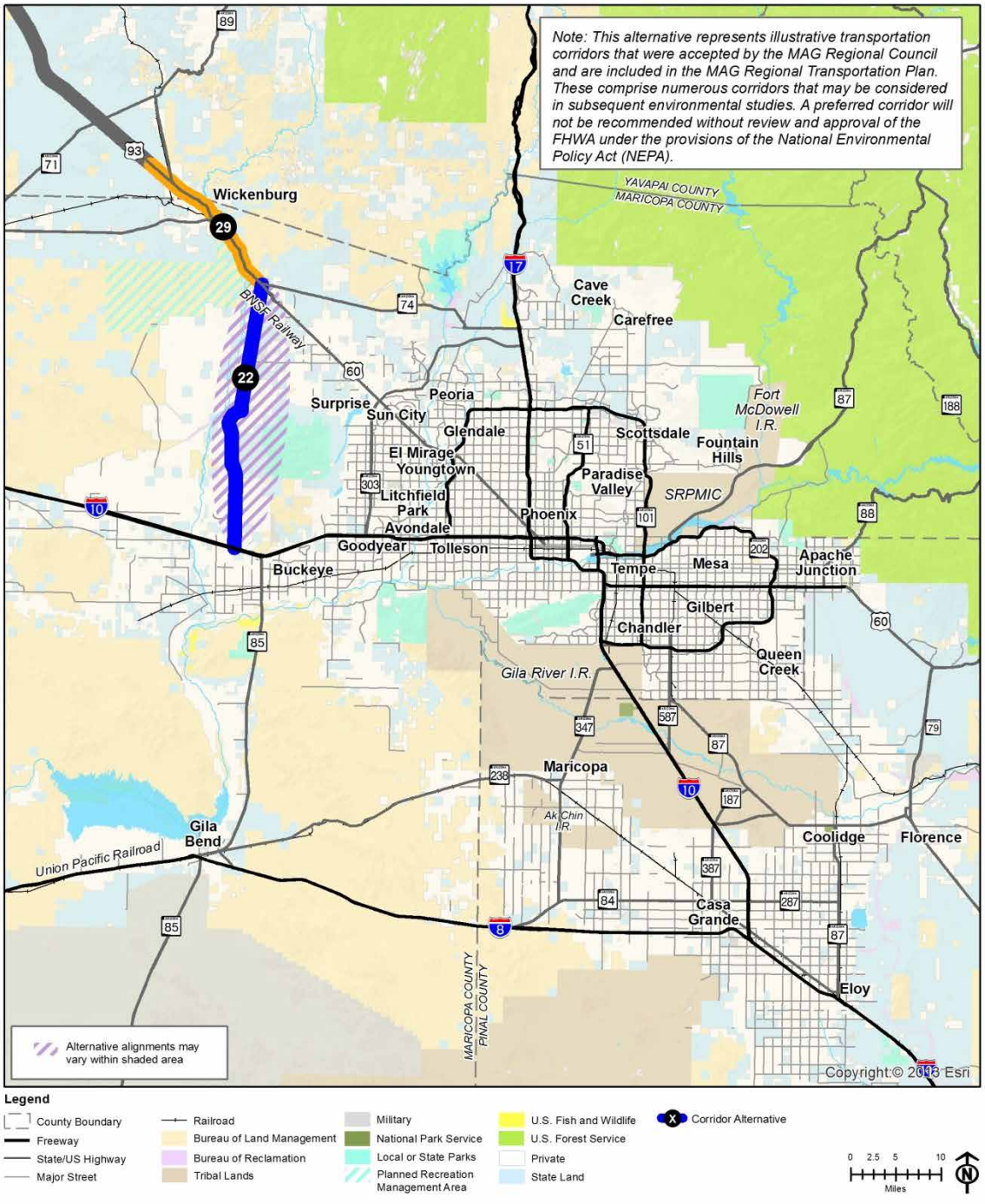
Alternative I - North

Opportunities

- Avoids planned BLM Vulture Mountains Cooperative Recreation Management Area

Constraints

- Limited ability to accommodate multiple modes and uses due to significant right-of-way and land use constraints
- Not consistent with local, regional, or statewide transportation plans or visions
- High impact anticipated to sensitive species, habitat, wildlife movement, and land managed for conservation



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative I - North			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Limited ability to accommodate multiple modes due to significant right-of-way and land use constraints along the corridor; however reasonable alternate corridors can be developed to accommodate other modes. An alternative corridor could utilize the Arizona Passenger Rail Corridor to central Phoenix, and either the UPRR Wellton Branch to the proposed Hassayampa Freeway or the Grand Avenue/US-60 BNSF corridor to Wickenburg.
Capacity/ Congestion	2A Travel time savings over No-Build?		Greater than 10 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		10 - 20 percent greater long distance VMT than Alternative LL.
	2C Total VHD?		Highest total vehicle hours of delay.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $1,700,000,000 - $3,400,000,000.
	3B Cost of delay?		Highest total cost of delay.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Segment 22 (Sun Valley/Turner Parkway) not included in MAG 2035 RTP (existing Sun Valley/Turner Parkway shown as an eight lane parkway) - not consistent. No funded improvements for US-60 (currently a four-lane divided highway); not access-controlled - not consistent.
	4B Consistent with long-term transportation visions and plans?		Corridor is not included in bqAZ (Sun Valley/Turner Parkway planned to be upgraded to a parkway only; no plans on US-60) - not consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, this entire corridor is seen to have potentially high impact to wildlife corridors and habitat blocks, specifically due to the proximity to high quality riparian habitat in the Hassayampa River Preserve. Per TNC, impacts to the Lower Hassayampa River could degrade or cause loss to wildlife and habitat, notably ESA Endangered and Proposed Threatened species, including Bonytail, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, and ESA Candidate species Sonoran Desert Tortoise.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, this entire corridor is seen to have potentially high impact to land managed for conservation purposes due to the proximity of the corridor to the planned BLM Vulture Mountain Cooperative Management Recreation Area and White Tank Regional Park. Per TNC, this corridor would impact the Hassayampa River Preserve, an area acquired for conservation purposes.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 0.6 miles of undisturbed floodplains.
	5D General impact to air quality?		More long-term operational impacts to populated areas.
	5E Additional environmental concerns identified by stakeholders?		Potential visual impacts related to White Tank Mountain Regional Park.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses along this alternative are primarily focused toward residential- and resort-oriented master planned community growth (Buckeye/Maricopa County/ASLD) and open space/environmentally-sensitive areas - not that of a major trade corridor. Major employment center planned adjacent to I-10/Sun Valley Parkway interchange.
	6B Compatible with major land ownership patterns and resource plans?		Partially compatible with land ownership patterns (primarily private, State Land, and BLM) in northern portion of corridor. ASLD land, located within White Tanks Master Land Use Plan, and BLM/ASLD land immediately north of I-10/SR-85 interchange would generally be considered incompatible with trade corridor development.
Community Acceptance	7A Core Agency Partners?		Mostly non-supportive comments.
	7B Stakeholder Partners?		Mostly supportive comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "strongly prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $1,416,000,000.

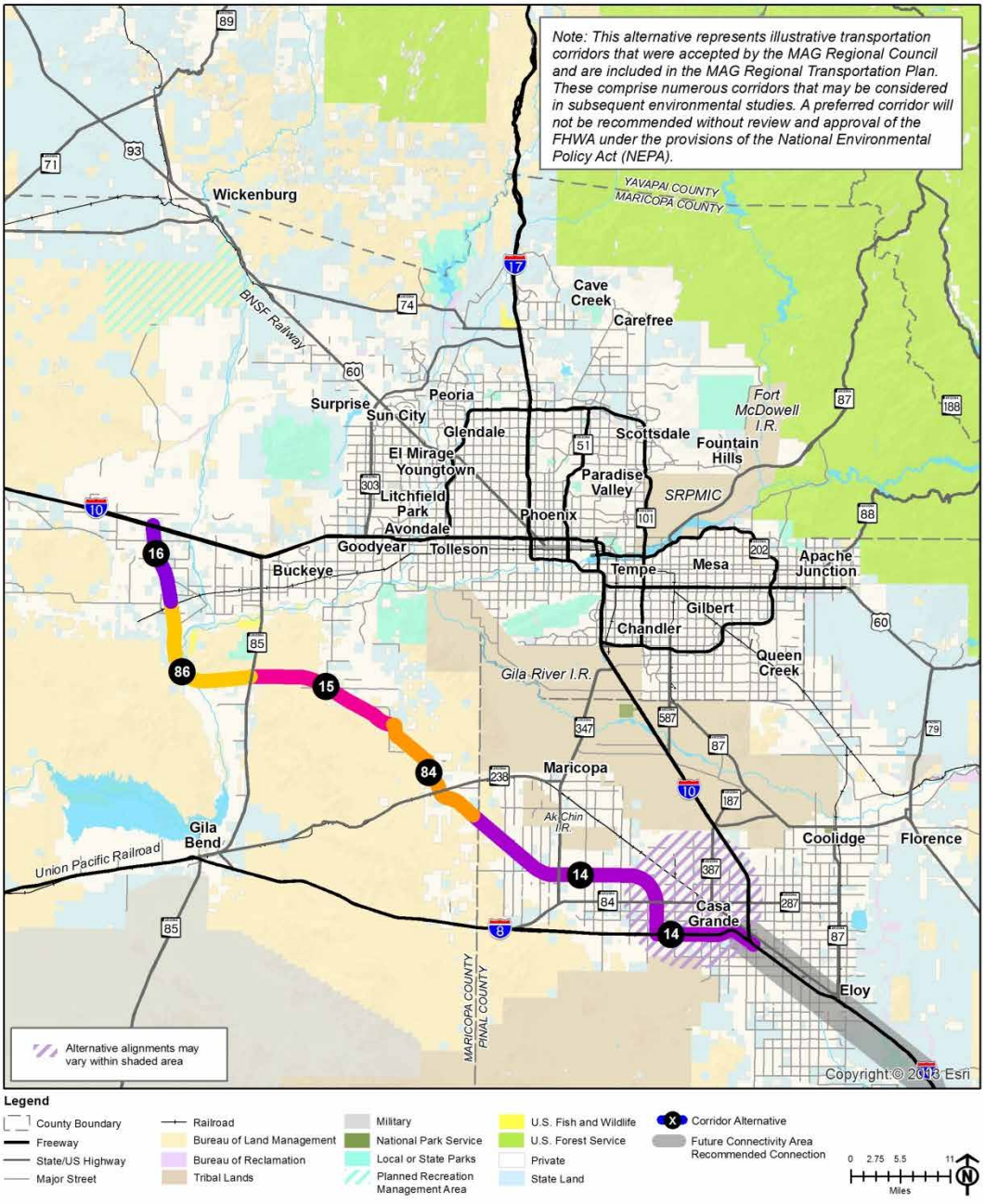
Alternative G - South

Opportunities

- Entire corridor included as a future freeway in the bqAZ Statewide Transportation Framework Study; reflected in consistency of local transportation and land use plans
- Compatibility with major land ownership categories; segments 15 and 84 within Section 368 energy corridor where current regional infrastructure exists and other major facilities are planned
- Ability to accommodate multiple modes and uses through all of corridor

Constraints

- High impact anticipated (particularly in portions of Segment 86) to sensitive species, habitat, wildlife movement, land managed for conservation, and floodplains; potential to form wildlife movement barrier through Sonoran Desert National Monument
- Potential cultural resource impacts



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative G - South			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through all of the corridor.
Capacity/ Congestion	2A Travel time savings over No-Build?		Less than 5 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Less than 10 percent greater long distance VMT than Alternative LL.
	2C Total VHD?		10 - 20 percent less delay than Alternative I.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $5,100,000,001 - $6,800,000,000.
	3B Cost of delay?		10 - 20 percent less cost of delay than Alternative I.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Proposed Hassayampa Freeway portion not funded in MAG 2035 RTP (included as an "illustrative corridor") - not consistent. I-8 portion of Segment 14 already includes four lanes in each direction with no funded improvements ; excess capacity exists - consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeway in the bqAZ Statewide Framework Study. Majority of corridor defined as proposed Hassayampa Freeway and "potential future Interstate" - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, majority of the corridor is seen to have potentially high impact to wildlife corridors and habitat blocks. The greatest impacts are focused on the proposed Hassayampa Freeway west of SR-85, with moderate to high impacts on the same corridor throughout Maricopa County (paralleling north border of Sonoran Desert National Monument). The latter is anticipated to form a new barrier for wildlife movement, already pinned in by I-8 and SR-85.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, about half of this corridor is seen to have potentially high impact to land managed for conservation. The proposed Hassayampa Freeway west of SR-85 traverses the Lower Salt and Gila Rivers Important Bird Area (IBA), as designated by the National Audubon Society. The proposed freeway link would significantly impact wildlife conservation in proximity to the Sonoran Desert National Monument and Arlington and Powers Butte Wildlife Areas.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 12.4 miles of undisturbed floodplains.
	5D General impact to air quality?		Higher short-term operational impacts from construction than Alternative MM.
	5E Additional environmental concerns identified by stakeholders?		Traverses cultural resource sites at Lower Salt and Gila Rivers IBA. Potential impact to outdoor recreational opportunities, including access.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses are generally compatible with implementation of a major trade corridor throughout this alternative, including the development of several master plans in Buckeye and Goodyear oriented toward freeway development (business park, industrial), and clusters of employment land uses along Montgomery Road and I-8 in Casa Grande/Pinal County. In addition, Pinal County has designated several high intensity activity centers along this corridor, paired with Casa Grande's designation of commerce/business and manufacturing/industry along this route.
	6B Compatible with major land ownership patterns and resource plans?		Generally compatible with land ownership patterns (primarily undeveloped private, State Land, and BLM); alternative proposed within multi-use utility corridor paralleling northern boundary of Sonoran Desert National Monument where current regional infrastructure exists and other major facilities are planned (Section 368 energy corridor).
Community Acceptance	7A Core Agency Partners?		Mostly supportive comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $4,772,000,000.

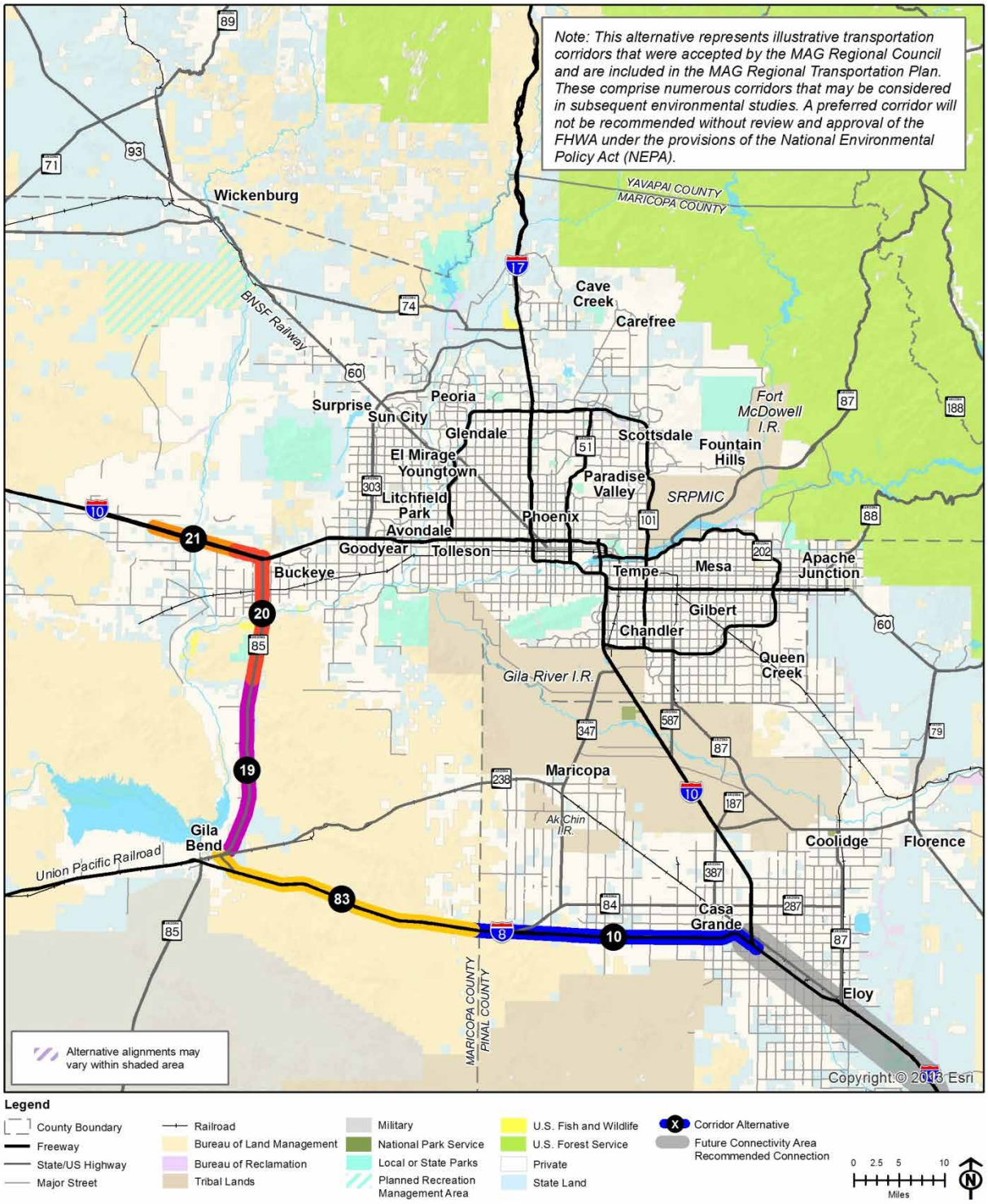
Alternative H - South

Opportunities

- Minimal environmental impacts anticipated due to use of existing corridors; opportunities to improve habitat connectivity through corridor improvement
- Lowest preliminary estimated total cost

Constraints

- Minimal travel time savings over No-Build



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative H - South			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through most of the corridor, with the possible exceptions of minor right-of-way and to a lesser extent land use constraints in the urban areas of Gila Bend and Buckeye.
Capacity/ Congestion	2A Travel time savings over No-Build?		Less than 5 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		10 - 20 percent greater long distance VMT than Alternative LL.
	2C Total VHD?		10 - 20 percent less delay than Alternative I.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $3,400,000,001 - $5,100,000,000.
	3B Cost of delay?		10 - 20 percent less cost of delay than Alternative I.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		No new improvements currently funded for I-10. South of I-10, no new improvements funded for SR-85 (four-lane state highway; limited access) or I-8 (four-lane freeway; access-controlled) in MAG 2035 RTP. Excess capacity available - consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeways in the bqAZ Statewide Framework Study. SR-85 and I-8 corridors included to be widened/upgraded - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, moderate habitat impacts are anticipated for this alternative.I-8 through the Sonoran Desert National Monument could have potentially moderate impact to wildlife corridors and habitat blocks.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, a small portion of this corridor is seen to have potentially moderate impact to land managed for conservation due to the proximity of the corridor to the Buckeye Hills Recreation Area and Gila River and Robbins Butte Wildlife Areas.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses no undisturbed floodplains.
	5D General impact to air quality?		Lower construction impacts than Alternative MM, but more long-term operational impacts to populated areas.
	5E Additional environmental concerns identified by stakeholders?		Potential impact to Title VI/Environmental Justice population in/around Town of Gila Bend (per MAG 2035 RTP).
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		This alternative traverses much land that is not expected to see future development due to its designation for planned open space, and as part of the Sonoran Desert National Monument. Therefore, planned land uses will generally not enhance this corridor as a major trade route. At both alternative termini however, clusters of mixed use, business park, industrial, and employment land uses are seen as compatible with trade corridor development. In addition, Pinal County has designated several low intensity and high intensity activity center locations along I-8, paired with Casa Grande's designation of commerce/business along this route.
	6B Compatible with major land ownership patterns and resource plans?		Compatible with land ownership patterns (primarily private, State Land, and BLM); assumes available right-of-way on I-8 through Sonoran Desert National Monument.
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		Mostly supportive comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters were "neutral" to this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $2,533,000,000.

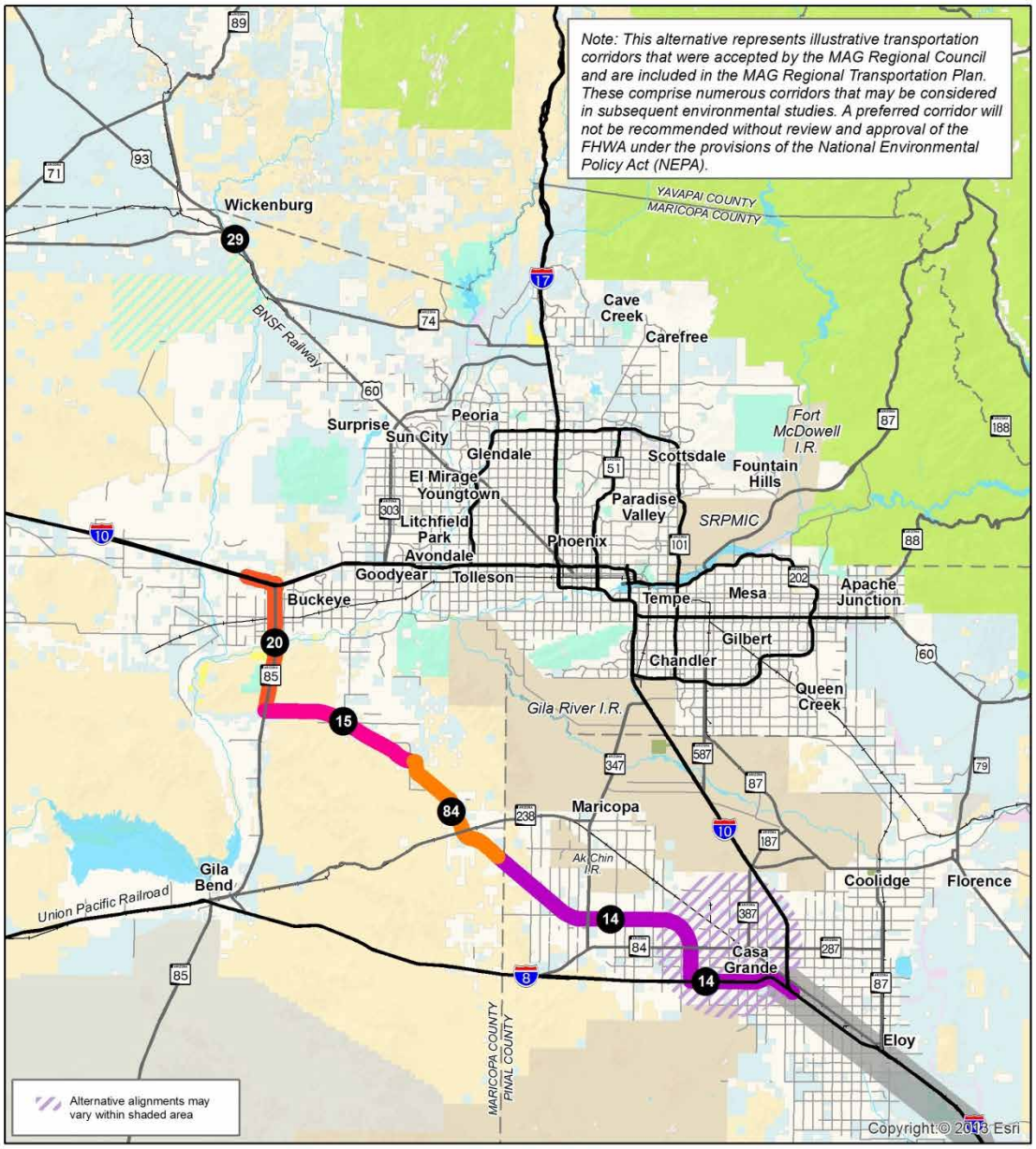
Alternative I - South

Opportunities

- Planned land uses generally compatible with implementation of a major trade corridor
- Compatibility with major land ownership categories; segments 15 and 84 within Section 368 energy corridor where current regional infrastructure exists and other major facilities are planned
- Avoids the major environmental constraints found in segment 86

Constraints

- High impact anticipated to habitat; potential to form wildlife movement barrier through Sonoran Desert National Monument
- More long-term air quality impacts to populated areas anticipated



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative I - South			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through most of the corridor, with the possible exceptions of minor right-of-way and to a lesser extent land use constraints in the urban area of Buckeye.
Capacity/ Congestion	2A Travel time savings over No-Build?		Greater than 10 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		10 - 20 percent greater long distance VMT than Alternative LL.
	2C Total VHD?		Highest total vehicle hours of delay.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $3,400,000,001 - $5,100,000,000.
	3B Cost of delay?		Highest total cost of delay.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		No new improvements funded for SR-85 (four-lane state highway; limited access) or I-8 (four-lane freeway; access-controlled); excess capacity available - consistent. Segments 14, 15, and 84 (proposed Hassayampa Freeway) not funded in MAG 2035 RTP (included as an "illustrative corridor") - not consistent. No systems interchange planned for SR-85 and I-10. Overall - not consistent north I-10.
	4B Consistent with long-term transportation visions and plans?		SR-85 is included to be upgraded to a freeway - consistent. Remainder of corridor included in bqAZ as proposed Hassayampa Freeway and proposed Montgomery Road Freeway - consistent. The portion of the corridor in Pinal County is consistent with corridor planning for the East-West Corridor Study - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, the majority of the corridor is seen to have potentially high impact to wildlife corridors and habitat blocks. Greatest impacts are focused on SR-85 near the Buckeye Hills Recreation Area and proposed Hassayampa Freeway link in Maricopa County (paralleling north border of Sonoran Desert National Monument). This latter link is anticipated to form a new barrier for wildlife movement, which is already pinned in by I-8 and SR-85.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, about half of the corridor is seen to have potentially moderate to high impact to land managed for conservation due to the proximity of the corridor to the Buckeye Hills Recreation Area and the Sonoran Desert National Monument.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 7.3 miles of undisturbed floodplains.
	5D General impact to air quality?		More long-term operational impacts to populated areas.
	5E Additional environmental concerns identified by stakeholders?		Potential impact to outdoor recreational opportunities, including access.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses are generally compatible with implementation of a major trade corridor throughout this alternative, including the development of several master plans in Buckeye and Goodyear oriented toward freeway development (business park, industrial), and clusters of employment land uses along Montgomery Road and I-8 in Casa Grande/Pinal County. In addition, Pinal County has designated several high intensity activity centers along this corridor, paired with Casa Grande's designation of commerce/business and manufacturing/industry along this route.
	6B Compatible with major land ownership patterns and resource plans?		Generally compatible with land ownership patterns (primarily undeveloped private, State Land, and BLM); alternative proposed within multi-use utility corridor paralleling northern boundary of Sonoran Desert National Monument where current regional infrastructure exists and other major facilities are planned (Section 368 energy corridor).
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $3,688,000,000

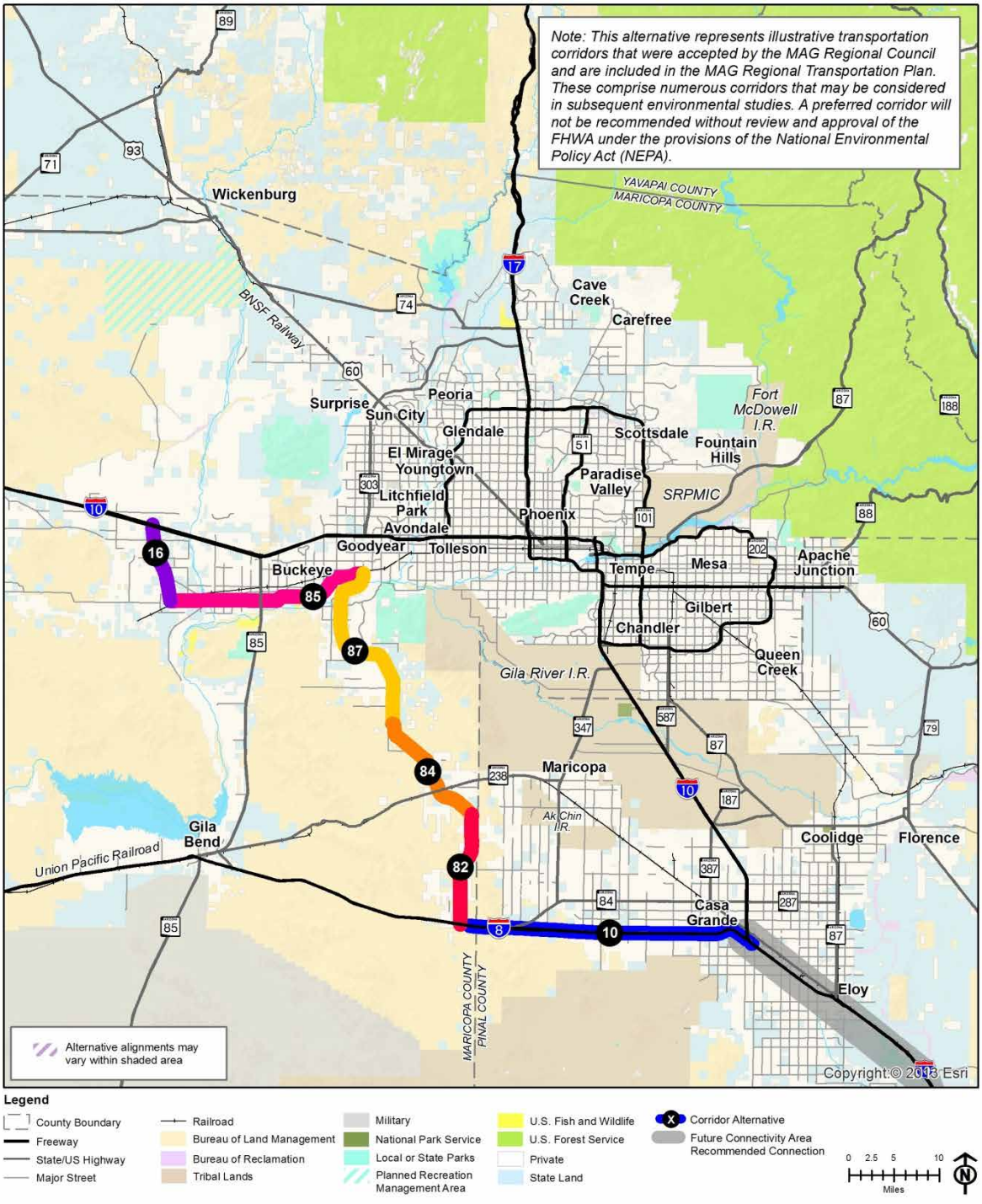
Alternative LL - South

Opportunities

- Entire corridor included as future freeways in the bqAZ Statewide Transportation Framework Study; reflected in consistent local transportation and land use plans
- Ability to accommodate multiple modes and uses through all of corridor

Constraints

- More circuitous route
- Targeted high impact environmental constraints, including habitat loss and degradation due to Segment 82 (Vekol Valley) and contributing to isolate habitat movement to/from the Sonoran Desert National Monument



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Alternative LL - South			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through all of the corridor.
Capacity/ Congestion	2A Travel time savings over No-Build?		Between 5 and 10 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Lowest long distance VMT.
	2C Total VHD?		20 - 40 percent less delay than Alternative I.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is greater than $6,800,000,000.
	3B Cost of delay?		20 - 40 percent less cost of delay than Alternative I.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Segments 16 and 85 (west of SR-85) not included in MAG 2035 RTP - not consistent. Segment 85 east of SR-85 (planned SR-30) funded for a two-lane corridor - not consistent. Segments 87 and 84 planned as a four-lane arterial - not consistent. Segment 82 not included in MAG 2035 RTP - not consistent. No new improvements funded for I-8 (four-lane freeway; access-controlled); excess capacity available - consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeways in the bqAZ Statewide Framework Study. New corridors include: SR-30, SR-303L extensions, proposed Hassayampa Freeway; existing to be widened/upgraded corridors include I-10, SR-85, I-8 - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, about half the corridor is seen to have potentially high impact to wildlife corridors and habitat blocks (proposed SR-30 link and proposed Hassayampa Freeway link/SR-303L Vekol Valley extension). Per TNC, impact to SR-303L Vekol Valley extension segment would cause habitat loss or degradation to desert tortoise and native habitats, and would contribute to isolating the northern portion of Sonoran Desert National Monument.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, about half of the corridor is seen to have potentially moderate to high impact to land managed for conservation due to the proximity of the corridor to the Estrella Mountain Regional Park and the Sonoran Desert National Monument.
	5C Linear miles of undisturbed waterways/floodplains impacted?		Traverses approximately 6.8 miles of undisturbed floodplains.
	5D General impact to air quality?		Largest long-term operational impacts to populated areas.
	5E Additional environmental concerns identified by stakeholders?		Potential impact to outdoor recreational opportunities, including access.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses are generally compatible with implementation of a major trade corridor, as this alternative follows a series of planned freeways. General plan documents include these planned freeways and have oriented planned land uses to be compatible with and take advantage of freeway frontage opportunities (industrial, commercial, employment, business park) (Buckeye, Goodyear, Pinal County). In addition, Pinal County has designated several low intensity and high intensity activity center locations along I-8, paired with Casa Grande's designation of commerce/business along this route.
	6B Compatible with major land ownership patterns and resource plans?		Generally compatible with land ownership patterns (primarily undeveloped private, State Land, and BLM); alternative proposed within multi-use utility corridor paralleling northern boundary of Sonoran Desert National Monument where current regional infrastructure exists and other major facilities are planned (Section 368 energy corridor).
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "oppose" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $4,505,000,000.

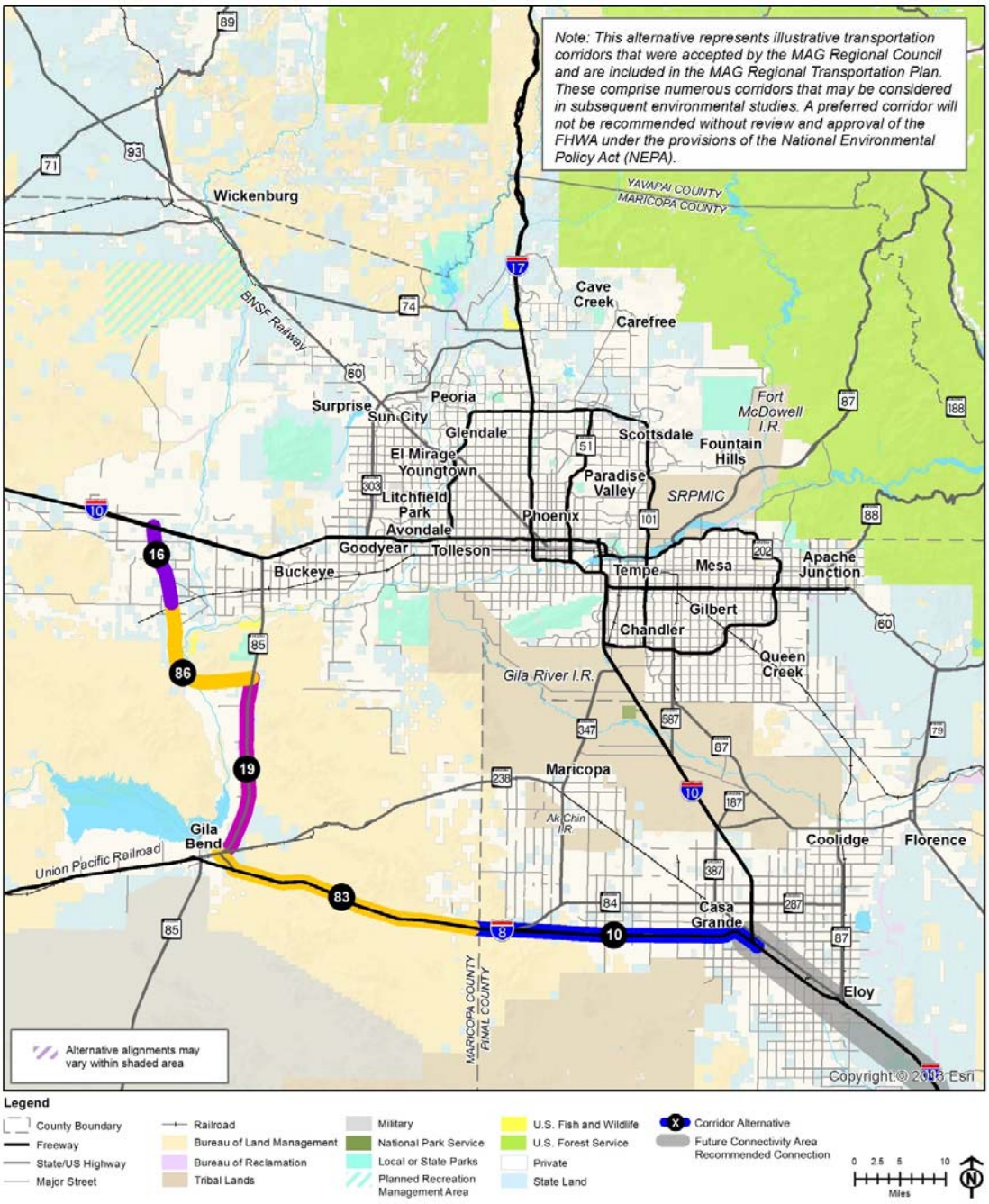
Alternative MM - South

Opportunities

- Uses existing roadways and avoids long-term air quality impacts to populated areas

Constraints

- Moderate to high impact anticipated to sensitive species, habitat, wildlife movement, cultural resources, and land managed for conservation (particularly on segment 86)
- Planned land uses will generally not enhance major trade corridor; traverses much land not expected to see future development due to open space designations



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Alternative MM - South			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through most of the corridor, with the possible exceptions of minor right-of-way and to a lesser extent land use constraints in the urban area of Gila Bend.
Capacity/ Congestion	2A Travel time savings over No-Build?		Greater than 10 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Less than 10 percent greater long distance VMT than LL.
	2C Total VHD?		20 - 40 percent less delay than Alternative I.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $3,400,000,001 - $5,100,000,000.
	3B Cost of delay?		20 - 40 percent less cost of delay than Alternative I.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Segments 16 and 86 not included in MAG 2035 RTP - not consistent. No new improvements funded for SR-85 (four-lane state highway; limited access) or I-8 (four-lane freeway; access-controlled); excess capacity available - consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeways in the bqAZ Statewide Framework Study. SR-85 and I-8 corridors included to be widened/upgraded - consistent. Segment 16 and 86 included as proposed Hassayampa Freeway - consistent. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, about half of the corridor is seen to have potential impact to wildlife corridors and habitat blocks (high impact on the proposed Hassayampa Freeway west of SR-85; moderate impact on I-8 through the Sonoran Desert National Monument).
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, a small portion of this corridor is seen to have potentially high impact to land managed for conservation. The proposed Hassayampa Freeway link west of SR-85 traverses the Lower Salt and Gila Rivers Important Bird Area (IBA), as designated by the National Audubon Society, as well as is proximate to the Gila River and Robbins Butte Wildlife Areas.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 5.1 miles of undisturbed floodplains.
	5D General impact to air quality?		Uses more existing roadway and avoids long-term operational impacts in populated areas.
	5E Additional environmental concerns identified by stakeholders?		Traverses cultural resource sites at Lower Salt and Gila Rivers IBA. Potential impact to outdoor recreational opportunities, including access. Potential impact to Title VI/Environmental Justice population in/around Town of Gila Bend (per MAG 2035 RTP).
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		This alternative traverses much land that is not expected to see future development due to its designation for planned open space, and as part of the Sonoran Desert National Monument. Therefore, planned land uses will generally not enhance this corridor as a major trade route. At key locations however (SR-85/I-8 junction, I-8/I-10 junction, clusters of mixed use, business park, industrial, and employment land uses are seen as compatible with trade corridor development. In addition, Pinal County has designated several low intensity and high intensity activity center locations along I-8, paired with Casa Grande's designation of commerce/business along this route.
	6B Compatible with major land ownership patterns and resource plans?		Compatible with land ownership patterns (primarily private, State Land, and BLM); assumes available right-of-way on I-8 through Sonoran Desert National Monument.
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "oppose" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $2,588,000,000.

Evaluation Results: Northern Arizona/Southern Nevada

The Northern Arizona/Southern Nevada section generally includes the area north of Wickenburg, Arizona to just north of Boulder City, Nevada—inclusive of the Boulder City Bypass project.

The study team conducted the Level 2 evaluation of the following alternatives in Northern Arizona/Southern Nevada based on the recommendations from the Level 1 analysis (see the *Technical Memorandum: Level 1 Evaluation Results Summary*, January 2014):

- Alternative Q
- Alternative UU

Each alternative was rated with respect to each of the Level 2 evaluation criteria. The rating system consisted of a qualitative scale from least to most favorable, with "most favorable" relative rating representing the best performance and "least favorable" relative rating representing the worst performance. An explanation of the evaluation approach for each criterion for Northern Arizona/Southern Nevada follows.

Modal Interrelationships

1A: How well does this corridor provide sufficient opportunity for a multi-use corridor?

Each alternative is rated based on its ability to accommodate multiple modes and multiple uses, as noted below. A description of the multi-use evaluation process and results is included at the end of this document under the Summary of Recommended Reasonable and Feasible Corridors section.

- Least favorable: Cannot accommodate multiple modes due to constraints along the corridor, and alternate corridors cannot be developed to accommodate other modes.
- Less favorable: Cannot accommodate multiple modes due to constraints along the corridor, and less reasonable alternate corridors can be developed to accommodate other modes.
- Moderately favorable: Cannot accommodate multiple modes due to significant constraints along the corridor, however reasonable alternate corridors can be developed to accommodate other modes. Such alternate corridors would be relatively direct, with reasonable implementation.
- Somewhat favorable: Can accommodate multiple modes and uses through most of the corridor, with minor exceptions and where a reasonable deviation could be found.
- Most favorable: Can fully accommodate multiple uses and rail throughout the entire length and within the same footprint rated most favorable for the following reasons: it is likely to be the most direct route, right-of-way could be preserved over the long-term, implementation would be maximized and flexibility preserved for future uses or technologies.

Capacity/Congestion

The I-11 study team used the September 2011 version of Arizona Statewide Travel Demand Model, which is maintained by ADOT. The I-11 study team coded the corridor alternatives into the statewide travel demand model's 2035 model network, which includes existing and planned facilities as reflected in the adopted regional transportation plans. The ADOT travel demand modeling group used these model networks to conduct model runs using the 2035 population and employment projections, and provided the results of these model runs to the

I-11 study team for evaluation. The study team evaluated each corridor for overall travel time savings compared to a no-build condition. Other criteria included corridor vehicle miles of travel and corridor vehicle hours of delay. The Arizona Statewide Model also provided measures for long distance travel. More detailed information on the travel demand modeling methodology and approach is provided in Appendix H.

2A: What are the estimated travel time savings over No-Build (2035)?

In Northern Arizona there is no distinguishable difference in travel time savings between the two alternatives, therefore both were given a neutral rating of moderately favorable.

2B: What are the total long distance vehicles miles traveled (VMT)?

A comparative analysis of the alternatives was calculated for total long distance VMT using the 2035 Arizona statewide travel demand model. Each alternative was compared against the alternative with the lowest VMT. In response to the narrow range of differences between the alternatives in Northern Arizona, the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Lowest long distance VMT alternative
- Moderately favorable: 10 – 20% greater VMT than the lowest long distance VMT alternative
- Somewhat favorable: 20 – 40% greater VMT than the lowest long distance VMT alternative
- Most favorable: n/a

2C: What are the total vehicle hours of delay (VHD)?

A comparative analysis of the alternatives was calculated for total VHD using the Arizona statewide travel demand model. Each alternative was compared against the alternative with the highest total VHD. In response to the narrow range of differences between the alternatives in Northern Arizona, the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Alternative with the highest total VHD
- Moderately favorable: 10 – 20% less delay than the alternative with the highest total VHD
- Somewhat favorable: 20 – 40% less delay than the alternative with the highest total VHD
- Most favorable: n/a

2D: What is the average travel speed on the corridor?

The estimated 2035 average PM peak period, peak direction, travel speed for each alternative is derived from the Arizona statewide travel demand model. The Highway Capacity Manual was referenced to develop the rating scale, which states that 60 mph or greater is considered Level of Service A. Therefore, alternatives with an average travel speed of 60 mph or greater received the highest rating, and the lower speeds were defined based on engineering judgment. The rating scale is as follows:

- Least favorable: Less than 30 mph
- Less favorable: 31 – 45 mph
- Moderately favorable: 46 – 54 mph
- Somewhat favorable: 55 – 60 mph
- Most favorable: Greater than 60 mph

Economic Vitality

3A: What are the expected short-term impacts to the regional economy, as measured by the number of jobs (direct, indirect and induced) and economic output from construction related activities?

Quantitative analysis was conducted based on input from the IMPLAN Version 3.0 model. IMPLAN is an econometric software program utilizing input-output analysis by applying trade flow data and multipliers to investigate the consequences of projected economic transactions in a geographic region. The underlying information is gathered from federal data sets and used to develop custom models for each individual study region. IMPLAN is the most widely employed and accepted regional economic analysis software in the U.S. for predicting economic impacts. An econometric trade flow model was created for both Arizona and Nevada utilizing the IMPLAN software and the most recent 2011 state data packages available. The economic impact findings are measured by the number of jobs, labor income, and economic output from construction related activities:

- Jobs include the full and part time jobs, including self-employed.
- Labor income represents the wages paid to personnel associated with the industry. Includes total wage and salary including benefits of the direct, indirect and induced employees.
- Economic output represents the spending or gross receipts for goods or services generated.

The direct construction spending for each alternative was used to estimate the indirect and induced impacts that would accrue to each state, as described below:

- Indirect economic impacts are those economic activities undertaken by vendors and suppliers within the supply chain of the direct activity as a result of the initial economic activity. For example, suppliers of goods, materials, and services used in the direct activities produce indirect economic impacts.
- Induced economic impacts result from the spending of wages paid to employees in local industries involved in direct and indirect activities. These wages, which are analogous to household spending, support additional local activities, such as the purchase of goods and services within the region. In turn, that portion of spending that accrues to local businesses and employees is once again re-circulated within the local economy, producing additional activity.

The rating scale as it relates to **total economic output** is as follows:

- Least favorable: Less than $1,700,000,000
- Less favorable: $1,700,000,000 - $3,400,000,000
- Moderately favorable: $3,400,000,001 - $5,100,000,000
- Somewhat favorable: $5,100,000,001 - $6,800,000,000
- Most favorable: Greater than $6,800,000,001

3B: What is the cost of delay?

The Texas A&M Transportation Institute publishes an annual Urban Mobility Report that summarizes the impacts of congestion on our economy. A few excerpts from the 2012 report include:

> "In many regions, traffic jams can occur at any daylight hour, many nighttime hours and on weekends. The problems that travelers and shippers face include extra travel time, unreliable travel time and a system that is vulnerable to a variety of irregular congestion-producing occurrences…. Congestion wastes a massive amount of time, fuel and money…. [It] affects people who travel during the peak period….[and] is also a problem at other hours…. Trucks become a mobile warehouse; and if their arrival times are missed, production lines can be stopped, at a cost of many times the value of the truck delay times."

According to the Texas A&M Transportation Institute the value of travel time delay is estimated at $16.79 per hour of person travel and $86.81 per hour of truck time. The total vehicle hours of delay (from Criterion 2C) is directly proportional to the cost of delay. In response to the narrow range of differences between the alternatives in Northern Arizona the rating scale for this criterion does not include the top and bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: Alternative with the highest total cost of delay
- Moderately favorable: 10 – 20% less cost of delay than the alternative with the highest total cost of delay
- Somewhat favorable: 20 – 40% less cost of delay than the alternative with the highest total cost of delay
- Most favorable: n/a

Transportation Plans and Policies

4A: How well is this alternative consistent with funded transportation projects?

In Northern Arizona, the alternatives that rated most favorable are funded in ADOT's Statewide Transportation Improvement Program (STIP) or Western Arizona Council of Governments' (WACOG) Transportation Improvement Program (TIP) for a minimum of a 4-lane high capacity, access-controlled facility, or if the facility already exists, it has excess capacity to handle I-11 trade corridor-level traffic without improvements. Those that rated least favorable have nothing funded or the funded improvements are not consistent with a 4-lane high capacity, access-controlled facility. The rating for each alternative is based on the percentage of the alternative that is consistent with ADOT's STIP or WACOG's TIP, as described above. The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with funded transportation projects
- Less favorable: Approximately 25% of the alternative is consistent with funded transportation projects
- Moderately favorable: Approximately 50% of the alternative is consistent with funded transportation projects
- Somewhat favorable: Approximately 75% of the alternative is consistent with funded transportation projects
- Most favorable: All of the alternative is consistent with funded transportation projects

4B: How well is this alternative consistent with long-term transportation visions and plans?

In Northern Arizona, the alternatives included as illustrative projects in the bqAZ Statewide Transportation Framework Study as a high capacity, access-controlled facility rated most favorable as being consistent with this long-term transportation vision; those not included as such rated least favorable. The rating for each alternative is based on the percentage of the alternative that is consistent with bqAZ. The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with long-term transportation visions and plans
- Less favorable: Approximately 25% of the alternative is consistent with long-term transportation visions and plans

- Moderately favorable: Approximately 50% of the alternative is consistent with long-term transportation visions and plans
- Somewhat favorable: Approximately 75% of the alternative is consistent with long-term transportation visions and plans
- Most favorable: All of the alternative is consistent with long-term transportation visions and plans

Environmental Sustainability

The Environmental Sustainability category was evaluated based on input received from AGFD, TNC, the Sonoran Institute, Archaeology Southwest, Arizona Department of Environmental Quality, Sonoran Audubon Society, Maricopa County Parks and Recreation, Arizona Wildlife Federation, and Sierra Club - Grand Canyon Chapter. **Figure 14** illustrates the major environmental constraints in Northern Arizona, shown in green shading and labeled accordingly. Please note that this map does not illustrate all environmental layers available, but rather provides context to specific environmental constraints noted in the evaluation matrix, including such elements as designated AGFD habitat areas, BLM's areas of critical environmental concern, wilderness areas, national monuments, designated Important Bird Areas, and others.

AGFD and TNC completed their own analyses using GIS data layers to provide input on which alternatives and/or segments had significant environmental impacts, specifically noting those where mitigation was feasible (or not). These analyses also noted alternatives that provided opportunities to improve wildlife linkages. These detailed analyses are provided in Appendix B and Appendix C.

5A: What is the impact to wildlife corridors and/or habitat blocks?

Each alternative is rated based on the degree to which a corridor impacts various wildlife corridors and/or habitat blocks, as shown on Figure 14, on the following scale:

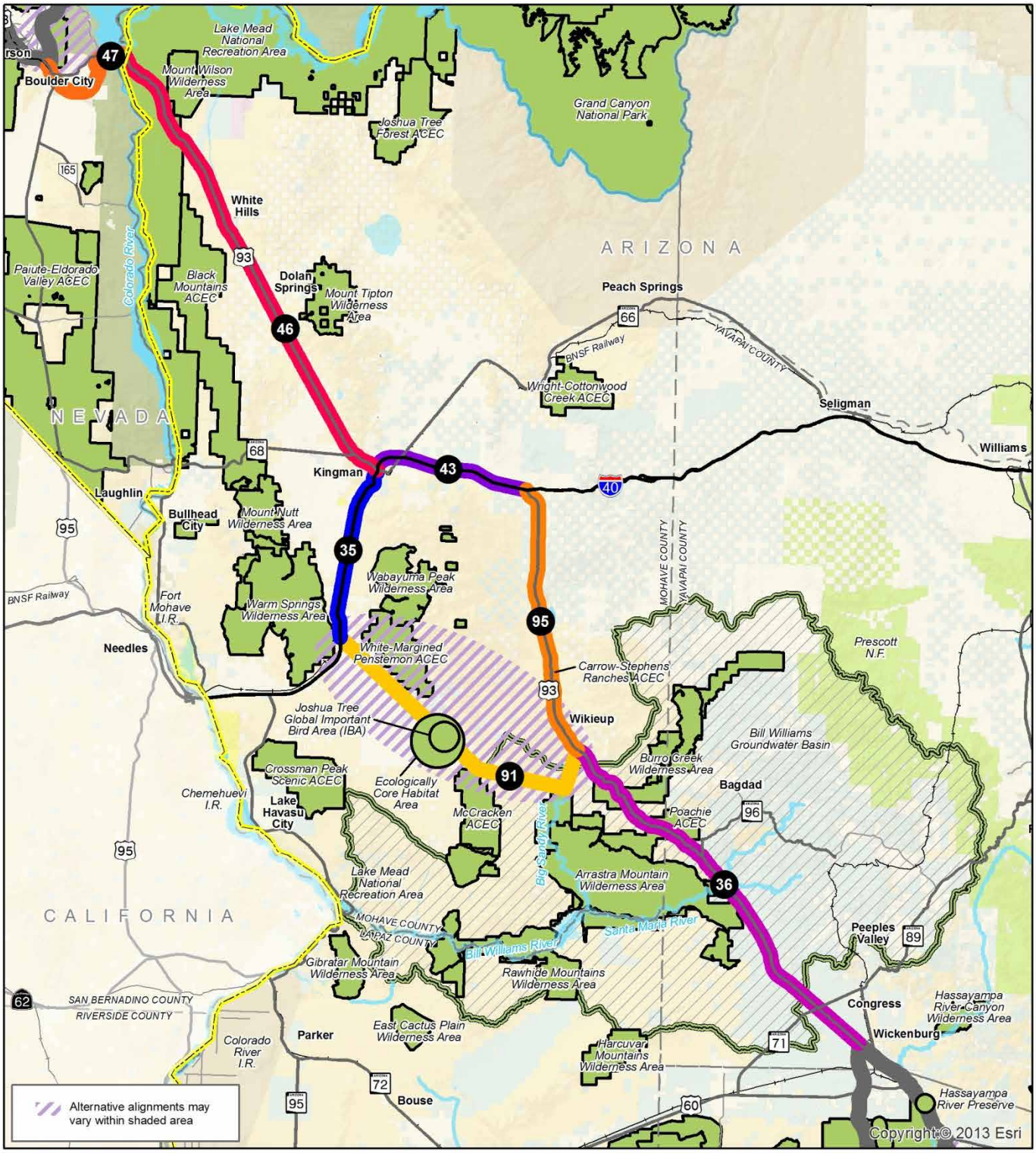
- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

5B: What is the impact to land managed for conservation or wildlife purposes?

Each alternative is rated based on the degree to which a corridor impacts land managed for conservation or wildlife purposes, as shown on Figure 14, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

Figure 14. Northern Arizona/Southern Nevada: Key Environmental Constraints



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5C: How many linear miles of undisturbed waterways/ floodplains are impacted?

The linear miles of undisturbed floodplains that each alternative traverses were calculated by overlaying the alternatives onto FEMA 100-year floodplain data. Existing roadways with drainage infrastructure already in place received the highest rating, as these are not considered undisturbed. In response to the narrow range of differences between the alternatives in Northern Arizona and the minimal number of miles impacted (0 to 2), the rating scale for this criterion does not include the bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: n/a
- Moderately favorable: More than 1.0 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Somewhat favorable: 0.1 to 1.0 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Most favorable: The alternative impacts less than 0.1 miles of currently undisturbed waterways/ floodplains

5D: What is the general impact to air quality conditions with this alternative?

Based upon the relative quantity of emissions, duration of emissions from different activities, and potential air quality health impacts to the greatest number of people, the following assumptions were used to evaluate the alternatives:

- Short-term impacts from construction were considered to have a lower impact than long-term impacts from construction vehicle emissions and road dust from roadway use
- Impacts in less densely populated areas as compared with other alternatives were considered to have a lower impact that impacts in more densely populated areas as compared with the other alternatives
- Impacts from alternatives with steeper grades were considered to have higher impacts than alternatives at grade
- If all other factors were essentially the same, the amount of construction needed was used to distinguish between alternatives

In summary, relatively low impacts in less densely populated areas as compared with other alternatives were considered better than relatively high impacts in the relatively more densely populated areas. The rating scale is as follows:

- Least favorable: Construction impacts in a populated area and/or relatively higher long-term operational impacts in a relatively more densely populated area
- Less favorable: Construction impacts in a populated area and/or relatively lower long-term operational impacts in a relatively densely populated area
- Moderately favorable: Relatively low construction impacts and/or relatively lower long-term operational impacts in a relatively less densely populated area
- Somewhat favorable: Relatively low construction impacts and/or lower long-term operational impacts than other alternatives in a sparsely populated area
- Most favorable: Relatively equal or lower construction impacts and/or relatively lower long-term operational impacts

5E: What additional environmental concerns were identified by stakeholders?

Various resource agencies and stakeholder partners identified additional potential environmental concerns including recreational impacts (e.g. hunting) due to the loss of undisturbed habitat. Each alternative is rated based on the degree to which a corridor impacts known additional environmental factors, as provided by various resource agencies and stakeholder partners, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

Land Use and Ownership

6A: How consistent is this alternative with regional and local land use plans (including tribal plans, if available)?

Land use maps and information from comprehensive/general/master plans along the corridor were reviewed for consistency with a high capacity, access-controlled transportation facility. Supportive land uses near the corridor were considered to be industrial, regional commercial, business park, employment, and others that would denote clustered activity center development. In addition, proximity to multimodal and freight and logistics-related facilities was considered consistent land use.

- Least favorable: No part of the alternative is consistent with land use plans
- Less favorable: Approximately 25% of the alternative is consistent with land use plans
- Moderately favorable: Approximately 50% of the alternative is consistent with land use plans
- Somewhat favorable: Approximately 75% of the alternative is consistent with land use plans
- Most favorable: All of the alternative is consistent with land use plans

6B: How compatible is this alternative with major land ownership patterns and resource plans?

Alternatives were evaluated based on the compatibility of a major transportation infrastructure facility to traverse land under state or federal ownership, including such land owners as BLM, Bureau of Reclamation, U.S. Military, National Park Service, state land departments, state parks, tribal communities, U.S. Fish and Wildlife, and U.S. Forest Service. Built private lands were considered less compatible than undeveloped private lands.

- Least favorable: No part of the alternative is compatible with land ownership patterns
- Less favorable: Approximately 25% of the alternative is compatible with land ownership patterns
- Moderately favorable: Approximately 50% of the alternative is compatible with land ownership patterns
- Somewhat favorable: Approximately 75% of the alternative is compatible with land ownership patterns
- Most favorable: All of the alternative is compatible with land ownership patterns

Community Acceptance

7A: How well is this alternative accepted by the Core Agency Partners (CAP)?

Input received from the CAP at the January 2014 CAP meeting, as well as input received during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a “moderately favorable” rating. Alternatives that received mostly supportive comments received the

"somewhat favorable" rating, and alternatives that received mostly non-supportive comments received the "less favorable" rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7B: How well is this alternative accepted by the Stakeholder Partners?

Input received from Stakeholder Partners and their constituents at the January 2014 stakeholder partner meetings, as well as input received via the online comment form and via phone/email during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a "moderately favorable" rating. Alternatives that received mostly supportive comments received the "somewhat favorable" rating, and alternatives that received mostly non-supportive comments received the "less favorable" rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7C: How well is this alternative accepted by the general public?

Input received from the virtual public outreach effort that was conducted from 4 p.m. February 10 through 8 a.m. March 11, 2014, was considered in determining the degree of acceptance by the public at large of an alternative. This was conducted through an online survey system, where the public was asked to rate their impression of each corridor alternative in the five study area segments. The surveys did not ask for preference of one alternative over another, but asked for general opinion/support of each alternative independently. The feedback received was not statistically valid; the data might have included sample validity, non-responsive bias, stakeholder bias, and unverified respondents. The feedback received was reviewed on a qualitative rating scale that included five categories ranging from strongly opposed to strongly prefer.

- Least favorable: Mostly strongly oppose
- Less favorable: Mostly oppose
- Moderately favorable: Neutral
- Somewhat favorable: Mostly prefer
- Most favorable: Mostly strongly prefer

Cost

8A: What is the order of magnitude cost for this alternative, including construction and right-of-way?

Cost estimates were based on the NDOT cost estimating tool, Project Estimation Wizard, plus an order of magnitude cost for right-of-way. Assumptions used to develop these cost estimates are summarized in Appendix I. Alternative were rated based on the following scale:

- Least favorable: Greater than $3,700,000,000
- Less favorable: $2,800,000,000 - $3,700,000,000
- Moderately favorable: $1,900,000,000 - $2,800,000,000
- Somewhat favorable: $900,000,000 - $1,900,000,000
- Most favorable: Less than $900,000,000

Level 2 Evaluation Results

Just as in the Level 1 screening, the evaluation rating scale is strictly relative – alternatives were considered in relation to each other in the same project segment. If an alternative receives the highest rating, it may still face issues or obstacles with respect to that criterion. The color scheme for the qualitative rating scale is as follows:

Most Favorable	Somewhat Favorable	Moderately Favorable	Less Favorable	Least Favorable

The following summary sheets provide an overview of the Level 1 evaluation for each alternative in Northern Arizona/Southern Nevada, including a map of the alternative, major opportunities/constraints, followed by the detailed evaluation rating scales and notes.

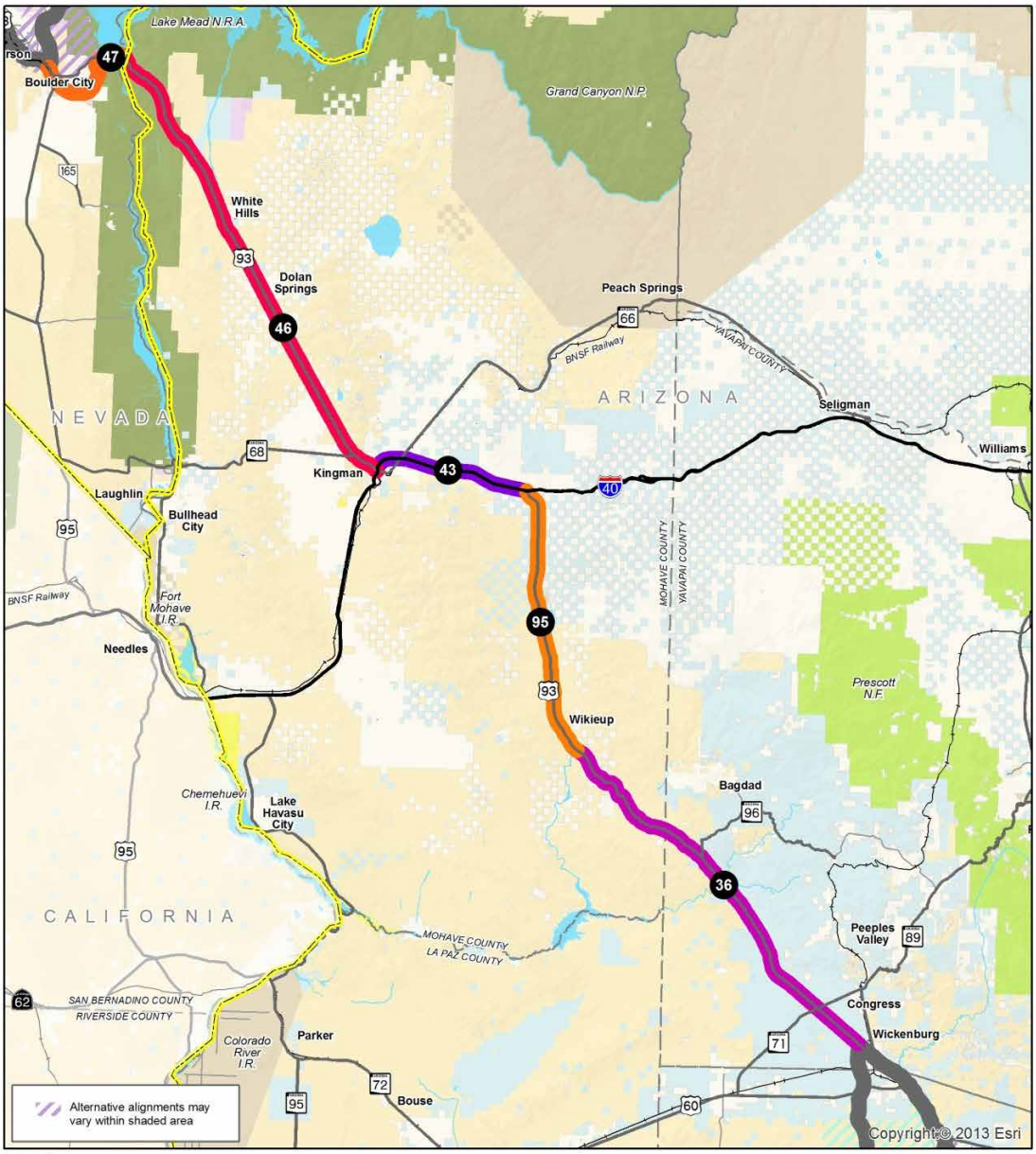
Alternative Q

Opportunities

- Entire corridor included as future freeway in the bqAZ Statewide Transportation Framework Study; portions of corridor included for short-term improvements in STIP
- Clustered nodes of planned land uses oriented toward commerce activities
- Minimal environmental constraints due to full use of existing corridors

Constraints

- Limited ability to accommodate multiple modes through all of the corridor



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Alternative Q			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Cannot accommodate multiple modes due to right-of-way and grade constraints, as well as land ownership through the Lake Mead National Recreation Area. Reasonable alternate rail corridors can be developed using a combination of existing corridors with some new connectors constructed.
Capacity/ Congestion	2A Travel time savings over No-Build?		No discernible difference in travel time savings between alternatives.
	2B Total long distance VMT?		20 - 40 percent greater total VMT than Alternative UU.
	2C Total VHD?		Highest total vehicle hours of delay.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $5,100,000,001 - $6,800,000,000.
	3B Cost of delay?		Highest total cost of delay.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Portions of US-93 planned as a four-lane access-controlled facility in STIP - consistent.
	4B Consistent with long-term transportation visions and plans?		Entire corridor included as future freeway (defined as "potential future Interstate") in the bqAZ Statewide Framework Study. Overall - consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, no corridor segments are seen to have potentially significant impact to wildlife corridors or habitat blocks, however expansion of the US-93 footprint could cause increased habitat loss in the surrounding vicinity.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, no corridor segments are seen to have potentially high impact to land managed for conservation. Moderate impacts could occur to the nearby Carrow-Stephens Ranches ACEC (US-93 between Wikieup and I-40).
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses no undisturbed floodplains.
	5D General impact to air quality?		Uses existing roadway routes through fairly sparsely populated areas without any major changes in roadway grade. Improvements to roadways will be required but major cut and fill activities that produce relatively large amounts of particulate are not anticipated.
	5E Additional environmental concerns identified by stakeholders?		No impacts identified.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Clustered nodes of planned land uses oriented toward commerce (heavy industrial, commercial, manufacturing) could enhance implementation of a major trade corridor (White Hills, Kingman). In addition, the Dutch Flat/Yucca area includes the Automotive Proving Ground facility.
	6B Compatible with major land ownership patterns and resource plans?		Compatible with land ownership patterns (primarily private, State Land, and BLM).
Community Acceptance	7A Core Agency Partners?		Mostly supportive comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $3,339,000,000.

Alternative UU

Opportunities

- Clustered nodes of planned land uses oriented toward commerce activities

Constraints

- Targeted high impact environmental constraints along Chicken Springs Road/Alamo Road area (Segment 91), including habitat loss and degradation, impact to land managed for conservation, and fragmentation of ecologically important areas

ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative UU			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Cannot accommodate multiple modes due to right-of-way and grade constraints, as well as land ownership through the Lake Mead National Recreation Area. Reasonable alternate rail corridors can be developed using a combination of existing corridors with some new connectors constructed.
Capacity/ Congestion	2A Travel time savings over No-Build?		No discernible difference in travel time savings between alternatives.
	2B Total long distance VMT?		Lowest total VMT.
	2C Total VHD?		20 - 40 percent less delay than Alternative Q.
	2D Average travel speed?		Average travel speed is greater than 60 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $5,100,000,001 - $6,800,000,000.
	3B Cost of delay?		20 - 40 percent less cost of delay than Alternative Q.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Portions of US-93 planned as a four-lane access-controlled facility in STIP - consistent. No improvements planned on I-40 (four-lane interstate); excess capacity available - consistent. No short-term improvements planned on Chicken Springs Rd/Alamo Rd - not consistent.
	4B Consistent with long-term transportation visions and plans?		US-93 corridor components included as future freeway (defined as "potential future Interstate") in the bqAZ Statewide Framework Study - consistent. I-40 included to be widened/upgraded. No corridor improvements for Chicken Springs Rd/Alamo Rd component. Overall - partially consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per AGFD, the Chicken Springs Rd/Alamo Rd corridor segment is considered the most sensitive area with the greatest impacts to wildlife corridors and habitat blocks. Per TNC, construction along Chicken Springs Rd/Alamo Rd would fragment an area of regional importance, identified as an ecologically core area; degrade wildlife habitat for several ESA Endangered and Candidate species, including the Southwestern Willow Flycatcher, Yuma Clapper Rail, Sonoran Desert Tortoise, Roundtail Chub, and rare plant species. This segment would also impact the Bill Williams groundwater basin supporting the Big Sandy River, which supports a diversity of wildlife and habitat.
	5B Impact to land managed for conservation or wildlife purposes?		Per AGFD, the Chicken Springs Rd/Alamo Rd corridor segment is considered to have potentially high impact to land managed for conservation, as it traverses the Joshua Tree Important Bird Area (IBA), as designated by the National Audubon Society. Per TNC, the Chicken Springs Rd/Alamo Rd corridor segment would impact the McCracken Desert Tortoise ACEC, and to perennial waters (Big Sandy River).
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 2.1 miles of undisturbed floodplains.
	5D General impact to air quality?		Avoids densely populated areas, but new roadways will need to be built with steep grades in some locations. Relatively higher short-term construction impacts and relatively higher long-term operational impacts.
	5E Additional environmental concerns identified by stakeholders?		Per AGFD and TNC, the Chicken Springs Rd/Alamo Rd corridor segment would result in a loss of undisturbed habitat which could result in the loss of recreational opportunities including hunting.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Clustered nodes of planned land uses oriented toward commerce (heavy industrial, commercial, manufacturing) could enhance implementation of a major trade corridor (White Hills, Kingman).
	6B Compatible with major land ownership patterns and resource plans?		Mostly compatible with land ownership patterns (primarily private, State Land, and BLM) except for the Chicken Springs Rd/Alamo Rd corridor segment.
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters were "neutral" to this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $3,748,000,000.

Evaluation Results: Las Vegas Metropolitan Area

The Las Vegas Metropolitan Area section encompasses all of Southern Nevada up to the northernmost edge of the Las Vegas Valley (including Pahrump), with the exception of the City of Boulder City. All of the alternatives in this segment share a southern terminus at the western/northern end of Boulder City Bypass project (at I-515 and the Foothills grade separation).

The first step of the Level 2 evaluation was to evaluate each alternative recommendations from the Level 1 analysis (see the *Technical Memorandum: Level 1 Evaluation Results Summary*, January 2014)) for its connectivity to adjacent segments. This is a critical element in creating an international trade corridor throughout the Intermountain West. Therefore, any alternative that did not form a direct connection with an alternative in an adjacent segment was removed from further Level 2 evaluation.

Alternative AA in the Las Vegas Metropolitan Area was the only alternative removed per this evaluation measure. Alternative AA was planned to utilize I-15/US-93 to make an easterly connection into Northern Nevada. Core components of the alternative (using I-515 through the core of the metropolitan area) are present in other alternatives; therefore a hybridization of this alternative was not determined necessary. Therefore, the study team conducted the Level 2 evaluation of the following alternatives in the Las Vegas Metropolitan Area:

- Alternative Y
- Alternative Z
- Alternative BB-QQ

Each alternative was rated with respect to each of the Level 2 evaluation criteria. The rating system consisted of a qualitative scale from least to most favorable, with "most favorable" relative rating representing the best performance and "least favorable" relative rating representing the worst performance. An explanation of the evaluation approach for each criterion for the Las Vegas Metropolitan Area follows.

Modal Interrelationships

1A: How well does this corridor provide sufficient opportunity for a multi-use corridor?

Each alternative is rated based on its ability to accommodate multiple modes and multiple uses, as noted below. A description of the multi-use evaluation process and results is included at the end of this document under the Summary of Recommended Reasonable and Feasible Corridors section.

- Least favorable: Cannot accommodate multiple modes due to constraints along the corridor, and alternate corridors cannot be developed to accommodate other modes.
- Less favorable: Cannot accommodate multiple modes due to constraints along the corridor, and less reasonable alternate corridors can be developed to accommodate other modes.
- Moderately favorable: Cannot accommodate multiple modes due to significant constraints along the corridor, however reasonable alternate corridors can be developed to accommodate other modes. Such alternate corridors would be relatively direct, with reasonable implementation.
- Somewhat favorable: Can accommodate multiple modes and uses through most of the corridor, with minor exceptions and where a reasonable deviation could be found.
- Most favorable: Can fully accommodate multiple uses and rail throughout the entire length and within the same footprint rated most favorable for the following reasons: it is likely to be the most direct route, right-of-way

could be preserved over the long-term, implementation would be maximized and flexibility preserved for future uses or technologies.

Capacity/Congestion

The I-11 study team used the 2012 version of the RTCSNV regional travel demand model. The I-11 study team coded the corridor alternatives into the RTCSNV travel demand 2035 model network, conducted the RTCSNV model runs and evaluated the results. The study team evaluated each corridor for overall travel time savings compared to a no-build condition. Other criteria included corridor vehicle miles of travel and corridor vehicle hours of delay. More detailed information on the travel demand modeling methodology and approach is provided in Appendix H.

2A: What are the estimated travel time savings over No-Build (2035)?

A comparative analysis of the alternatives was calculated for travel time savings compared to the No-Build option using the 2035 RTCSNV regional travel demand model. The 2035 No-Build model network includes existing and planned facilities as reflected in the adopted regional transportation plan. The travel time for the No-Build network was estimated based on the shortest path between the shared endpoints of the alternatives. The rating scale is as follows:

- Least favorable: Less than 10 minutes savings over No-Build
- Less favorable: 10 -20 minutes savings over No-Build
- Moderately favorable: 20 – 30 minutes savings over No-Build
- Somewhat favorable: 30 – 40 minutes savings over No-Build
- Most favorable: Greater than 40 minutes savings over No-Build

2B: What are the total long distance vehicles miles traveled (VMT)?

A comparative analysis of the alternatives was calculated for total long distance VMT using the RTCSNV regional travel demand model. Each alternative was compared against the alternative with the lowest VMT. The rating scale is as follows:

- Least favorable: Lowest long distance VMT alternative
- Less favorable: 0 – 25% greater VMT than the lowest long distance VMT alternative
- Moderately favorable: 25 – 50% greater VMT than the lowest long distance VMT alternative
- Somewhat favorable: 50 – 75% greater VMT than the lowest long distance VMT alternative
- Most favorable: Over 75% greater VMT than the lowest long distance VMT alternative

2C: What are the total vehicle hours of delay (VHD)?

A comparative analysis of the alternatives was calculated for total VHD using the RTCSNV regional travel demand model. Each alternative was compared against the alternative with the highest total VHD. In the Las Vegas Metropolitan Area, the rating scale is as follows:

- Least favorable: Alternative with the highest total VHD
- Less favorable: 0 – 25% less delay than the alternative with the highest total VHD
- Moderately favorable: 25 – 50% less delay than the alternative with the highest total VHD
- Somewhat favorable: 50 – 75% less delay than the alternative with the highest total VHD
- Most favorable: Over 75% less delay than the alternative with the highest total VHD

2D: What is the average travel speed on the corridor?

The estimated 2035 average PM peak period, peak direction, travel speed for each alternative is derived from the RTCSNV regional travel demand model. The Highway Capacity Manual was referenced to develop the rating scale, which states that 60 mph or greater is considered Level of Service A. Therefore, alternatives with an average travel speed of 60 mph or greater received the highest rating, and the lower speeds were defined based on engineering judgment. The rating scale is as follows:

- Least favorable: Less than 30 mph
- Less favorable: 31 – 45 mph
- Moderately favorable: 46 – 54 mph
- Somewhat favorable: 55 – 60 mph
- Most favorable: Greater than 60 mph

Economic Vitality

3A: What are the expected short-term impacts to the regional economy, as measured by the number of jobs (direct, indirect and induced) and economic output from construction related activities?

Quantitative analysis was conducted based on input from the IMPLAN Version 3.0 model. IMPLAN is an econometric software program utilizing input-output analysis by applying trade flow data and multipliers to investigate the consequences of projected economic transactions in a geographic region. The underlying information is gathered from federal data sets and used to develop custom models for each individual study region. IMPLAN is the most widely employed and accepted regional economic analysis software in the U.S. for predicting economic impacts. An econometric trade flow model was created Nevada utilizing the IMPLAN software and the most recent 2011 state data package available. The economic impact findings are measured by the number of jobs, labor income, and economic output from construction related activities:

- Jobs include the full and part time jobs, including self-employed.
- Labor income represents the wages paid to personnel associated with the industry. Includes total wage and salary including benefits of the direct, indirect and induced employees.
- Economic output represents the spending or gross receipts for goods or services generated.

The direct construction spending for each alternative was used to estimate the indirect and induced impacts that would accrue to each state, as described below:

- Indirect economic impacts are those economic activities undertaken by vendors and suppliers within the supply chain of the direct activity as a result of the initial economic activity. For example, suppliers of goods, materials, and services used in the direct activities produce indirect economic impacts.
- Induced economic impacts result from the spending of wages paid to employees in local industries involved in direct and indirect activities. These wages, which are analogous to household spending, support additional local activities, such as the purchase of goods and services within the region. In turn, that portion of spending that accrues to local businesses and employees is once again re-circulated within the local economy, producing additional activity.

The rating scale as it relates to **total economic output** is as follows:

- Least favorable: Less than $1,700,000,000
- Less favorable: $1,700,000,000 - $3,400,000,000
- Moderately favorable: $3,400,000,001 - $5,100,000,000

- Somewhat favorable: $5,100,000,001 - $6,800,000,000
- Most favorable: Greater than $6,800,000,001

3B: What is the cost of delay?

The Texas A&M Transportation Institute publishes an annual Urban Mobility Report that summarizes the impacts of congestion on our economy. A few excerpts from the 2012 report include:

> "In many regions, traffic jams can occur at any daylight hour, many nighttime hours and on weekends. The problems that travelers and shippers face include extra travel time, unreliable travel time and a system that is vulnerable to a variety of irregular congestion-producing occurrences…. Congestion wastes a massive amount of time, fuel and money…. [It] affects people who travel during the peak period….[and] is also a problem at other hours…. Trucks become a mobile warehouse; and if their arrival times are missed, production lines can be stopped, at a cost of many times the value of the truck delay times."

According to the Texas A&M Transportation Institute, the value of travel time delay is estimated at $16.79 per hour of person travel and $86.81 per hour of truck time. The total vehicle hours of delay (from Criterion 2C) is directly proportional to the cost of delay. In the Las Vegas Metropolitan Area, the rating scale is as follows:

- Least favorable: Alternative with the highest total cost of delay
- Less favorable: 0 – 25% less cost of delay than the alternative with the highest total cost of delay
- Moderately favorable: 25 – 50% less cost of delay than the alternative with the highest total cost of delay
- Somewhat favorable: 50 – 75% less cost of delay than the alternative with the highest total cost of delay
- Most favorable: Over 75% less cost of delay than the alternative with the highest total cost of delay

Transportation Plans and Policies

4A: How well is this alternative consistent with funded transportation projects?

In the Las Vegas Metropolitan Area, existing facilities would need to be widened an additional 4 lanes, to a maximum of 10 lanes, to accommodate an I-11 trade corridor. New facilities would require a minimum 4-lane high capacity, access-controlled facility. Therefore, the alternatives that rated most favorable are funded in RTCSNV's RTP to accommodate an I-11 trade corridor as defined above. Those that rated least favorable have nothing funded or the funded improvements are not consistent with an I-11 trade corridor as defined above. The rating for each alternative is based on the percentage of the alternative that is consistent with the RTCSNV's RTP, as described above. The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with funded transportation projects
- Less favorable: Approximately 25% of the alternative is consistent with funded transportation projects
- Moderately favorable: Approximately 50% of the alternative is consistent with funded transportation projects
- Somewhat favorable: Approximately 75% of the alternative is consistent with funded transportation projects
- Most favorable: All of the alternative is consistent with funded transportation projects

4B: How well is this alternative consistent with long-term transportation visions and plans?

In the Las Vegas Metropolitan Area, the alternatives consistent with high capacity, access-controlled facilities listed in the RTCSNV's "Summary of Regional Strategic Investments: Unfunded Needs" rated most favorable, and if not, rated least favorable. The rating for each alternative is based on the percentage of the alternative that is consistent with the "Unfunded Needs." The rating scale is as follows:

- Least favorable: No part of the alternative is consistent with long-term transportation visions and plans
- Less favorable: Approximately 25% of the alternative is consistent with long-term transportation visions and plans
- Moderately favorable: Approximately 50% of the alternative is consistent with long-term transportation visions and plans
- Somewhat favorable: Approximately 75% of the alternative is consistent with long-term transportation visions and plans
- Most favorable: All of the alternative is consistent with long-term transportation visions and plans

Environmental Sustainability

The Environmental Sustainability category was evaluated based on input received from NDOW, Bureau of Reclamation – Lower Colorado Regional Office, and BLM – Southern Nevada District.

5A: What is the impact to wildlife corridors and/or habitat blocks?

Each alternative is rated based on the degree to which a corridor impacts various wildlife corridors and/or habitat blocks, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

5B: What is the impact to land managed for conservation or wildlife purposes?

Each alternative is rated based on the degree to which a corridor impacts land managed for conservation or wildlife purposes, on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor
- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

5C: How many linear miles of undisturbed waterways/ floodplains are impacted?

The linear miles of undisturbed floodplains that each alternative traverses were calculated by overlaying the alternatives onto FEMA 100-year floodplain data. Existing roadways with drainage infrastructure already in place received the highest rating, as these are not considered undisturbed. In response to the narrow range of differences between the alternatives in Las Vegas and the minimal number of miles impacted (0 to 1.3), the rating scale for this criterion does not include the bottom ends of the scale. The rating scale is as follows:

- Least favorable: n/a
- Less favorable: n/a
- Moderately favorable: More than 0.6 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Somewhat favorable: 0.1 to 0.6 miles of the alternative impacts currently undisturbed waterways/ floodplains
- Most favorable: The alternative impacts less than 0.1 miles of currently undisturbed waterways/ floodplains

5D: What is the general impact to air quality conditions with this alternative?

Based upon the relative quantity of emissions, duration of emissions from different activities, and potential air quality health impacts to the greatest number of people, the following assumptions were used to evaluate the alternatives:

- Short-term impacts from construction were considered to have a lower impact than long-term impacts from construction vehicle emissions and road dust from roadway use
- Impacts in less densely populated areas as compared with other alternatives were considered to have a lower impact that impacts in more densely populated areas as compared with the other alternatives
- Impacts from alternatives with steeper grades were considered to have higher impacts than alternatives at grade
- If all other factors were essentially the same, the amount of construction needed was used to distinguish between alternatives

In summary, relatively low impacts in less densely populated areas as compared with other alternatives were considered better than relatively high impacts in the relatively more densely populated areas. The rating scale is as follows:

- Least favorable: Construction impacts in a populated area and/or relatively higher long-term operational impacts in a relatively more densely populated area
- Less favorable: Construction impacts in a populated area and/or relatively lower long-term operational impacts in a relatively densely populated area
- Moderately favorable: Relatively low construction impacts and/or relatively lower long-term operational impacts in a relatively less densely populated area
- Somewhat favorable: Relatively low construction impacts and/or lower long-term operational impacts than other alternatives in a sparsely populated area
- Most favorable: Relatively equal or lower construction impacts and/or relatively lower long-term operational impacts

5E: What additional environmental concerns were identified by stakeholders?

Various resource agencies and stakeholder partners identified additional potential environmental concerns such as impacts to environmental justice communities, noise and health impacts to schools, and impacts to utility corridors, recreational and visual impacts. Each alternative is rated based on the degree to which a corridor impacts these additional environmental factors on the following scale:

- Least favorable: A high degree of impacts to the majority of the corridor
- Less favorable: A high degree of impacts to small portions of the corridor
- Moderately favorable: Moderate degree of impacts to the entire corridor

- Somewhat favorable: Moderate degree of impacts to small portions of the corridor
- Most favorable: Limited impacts to the entire corridor

Land Use and Ownership

6A: How consistent is this alternative with regional and local land use plans (including tribal plans, if available)?

Land use maps and information from comprehensive/general/master plans along the corridor were reviewed for consistency with a high capacity, access-controlled transportation facility. Supportive land uses near the corridor were considered to be industrial, regional commercial, business park, employment, and others that would denote clustered activity center development. In addition, proximity to multimodal and freight and logistics-related facilities was considered consistent land use.

- Least favorable: No part of the alternative is consistent with land use plans
- Less favorable: Approximately 25% of the alternative is consistent with land use plans
- Moderately favorable: Approximately 50% of the alternative is consistent with land use plans
- Somewhat favorable: Approximately 75% of the alternative is consistent with land use plans
- Most favorable: All of the alternative is consistent with land use plans

6B: How compatible is this alternative with major land ownership patterns and resource plans?

Alternatives were evaluated based on the compatibility of a major transportation infrastructure facility to traverse land under state or federal ownership, including such land owners as Bureau of Land Management, Bureau of Reclamation, U.S. military, National Park Service, state land departments, state parks, tribal communities, U.S. Fish and Wildlife, and U.S. Forest Service. Built private lands were considered less compatible than undeveloped private lands.

- Least favorable: No part of the alternative is compatible with land ownership patterns
- Less favorable: Approximately 25% of the alternative is compatible with land ownership patterns
- Moderately favorable: Approximately 50% of the alternative is compatible with land ownership patterns
- Somewhat favorable: Approximately 75% of the alternative is compatible with land ownership patterns
- Most favorable: All of the alternative is compatible with land ownership patterns

Community Acceptance

7A: How well is this alternative accepted by the Core Agency Partners (CAP)?

Input received from the CAP at the January 2014 CAP meeting, as well as input received during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a “moderately favorable” rating. Alternatives that received mostly supportive comments received the “somewhat favorable” rating, and alternatives that received mostly non-supportive comments received the “less favorable” rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7B: How well is this alternative accepted by the Stakeholder Partners?

Input received from Stakeholder Partners and their constituents at the January 2014 stakeholder partner meetings, as well as input received via the online comment form and via phone/email during the comment period from January through March 11, 2014, was considered in determining the degree of acceptance of an alternative. Alternatives that received no comments or conflicting comments (supportive and non-supportive) received a "moderately favorable" rating. Alternatives that received mostly supportive comments received the "somewhat favorable" rating, and alternatives that received mostly non-supportive comments received the "less favorable" rating.

- Least favorable: n/a
- Less favorable: Mostly non-supportive comments
- Moderately favorable: No comments or conflicting comments (supportive and non-supportive)
- Somewhat favorable: Mostly supportive comments
- Most favorable: n/a

7C: How well is this alternative accepted by the general public?

Input received from the virtual public outreach effort that was conducted from 4 p.m. February 10 through 8 a.m. March 11, 2014, was considered in determining the degree of acceptance by the public at large of an alternative. This was conducted through an online survey system, where the public was asked to rate their impression of each corridor alternative in the five study area segments. The surveys did not ask for preference of one alternative over another, but asked for general opinion/support of each alternative independently. The feedback received was not statistically valid; the data might have included sample validity, non-responsive bias, stakeholder bias, and unverified respondents. The feedback received was reviewed on a qualitative rating scale that included five categories ranging from strongly opposed to strongly prefer.

- Least favorable: Mostly strongly oppose
- Less favorable: Mostly oppose
- Moderately favorable: Neutral
- Somewhat favorable: Mostly prefer
- Most favorable: Mostly strongly prefer

Cost

8A: What is the order of magnitude cost for this alternative, including construction and right-of-way?

Cost estimates were based on the NDOT cost estimating tool, Project Estimation Wizard, plus an order of magnitude cost for right-of-way. Assumptions used to develop these cost estimates are summarized in Appendix I. Alternative were rated based on the following scale:

- Least favorable: Greater than $2,800,000,000
- Less favorable: $2,100,000,000 - $2,800,000,000
- Moderately favorable: $1,400,000,000 - $2,100,000,000
- Somewhat favorable: $700,000,000 - $1,400,000,000
- Most favorable: Less than $700,000,000

Level 2 Evaluation Results

Just as in the Level 1 screening, the evaluation rating scale is strictly relative – alternatives were considered in relation to each other in the same project segment. If an alternative receives the highest rating, it may still face issues or obstacles with respect to that criterion. The color scheme for the qualitative rating scale is as follows:

Most Favorable	Somewhat Favorable	Moderately Favorable	Less Favorable	Least Favorable

The following summary sheets provide an overview of the Level 1 evaluation for each alternative in the Las Vegas Metropolitan Area, including a map of the alternative, major opportunities/constraints, followed by the detailed evaluation rating scales and notes.

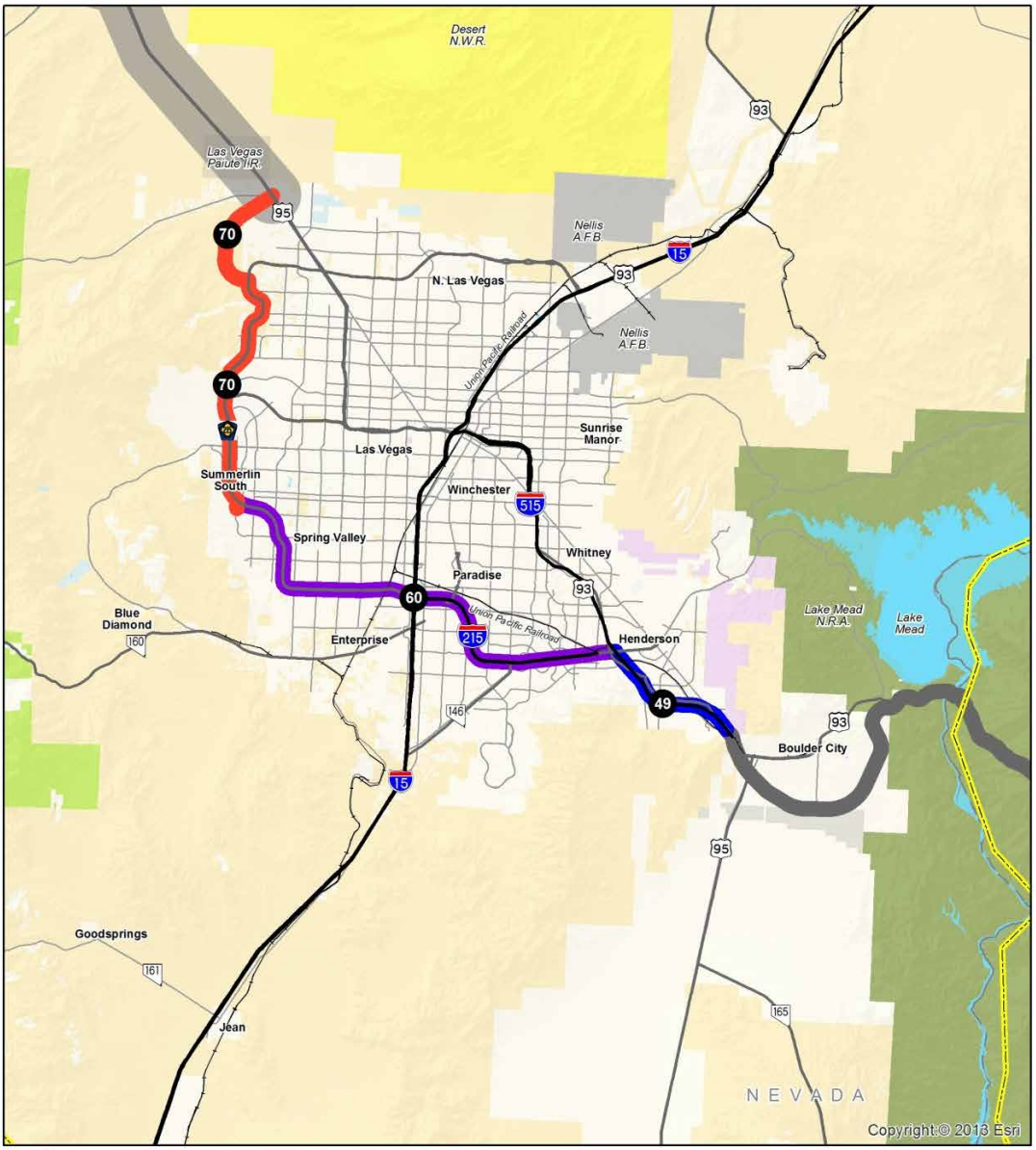
Alternative Y

Opportunities

- Minimal environmental impacts anticipated, as alternative mostly utilizes existing corridors
- Compatible with land ownership patterns (primarily Clark County right-of-way)

Constraints

- Much of the corridor is inconsistent with adjacent residential land uses
- Cannot accommodate multiple modes; reasonable alternatives require new corridor connectors not currently envisioned or present in any transportation plans
- Long-term operational impacts of adding traffic through a densely populated area creates high air quality impacts



ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Alternative Y			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Cannot accommodate multiple modes due to right-of-way constraints on the existing freeway corridors. Reasonable alternate rail corridors can be developed using a combination of the existing UPRR corridor with some new connectors constructed south toward Phoenix and north to Northern Nevada.
Capacity/ Congestion	2A Travel time savings over No-Build?		Between 20 and 30 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Over 75 percent greater total VMT than Alternative BB-QQ.
	2C Total VHD?		0 - 25 percent less delay than Alternative Z.
	2D Average travel speed?		Average travel speed is between 46 mph and 54 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is less than $1,700,000,000.
	3B Cost of delay?		0 - 25 percent less cost of delay than Alternative Z.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Approximately half of the corridor has programmed improvements along corridor in RTCSNV 2035 RTP (improvements to CC-215); improvements may not provide enough capacity to accommodate I-11.
	4B Consistent with long-term transportation visions and plans?		Majority of the corridor has planned improvements (Summary of Regional Strategic Improvements - Unfunded Needs from RTCSNV 2035 RTP): Eastern to Charleston planned for 10 lanes, Charleston to Sheep Mountain Parkway 8 lanes - fairly consistent.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Per BLM, threatened and endangered species may exist in the north end of segment 70 (Grand Teton to CC-215). This segment is currently undergoing an EA as part of the Sheep Mountain Parkway and is expected to clear BLM ROW.
	5B Impact to land managed for conservation or wildlife purposes?		Per BLM, the north end of segment 70 traverses the Red Rock Canyon National Conservation Area. This segment is currently undergoing an EA as part of the Sheep Mountain Parkway and is expected to clear BLM ROW.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 0.17 miles of undisturbed floodplains.
	5D General impact to air quality?		Higher long-term operational impacts adding traffic through relatively densely populated residential areas.
	5E Additional environmental concerns identified by stakeholders?		Other potential impacts associated with widening the existing corridor include: noise and health impacts associated with 10 schools within approximately 1,000 feet of the alternative corridor. Minimal environmental justice impacts as majority of the census tracts along this alternative have less than 10% population below poverty.
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses along this alternative could both enhance and diminish the value of implementation of a major trade corridor. This corridor traverses many residential-based master planned communities (Summerlin South, Las Vegas, Henderson). However, the corridor is also within close proximity to the mixed use, highway commercial, and industrial land uses - including McCarran International Airport and UPRR railroad tracks (Boulder City, Paradise, Spring Valley).
	6B Compatible with major land ownership patterns and resource plans?		Compatible with land ownership patterns (primarily Clark County right-of-way).
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "strongly prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $1,095,000,000.

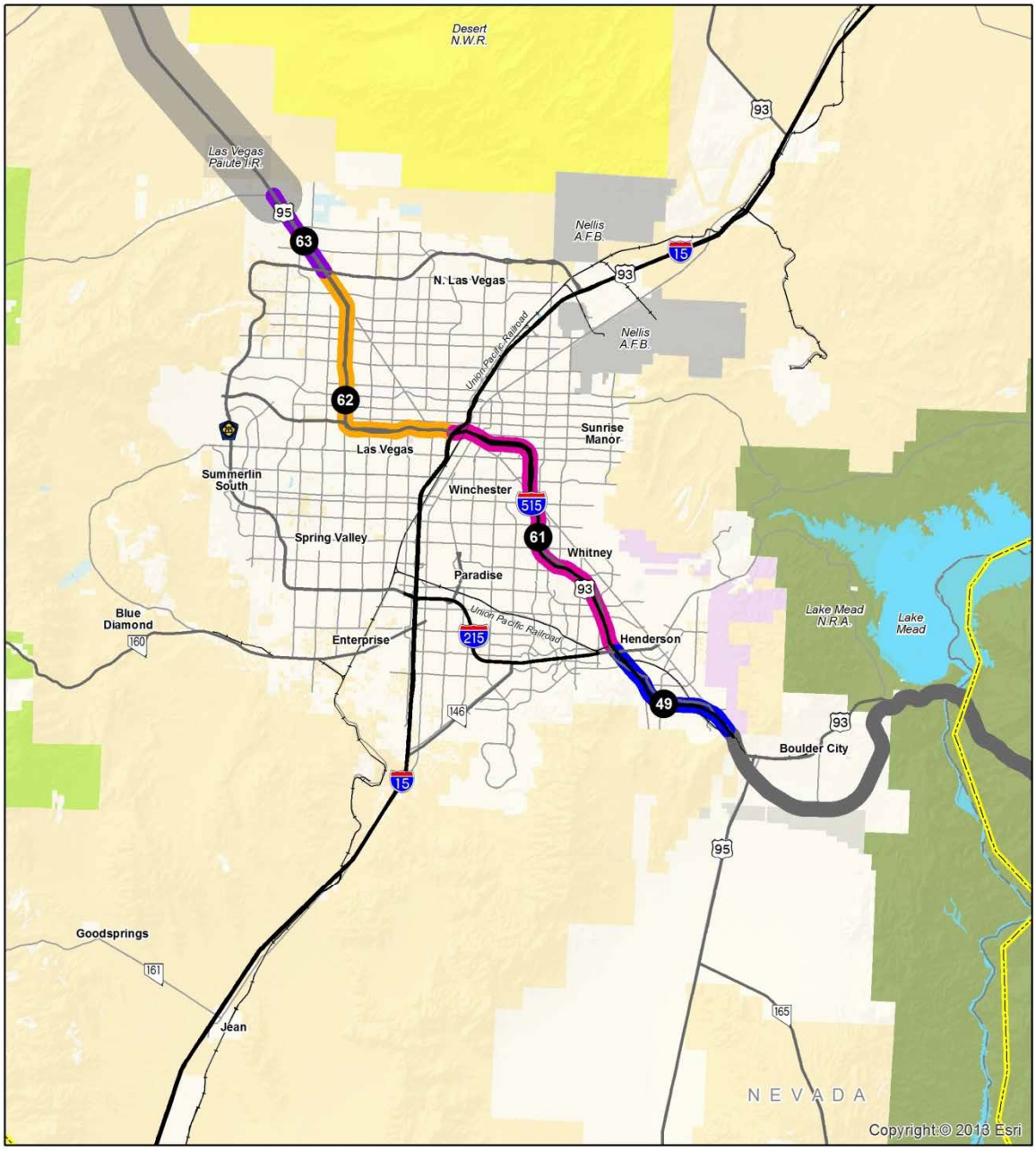
Alternative Z

Opportunities

- Fewer environmental impacts anticipated, as alternative utilizes existing corridors

Constraints

- Multiple constraints associated with adding traffic through a densely populated urban core: operational, air quality, environmental justice, incompatibility with existing built out land, etc.
- Highest total vehicle hours of delay; poor travel speeds
- Highest estimated total cost



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Alternative Z			
Category	**Criteria**	**Rating**	**Notes**
Modal Interrelationships	1A Opportunity for a multi-use corridor?		Cannot accommodate multiple modes due to right-of-way constraints on the existing freeway corridors. Reasonable alternate rail corridors can be developed using a combination of the existing UPRR corridor with some new connectors constructed south toward Phoenix and north to Northern Nevada.
Capacity/ Congestion	2A Travel time savings over No-Build?		Between 30 and 40 minutes in improvement in overall travel time savings over No-Build.
	2B Total long distance VMT?		Over 75 percent greater total VMT than Alternative BB-QQ.
	2C Total VHD?		Highest total vehicle hours of delay.
	2D Average travel speed?		Average travel speed is between 31 mph and 45 mph.
Economic Vitality	3A Expected short-term impacts to the regional economy?		Total economic output is between $3,400,000,001 - $5,100,000,000.
	3B Cost of delay?		Highest total cost of delay.
Transportation Plans and Policies	4A Consistent with funded transportation projects?		Key system interchanges (I-15/I-515, US-95/CC-215) have funded improvements in RTCSNV 2035 RTP; entire corridor may not have available capacity to accommodate I-11 - not consistent.
	4B Consistent with long-term transportation visions and plans?		Majority of the corridor has planned improvements (Summary of Regional Strategic Improvements - Unfunded Needs from RTCSNV 2035 RTP): I-515, Spaghetti Bowl to Boulder City Bypass planned for 10 lanes.
Environmental Sustainability	5A Impact to wildlife corridors and/or habitat blocks?		Existing urbanized corridor; no impacts to wildlife corridors or habitat blocks.
	5B Impact to land managed for conservation or wildlife purposes?		Existing urbanized corridor; no impacts to land managed for conservation or wildlife purposes.
	5C Linear miles of undisturbed waterways/ floodplains impacted?		Does not traverse any undisturbed floodplains.
	5D General impact to air quality?		High long-term operational impacts adding traffic through the center of the Las Vegas Valley near areas with high population densities.
	5E Additional environmental concerns identified by stakeholders?		Other potential impacts associated with widening the existing corridor include: noise, health impacts associated with 17 schools within approximately 1,000 feet of the alternative corridor, and environmental justice impacts. Based on census data, the majority of the census tracts along alternative Z have 10-20% population below poverty. Census tracts around the spaghetti bowl have much higher concentration of below poverty population (20-40%)
Land Use and Ownership	6A Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses along this alternative could both enhance and diminish the value of implementation of a major trade corridor. This corridor traverses many residential-based master planned communities (Sunrise Manor, Winchester, Las Vegas, Henderson). However, the corridor is also within close proximity to commercial and industrial land uses - including UPRR railroad tracks (Boulder City, Whitney). Identified as portion of CANAMEX (I-515) corridor and Washoe County high-priority corridor (US 95).
	6B Compatible with major land ownership patterns and resource plans?		Portions of the corridor not compatible with existing built-out land ownership adjacent to corridor.
Community Acceptance	7A Core Agency Partners?		No comments or mixed comments.
	7B Stakeholder Partners?		No comments or mixed comments.
	7C General public?		Based on virtual public outreach process, the majority of responders/commenters "prefer" this alternative.
Cost	8A Order of magnitude cost?		Planning level cost estimate $2,863,000,000.

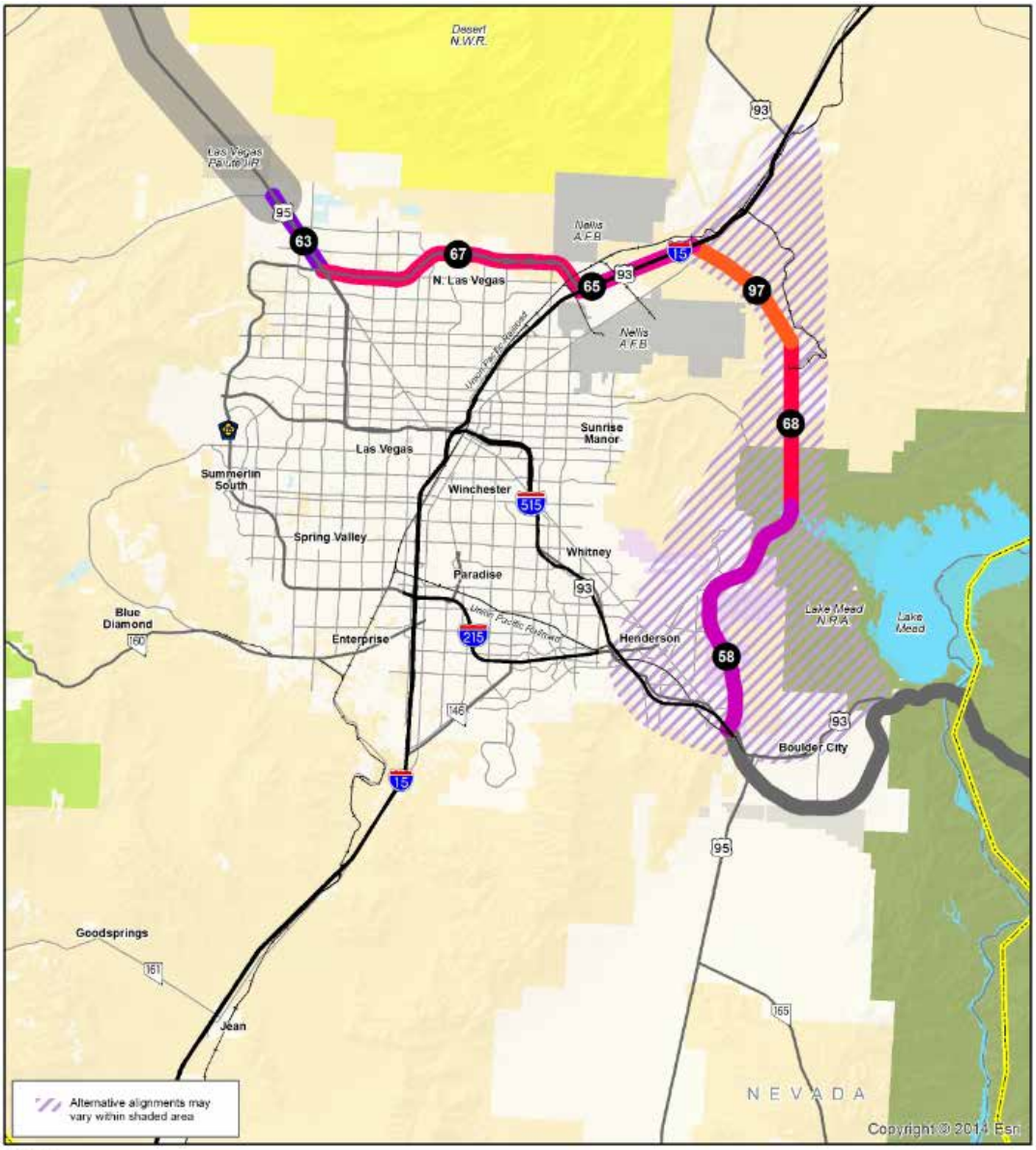
Alternative BB-QQ

Opportunities

- Very high travel time savings and lesser anticipated delay as it bypasses the heavily congested areas of the Las Vegas Valley
- Provides a more direct route from Phoenix to the major industrial and logistics facilities in the Las Vegas metropolitan area
- Eastern transportation corridor planned to be constructed as truck/bypass route in the Summary of Regional Strategic Improvements - Unfunded Needs from RTCSNV 2035 RTP

Constraints

- Targeted high impact environmental constraints, including impact to sensitive species and habitat blocks
- Incompatibility with some land use and land ownership patterns



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Alternative BB-QQ

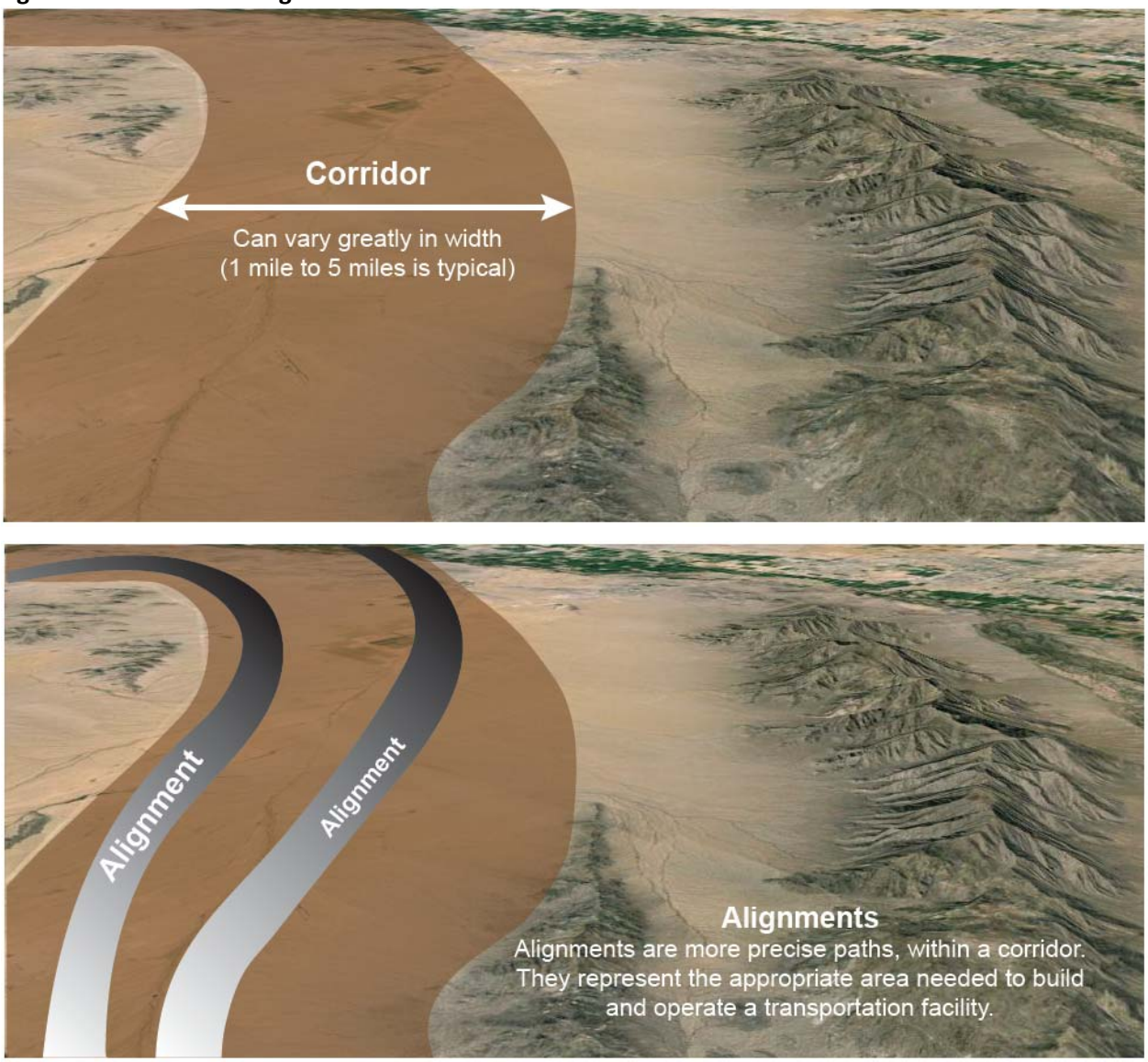
Category		Criteria	Rating	Notes
Modal Interrelationships	1A	Opportunity for a multi-use corridor?		Can accommodate multiple modes and uses through most of the corridor, with possible exceptions in some locations along the Northern Beltway where adjacent development abuts the ROW, and in the area of the LMNRA.
Capacity/ Congestion	2A	Travel time savings over No-Build?		Between 30 and 40 minutes in improvement in overall travel time savings over No-Build.
	2B	Total long distance VMT?		Lowest total VMT.
	2C	Total VHD?		Over 100 percent less delay than Alternative Z.
	2D	Average travel speed?		Average travel speed is between 55 mph and 60 mph.
Economic Vitality	3A	Expected short-term impacts to the regional economy?		Total economic output is less than $1,700,000,000.
	3B	Cost of delay?		Over 100 percent less cost of delay than Alternative Z.
Transportation Plans and Policies	4A	Consistent with funded transportation projects?		Segments 58, 68, and 97 (eastern bypass) not included in RTCSNV 2035 RTP - not consistent. Funded improvements on CC-215 Northern Beltway in RTCSNV 2035 RTP, with improvements to system interchanges at I-15 and US-95; funded improvements to I-15 from Apex to Speedway - improvements may not have available capacity to accommodate I-11 - not consistent.
	4B	Consistent with long-term transportation visions and plans?		Majority of the corridor has planned improvements (Summary of Regional Strategic Improvements - Unfunded Needs from RTCSNV 2035 RTP): Eastern transportation corridor planned to be constructed as truck/bypass route.
Environmental Sustainability	5A	Impact to wildlife corridors and/or habitat blocks?		Per NDOW, occupied bighorn sheep distribution exists within portions of the project area and four-mile buffer area. Also, various species of raptors, may reside in the vicinity of the project area. A number of other wildlife species have also been observed in the vicinity of the project area.
	5B	Impact to land managed for conservation or wildlife purposes?		Per BLM, segments 58 and 68 (eastern bypass) traverse the Rainbow Gardens and River Mountains ACECs and LMNRA. Northern beltway within close proximity to Eglington Plant Preserve.
	5C	Linear miles of undisturbed waterways/ floodplains impacted?		Traverses approximately 1.33 miles of undisturbed floodplains.
	5D	General impact to air quality?		Will have larger short-term construction impacts, but avoids densely populated Las Vegas Valley. Should have lower traffic congestion than Alternatives Y and Z, and will have significantly lower operational impacts to residences.
	5E	Additional environmental concerns identified by stakeholders?		Possible cultural resources, visual and noise impacts, and erosion potential due to slope and topography. Minimal noise and health impacts associated with 2 schools within approximately 1,000 feet of the alternative. Some environmental justice impacts as majority of the census tracts have less than 10% or 10-20% population below poverty. Per NPS, impacts to recreation, viewshed and soundscape in LMNRA. Per BOR, potential conflicts and impacts with vital infrastructure of the Southern Nevada Water Authority (SNWA) system and proposed power transmission corridors. Recreational impacts including possible disruption of River Mountains Loop Trail including existing foot, bicycle, and equestrian recreation access outside the recreational area.
Land Use and Ownership	6A	Consistent with regional and local land use plans (including tribal plans, if available)?		Planned land uses along this alternative could both enhance and diminish the value of implementation of a major trade corridor. This corridor traverses residential-based master planned communities (Henderson). However, the corridor is also within close proximity to major industrial and commerce land uses (Boulder City, North Las Vegas), and provides additional access to Nellis AFB and the UPRR Intermodal Yard.
	6B	Compatible with major land ownership patterns and resource plans?		Mostly compatible with land ownership patterns (primarily private, BLM, and BOR). Corridor portion through LMNRA (NPS) (letter dated 11/06/2013) not considered feasible; potential impacts to BOR land.
Community Acceptance	7A	Core Agency Partners?		Mostly supportive comments.
	7B	Stakeholder Partners?		No comments or mixed comments.
	7C	General public?		Based on virtual public outreach process, the majority of responders/commenters "strongly oppose" this alternative.
Cost	8A	Order of magnitude cost?		Planning level cost estimate $1,161,000,000.

Summary of Recommended Reasonable and Feasible Corridors

Recommended Reasonable and Feasible Corridors Based on Level 2 Evaluation

The recommended reasonable and feasible corridors based on the Level 2 evaluation results is the reasonable and feasible range of alternatives for the I-11 corridor to be carried into a more detailed planning and environmental analysis in future studies. This study resulted in recommended alternative corridors; future studies will determine specific alignments within these recommended corridors (**see Figure 15**). This includes three alternative corridors in the Phoenix Metropolitan Area, one alternative corridor in Northern Arizona/Southern Nevada, and three alternative corridors in the Las Vegas Metropolitan Area.

Figure 15. Corridor vs. Alignment



Phoenix Metropolitan Area Section

As noted previously, due to the similarities and shared segments in the Phoenix Metropolitan Area, the alternatives in this section were split north and south of I-10 to perform a more focused evaluation that allowed the identification of targeted issue areas – resulting in two alternative segments north of I-10 and five alternatives south of I-10.

Per the screening results, both alternatives north of I-10 are strong candidates to be carried forward into future NEPA planning processes. They both have potential environmental constraints that will need to be analyzed further, however these alternatives are considered within the reasonable and feasible range of alternatives, meaning that nothing has been identified to warrant removal at this point in the process. However, as these alternatives are so similar – making a connection between I-10 and Wickenburg west of the White Tank Mountains in the same geographic area – these have been combined into a single corridor with the two alternatives as multiple options for further NEPA consideration. Additionally, in response to several stakeholder comments received, a third option has been added to this corridor swath to the west, avoiding traversal of the planned Vulture Mountains Cooperative Recreation Management Area. This alternative has not been analyzed and evaluated to the same level of detail as the other corridor alternatives.

South of I-10, Segment 86 (proposed Hassayampa Freeway link south of I-10 and west of SR 85) was identified as the principal area of concern, primarily for environmental reasons, including but not limited to the presence of the Lower Salt and Gila Rivers Important Bird Area, potential cultural resource site, and multiple wildlife areas. This segment has substantial issues that can be compounded by major infrastructure corridor development. Because reasonable alternatives exist to avoid this area, alternatives including Segment 86 were not seen as strong candidates for further NEPA study and therefore were modified accordingly. Additionally, portions of Segments 85 (east of SR 85) and Segment 87 were modified to create a less out of direction route connection.

Depending on the preferred connection of corridor options north and south of I-10, an I-11 Corridor may potentially be co-located with I-10 for a short distance. Where the I-11 Corridor would share right-of-way with I-10, or any other existing freeway, additional traffic analyses will be required in future studies to understand the operational implications of co-locating these facilities to ensure no adverse impacts on the existing freeway corridor.

Figure 16 through **Figure 18** illustrate the recommended reasonable and feasible corridor alternatives (with the modifications mentioned above) for the Phoenix Metropolitan Area. These include one corridor north of I-10, and two alternative corridors south of I-10. The corridor segment options north of I-10 can be paired together with the alternative corridors south of I-10 using I-10 as a link to create a series of hybrid alternatives with greater strengths. The maps in this document, however, keep these corridors separate. Alternative 3 South actually contains a series of potential alternative corridor segments that generally traverse the study area in the same direction – forming a connection from I-10 near Buckeye to I-10 near Casa Grande, traveling diagonally across the Hidden Valley using new corridor routes. The Phoenix Metropolitan Area recommended alternative corridors include:

- Alternative 1 (North): Includes Alternative G/H/LL/MM-North with no modifications, Alternative I-North with no modifications, and a third westerly link avoiding the planned Vulture Mountains Cooperative Recreation Management Area
- Alternative 2 (South): Alternative H-South with no modifications
- Alternative 3 (South): Potential alternative options utilizing new corridors that diagonally traverse the Hidden Valley (Alternative G-South with modifications to Segment 86; Alternative I-South; Alternative LL-South with modifications to Segments 85 and 87)

Northern Arizona/Southern Nevada Section

In Northern Arizona/Southern Nevada, two alternatives were evaluated in the Level 2 screening. While these two alternatives are very similar, sharing three segments (36, 46 and 47), the environmental and financial constraints associated with Alternative UU (primarily segment 91

which follows Chicken Springs Road) outweigh the benefits. Even though Alternative UU is not the strongest candidate in this section as a major trade corridor for future I-11, this does not preclude other agencies from conducting more detailed analyses of this corridor in support of local land use and economic development purposes. Alternative Q is the recommended reasonable and feasible corridor to be carried forward into future NEPA planning processes for Northern Arizona/Southern Nevada (see **Figure 19**).

Las Vegas Metropolitan Area Section

Through the process of conducting the Level 2 analysis, it was confirmed that all three alternatives are important for differing reasons, and none are without challenges. As described below, Alternatives Y, Z and BB-QQ are all shown to be reasonable and feasible corridors for the Las Vegas Metropolitan Area, therefore, it is recommended that all three be carried forward into future planning and environmental analyses for the purpose of recommending a single alternative (see **Figure 20** through **Figure 22**).

Alternative BB-QQ appears to be the strongest alternative. While somewhat out-of-direction for travel between Phoenix and Reno and points beyond, this alternative provides a more direct route from Phoenix to the major logistics facilities and land uses in the metropolitan area (located in northeast corner of the Valley), a direct connection to the CANAMEX corridor north of Las Vegas, and bypasses the heavily congested areas of the Valley. This alternative has significant advantages as a major interstate trade corridor. There are a number of potential environmental constraints associated with developing any new transportation facility through undisturbed land that will require thorough analyses in future NEPA planning studies, however, alternatives Y and Z are not without environmental challenges associated with widening a facility through dense urban areas, such as air quality, noise, environmental justice, close proximity to schools, and others. In addition, many Henderson residents in the vicinity of the Corridor are opposed to this alternative.

Alternative Y is also considered to be reasonable and feasible because it primarily utilizes existing corridors, most of which have available right-of-way and are programmed for widening, thus minimizing environmental impacts and lowering the total cost to construct. This alternative primarily follows the Southern and Western Clark County Beltway and serves local circulation traffic—commuter trips and “last mile” commercial delivery trips. Nevertheless, it has some challenges as a major NAFTA trade corridor. For instance, it might not be used as a north-south interstate trade corridor because it is somewhat out of direction, passes through congested urban environments that are less reliable for long-distant trips, and lacks regional logistics facilities and land uses. In fact, the land uses along the majority of the corridor are inconsistent with a major trade corridor.

Alternative Z is also considered to be reasonable and feasible because it is the most direct north-south route of the alternatives and primarily follows I-515 and US 95 through the heart of the metropolitan area. It provides good connectivity to major logistics facilities and land uses, and like Alternative Y, it also supports local circulation traffic—commuter trips and “last mile” commercial delivery trips. However, it has long been anticipated that additional capacity will be needed. High-level modeling shows that widening the corridor to accommodate anticipated traffic associated with a major trade corridor will not be sufficient to avoid travel time delays and congestion. This alternative also has the highest air quality impacts associated with adding traffic through the center of the Las Vegas Valley near areas with high population densities.

Figure 16. Phoenix Metropolitan Area: Recommended Alternative 1 (North)

Alternative G/H/LL/MM-North with no modifications, Alternative I-North with no modifications, and a new westerly link

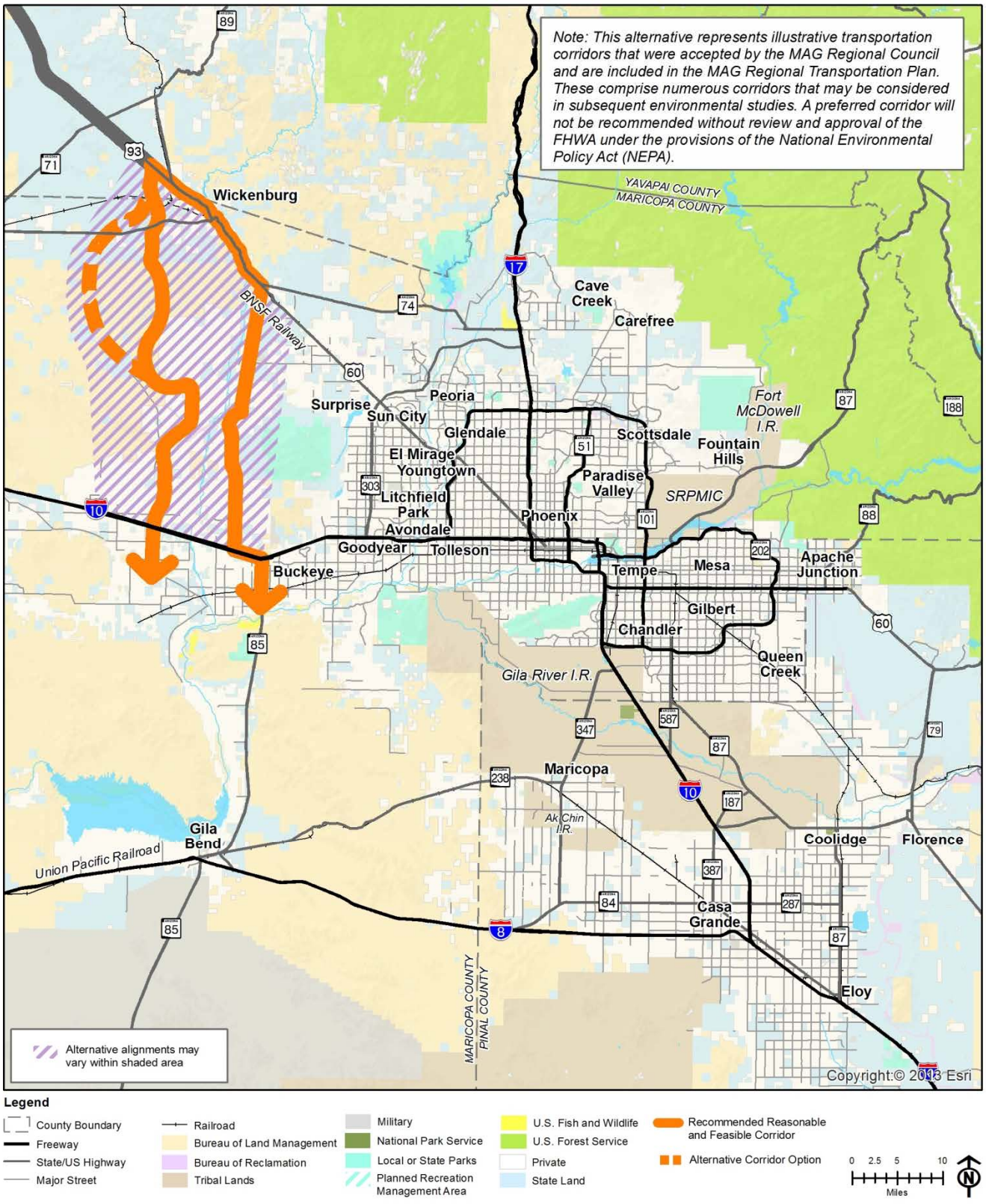


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Figure 17. Phoenix Metropolitan Area: Recommended Alternative 2 (South)

Alternative H-South with no modifications

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Figure 18. Phoenix Metropolitan Area: Recommended Alternative 3 (South)

Potential new diagonal corridor options (Alternative G-South, I-South, and LL-South with modifications)

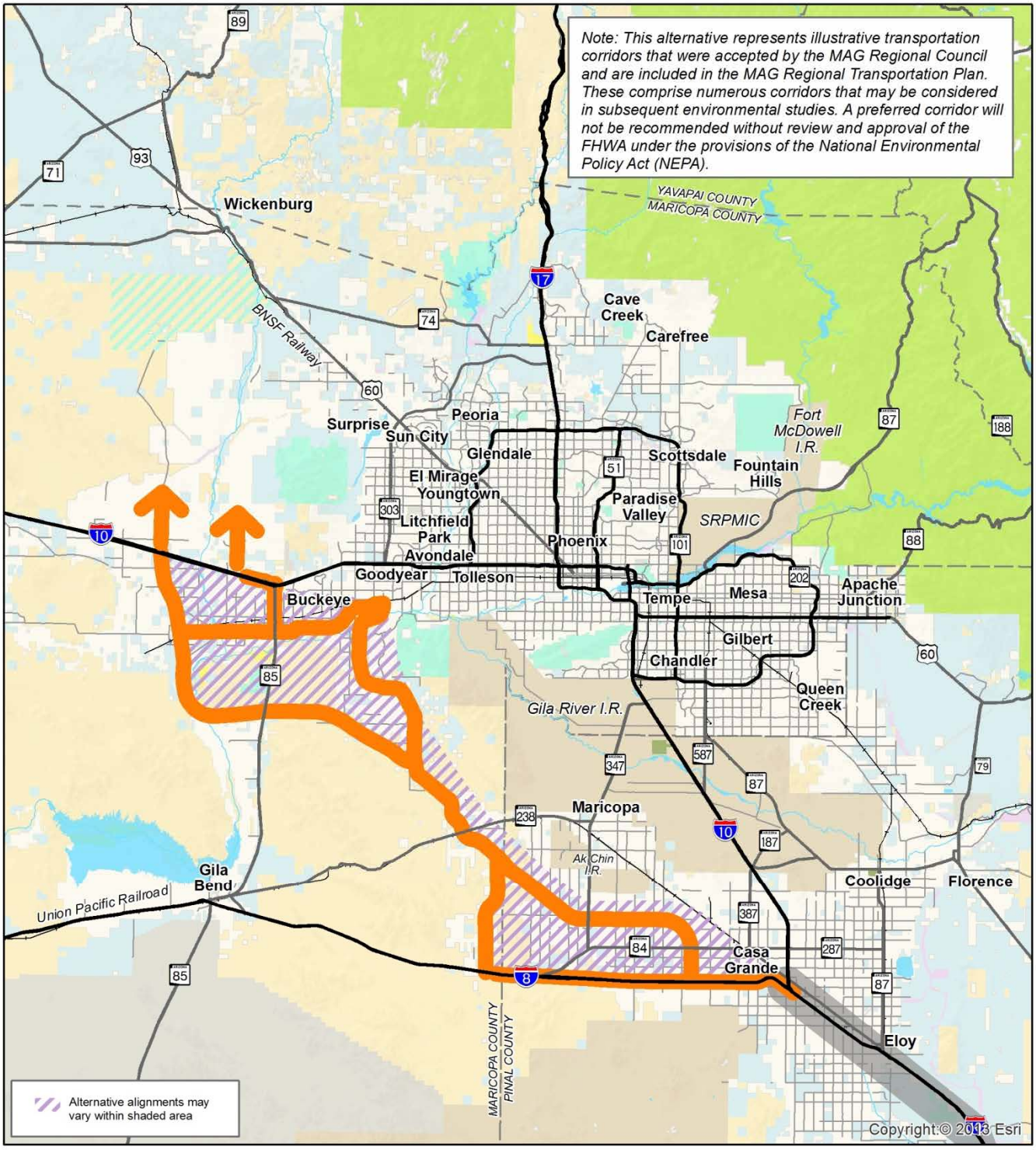

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Figure 19. Northern Arizona/Southern Nevada: Recommended Alternative Q

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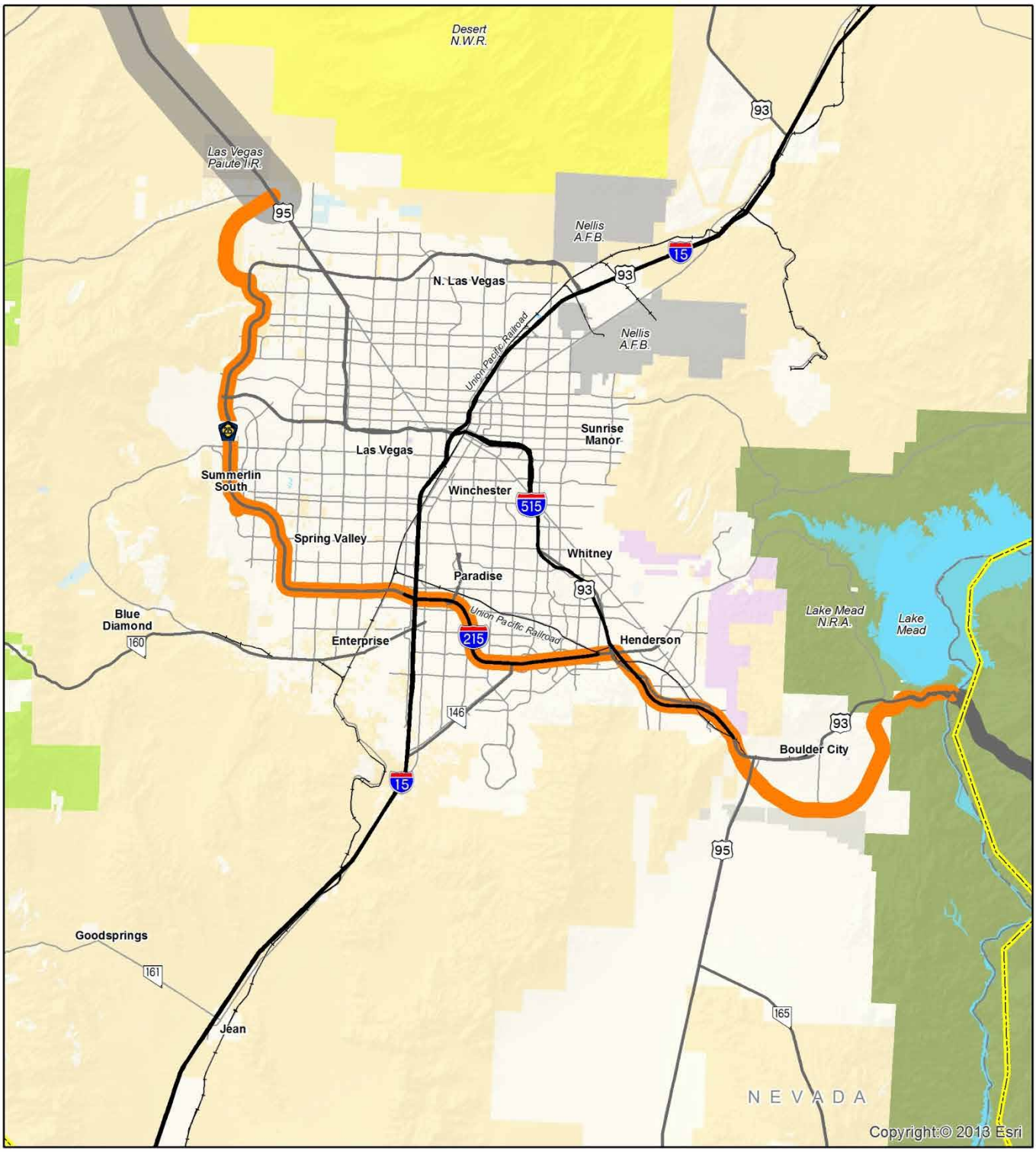
Figure 20. Las Vegas Metropolitan Area: Recommended Alternative Y



Legend

- County Boundary
- Freeway
- State/US Highway
- Major Street
- Railroad
- Bureau of Land Management
- Bureau of Reclamation
- Tribal Lands
- Military
- National Park Service
- Local or State Parks
- Planned Recreation Management Area
- U.S. Fish and Wildlife
- U.S. Forest Service
- Private
- State Land
- Recommended Reasonable and Feasible Corridor
- Future Connectivity Area Recommended Connection

0 1.25 2.5 5 Miles

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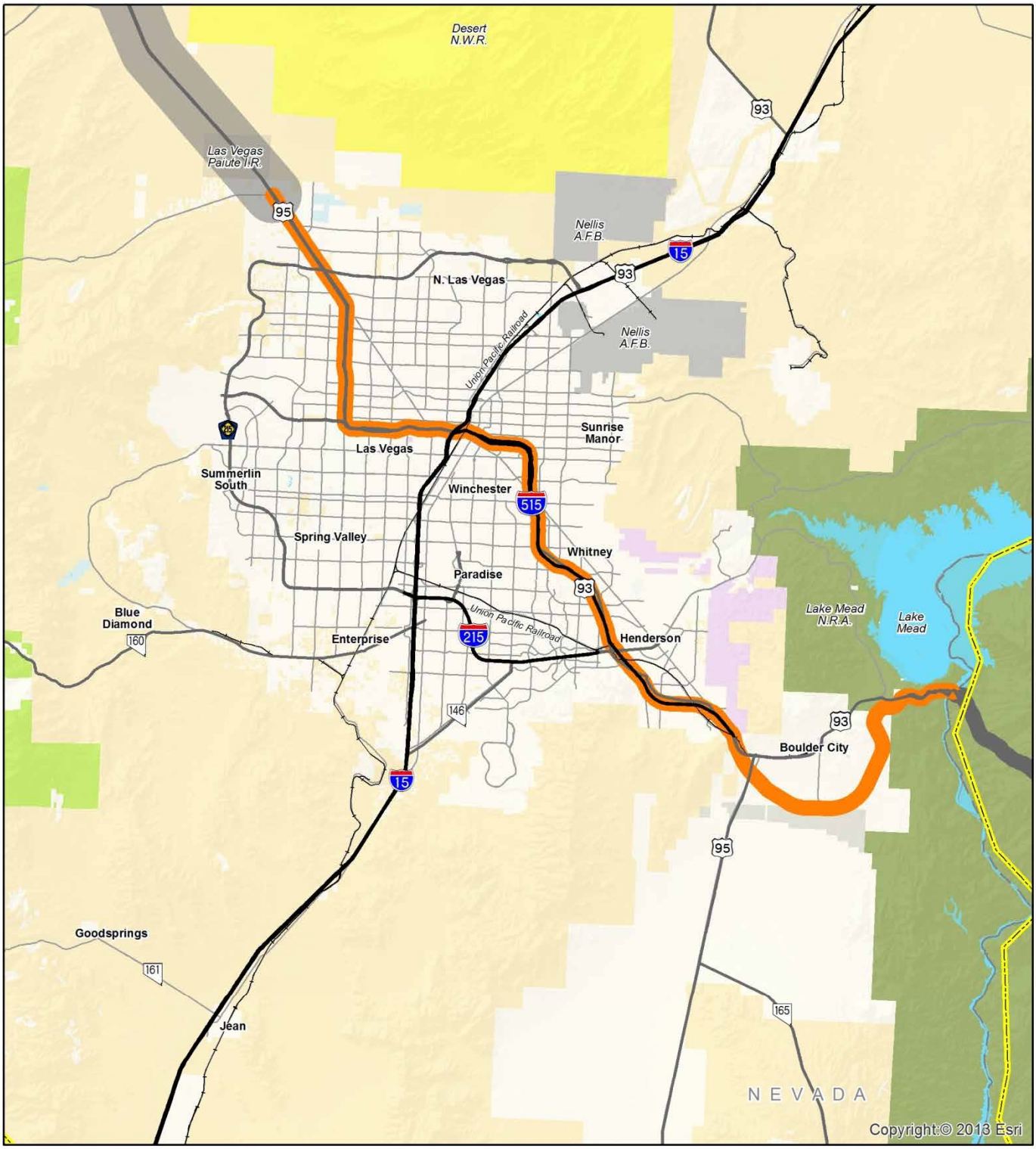
Figure 21. Las Vegas Metropolitan Area: Recommended Alternative Z



Legend

- County Boundary
- Freeway
- State/US Highway
- Major Street
- Railroad
- Bureau of Land Management
- Bureau of Reclamation
- Tribal Lands
- Military
- National Park Service
- Local or State Parks
- Planned Recreation Management Area
- U.S. Fish and Wildlife
- U.S. Forest Service
- Private
- State Land
- Recommended Reasonable and Feasible Corridor
- Future Connectivity Area Recommended Connection

0 1.25 2.5 5 Miles

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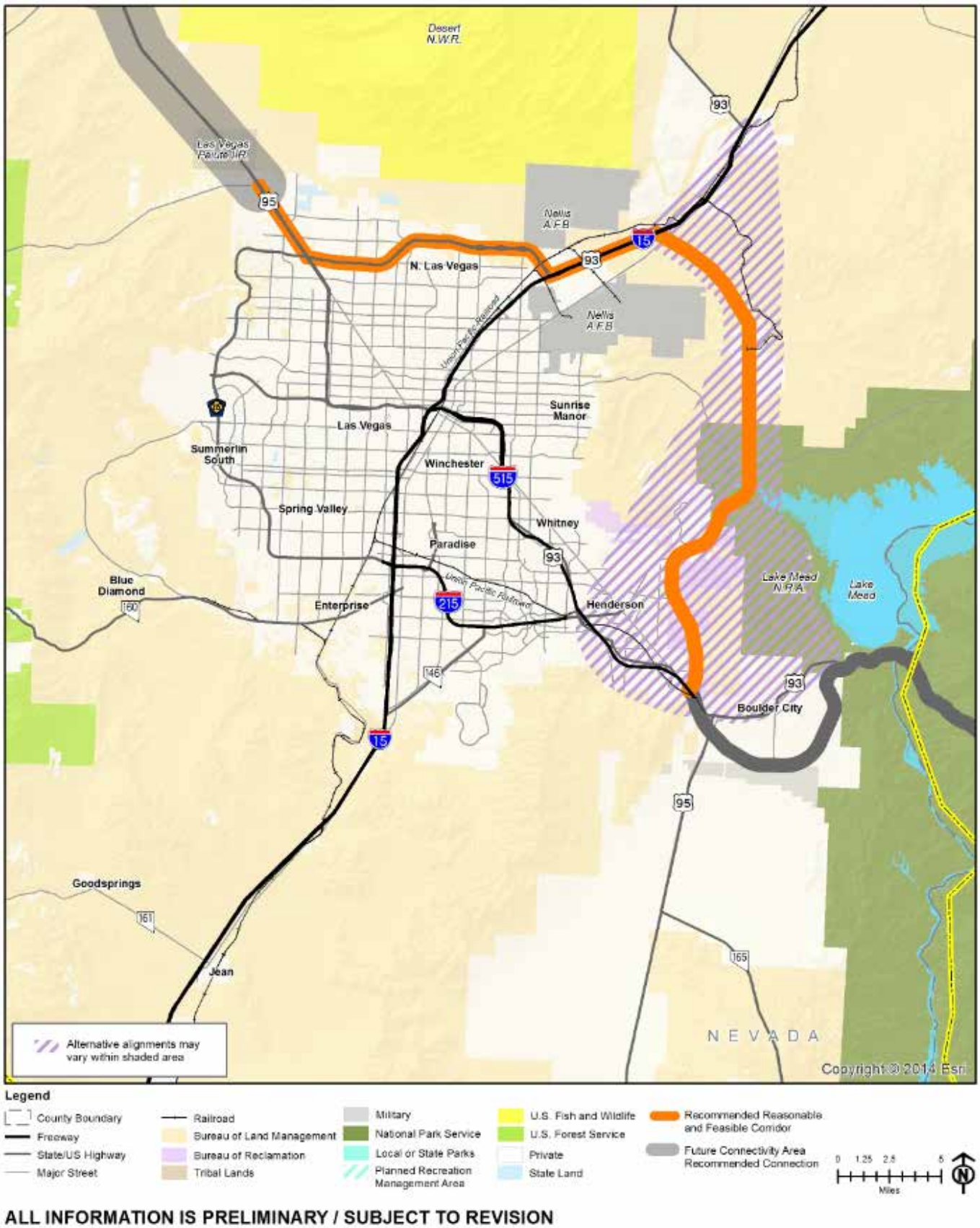
Figure 22. Las Vegas Metropolitan Area: Recommended Alternative BB-QQ



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Appendix A
Multi-Use Evaluation Technical Memorandum

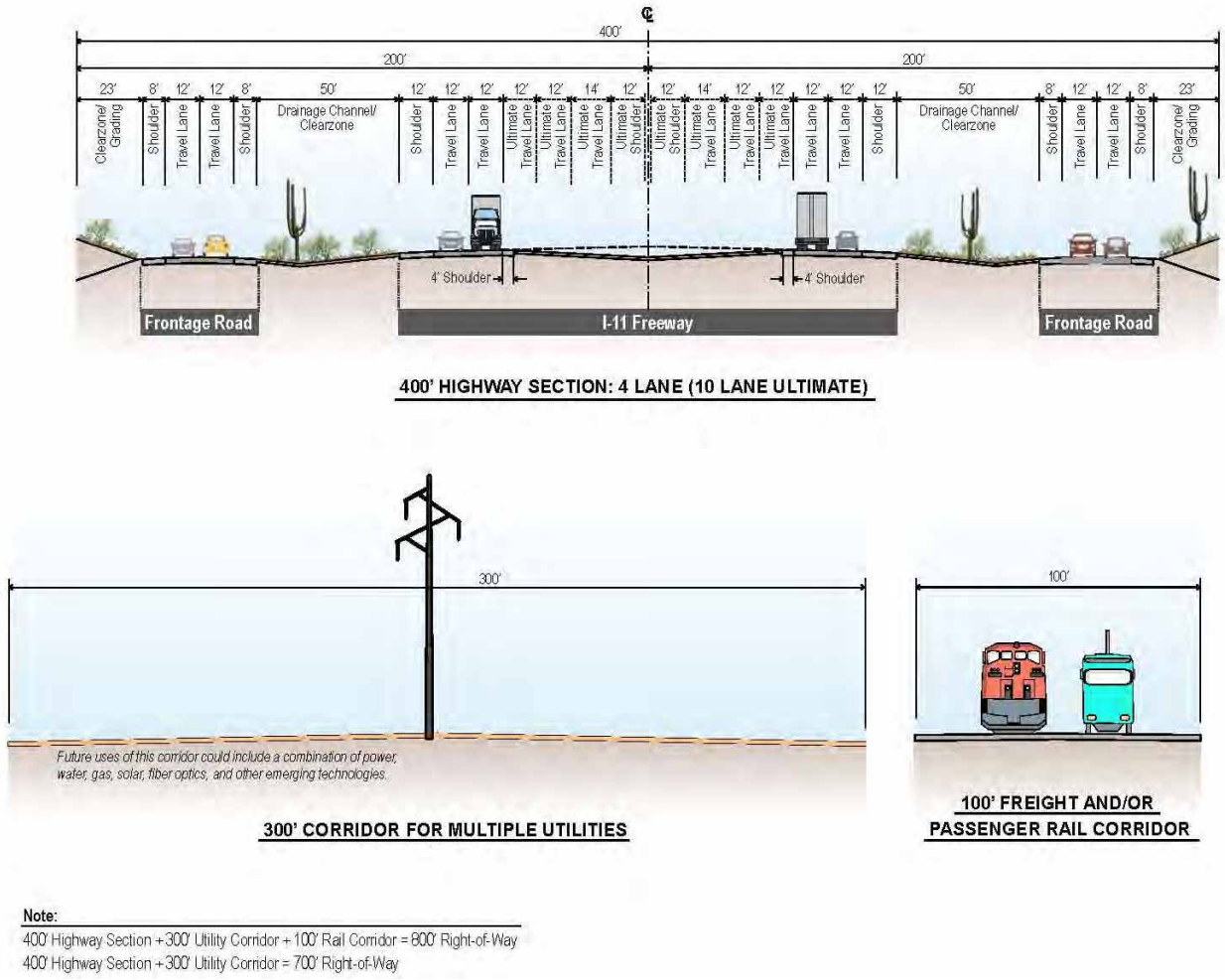
Multi-Use Evaluation

Introduction

As discussed in the *Draft Preliminary Level 2 Evaluation Results Summary* technical memorandum, each alternative was rated based on its ability to accommodate multiple modes and uses to help distinguish those alternatives that have the greatest potential as a multi-use corridor. Several possible footprints for the I-11 and Intermountain West Corridor were developed and, shown in Figure 1, include accommodating multiple uses and modes (800-foot width), highway and utilities (700-foot width), or highway only (400-foot width).

Figure 1: I-11 Potential Cross-sections Accommodating Multiple Uses and Modes

Typical sections show maximum footprint that might be required. Individual elements and needs will vary.



Through this analysis, it was discovered that the majority of the alternatives are not able to accommodate multiple modes, specifically rail, throughout the entire length of the corridor due to right-of-way or terrain constraints. Therefore, alternate rail corridors have been proposed for possible consideration in on-going and future planning studies conducted by public agencies and private sector stakeholders. These studies, as well as the role of Arizona and Nevada state departments of transportation in rail planning and project implementation (described in the next section), provide possible solutions for an improved or expanded rail network and services. Other uses within the corridor, including energy and communications transmission for example, is feasible through most of the alternatives, and continues to be a priority for consideration as the I-11 Corridor concept is refined and developed.

Role of State Departments of Transportation in Rail Planning and Project Implementation

State Rail Planning

Many states – including Arizona and Nevada – have long possessed some measure of legislative authority to oversee and regulate railroads (i.e. road-rail grade crossing construction and maintenance, right-of-way fencing, review of railroad abandonment processes, issues concerning public safety, etc.), but state rail planning and involvement in rail projects did not begin in earnest until after 1970. The focus of initial rail planning efforts and crafting of freight rail policy by state departments of transportation and other state transportation agencies was to support rail freight service on lines subject to abandonment via the Local Rail Service Assistance (LRSA) program. The Federal Railroad Administration (FRA) provided state planning grants to develop and update initial state rail plans and some funding for rehabilitation of light density rail lines that may have been subject to abandonment without infrastructure improvements. In the 1980s and early 1990s, the program continued as the Local Rail Freight Assistance program (LRFA).

The focus of state rail planning efforts changed markedly from the mid-1990s through 2008. States began to identify both passenger and freight rail investments in their SRP updates, as part of multimodal planning efforts. These efforts were called for in multi-year pieces of Federal surface transportation funding authorization bills: the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA); the 1998 Transportation Efficiency Act for the 21st Century (TEA-21); and the 2005 Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), the nation's surface transportation program.

In 2008, the Passenger Rail Investment and Improvement Act (PRIIA) was passed by the U.S. Congress. This legislation authorized increased Federal funding for intercity rail passenger service and high-speed rail development, and also mandated the creation of SRPs, or updates to existing SRPs, as a requirement for states to be eligible for future Federal rail project funding. The FRA must approve all SRPs. The Arizona Department of Transportation (ADOT) and Nevada Department of Transportation (NDOT) completed PRIIA-compliant SRPs in March 2011 and March 2012, respectively.

The American Recovery and Reinvestment Act of 2009 (ARRA) created the Transportation Investment Generating Economic Recovery (TIGER) Program, which funded $1.5 billion in infrastructure projects. Freight and passenger rail projects were eligible, along with highways, bridges, ports, and public transit projects. ARRA also provided $8 billion for capital projects related to intercity and high-speed rail corridors. These funds could be utilized for acquisition, construction, or improvement of track, rolling stock, and other rail facilities.

A Congressional appropriation in 2010 of $50 million for rail planning grants was aimed at establishing a pipeline of future high-speed and intercity passenger rail projects and corridor development programs by advancing planning activities for corridors that were at an early stage. The grants are to be used for completion of state rail plans and are the impetus for numerous state rail planning initiatives.

State rail plans have provided the basis for recent state involvement in rail planning and eligibility for Federal funding. SRPs, at a minimum, provide the following for state rail planning efforts:

- Inventory of rail system, services, facilities, commodity flows, and passenger data
- Evaluation of rail lines, including high-speed rail corridors and rail line abandonments
- Review of intermodal connections
- Review of existing publicly-funded rail projects
- General transportation, economic, and environmental impacts of rail service
- Rail safety and security

- Passenger rail service objectives
- Rail infrastructure needs assessment based on stakeholder input
- Performance evaluation of existing passenger services
- High-speed rail corridor development plan
- Long-range service and investment program and development of lists of projects that could improve the efficiency, velocity, and safety of passenger and freight rail services
- Determination of public and private benefits
- Funding sources, financial alternatives, and creation of a short and long-term investment plan

An important outcome of the state rail planning process involves identification of transportation opportunities and physical and operational rail transportation needs through study and a public outreach process, which includes extensive participation from the following stakeholders: Class I railroads (e.g. BNSF Railway and Union Pacific Railroad); short line railroads (e.g. Arizona & California Railroad, Arizona Eastern Railway, and Copper Basin Railway); freight shippers; manufacturers; passengers; public sector agencies such as metropolitan planning organizations (MPOs), local economic development organizations, and state, county, city, and tribal agencies; and citizens. These needs are used to prioritize freight and passenger rail infrastructure and service needs, develop a long-range investment plan, and explore funding options and a possible policy direction to reach implementation. These projects commonly involve the rehabilitation or upgrade of railroad track, bridges, and grade crossing surface and signals (track and bridge upgrades are often facilitated to increase the maximum allowable gross weight per freight car to the emerging U.S. standard of 286,000 lbs.); relocation or construction of a new track or railroad switching or storage yard; and the development of facilities to sustain passenger rail and transit operations.

Funding and Oversight of Rail Project Implementation

A key function of state rail planning is to identify short and long-term investments and to identify funding sources that may be utilized for implementation. This effort begins with identification of historical and current sources used to fund rail-related projects at the Federal, state, and local levels. These avenues should include both public and private sources network investment, including public-private partnerships (PPPs). In many cases, matching state or local funding sources will be obligated to secure Federal funding. Competition for Federal transportation funding by states is keen. Both DOTs identified potential sources of Federal funding available for rail projects in their respective SRPs.

Historically, construction and improvement of freight railroad infrastructure has been funded almost entirely by railroad companies in the private sector. Few dedicated programs for rail capital assistance to states existed at the Federal level until recently. PRIIA and related appropriation bills provided funds for intercity passenger rail investments directly to states in 2008 and amounted to $13 billion in total investment between 2009 and 2013. In 2009, the ARRA provided additional transportation funding options to states, which could be leveraged for passenger rail development. Provisions of SAFETEA-LU contain a number of options for funding railroad line relocations, infrastructure and facilities improvements, enhanced connectivity between transportation modes, and safety initiatives, as well as offering loans and credit assistance to public and private sponsors of rail and intermodal projects. Potential funding programs that have been utilized in other states or communities should also be considered.

Some states have broader authority than others to obligate funds for the implementation of rail construction and improvement projects. A state is eligible to receive Federal grant assistance for rail-related projects when it complies with the regulations that the U.S. Secretary of Transportation prescribes under 49 USC § 22102. Arizona and Nevada meet these criteria and are therefore eligible to receive Federal funding. The regulations require that:

1. The State has an adequate plan for rail transportation and a suitable process for updating, revising, and modifying the plan;
2. The State Plan is administered or coordinated by a designated State authority and provides for a fair distribution of resources;
3. The State Authority –
    - Is authorized to develop, promote, supervise, and support safe, adequate, and efficient rail transportation
    - Employs or will employ sufficient qualified and trained personnel
    - Maintains or will maintain adequate programs of investigation, research, promotion, and development with opportunity for public participation; and
    - Is designated and directed to take all practicable steps (by itself or with other State authorities) to improve rail transportation safety and reduce energy use and pollution related to transportation
4. The State has ensured that it maintains or will maintain adequate procedures for financial control, accounting, and performance evaluation for the proper use of assistance provided by the U.S. Government.

It is important to note that neither state is prohibited from spending federal funds to study enhancements or implementation of passenger, transit, and freight rail services.

ADOT possesses some authority in the oversight, planning, and development of rail projects in Arizona. Most of these efforts are realized through general highway improvement projects funded by the Federal Highway Administration (FHWA) and ADOT, including removal of road-rail grade crossings, replacement or new installation of grade separations, and widening or improvement of existing road-rail or grade separated crossings. ADOT is leading the effort to study the feasibility of passenger intercity rail between Phoenix and Tucson, in cooperation with the FRA and Federal Transit Administration (FTA), and will identify possible sources of funding it can obligate through various means to develop the service. Arizona Governor, Jan Brewer, signed into law HB 2396, on July 13, 2009, which allows ADOT to use PPPs as a tool to address the state's transportation requirements. This law grants ADOT broad authority to partner with the private sector to build or improve Arizona transportation facilities. The new authority gives ADOT additional methods to fund the construction and enhancement of roads, transit, and other transportation facilities. PPPs allow for many options to fund and construct new and enhanced facilities. With the passage of this law, ADOT has the legal authority to explore these options.

NDOT has considerable authority in rail oversight, planning, and development in the state, as authorized and directed by the Nevada revised statutes (NRS). NRS 705.421 directs NDOT to prepare and implement a state plan for rail service in cooperation with Nevada's Public Utilities Commission (NPUC), including projects to preserve rail lines, rehabilitate rail lines to improve service, and restore or improve freight service on rail lines that are potentially subject to abandonment. NRS 705.423 gives NDOT the power to accept Federal, state, local, and private funds to develop and implement the state rail plan with state legislative approval required to expend funds to implement the plan, to enter into agreements for railroad purposes, and to act as agent for counties and cities for railroad purposes. Other statutory authority entrusted to NDOT is embodied in NRS 705.425, which provides for a state program to preserve lines where service has been discontinued; NRS 705.427, which permits NDOT to acquire and operate track and other railroad property that is the subject of abandonment or discontinuation of service; and NRS 705.428, which authorizes NDOT to contract for construction, improvement, or rehabilitation of any trackage or rail line property, provided state legislative approval authorizes the expenditure of funds.

Existing Passenger Rail Network Overview

Amtrak has provided passenger rail service to the Intermountain West continuously since 1971. As of January 2014, three regularly-scheduled Amtrak long-distance trains provide service over east-west transcontinental routes that penetrate Arizona and Nevada and intersect with or exist within close proximity to the I-11 corridor[1]. From south to north, these include:

- **Sunset Limited** (operates thrice-weekly between Los Angeles, California, and New Orleans, Louisiana): Stations serving Arizona include Yuma, Maricopa (south of Phoenix), Tucson, and Benson.
- **Southwest Chief** (operates daily between Los Angeles, California, and Chicago, Illinois): Stations serving Arizona include Needles, California (north of Lake Havasu City, Arizona, and south of Laughlin, Nevada), Kingman, Williams Junction (south of Grand Canyon National Park), Flagstaff, and Winslow.
- **California Zephyr** (operates daily between San Francisco Bay, California, and Chicago, Illinois): Stations serving Nevada include Reno, Winnemucca, and Elko.

Additional passenger rail service has been provided by the Grand Canyon Railway between Williams and the Grand Canyon National Park in Arizona since 1989. As of January 2014, a daily regularly-scheduled service operates over the north-south line. The Verde Canyon Railroad is a heritage railway that operates on the Arizona Central Railroad shortline between Clarkdale and Perkinsville in Arizona. The service runs year round with daily service during the peak season.

Rail transit services have been provided in the Arizona segment of the I-11 Corridor since 2008 via the 20-mile Metro Light Rail network serving Phoenix, Tempe, and Mesa.

Existing Freight Rail Network Overview

Arizona and Nevada host main routes of two Class I railroads serving the western U.S. – BNSF Railway (BNSF) and Union Pacific Railroad (UP) – as well as a network of local shortline railroads.

Class I lines in the Intermountain West are components of heavily trafficked east-west transcontinental routes, carrying predominantly bulk commodities (i.e. coal, petroleum products, chemicals, and aggregates), automobiles, agricultural and food products, and domestic and international containerized intermodal freight over long distances. Some routes host Amtrak passenger trains. All routes intersect with or exist within close proximity to the I-11 Corridor. The Class I railroad corridors across Arizona and Nevada, include the following, from south to north[2]:

- **UP Sunset Route:** Between Los Angeles, California, and New Orleans, Louisiana, via Yuma and Tucson, Arizona. Principal north-south lines to Phoenix and Nogales, Arizona, connect with the Sunset Route at Picacho and Tucson, respectively.
- **BNSF Transcon Route:** Between Los Angeles, California, and Chicago, Illinois, via Needles, California, and Flagstaff and Williams, Arizona. A principal north-south line to Phoenix connects with the Transcon Route at Williams Junction, Arizona.
- **UP Salt Lake Route:** Between Los Angeles, California, and Salt Lake City, Utah, via Las Vegas and Caliente, Nevada.
- **UP Overland Route:** Between San Francisco Bay, California, and Chicago, Illinois, via Reno, Winnemucca, and Elko, Nevada.

[1] Amtrak System Timetable, Summer-Fall 2013

[2] System Maps, BNSF Railway and Union Pacific Railroad

Shortline railroads serve local freight customers and transport shipments for short distances, where they are interchanged with Class I railroads for furtherance over the national freight rail network. Shortlines in Arizona include the Apache Railway, Arizona & California Railroad (which provides BNSF with an east-west shortcut between Phoenix and Los Angeles), Arizona Central Railroad, Arizona Eastern Railway, Copper Basin Railway, Black Mesa and Lake Powell Railroad, and the San Pedro & Southwestern Railroad[3]. Nevada's sole shortline – the Nevada Northern Railway – is not actively shipping freight.

Rail Planning Efforts in Progress

Many states – including Arizona and Nevada – continue to study the feasibility of new or enhanced passenger rail routes and services and improvements to the freight rail network. This planning includes development of strategies for securing construction funding and project implementation in the short- and long-term horizons.

The combined populations of Phoenix, Tucson, Las Vegas, and Reno grew from 700,000 in 1956 to approximately 8 million in 2012. Future projections indicate that population centers within the proposed I-11 Corridor will continue to see significant growth, prompting the need for improved surface transportation to accommodate passenger travel demand, as well as mobility for freight shipments within the Intermountain West. The Corridor would also offer alternative routes for passenger and freight flows, bolster intermodal connectivity, and improve highway and rail system reliability for better trade, commercial, economic, and environmental opportunities. Both Arizona and Nevada have already completed PRIIA-compliant State Rail Plans, which identify rail service issues and opportunities and will inform and supplement the analysis conducted during the I-11 and Intermountain West Corridor Study. Development of additional passenger rail services within the I-11 Corridor and adjacent areas are under consideration via two studies currently in progress and one completed study. These state and regional efforts will further complement the conceptual planning and analysis being undertaken for the I-11 and Intermountain West Corridor Study.

High-Speed Passenger Rail

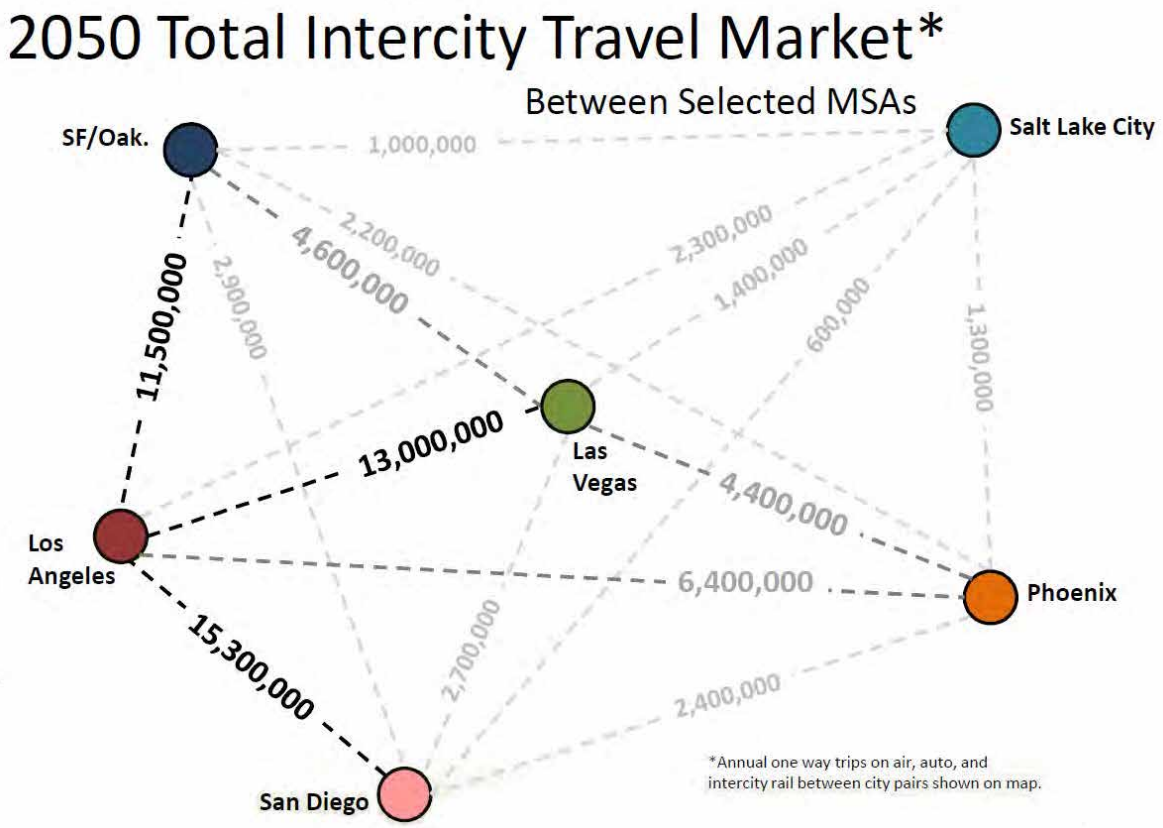
The FRA is leading the current study of high-speed passenger rail options within the U.S. Southwest, which includes the exploration of sustainable north-south travel generally along the I-11 Corridor via the Southwest Multi-State Rail Planning Study.

A primary purpose of the ongoing Southwest Multi-State Rail Planning Study is to work with stakeholders in Arizona, Nevada, and California to promote multi-state rail planning efforts and coordination, including the development of a vision and candidate corridors for high-speed rail in the U.S. Southwest. The study will evaluate corridors in a national network context and select corridors in the Southwest that merit additional study. Priorities for route selection and implementation will be qualified based upon ridership estimates, competitiveness with other modes, and the cost-effectiveness of the investment.

As part of the study, the FRA has developed preliminary estimates of travel demand between metropolitan areas in the Southwest. These estimates from FRA indicate the strongest demand for passenger rail exists between Southern California and Las Vegas, with less demand between Southern California and Phoenix, and the least demand for passenger rail between Phoenix and Las Vegas. These three corridor routes, and the projected person travel demand (all modes) for the U.S. Southwest, are shown in Figure 2 below.

[3] Arizona Railroad Map, 2012

Figure 2: Proposed 2050 Total Intercity Travel Market in the U.S. Southwest



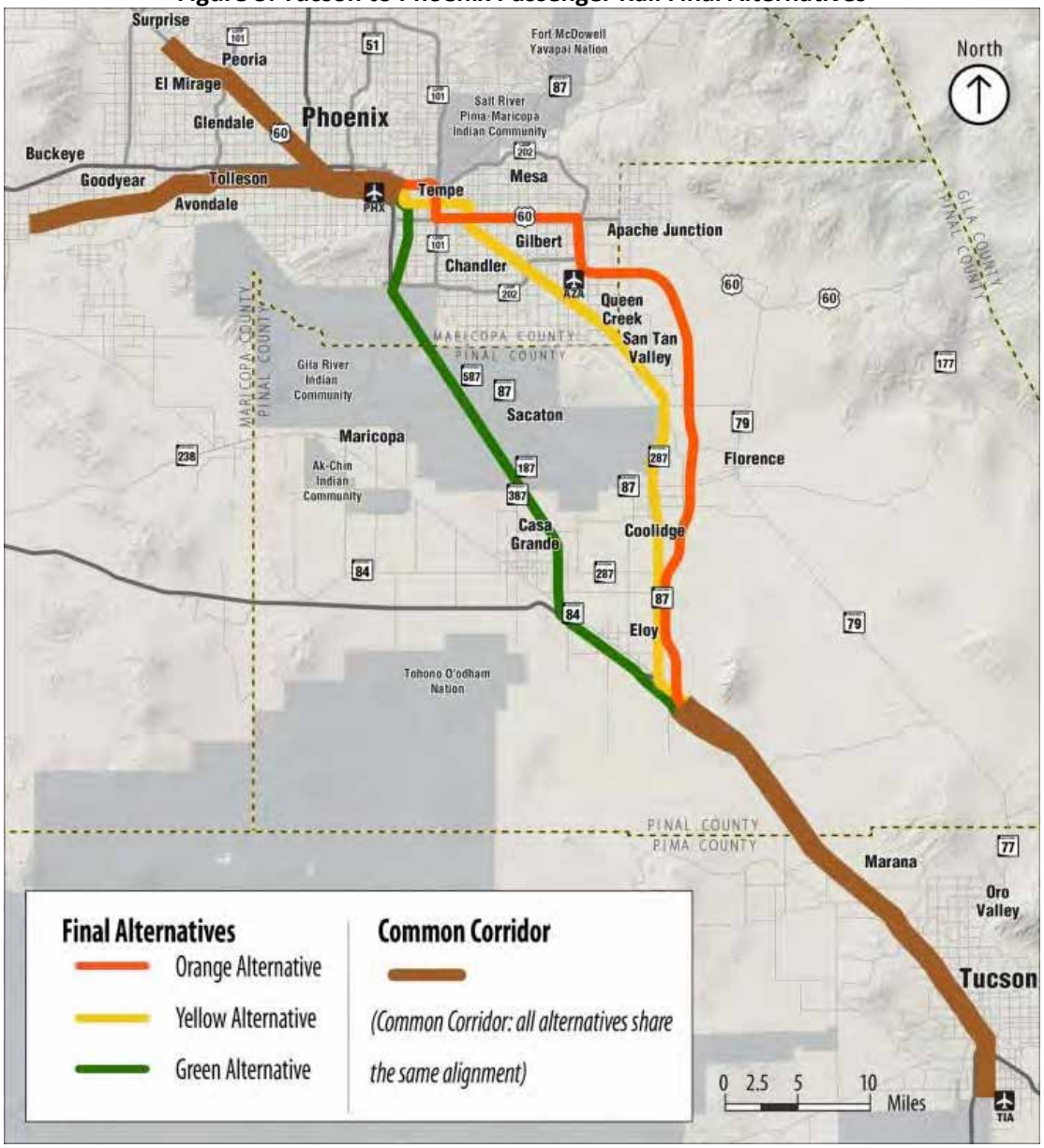
Source: Federal Railroad Administration

Intercity Passenger Rail

An effort is underway to study the feasibility of a new intercity passenger/commuter rail service between Arizona's two largest population centers, including Phoenix along the I-11 Corridor. The Arizona Passenger Rail Corridor Study represents a cooperative effort between FRA, FTA, ADOT, and local governments and planning organizations in Maricopa, Pinal, and Pima counties, and its goal is to identify an implementable passenger rail service. The study is exploring passenger rail service options – including an express service and a local commuter service that would accommodate several communities between Tucson and Phoenix – as well as possible route alternatives which are identified in Figure 3 below[4].

[4] Arizona Department of Transportation website, January 30, 2014: http://www.azdot.gov/planning/CurrentStudies/PassengerRail/overview

Figure 3: Tucson to Phoenix Passenger Rail Final Alternatives



Source: Arizona Department of Transportation, 2013

The three final corridor options now under study within a Tier 1 EIS process (out of a universe of seven corridors initially identified) include the Green Alternative route, which follows Interstate 10 between Tucson and Phoenix, the Orange Alternative, which would follow part of the future North-South Freeway Corridor and better serve the East Valley of the Phoenix Metropolitan Area, and the Yellow Alternative, which would share right-of-way with the UPRR Phoenix Subdivision and also better serve the East Valley. All three route alternatives would follow Interstate 10 between Eloy and Tucson and are illustrated in Figure 3.

Neither funding sources nor a construction schedule have been identified for the passenger rail service. Policymakers and the public will ultimately decide if the project is feasible, and the best strategies for construction funding and service implementation. Completion of the first phase of study of the Tucson to Phoenix Passenger Rail Study is anticipated for [late 2014].

Commuter Rail

In 2010 the Maricopa Association of Governments (MAG) conducted a county-wide commuter rail feasibility study and identified five potential corridors for future service within the Phoenix Metropolitan Area. The study "established priorities for implementing commuter rail service through an evaluation of ridership potential, operating strategies, and associated capital and operating costs[5]." The northwest-southeast Grand Avenue Corridor identified as potentially most feasible initially, is somewhat coincident with the proposed alignment of the I-11 Corridor in the West Valley of the Phoenix Metropolitan Area. Figure 4 illustrates the routes explored in the study.

Figure 4: Proposed MAG Commuter Rail System Routes

Source: Maricopa Association of Governments, 2014

Freight Railroads

Freight railroads typically own their own right-of-way and infrastructure and perpetually conduct independent analysis and planning to improve the capacity, velocity, efficiency, and safety of network and transportation operations. Typical improvements include installation of double-track or sidings, expansion of yards and terminals, erecting of facilities to support maintenance and operations, reconstruction or replacement of bridges, upgrades to track structure, installation of signal and communications systems, and acquisition of locomotives and freight cars (or rolling stock). Annual private sector investment continues to drive improvements to infrastructure, physical plant, and services on freight railroads in Arizona and Nevada. Many upgrades to railroad-highway grade crossing surfaces and warning devices, as well as projects involving the grade separation of railroads and highways, are at least partially funded by federal or state funding. Release of information about planning and project implementation is typically conducted at the discretion of the freight railroads. Some projects funded by freight railroads are identified in SRPs. Freight railroads have been consulted during the I-11 Study process to ascertain if independent projects are anticipated within the I-11 Corridor and to identify possible correspondence with rail planning identified in the I-11 Study.

[5] Maricopa Association of Governments website, January 30, 2014: http://www.azmag.gov/Projects/Project.asp?CMSID=1076

Rail Considerations in the Intermountain West

Figure 5 shows the existing rail network within the I-11 study region and suggests possible new rail alignments that could close north-south gaps in the existing rail network in Arizona and Nevada and provide critical connectivity between Mexico and the UP Sunset Route and BNSF Transcon corridor, as well as an alternative for routing trains around Southern California's congested freight rail network. These suggestions are being presented to the Class I railroads within the I-11 study area (UPRR, BNSF) and will require further detailed analyses, and are identified here primarily to illustrate the possibilities for rail enhancements in the region that are complimentary with the I-11 Corridor. While private rail owners are responsible for decisions regarding their networks, it is hoped that the analyses and recommendations proposed in this study will offer support for those decisions and potentially lay the groundwork for future PPPs between the states and the Class I railroads that will achieve the mobility and economic objectives of the I-11 and Intermountain West Corridor Study.

Figure 5: I-11 Multimodal Evaluation

ALL INFORMATION IS PRELIMINARY / SUBJECT TO REVISION

Maps identify desired connections between metropolitan areas. Alternatives do not identify specific alignments, nor preclude multiple alignments within each alternative.

Appendix B
Arizona Game and Fish Department Evaluation for Interstate 11 and Intermountain West Corridor Study, Level 2 Evaluation in Arizona

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
5000 W. CAREFREE HIGHWAY
PHOENIX, AZ 85086-5000
(602) 942-3000 • WWW.AZGFD.GOV

December 9, 2013

Mr. Michael Kies, PE
Arizona Department of Transportation
206 South 17th Avenue
Phoenix, AZ 85007

Re: Evaluation for Interstate 11 and Intermountain West Corridor Study, Level 2 Evalaution

Dear Mr Kies:

The Arizona Game and Fish Department (Department) has reviewed the information on the Interstate 11 Intermountain West multimodal Corridor provided via e-mail, at an October 21, 2013 meeting with staff from the Arizona Department of Transportation (ADOT), the Nature Conservancy (TNC) and AECOM and at the November 21, 2013 Environmental and Resource Agency Coordination meeting. The results of our evaluation of the potential impacts to wildlife, wildlife habitats and wildlife-dependent recreation are below.

The Department understands that the current vision is for a multi-modal corridor from the Arizona-Mexico border to the U.S.-Canada border. The Level 1 analysis consisted of a fatal flaw evaluation of broad corridors from the Arizona-Mexico border through Nevada. The Department provided Level 1 comments in a letter dated September 13, 2013. The Level 2 evaluation focuses on more detailed corridors between Casa Grande, Arizona and Las Vegas Nevada. The results of the evaluation will be used by ADOT and Nevada Department of Transportation (NDOT) to inform the development of alternatives for National Environmental Policy Act (NEPA) environmental impact analysis.

The Department's evaluation is limited to the state of Arizona. Each segment was categorized as existing (existing interstate or 4 lane highway, segments 10, 11, 21, 29, 35, 36, 43, 46, 83 and 95), expand (an improved road exists on the alignment, segments 19, 20, 29, 85) and new (there is no current road, segments 14, 15, 16, 18, 82, 84 and 91). Segments 17, 22, 86 and 87 consist of new and expand sections.

Our evaluation centers on a GIS-based evaluation tool we are developing. One-mile hexagons covering the state are populated with values from the models and data developed for the State Wildlife Action Plan (SWAP: Species of Economic and Recreational Importance (SERI), Species of Greatest Conservation Need (SGCN), Unfragmented Habitat Blocks (Unfrag), Species and Habitat Conservation Guide (SHCG). These data are all viewable in HabiMap which can be found at http://habimap.org/habimap. Figure 1 is an example of a map generated by HabiMap and used in the evaluation. The hexagons were also populated with values from a

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Michael Kies

Floodplains shapefile developed Federal Emergency Management Agency's (FEMA) Q3 Flood data, Streams shapefile developed by the Arizona State Land Department (ASLD) from DLG data, Perennial waters shapefile developed by Arizona Department of Environmental Quality, Critical Habitats shapefile developed by U.S. Fish and Wildlife Service and Vegetation raster developed by Southwest Regional GAP Analysis Project. The one-mile hexagons that intersected the segment alignments provided by ADOT were used to generate the quantative data used in the Department's analysis.

The Department is also developing a map of undisturbed habitats in the state. This draft map was used in a preliminary analysis of the potential loss of undisturbed habitats.

It is difficult to assess wildlife connectivity and linkages at this scale of analysis. We counted the linkages identified in the County Wildlife Linkages Stakeholder Assessments and Arizona Wildlife Linkages that were crossed by the segments. We also noted if the segments were creating new fragmentation and if the new fragmentation would isolate a habitat block (completely surrounded by barriers). In general, new roads will require mitigation for lost wildlife connectivity; expand and existing roads create opportunities to improve wildlife connectivity.

Department staff used the data for evaluating the Level 2 Evaluation Criteria 7 A – C and E and 8C. Descriptions are in Table 2 below. The results were categorized as high (significant impacts to wildlife) medium (impacts to wildlife, potential to minimize impacts) and low (limited impacts to wildlife). Each segment was given an overall rating of high, medium or low. High segments are considered sensitive areas. The overall results are in Table 1, the evaluation criteria results are in Table 2.

Several segments were difficult to categorize and require further explanation. Segment 17 is difficult to analyze because the impacts change depending on the location of the alignment relative to the existing two lane roads. Currently the segment passes through undisturbed habitat. However the private land in the southern portion has approved development plans and could be developed by the time of construction. This would change the categorization to low. The northern BLM lands are a sensitive area. The Department still believes that an interstate through a proposed county park with the significant loss of recreational opportunities, including lost hunting opportunities, loss of wildlife habitats and new fragmentation constitutes a fatal flaw. We would prefer an alignment that turns to the west of the Vulture Mountains for Segment 17. There will still be impacts to wildlife and wildlife habitats, but they will less significant than the current Segment 17.

The Sonoran Desert National Monument (SDNM) has significant barriers to the west (SR 85) and south (I – 8). Segments 15 and 84 will create a new barrier to the north. Given the existing and proposed develop to the east, the northern section of SDNM would be surrounded by significant barriers, isolating the monument from other wildlife habitats. This would be a significant impact to wildlife, wildlife habitats and wildlife-dependent recreation.

Segment 29 is categorized as high because of its proximity to high quality riparian habitat in the Hasayampa River Preserve. However an interstate expansion that avoids impacts to this habitat could be acceptable.

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Segment 91 is considered the most sensitive area and the segment with the most significant impacts. This segment fragments a 1,300,000 acre block of undisturbed habitat, would result in the direct loss of undisturbed habitat and could result in the loss of recreational opportunities, including hunting opportunity.

In general, the Department prefers the use of existing interstates and 4 lane divided highways, especially, SR 85 and US 93. New construction will fragment existing habitat blocks, create wildlife connectivity impacts and result in the direct loss of undisturbed habitat. Arizona Game and Fish Commission policy A2.16 directs the Department to seek compensation at the 100% level for habitat loss. New construction could result in considerable compensation costs.

The Department greatly appreciates ADOT's willingness to share information and meet with Department staff to discuss the evaluation of the proposed interstate/multi-modal corridor. Our early and informed involvement provided us an opportunity to provide ADOT with a detailed evaluation of the proposed segments. We look forward to continuing to work with ADOT as this project moves forward.

If you have any questions or wish further information please contact Bill Knowles at 928-341-4047 or bknowles@azgfd.gov.

Sincerely

Joyce M. Francis

Joyce Francis
Habitat Branch Chief

cc: Jim DeVos, Assistant Director WMD
Jim Hinkle, Assistant Director Field Ops
Pat Barber Regional Supervisor Region IV
Rod Lucas Regional Supervisor Region VI
Tom Finley Regional Supervisor Region III
Bill Knowles, Habitat Program Manager, Region IV
Thor Anderson, ADOT
Dan Andersen CH2M Hill
Jaclyn Kuechenmeisterv, AECOM

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Figure 1. An example of a HabiMap map of habitat blocks and Segment 91

Table 1. Overall Assessment for each Segment

		OVERALL ASSESSMENT		
		Significant Impacts to Wildlife Sensitive Areas	**Impacts to Wildlife are Likely Minimzied with Potential Strategies to Offset Impacts**	**Limited Impacts to Wildlife and Opportunities to Offset and Enhance**
SEGMENT NAME	**SEGMENT NO**			
I-8	10			X
I-10	11			X
Hassayampa Freeway	14		X	
Hassayampa Freeway	15	X		
Hassayampa Freeway	16			X
Hassayampa Freeway	17	X		
Hassayampa Freeway	18		X	
SR 85	19			X
SR 85	20			X
I-10	21			X
Sun Valley Pkwy	22	X		
US 93	29	X		
I-40	35			X
US 93	36			X
I-40	43			X
US 93	46			X
SR 303 Ext- Vekol Valley	82	X		
I-8	83			X
Hassayampa Freeway	84	X		
SR 30	85			X
Hassayampa Freeway	86	X		
SR 303	87		X	
Chicken Springs Road	91	X		
US 93	95			X

Table 2. Sensitivity Categorizations for each segment for each evaluation categorization

			Sensitivity Categorizationn (Low/Moderate/High)				
		Proposed Change in Infrastructure	**How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative?**	**How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?**	**How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?**	**How many linear miles and/or acres of waterways, floodplains, and acquifers are impacted?**	**How does this alternative impacts outdoor recreational opportunities, including access?**
[redacted]							
I-8	10	Existing	Low	Low	Low	Low	Low
I-10	11	Existing	Low	Low	Low	Low	Low
Hassayampa Freeway	14	New	Moderate	Moderate	Low	Moderate	Low
Hassayampa Freeway	15	New	High	Moderate?	High	Moderate	High
Hassayampa Freeway	16	New	Low	Low	Low	Low	Low
Hassayampa Freeway	17	Partial New	High	High	High	Moderate	High
Hassayampa Freeway	18	New	High	Moderate	Low	Moderate	Moderate
SR 85	19	Expand	Low	Low	Low	Moderate	Low
SR 85	20	Expand	Low	High	Moderate	High	Low
I-10	21	Existing	Low	Low	Low	Moderate	Low
Sun Valley Pkwy	22	Partial New	High	Moderate	High	Moderate	Moderate
US 93	29	Existing	Moderate	High	High	High	Moderate
I-40	35	Existing	Low	Low	Low	Moderate	Low

US 93	36	Existing	Low	High	Low	High	Low
I-40	43	Existing	Low	Moderate	Low	Low	Low
US 93	46	Existing	Low	High	Low	High	Low
SR 303 Ext- Vekol Valley	82	New	High	High	Moderate	Moderate	High
I-8	83	Existing	Moderate	Moderate	Low	Moderate	Low
Hassayampa Freeway	84	New	High	Moderate	High	Moderate	High
SR 30	85	Expand	Low	High	Low	High	Low
Hassayampa Freeway	86	Partial New	High	High	High	High	High
SR 303	87	Partial New	Low	Low	Moderate	High	Low
Chicken Springs Road	91	New	High	High	High	High	Moderate
US 93	95	Existing	Low	High	Low	High	Low

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
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PHOENIX, AZ 85086-5000
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December 27, 2013

Mr. Michael Kies, PE
Arizona Department of Transportation
206 South 17th Avenue
Phoenix, AZ 85007

Re: Methods for Evaluation for Interstate 11 and Intermountain West Corridor Study, Level 2 Evaluation

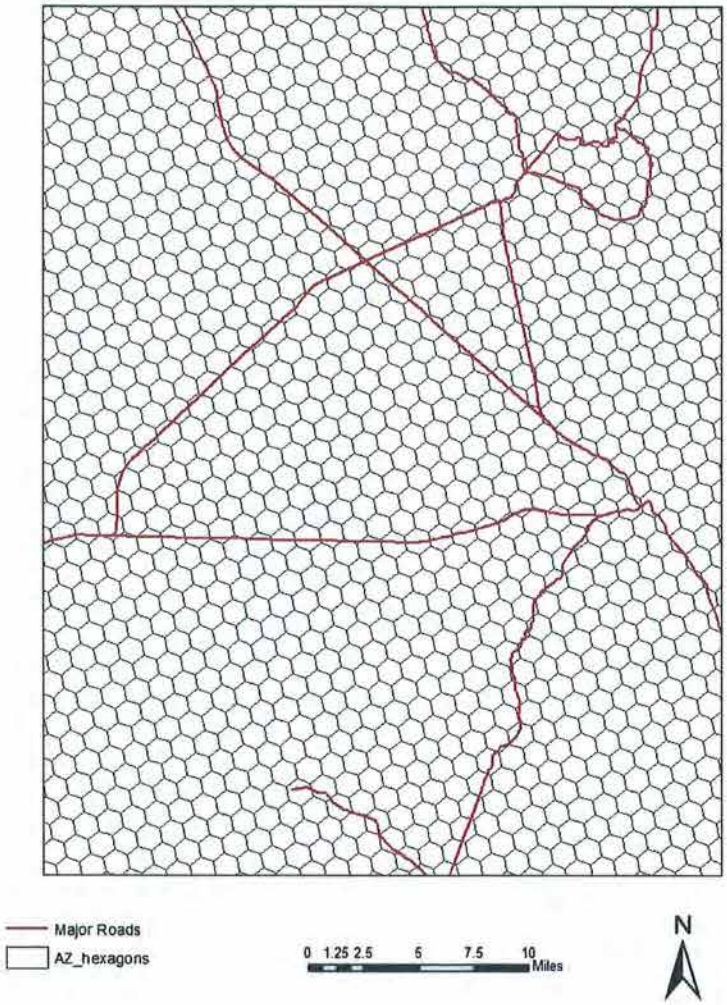
Dear Mr Kies:

The Arizona Game and Fish Department (Department) submitted a letter on December 9, 2013 with the results of our evaluation of the potential impacts to wildlife and wildlife-dependent recreation from the alternative segments for the Interstate 11 and Intermountain West Corridor Study, Level Two Analysis. In order for the evaluation to be available for your internal meetings on December 9, the methods discussion was minimal. Upon reflection we determined that it would be beneficial to provide you with a more thorough discussion of the methods employed in the evaluation.

The Department has long recognized that geographic Information Systems (GIS) and spatial data are powerful tools for wildlife conservation. Our online HabiMap is a web-based viewer that contains more than 300 layers of data and conservation models developed to inform the State Wildlife Action Plan (SWAP; AGFD 2012). The GIS based models and query tools within HabiMap are provided to allow planners and developers to access spatial explicit wildlife data at a statewide. However, we realize data at that coarse of a scale can be difficult to use and interpret at the local or regional scale. Therefore, we, in conjunction with The Nature Conservancy, have been developing an approach to facilitate use and analysis of HabiMap datasets and models, in addition to other datasets, to assist in project evaluation at a local or regional scale. The Interstate 11 (I-11) project provided us an opportunity to further develop an analytical approach, flexible enough to use evaluation criteria established by a project proponent (ADOT), that utilizes our wildlife related spatial datasets and models; that can be expanded as data and information becomes available; and is repeatable and standardized for future project review.

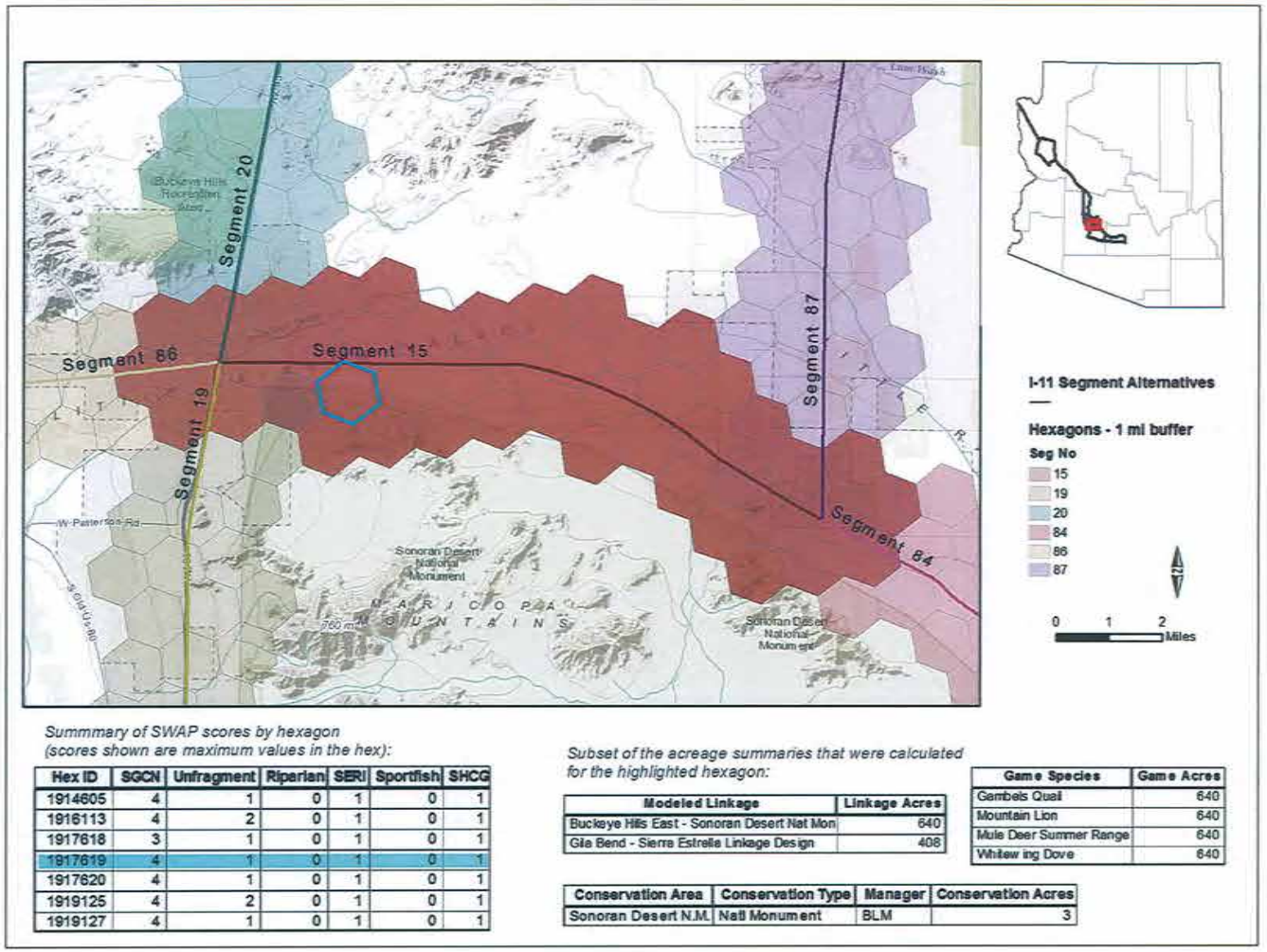
This new process is based on 1 square mile hexagons covering the state of Arizona. Figure 1 provides an example of the hexagons in the Wickenburg area. Each hexagon is attributed with available wildlife data including values from the models in HabiMap. The method to populate the hexagons depends on the type and spatial resolution of the data. For the 30 meter pixel raster

Figure 1. Example of 1 mile hexagons in the Wickenburg Area



data used in HabiMap, usually the maximum of the pixel values within the hexagon was used. On occasion, if the data supported it, the mean of the pixels contained within the hexagon was added as an attribute (See Figure 2). The attributes from polygons were transferred to overlapping hexagons. Where applicable, acres of overlap between the polygon and the hexagon were also added as an attribute (See Figure 3). Finally, the number of species occurring or having potential habitat in the hexagon were counted and added to the attributes. For the I-11 evaluation, a one mile buffer was used. This means that any hexagon within one mile of the segment was considered to be directly impacted. Although this is coarser than ideal, it is the best fit for the one square mile hexagons. As the segments are refined into actual alignments, we will also be refining our data to actual impacts.

Figure 2. Hexagons along segment 15 with attribute table showing SWAP scores



Summmary of SWAP scores by hexagon (scores shown are maximum values in the hex):

Hex ID	SGCN	Unfragment	Riparian	SERI	Sportfish	SHCG
1914605	4	1	0	1	0	1
1916113	4	2	0	1	0	1
1917618	3	1	0	1	0	1
1917619	4	1	0	1	0	1
1917620	4	1	0	1	0	1
1919125	4	2	0	1	0	1
1919127	4	1	0	1	0	1

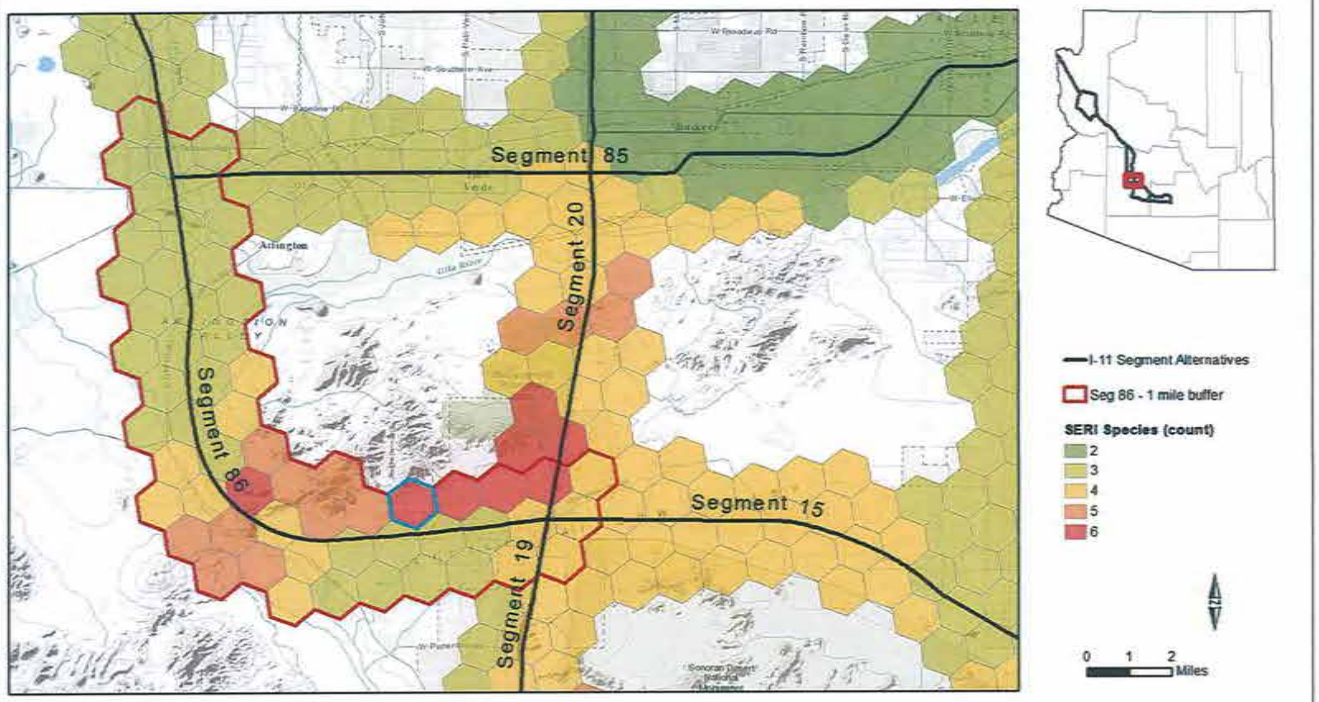
Subset of the acreage summaries that were calculated for the highlighted hexagon:

Modeled Linkage	Linkage Acres
Buckeye Hills East - Sonoran Desert Nat Mon	640
Gila Bend - Sierra Estrella Linkage Design	408

Game Species	Game Acres
Gambels Quail	640
Mountain Lion	640
Mule Deer Summer Range	640
Whitew ing Dove	640

Conservation Area	Conservation Type	Manager	Conservation Acres
Sonoran Desert N.M.	Natl Monument	BLM	3

Figure 3. Hexagons showing attributes for polygonal data



Summmary of SERI Species acres that intersect the 1 mile hexagon buffer on Segment 86:

Species	Class	Density	Acres	Seg_No
Bighorn Sheep		Sparse density	3,777	86
Bighorn Sheep		Very sparse	140	86
Gambels Quail	Primary range		33,849	86
Gambels Quail	Secondary range		3,266	86
Javelina		Sparse density	1,735	86
Mule Deer Summer Range		Very Sparse	7,572	86
Whitewing Dove	Primary Range		37,115	86

SERI species acres that intersect the highlighted hexagon:

Hex ID	Species	Class	Density	Acres
1914602	Bighorn Sheep	<Null>	Sparse density	117
1914602	Gambels Quail	Primary range	<Null>	640
1914602	Javelina	<Null>	Sparse density	19
1914602	Mule Deer Summer Range	<Null>	Very Sparse	23
1914602	Whitewing Dove	Primary Range	<Null>	640

After much discussion, the team decided the development of the process had not progressed enough to create a score for each evaluation criteria or segment. Therefore we categorized the results for each of segment evaluation criteria as low, medium or high. Department staff reviewed the results and determined the ranking. We were not prepared to develop thresholds at this time, therefore we used the expert opinion of Department staff for the ranking, based on quantitative values in relation to other segments, i.e. if the number of ESA species ranged between 0 and 4 among the segments, segments with 0 or 1 ESA species were ranked low, segments with 2 ESA species were ranked medium, and segments with 3-4 ESA species were ranked high. Because the quantitative values for most criteria did not account for the level of expected disturbance (new road segments would result in the highest amount of actual disturbance and fragmentation to habitat, while existing segments would result in the least amount of actual disturbance and fragmentation), this qualitative value was factored into each evaluation criteria ranking after the quantitative ranking was established. For example, if a number of criteria for a specific segment were ranked "high" based on quantitative values, but the segment was comprised entirely of existing roadway, the ranking was lowered to "medium" to reflect the lesser amount of expected disturbance and fragmentation; if a number of criteria for a segment ranked "medium" based on quantitative values, but the segment was comprised of entirely "new" roadway, the overall ranking for this segment was increase to "high" to reflect the highest amount of expect habitat disturbance and fragmentation. We have provided Table 3 with detailed information on the metrics associated with each dataset(s) used for each Level 2 Evaluation Criteria (ADOT). A segment by segment summary with AGFD evaluation comments is provided in Table 4.

The Department hopes this follow up letter increases your understanding of our evaluation process and the results. We continue to look forward to partnering with ADOT on this important transportation project. If you have further questions or wish to further discuss our evaluation, please contact Bill Knowles at 929-341-4047 or bknowles@azgfd.gov.

Sincerely,

Joyce M. Francis

Joyce Francis
Habitat Branch Chief

cc: Jim DeVos, Assistant Director WMD
Jim Hinkle, Assistant Director Field Ops
Pat Barber Regional Supervisor Region IV
Rod Lucas Regional Supervisor Region VI
Tom Finley Regional Supervisor Region III
Bill Knowles, Habitat Program Manager, Region IV
Thor Anderson, ADOT
Dan Andersen CH2M Hill
Jaclyn Kuechenmeisterv, AECOM

Table 1. Links to Resources

Arizona State Wildlife Action Plan (SWAP)	http://www.azgfd.gov/w_c/swap.shtml
HabiMap	http://habimap.org/
Wildlife Linkages/Connectivity	http://www.azgfd.gov/w_c/conn_whatGFDoing.shtml
HDMS/Environmental Online Tool	http://www.azgfd.gov/hgis/
Southwest ReGap	http://swregap.nmsu.edu/default.htm
USFWS Critical Habitat	http://crithab.fws.gov/crithab/
Protected Areas Database (PAD-US)	http://consbio.org/products/projects/2
Nat'l. Conservation Easement Database (NCED)	http://nced.conservationregistry.org/

Table 2. Data Sets, Types and Sources Used in Analysis and Analytical

Data Set*	Data Type	Source**	Analytical Method
Corridors	Polygons	AGFD County/Missing Linkages	See text below
Unfragmented	Polygons	AGFD model in HabiMap	See text below
SGCN	30 m pixel	AGFD model in HabiMap	Count of species intersecting the 1 mile hexagon buffer of each segment
SERI	Polygons	AGFD Game species polygons	Count of species intersecting the 1 mile hexagon buffer of each segment
Special Status Sp.	Polygons	HDMS	Count of species within 3 mile buffer of each segment
Critical Habitat	Polygons	USFWS	Sum of acres of critical habitat intersecting the 1 mile hexagon buffer for each segment by species
Undev.Habitat	30 m pixel	AGFD model	Sum of acres of undeveloped habitat intersecting the one mile hexagon buffer. % of total acres of hexagons for segment
Habitat Type	30 m pixel	Southwest ReGap (modified)	Acres of each habitat type within 1 mile buffer of each segment
Cons. Areas	Polygons	AGFD/BLM/NCED/PAD-US	Sum of acres of Conservation Area intersecting the 1 mile hexagon buffer for each segment by Conservation Area
Floodplains	Polygons	FEMA	Sum of acres of Floodplains intersecting the 1 mile hexagon buffer for each segment
Perennial Streams	Polylines	ADEQ	Miles of Perennial Streams intersecting the 1 mile hexagon buffer for each segment

* SGCN = Species of Greatest Conservation Need From Statewide Action Plan
SERI = Species of Economic and Recreational Importance
Undev. Habitat = Undeveloped Habitat
Cons. Areas = Areas with Conservation Investment/Dedicated to Conservation

** HDMS = Heritage Data Management System
USFWS = US Fish and Wildlife Service
NCED = National Conservation Easement Database
FEMA = Federal Emergency Management Agency
ADEQ = Arizona Department of Environmental Quality
PAD-US Protected Areas Database-US

Table 4. Evaluation of I-11 Level 2 Segments

Table 3. Results of analysis for each evaluation criteria. Note: Calculations are based on segments as provided in the GIS shapefile by ADOT on 10/15/13

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*						*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**													
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**			Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**			Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
10	Existing	9	1 block 767,000 acres	8	47	8	5	1		21,070 (38%)		669		17,108	16,368	28			43	13,214 SDNM		0	No new impacts
11	Existing	4	0 blocks	8	36	4	4	1		0 (0%)		327		1,665	7,131				128	0		0	No new impacts
14	New	6	0 blocks	8	43	8	4	1		13,252 (25%)	43	399		4,028	19,186				100	0		0	No new impacts
15	New	2	1 block in combination with Segment 84, 140,000 acres in SDNM Block would be isolated with existing fragmentation at SR 85 and MC 238	7	38	7	1	1		6,569 (19%)		242		242	16,639					3,741 SDNM	743	0	Reduce access to SDNM
16	New	0	0 blocks	8	36	3	0	0		3,108 (11%)		584		213	12,113					0	176	0	No new impacts

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*		*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**																	
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**	Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**	Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
			Depends on alignment, two small blocks (33,900 and 18,300)are fragmented by Wickenburg Way a low volume two lane improved road, 3 blocks (213,500, 70,300 and 105,900 acres) are fragmented by the combination of Wickenburg Way and Vulture Mine Road (a low volume windy improved road). I - 11 will have a greater barrier effect and, depending on															Direct 22462 acres Vulture Mountains County Park, 304 acres Vulture Mountains ACEC **Indirect:** 38,458 acres fragmentation of the White Tank Mountains Regional Park (29,195ac) and the Buckeye's Skyline Regional Park			

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*						*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**														
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**			Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**			Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
18	New	1	New 2 blocks 26,300 and 57,800 acres	6	30	5	1	1		21,984 (98%)		228		6,846	1,665	1,452			413	0	1,260	0	reduced equestrian OHV
19	Expand	4	Existing 1 block 1400,000 acres	8	39	7	4	2		17,739 (38%)		584		1,494	21,265					5,758 SDNM	2,593	0	Some reduced access to SDNM
20	Expand	3	Existing isolated block 29,500 acres	9	40	5	6	3		10,288 (22%)	2,235	313		3,103	10,291					31 AGFD Wildlife Area, 3,349 County Park, 846 AGFD PLO1015 Lands, 2,090 AGFD Robbins Butte Wildlife Area	5,250	4	Reduce access to Wildlife areas, reduce hunting opportunities
21	Existing	2	0 blocks	9	37	3				3,568 (13%)		498		925	11,315					0	2,302	0	No new impacts

		7A		7B																	7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*						*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**														
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**			Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**			Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
22	Partial New	5	Sun Valley Parkway section expand split between 2 fragments (including White Tanks County Park)34,000 and 74,500 acres other section new split of 2 blocks of 63,900 and 70,300 acres	8	38	5	6	1		34,883 (68%)		612		14,788	24,182					Increase isolation of both the White Tank Mountains Regional Park (29,195ac) and Buckeye's Skyline Regional Park (9,263ac)from other habitats & wildlife populations	5,787	0	**Indirect:** effects possibly to the Vulture Mtns Recreational Area, a planned regional park in Maricopa County; **Cumulative:** development around the White Tank Mtns not compatible to hunting may result in closure of area to hunting (lost opportunity & revenue)

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*					*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**															
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**				**Special Status Species- species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**		Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
29	Expand	3	Expand existing 2 blocks 704,000 and 63,900 acres, expand existing between 704,000 acre and 85, 200 acre blocks. 85,200 acre block isolated by roads and the town of Wickenburg.	13	39	7	14	3	Yes: Southwestern willow flycatcher Acres: 468	28,374 (73%)	1,423	882		17,208	1,338	1,438			114	Direct 826 Hassayampa River Preserve 310 Vulture Mountain County Park	4,781	6	Reduced access to Hassayampa River Preserve
35	Existing	1	Existing between 2 blocks 178,000 acres and 14,500 acres	5	27	5	7	1	10J area for California condor	26,958 (60%)		911			16,069	13,892	114		28	0	5,842	0	Reduced access to wilderness

		7A		7B															7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**															*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Lass or Degradation to Species*		*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**																	
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**	Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**	Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
36	Existing	6		Expand existing between 2 blocks 1,865,000 and 712,600, expand existing between 712,600 and isolated block 310,200 and 14,900 and 57,800	11	41	12	22	4	Yes: Southwestern willow flycatcher Acres: 1,910	98474 (99%)	2,932	1,637		51,282	4,996	11,814	2,761		9,721	6,665 Burro Creek ACEC, 9,590 Poachie Desert Tortoise ACEC, 887 Three Rivers ACEC	6,978	15	Reduced access to wilderness ACEC
43	Existing	2		Existing Interstate 2 blocks 124,500 and 30,500	10	37	7	12	1	10J area for California condor	22,631 (55%)		384		14	356	20,453	968	2021	1,167	0	1,353	0	No new impacts

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*		*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**																	
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**	Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**	Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
46	Existing	1	Existing between 2 blocks 7,500,000 and 449,300 acres and between 449,300 and 231,00 amd between 449,300 and isloated blocks 168,900 and 33,900 acres	6	36	9	13	3	Yes: bonytail (51 acres and razorback sucker (200 acres) 10J area for California condor	82,582 (78%)		2,192			48,991	34,672	541	57	1,039	30,348 Lake Mead	8,588	4	No new impacts
82	New	7	New split in 143,700 acre block	7	45	9	2	0		25,929 (78%)		712		2,491	14,959					3,700 SDNM		0	Reduced access to SDNM
83	Existing	6	Existing between blocks 143,700 and 767,000; Blocks in SDNM	7	43	9	5	2		43,599 (89%)		897		17,521	18,717				14	49,260 SDNM	1,277	0	No new impacts
84	New	3	New split 2 blocks 140,000 and 183,000 acres. 140,000 block in SDNM	7	42	6	1	1		16,178 (41%)		384		228	24,125					5627 SDNM	692	0	Reduced access to SDNM

		7A		7B																7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres ond/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**																*How many acres of areas acquired or managed for conservation or wildlife purposes ore impacted?*	*How many linear miles and/or acres of woterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitot Loss or Degradation to Species*						*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**													
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**					Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**	Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
85	Expand	2	0 blocks	10	41	5	7	3		2,408 (5%)	5,295	783		213	5,693					78 Buck Fire AGFD Wildlife Area, 150 Green Tract AGFD Wildlife Area 1545 AGFD PLO 1015 Lands 848 Robbins Butte Wildlife Area	19,060	13	No new impacts
86	Partial New	5	Expand 2 isolated blocks 157,300 and 29,500 acres	8	42	7	4	4		13,952 (36%)	2,320	712		1,665	12,995					1720 Arlington Wildlife Area, 373 Powers Butte Wildlife Area, 954 PLO 1015	10,604	7	No new impacts
87	Partial New	4	0 blocks	9	40	4	5	3		2,283 (7%)	1,722	584		1,808	8,867					383 PLO 1015, 356 SDNM	5,731	4	No new impacts
91	New	0	New split block of 1,317,000 acres	10	40	9	10	2	Yes: Southwestern willow flycatcher Acres: 332	62,586 (94%)	584	1,167		5,337	3,800	38,814	3,416	1779	413	11112 White Margined Penstemon ACEC	4,041	1	Reduce access to large area

		7A		7B															7C		7E	8C
		How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative? **Note: Direct effects are calculated using a 1 mile buffer on segments**		*How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?* **Note: Direct effects are calculated using a 1 mile buffer on segments**															*How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?*	*How many linear miles and/or acres of waterways, floodplains and aquifers are impacted?*		*How does this alternative impact outdoor recreational opportunities, including access?*
		Corridors	*Unfragmented Habitat Blocks*	*Habitat Loss or Degradation to Species*		*Habitat Loss or Degradation of Native Habitats* **(Reclassification of SWReGAP using Brown & Lowe communities)**																	
Segment No	**Proposed Change in infra-structure**			*SWAP Species-* **potential, historic or current habitat**	Special Status Species- **species occurrence within 3 mile buffer of segments (See Appendix B for list of HDMS Sensitive Species and Habitats from Environmental Review Layer)**	Undeveloped Native Habitat Note: **Calculated using AGFD Landscape Integrity Model**	Riparian	Xeric-Riparian	Mesquite Bosque	Upland Sonoran Desertscrub	Sonoran/ Mohave Desert Scrub	Mohave Desert Scrub	Pinyon-Juniper Woodland	Chaparral	Semidesert Grassland		Floodplains (acres)	Perennial (miles)	
95	Existing	1	Existing split between 3 blocks 1,864,300, 411,700 and 50,500 acres	8	Yes: Southwestern willow flycatcher Acres: 332; 10J area for California condor	43,490 (80%)	2,519	1,309		18,489	7,871	11,799	455		157	2385 Carrow Stephens Ranches ACEC	10,660	3	No new impacts

Table 4. Evaluation of I-11 Level 2 Segments

			Sensitivity Score (Low/Moderate/High)				
		Change in Infrastructure	How many wildlife corridors and unfragmented habitat blocks are crossed by the alternative?	How many acres and/or what magnitude of wildlife habitat loss or degradation results from each alternative segment?	How many acres of areas acquired or managed for conservation or wildlife purposes are impacted?	How many linear miles and/or acres of waterways, floodplains, and aquifers are impacted?	How does this alternative impact outdoor recreational opportunities, including access?
SEGMENT NAME	**SEGMENT NO**	**Existing/New/Expanded**	**7A**	**7B**	**7C**	**7E**	**8C**
I-8	10	Existing	Low	Low	Low	Low	Low
I-10	11	Existing	Low	Low	Low	Low	Low
Hassayampa Freeway	14	New	Moderate	Moderate	Low	Moderate	Low
Hassayampa Freeway	15	New	High	Moderate?	High	Moderate	High
Hassayampa Freeway	16	New	Low	Low	Low	Low	Low
Hassayampa Freeway	17	New & minor to Interstate	High	High	High	Moderate	High
Hassayampa Freeway	18	New	High	Moderate	Low	Moderate	Moderate
SR 85	19	Expand	Low	Low	Low	Moderate	Low
SR 85	20	Expand	Low	High	Moderate	High	Low
I-10	21	Existing	Low	Low	Low	Moderate	Low
Sun Valley Pkwy	22	New & minor to Interstate	High	Moderate	High	Moderate	Moderate
US 93	29	Expand	Moderate	High	High	High	Moderate
I-40	35	Existing	Low	Low	Low	Moderate	Low
US 93	36	Existing	Low	High	Low	High	Low
I-40	43	Existing	Low	Moderate	Low	Low	Low
US 93	46	Existing	Low	High	Low	High	Low
SR 303 Ext- Vekol Valley	82	New	High	High	Moderate	Moderate	High
I-8	83	Existing	Moderate	Moderate	Low	Moderate	Low
Hassayampa Freeway	84	New	High	Moderate	High	Moderate	High
SR 30	85	Expand	Low	High	Low	High	Low
Hassayampa Freeway	86	New & minor to Interstate	High	High	High	High	High
SR 303	87	New & minor to Interstate	Low	Low	Moderate	High	Low
Chicken Springs Road	91	New	High	High	High	High	Moderate
US 93	95	Existing	Low	High	Low	High	Low

Table 4. Evaluation of I-11 Level 2 Segments - continued

		OVERALL ASSESSMENT			
		Proposed Change in Infrastructure	Significant Impacts to Sensitive Areas	Impacts to Wildlife are Likely and Potential Strategies to Offset Impacts	Limited Impacts to Wildlife and Opportunities to Offset and Enhance*
SEGMENT NAME	**SEGMENT NO**	**Existing/New/Expanded**			
I-8	10	Existing			X
I-10	11	Existing			X
Hassayampa Freeway	14	New			X
Hassayampa Freeway	15	New			X
Hassayampa Freeway	16	New			
Hassayampa Freeway	17	New & minor to Interstate			X
Hassayampa Freeway	18	New			X
SR 85	19	Expand			X
SR 85	20	Expand			X
I-10	21	Existing			X
Sun Valley Pkwy	22	New & minor to Interstate			X
US 93	29	Expand			X
I-40	35	Existing			X
US 93	36	Existing			X
I-40	43	Existing			X
US 93	46	Existing			X
SR 303 Ext- Vekol Valley	82	New			X
I-8	83	Existing			X
Hassayampa Freeway	84	New			X
SR 30	85	Expand			X
Hassayampa Freeway	86	New & minor to Interstate			X
SR 303	87	New & minor to Interstate			X
Chicken Springs Road	91	New			
US 93	95	Existing			X

*Note: An "**X**" indicates there is opportunity to offset impacts to wildlife linkages and/or enhance linkage areas along existing roadways

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
I-8	10	Existing	7A: Existing interstate, there are 9 corridors and opportunities to improve permeability; increased traffic volumes/barrier effects; 7B: high species counts; 1 ESA species (desert tortoise); but low for impacts to habitat; 7C: Direct impacts -goes through the SDNM; 7D: No floodplain data in Pinal county, 670 acres xeric-riparian; no perennial waters; 8C: No new impacts because it is existing road; Overall: assessed as low due to the fact that it is expanding an existing interstate with less habitat loss despite increased fragmentation and/or barrier effect
I-10	11	Existing	7A: Existing interstate, no landscape blocks affected; 7B: lower species counts; 1 ESA species (desert tortoise); 7C: no conservation lands identified; 7E: No floodplain data, no riparian, no perennial8C: No new impacts because it is an existing interstate with high traffic volume/barrier effects
Hassayampa Freeway	14	New	7A: This is a new road and this segment is on the fringe of development (25% native intact habitat), 6 corridors- connectivity impacts on the western end of the segment which is native intact habitat; 7B: medium to high species counts; 1 ESA species (Tucson shovel-nosed snake); 7C: no conservation lands in the area; 7E: riparian (43 ac) and low amount xeric-riparian (399ac) ; no floodplain data; no perennial water; 8C: None that we are aware of
Hassayampa Freeway	15	New	7A: This is a new road; unmaintained dirt road for utility ROW exists, linkages in the area and new habitat block fragmentation;7B: Lower species counts in the area; 1 ESA species (desert tortoise);, high quality xeric riparian in the area; combined with segment 84 habitat loss/fragmentation impacts become more significant and impacts to species are indirect and cumulative over time due to potential isolation 7C: Depending on the alternative developed with this segment, the fragmentation effects might be more significant; in conjunction with segment 84 the SDNM will be fragmented from a wilderness and a county regional park in the Estrellas, the Buckeye Hills (east half) and Sierra Estrella Mtns will be isolated, and the AGFD Gila River Wildlife Area complex will be cumulatively impacted; ; 7E: lower amount floodplain (743 ac) and xeric-riparian (242 ac), no riparian or perennial water impacted; 8C: Reduces access to SDNM , Estrellas, Buckeye Hills OHV recreation is high in the Buckeye Hills East area; indirect and cumulative impacts to hunting and recreation opportunities due to isolation.
Hassayampa Freeway	16	New	7A: new road, no corridors or blocks identified; 7B: species count in mid-low-range, no special status species in the area; 7C: no conservation areas affected; 7E: no floodplain or riparian issues; 8C: None anticipated
Hassayampa Freeway	17	New & minor to Interstate	7A: New and existing road; not currently a lot of traffic on existing minor road; alignment choice may change recommendations;; 7 corridors and multiple habitat blocks affected will increase fragmentation of habitat blocks even if it follows the existing roads with increased traffic volume/barrier effect, and will further isolate the White Tank Mtn; 7B: high Tier 1A species count; 1 ESA species (desert tortoise); habitat loss high -mostly unfragmented intact native habitat (82%-especially north half), crosses several major washes and potentially CAP mitigation lands north of CAP; 7C: high direct impact to proposed Vulture Mountain County Park, indirect and cumulative impacts due to White Tank Mtn Regional Park and Buckeye

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
			Skyline Regional Park due to isolation; 7E: medium amount of floodplain (1790 ac), and xeric riparian (562 ac), no perennial; 8C: high impacts in the Vultures and will reduce access to the Belmonts and White Tank Mtns with indirect and cumulative impacts to hunting and recreation opportunities
Hassayampa Freeway	18	New	7A: New road, affects 1 corridor, fragments intact block; 7B: lowest species count, 1 ESA species (desert tortoise) and high amount of undeveloped native habitat (98%); 7C: no new impacts; 7E: medium amount of floodplain (1260 ac), no riparian or perennial; 8C: reduced equestrian and OHV opportunities; Overall: Combined with 17 the impacts of the segment are higher
SR 85	19	Expand	7A: Expanding existing roadway, there are 4 corridors and opportunities to improve habitat permeability and connectivity between the SDNM and Gila Bend Mtns; increasing fragmentation and/or barrier effects ; 7B: mid-range species counts; 2 ESA species (desert tortoise and Tucson shovel-nosed snake), limited habitat loss due (41% native intact) - 7C: minor impacts to SDNM; 7E: near Gila River, medium amounts of floodplain (2593 ac), and xeric–riparian (584 ac), no perennial; 8C: minor access issues to the SDNM; potential indirect and cumulative impacts to hunting and recreation opportunities are limited; Overall: assessed as low due to the fact that it is expanding an existing state highway in a partially intact native habitat; with less habitat loss despite increased fragmentation and/or barrier effect
SR 85	20	Expand	7A:Expanding existing roadway, there are 3 corridors and opportunities to improve habitat permeability and connectivity between the Buckeye Hills (AGFD Gila River Wildlife Area complex) and SDNM; limited habitat connectivity still exists between the Buckeye Hills,Gila Bend Mtns and SDNM; increasing fragmentation and/or barrier effects; on fringe of developed areas; 7B: species counts in mid-high range; 3 ESA species (clapper rail, yellow-billed cuckoo, desert pupfish) but potential habitat loss is low because interstate will likely use existing bridge crossing of Gila River and floodplain and existing alignment 7C: potential direct and indirect/cumulative impacts to AGFD Wildlife Area complex and Buckeye Hills where Maricopa County Parks, Buckeye, BLM and AGFD are developing a cooperative management plan for wildlife and OHV recreation; 7E: near Gila River, high amount of floodplain (5250 acres) and riparian (2,235 ac) along Gila River, xeric- riparian (313 ac), perennial water and near BLM restoration areas to eradicate salt cedar; 8C: may expand access issues to the SDNM, AGFD wildlife area, Maricopa county park, and public lands; potential indirect and cumulative impacts to hunting and recreation opportunities; Overall: assessed as low due to the fact that it is expanding an existing state highway with less habitat loss despite increased fragmentation and/or barrier effect
I-10	21	Existing	7A: Already fragmented due to I-10, linkages immediately north; 7B: Hassayampa River in the segment, but bridged, medium number of species; 7C: no new impacts; 7E: medium amount floodplains (2302); 8C: no new impacts
Sun Valley Pkwy	22	New & minor to Interstate	7A: New and existing road; not currently a lot of traffic on existing 4-lane parkway; alignment choice may change recommendation; 5 corridors and two habitat blocks affected; will increase fragmentation of habitat blocks even if it follows the existing roads with increased barrier effect, and will further isolate the White Tank Mtn; 7B: species count in mid-range, 1 ESA species (desert tortoise) habitat loss high mostly

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
			unfragmented intact native habitat (68%), crosses several major washes and potentially CAP mitigation lands north of CAP; 7C: indirect and cumulative impacts; contributes to further fragmentation to the White Tank Mtns , and isolation of the White Tank Mtns Regional Park and Buckeye Skyline Regional Park; 7E: high amount of floodplains (5,787 ac), , medium amount xeric-riparian (612 ac); no perennial or riparian 8C: high impacts to White Tank Mtns with indirect and cumulative impacts to hunting and recreation opportunities, access may be affected overtime and cumulative with future urban development; Overall: assessed as high and in conjunction with segment 29 the impacts of this segment present higher concern
US 93	29	Expand	7A: Expand existing state highway; increasing fragmentation and/or barrier effect, 3 corridors in the area; 7B: Highest Tier 1A and special status species count; 3 ESA species (Yellow-billed cuckoo, SW willow flycatcher, desert tortoise), SW willow flycatcher Critical Habitat; potential loss of native riparian habitat high, some urban development but mostly intact native habitat (73%); 7C: Hassayampa River Preserve and proposed Vulture Mtns County Park; 7E: high amount of floodplain (4,781 ac), high riparian (1,423 ac), xeric-riparian (882 ac) and perennial water; 8C: potentially reduced access to the Preserve; Overall: assessed high due to highest species counts, significance of special status species and riparian/perennial water habitat.
I-40	35	Existing	7A: existing highway; 1 corridor and opportunities to improve habitat permeability and connectivity between habitat blocks; increasing fragmentation and/or barrier effect; 7B:lowest species counts, 1 ESA species (desert tortoise); 10j area for California condor is irrelevant here; about half of the block undeveloped (60% intact native habitat) but less direct habitat loss due to existing interstate ; 7C: no new impacts; 7E: high amounts of floodplain (5,842) ,no riparian and medium amount of xeric-riparian (911ac), no perennial water; 8C: minor impacts on access to wilderness. Overall: assessed as low due to the fact that it is expanding an existing highway with less habitat loss despite increased fragmentation and/or barrier effect
US 93	36	Existing	7A: existing interstate;6 corridors and increasing fragmentation and/or barrier effect; opportunities to improve habitat permeability and connectivity between habitat blocks; 7B: goes through high quality tortoise habitat high counts of Tier 1A, Tier 1B, HDMS, and game species (12) here; 4 ESA species (SW willow flycatcher, roundtail chub, desert tortoise, Yuma clapper rail) and SW willow flycatcher Critical Habitat; highly intact native habitat (99%) but less direct habitat loss due to existing interstate7C: 3 BLM-ACECs in the area, desert tortoise mitigation already ongoing in the area; 7E: high amounts of floodplain (6978 ac) and riparian (2,932 ac), xeric-riparian (1,637 ac) and perennial water; 8C: minor access issues to public lands; Overall: assessed as low due to expanding an existing interstate; although many opportunities to improve connectivity, and high amounts of wildlife resources in area and significant riparian areas
I-40	43	Existing	7A: Existing highway; 2 corridors but a county assessment hasn't been completed yet so there may be more; opportunities to improve habitat permeability and connectivity; increasing fragmentation and/or barrier effect 7B: High on species counts for Tier 1A and game (7), 1 ESA species (desert tortoise), habitat about half undeveloped (55% intact native)7C: No new issues; 7E: no riparian, no perennial, low amounts

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
			of xeric-riparian (384 ac) and floodplain (1,353 ac); 8C: no new impacts.
US 93	46	Existing	7A: Existing roadway, 1 corridor, , a county assessment hasn't been completed yet so there may be more, permeability has been increased in area with bighorn crossings and there may be other opportunities to improve/enhance habitat permeability and connectivity; 7B:low counts for SGCN species but high counts for special status species ; 3 ESA species (desert tortoise, relict leopard frog, razorback sucker) and Critical Habitat for bonytail and razorback sucker; high game species count (9) and sportfish due to proximity to Colorado River; relatively intact habitat (78%) with perennial waters; 7C: no new issues; 7E: no riparian, medium amounts of xeric-riparian (2,192 ac) , high amounts of floodplain (8,588 ac) and perennial water; 8C: No new impacts; Overall: assessed low due to expanding existing highway; special status species and critical habitats associated with Colorado River are unlikely to be affected by interstate expansion
SR 303 Ext- Vekol Valley	82	New	7A: New road, 7 corridors and splits an unfragmented habitat block, goes through Vekol Valley which has remnant grassland ; 7B: high Tier 1B and game species (9) counts, lower Tier 1A and sensitive species counts; no ESA species; ; relatively intact habitat (78%) with high quality xeric-riparian along Vekol Wash; significant amount of new habitat loss will occur; 7C: borders the SDNM therefore less of an impact than 84; 7E: no floodplain data for Pinal county, no riparian or perennial water, medium amounts of xeric-riparian (712 ac) 8C: may create access issues for recreation in the SDNM, especially in conjunction with 84; Overall: assessed high due to new habitat loss and fragmentation and a medium to high number of species; in conjunction with segment 84, the impacts of this segment present higher concern; reducing access to SDNM; indirect and cumulative impacts to hunting and recreation opportunities due to habitat fragmentation and isolation of Palo Verde Hills and portions of Table Top Mtns
I-8	83	Existing	7A: Existing interstate: I-8 already fragments high quality habitat, 6 corridors and increasing fragmentation and/or barrier effect; opportunities to improve habitat permeability and connectivity between habitat blocks; other than the interstate, the surrounding integrity of the landscape is high (89%); 7B: high Tier 1B and game (9) species counts, medium Tier 1A and special status species counts, 2 ESA species (desert tortoise, Tucson shovel-nosed snake); 7C: SDNM fragmented already, but will increase fragmentation/barrier effect with increased traffic volume between SDNM and San Tank/Table Top Mtns and Vekol Valley; 7E: medium amounts of floodplain (1,277 ac) and xeric riparian (897 ac); no riparian or perennial water; crosses numerous washes including Vekol Wash ; 8C: low potential for reduced access due to existing interstate; Overall: assessed as low due to the fact that it is expanding an existing interstate with less habitat loss despite increased fragmentation and/or barrier effect
Hassayampa Freeway	84	New	See 15 for more comments. 7A: This is a new road, unmaintained dirt road for utility ROW exists ;3 corridors and splits an unfragmented habitat block, in conjunction with segment 15 and/or 82 the impacts of this segment present higher concern; 7B: high Tier 1B counts, low Tier 1A and special status species counts; 1 ESA species (desert tortoise) ; significant amount of new habitat loss will occur fragmenting last intact habitat of Rainbow Valley between SDNM & Estrellas7C: Depending on the alternative developed with this segment, the fragmentation effects might be more significant; in conjunction with segment 15

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
			the SDNM will be fragmented from a wilderness and a county regional park in the Sierra Estrellas, the Buckeye Hills (east half) and Sierra Estrella Mtns will be isolated, and the AGFD Gila River Wildlife Area complex will be cumulatively impacted; in conjunction with segment 87 there will be less fragmentation between SDNM and Buckeye Hills (east half) 7E: medium amount of floodplain (692 ac) and xeric-riparian (384 ac); no riparian or perennial water 8C: Reduces access to SDNM and to the Estrellas ; indirect and cumulative impacts to hunting and recreation opportunities due to isolation.
SR 30	85	Expand	7A: Existing 2 lane roadway; 2 corridors associated with the Hassayampa and Gila River bridged crossings; small amount of intact native habitat (5%) primarily agriculture some urban; 7B: high Tier 1A, 1B and sensitive species counts due to proximity to Gila River; 3 ESA species (Yuma clapper rail, desert pupfish, Yellow-billed cuckoo) all associated with Gila River; 7C: adjacent to AGFD Gila River Wildlife Area complex and potential for indirect impacts; 7E: High amount of floodplain(19,060 ac), riparian (5,295), xeric-riparian (783 ac) and perennial water; 8C: no direct anticipated because segment is on north side of Gila River in developed area; but indirect possible due to impacts to agriculture lands used by upland game birds and other game (primarily mourning dove, white-winged dove; but also javelina and mule deer) that are hunted along AGFD Gila River Wildlife Areas
Hassayampa Freeway	86	New & minor to Interstate	7A: New and minor road to interstate, 5 corridors and significantly increase the amount of fragmentation and/or barrier effect; opportunities to improve habitat permeability and connectivity between habitat blocks; 7B: high Tier 1A species count; medium Tier 1B, game (7 spp including transplanted bighorn sheep herd) and special status species counts; 4 ESA species (desert tortoise, Yellow-billed cuckoo, SW willow flycatcher, Yuma clapper rail; potential for habitat loss highest along Gila River where Gila Bends and Buckeye Hills meet including riparian; 7C: high impact on AGFD Gila River Wildlife Areas (closest proximity); cumulative impacts to SDNM, Buckeye Hills (east half) depending on alignment; 7E: high amount of floodplain (10,604 acres associated with Centennial Wash and Gila River), xeric-riparian (712 ac) and perennial water; 8C: increased fragmentation and barrier effects would isolate Buckeye Hills from Gila Bend Mtns; could negatively impact game populations (including AGFD efforts to reestablish bighorn sheep herd in Buckeye hills) therefore indirect and cumulative impacts to hunting and recreation opportunities due to isolation; Overall: high for all evaluation criteria
SR 303	87	New & minor to Interstate	7A: existing minor roads & development (7% intact native habitat) except at southern terminus and within Gila River corridor; 4 corridors and no unfragmented habitat blocks; 7B: high Tier 1A and medium Tier 1B counts and special status species counts; 3 ESA species (Yellow-billed cuckoo, Yuma clapper rail, desert tortoise) associated with Gila River and southern terminus of segment; closer to the Gila River and southern terminus the greater potential for habitat loss; 7C: depending on alignment AGFD PLO-1015 lands may be bisected vicinity of Gila River; further fragmentation/isolation of Sierra Estrella Wilderness, Estrella Mtn County Park, SDNM; 7E: high amount floodplains (5,731), riparian (1,722 ac) and perennial water; medium amount xeric-riparian (584 ac); traverses Gila River and Waterman Wash; 8C: effects similar to segments 15 and 84; Reduces access to SDNM and Sierra Estrella Mtns ; indirect and cumulative impacts to

Table 4. Evaluation of I-11 Level 2 Segments - continued

		Proposed Change in Infrastructure	OVERALL ASSESSMENT - Comments
			hunting and recreation opportunities due to isolation.
Chicken Springs Road	91	New	7A: New road; splits Arizona's largest intact habitat block at the convergence of 3 ecoregions; no corridors because no linkage assessment for Mohave county; 7B: High species counts- Tier 1A (10), Tier 1B(40), Special Status Species (10) , 2 ESA species (desert tortoise and SW willow flycatcher and Critical Habitat); significant amount of undeveloped habitat (94%), with riparian and perennial areas; 7C: fragmenting intact ACEC; 7E: high amount floodplain (4,041 ac), riparian (584 ac), xeric-riparian (1,167 ac) and perennial water; 8C: may increase access but indirect and cumulative effects to game populations due to fragmentation and barrier effects; Overall: assessment is high due to direct impacts to large unfragmented habitat block with high species and habitat diversity
US 93	95	Existing	7A: existing highway; 1 corridor area and existing fragmentation between 3 blocks; increasing fragmentation and/or barrier effect; opportunities to improve habitat permeability and connectivity between habitat blocks 7B: high counts for game (11) and special status species, medium counts Tier 1A, low count of Tier 1B; 3 ESA species (SW willow flycatcher, roundtail chub, desert tortoise) and Critical Habitat for SW willow flycatcher; 10J area for California condor not relevant here; potential for habitat loss high (80% native intact habitat) and high amounts of riparian ; 7C: 1 BLM ACEC; 7E: high amount floodplain (10,660ac), riparian (2,519 ac), xeric-riparian (1,309 ac); no perennial water8C: no new impacts; Overall: low because existing highway; but many opportunities to improve habitat permeability/connectivity; and there are many species in the area including some sensitive species, significant riparian areas

Analysis Notes:

1. High level assessment using evaluation metrics to compare relative differences between segments ; did not include a species by species impact analysis; assumed impacts may be significant or insignificant with further NEPA level analysis
2. Direct impacts assumed within a 1 mile buffer of each segment; indirect and cumulative impacts assumed beyond the 1 mile buffer
3. Species occurrence is based on potential, historic and/or current distributions created by AGFD for SWAP; ESA species occurrences are based on AGFD Heritage Database Management System element occurrence records which tracks heritage species
4. The % intact habitat is within the 1 mile buffer *??? (Bill did this analysis and needs to explain)*

Base Data Notes (*representation, accuracy and disclaimers*):

Appendix C
The Nature Conservancy in Arizona—Level 2 Comments on the Proposed Interstate 11 Corridor-Wide Alignment Alternative

The Nature Conservancy
Protecting nature. Preserving life.™

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December 6, 2013

Michael Kies
Director of Planning and Programming
Arizona Department of Transportation
206 S. 17th Avenue, Mail Drop: 310B
Phoenix, AZ 85007

Dear Mr. Kies:

On behalf of The Nature Conservancy in Arizona, thank you for the opportunity to provide level 2 comments on the proposed *Interstate 11 Corridor-Wide Alignment Alternatives*. Our analysis and comments are focused on assisting with the Level 2 Planning and Environment Linkage review (PEL), specifically on describing impacts and identifying options for offsetting impacts. Use of the PEL process represents a significant advancement towards more integrated infrastructure planning, which should yield better planning tools and improvement in project delivery times while avoiding and minimizing impacts to natural resources.

Detailed comments and our evaluation for each alignment, as well as supporting materials such as analytical methods, assessment criteria, and map of the alignments evaluated, are provided in **Appendices A-E** (attached). Below is a brief summary of our findings.

We systematically evaluated 23 proposed segments for the Arizona portion of I-11. Of those, we concluded that two segments (9%) would have limited impacts to wildlife and water resources; 10 of the segments (43%) present opportunities to improve both motorist safety and passage of wildlife around existing roadways using practices already adopted by the Arizona Department of Transportation; and 6 segments (26%) would have significant impacts to wildlife or water resources that could be offset through mitigation measures.

Only five segments (22%) were identified as having significant impacts that would be difficult or infeasible to offset with mitigation measures. These alignments would result in significant habitat loss or degradation, adversely impact Threatened and Endangered or special status species, adversely impact wildlife in areas acquired, designated, and managed for conservation purposes, adversely impact wildlife and habitat not well represented elsewhere in the state and necessary to ensure that populations remain sustainable into the future, or adversely impact perennial surface waters and riparian areas important to wildlife.

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From a conservation standpoint the segments of most concern are those that include the construction of new routes and those that would expand existing infrastructure in proximity to perennial surface water and riparian habitat. We recommend the following segments be avoided: Chicken Springs Road (#91), segment 82 in the Vekol Valley, and segments 17, 22, and 29 west of Phoenix. If alternatives to segments 17, 22, and 29 are not feasible, there are more opportunities to minimize impacts for segments 17-18 than for 22-29 because of the greater distance of segments 17-18 from perennial surface water and riparian habitat. In some cases, expansion of existing routes would result in considerably less environmental impact than routes requiring new construction. For example, segments 95-43 are preferred over 91-35, and segments 10-83-19 are preferred over 14-84-15-86.

In the supporting materials, we provide information regarding options to offset impacts, including working with BLM's Desert Tortoise Mitigation Policy. There are additional opportunities to provide off-site compensation for loss of native habitat across the regional scale, including Arizona Game & Fish Department's Wildlife and Wildlife Habitat Compensation Policy, Federal Highway Administration's Eco-logical Framework, and new guidelines and policies from the Department of Interior and the Bureau of Land Management on regional mitigation. We would we happy to work with you and other partner agencies on data and tools that can be used to help evaluate and implement these opportunities.

If you have questions regarding our recommendations or the background information, please do not hesitate to contact me. I can be reached at rmarshall@tnc.org or 520-237-8778.

Sincerely,

Rob Marshall
Director, Center for Science & Public Policy

Cc:
Governor Jan Brewer
Congressman Paul Gosar
Larry Voyles, Director, Arizona Game & Fish Department
Scott Higginson, Executive Director Interstate 11 Coalition

Appendix A. Methods and Criteria

We designed our analysis to facilitate the purposes of the Level 2 PEL review, namely to complete a quantitative analysis of potential impacts of the proposed segments on environmentally sensitive areas, and to identify potential mitigation strategies and opportunities to offset impacts where they are unavoidable.

Two primary factors were used to distinguish the scope and magnitude of potential impacts. The first is the change in baseline infrastructure conditions for the proposed segment, which is necessary to determine the magnitude of impacts, such as habitat loss or fragmentation, relative to current conditions. In order to do this, we categorized all segments into one of three groups: existing, expand, and new. Those segments characterized as 'existing' include all interstates and divided limited-access highways. We classified segments as 'expand' for those areas with paved road infrastructure that would need to be expanded in order to accommodate the requirements of a multi-modal corridor. 'New' segments would require construction of paved roads in area with minimal infrastructure (e.g., unimproved dirt roads or trails). **Appendix B** is a map of the proposed segments shown by these categories.

The second factor is to quantify the potential direct and indirect impacts to wildlife resources of regional importance in the area. We evaluated potential impacts of the proposed segments on 9 conservation and wildlife criteria. These criteria were developed to correspond with Level 2 "environmental sustainability" criteria established for this corridor study. Specifically, we quantified adverse direct or indirect impacts to:

1. ESA species
2. BLM Desert Tortoise Lands
3. Areas managed for conservation purposes
4. Core wildlife habitat not represented or limited elsewhere in state
5. Perennial surface waters important to wildlife
6. Relatively intact riparian and xero-riparian habitat
7. Relatively intact Sonoran Desert Habitat
8. Relatively intact Mojave Desert Habitat
9. Wildlife Corridor/Linkage or Unfragmented Habitat Blocks

Using the best available data for these resources (see **Appendix C** for a list of these data sets), we quantified direct impacts within 1000 feet (500 foot buffer either side) of the proposed segments and indirect impacts within 2000 meters (1000 meter buffer either side, drawn beyond the direct impacts buffer). Following Council of Environmental Quality criteria[1], we define direct effects/impacts as those "…that are caused by the action and occur at the same time and place", and indirect effects/impacts as those "…that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable", including indirect effects on urban and suburban growth patterns. This distance of 1000 feet for direct impacts was chosen based on consultations with ADOT on the probable width that would be

impacted with construction or other activities. We estimated indirect impacts within 2000 meters of the segment based on field research of threatened desert tortoises in the Mojave Desert[2] and a global analysis of birds[3] that indicate that these animals avoid or exhibit lower population densities within 1000 meters of roads. The effects zone for mammals has been measured to much larger distances[3] and we elected to evaluate this effect using data related to the fragmentation effect of road construction (i.e., linkages and unfragmented blocks). We note that these distances are preliminary and subject to change once more precise alignments are drawn. Their primary value is to offer a comparative analysis of the impact of segments relative to one another.

To standardize our assessment, we evaluated all of these impacts in relation to the regional importance of the resource and the feasibility of offsetting impacts. **Appendix D** summarizes our impacts assessment, sorting segments with the least impacts to the most impacts. It allows for a direct comparison of the potential impact of each segment in relation to one another. The last column in Appendix D also provides our recommendation in terms of mitigation strategies and opportunities to offset impacts. For example, proposed alignments that would have limited direct or indirect impacts to wildlife were indicated as such. In the cases where wildlife habitat loss would result in significant impacts, there are two potential assessments: (1) impacts may be offset through mitigation measures or (2) mitigation measures are unlikely to offset impacts. Significant impacts do not categorically rule out a particular alignment. It's the regional significance of the wildlife resources and the importance of the habitat for the long-term sustainability of wildlife populations that determines whether impacts can be offset. Given that our transportation system was not originally designed to facilitate movement patterns by wildlife, we also indicate which segments present an opportunity to improve wildlife passage over existing conditions. This assessment was made using data from the Arizona Game and Fish Department on wildlife linkages.

Categories in **Appendix D** include:

1. Segments with **limited impacts** to wildlife
2. Segments with opportunities to **study and/or improve wildlife linkages**
3. Segments with significant impacts to wildlife but where options to **minimize and/or offset** these impacts are feasible
4. Segments with significant impacts to wildlife that should be **avoided** because mitigation options are unlikely to offset impacts

Appendix E provides a more descriptive narrative for each segment, summarizing the nature of the impacts, including specific resources that would be impacted, and options and opportunities to avoid these impacts or minimize and offset where impacts are unavoidable.

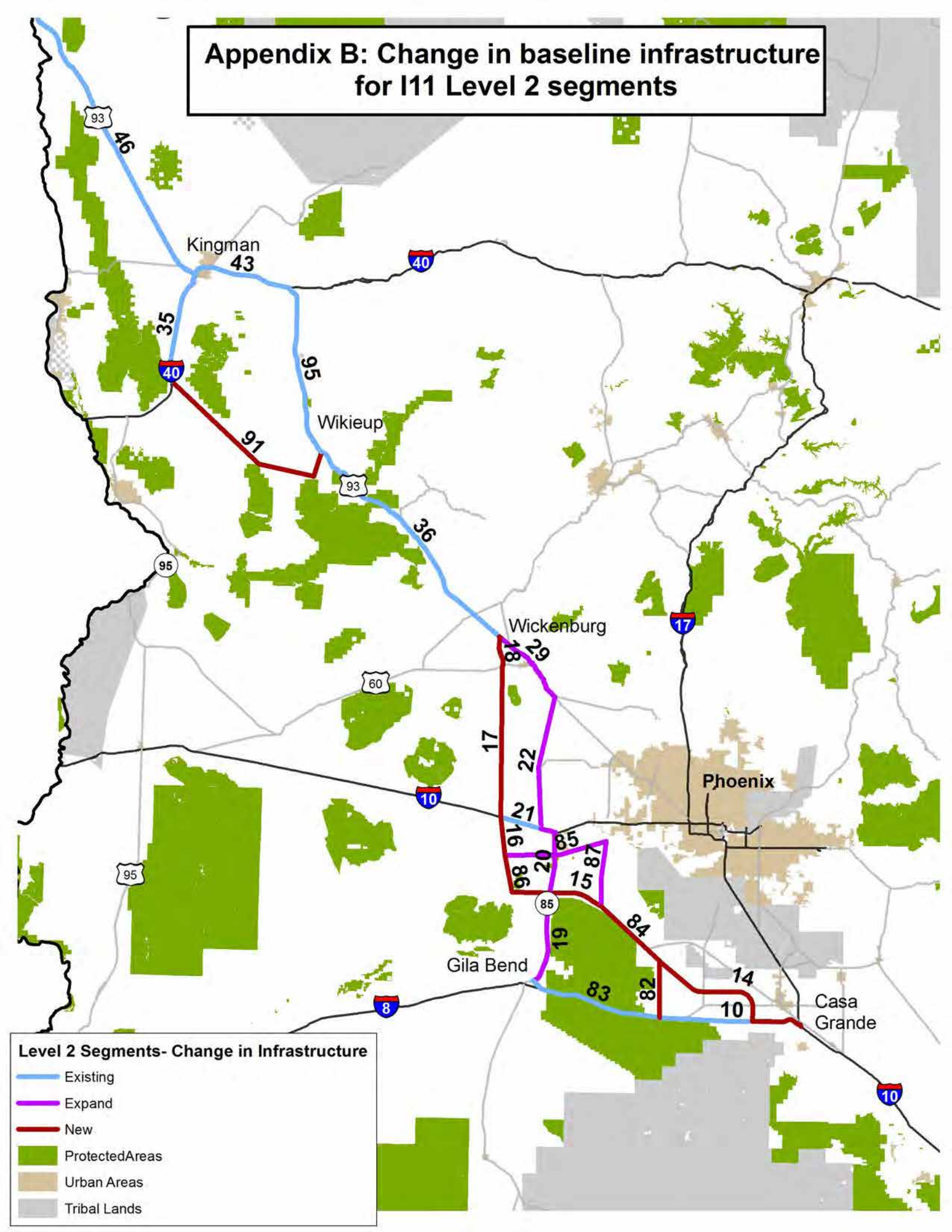
References

[1]Council for Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR §§ 1500-1508.

[2]Borman, WI and M Sazaki. 2006. A highway's road-effect zone for desert tortoises (Gopherus agassizii). Journal of Arid Environments 65: 94-101.

[3]Benitez-Lopez A, R Alkemade, and PA Verweij. 2010. The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. Biological Conservation 143: 1307-1316.

Appendix B: Change in baseline infrastructure for I11 Level 2 segments



Appendix C. Definitions of Resource Criteria and List of Source Datasets

1) ***ESA Species***: Species with following statuses under Endangered Species Act: Endangered, Threatened, Candidate, or Proposed
    a. USFWS Designated Critical Habitat; http://criticalhabitat.fws.gov/crithab/, latest update from USFWS, Feb, 2013
    b. Heritage Data Management System, data requested from AGFD, Nov 2013
2) ***BLM Desert Tortoise Lands***: Category 1 and 2 lands under BLM Desert Tortoise Mitigation Policy to avoid development or mitigate for losses.
    a. Updated GIS data requested from BLM, Nov 2013
    b. Tortoise habitat identified by BLM policy to avoid development or mitigate for losses; Final Report on "Compensation for the Desert Tortoise" Instructional Memorandum, 1991.
3) Areas managed for conservation purposes
    a. Protected Areas Database v2 (PAD-US), Conservation Biology Institute; http://consbio.org/products/projects/pad-us-cbi-edition
4) Core wildlife habitat not represented or limited elsewhere in state
    a. TNC Grasslands Assessment; http://azconservation.org/downloads/category/grassland_assessment
    b. TNC Habitat Conservation Priorities; TNC Ecoregional Assessments Roll-up, Dec. 2007; http://azconservation.org/downloads/category/ecoregional_assessment
5) Perennial surface waters important to wildlife
    a. TNC Freshwater Assessment; http://azconservation.org/downloads/category/freshwater_assessment
    b. Groundwater basins connected to surface water flow; Anning, D.W., and Konieczki, A.D., 2005. Classification of Hydrogeologic Areas and Hydrogeologic Flow Systems in the Basin and Range Physiographic Province, Southwestern United States. U.S. Geological Survey Professional Paper #1702, 37p.
6) ***Relatively intact riparian and xero-riparian habitat***: Identified for segments where majority of lands within direct impact buffer (1000 feet) are relatively intact (areal extent of human use <25%).
    a. USGS ReGAP vegetation data, modified by AGFD for SWAP, 2010
    b. TNC Human Use Intensity dataset, 2013
7) ***Relatively intact Sonoran Desert Habitat***: Identified for segments where majority of lands within direct impact buffer (1000 feet) are relatively intact (areal extent of human use <25%).
    a. USGS ReGAP vegetation data, modified by AGFD for SWAP, 2010
    b. TNC Human Use Intensity dataset, 2013
8) ***Relatively intact Mojave Desert Habitat***: Identified for segments where majority of lands within direct impact buffer (1000 feet) are relatively intact (areal extent of human use <25%).

a. USGS ReGAP vegetation data, modified by AGFD for SWAP, 2010
b. TNC Human Use Intensity dataset, 2013

9) ***Wildlife Corridor/Linkage or Unfragmented Habitat Block***: Wildlife corridors are identified from sources (a-c) below. Unfragmented habitat blocks are contiguous blocks of native habitat with highest landscape integrity (areal extent of human use <5%) (TNC 2013).
    a. Arizona Missing Linkages (modeled); NAU Study 2007-2008
    b. Detailed Linkage Designs (modeled); AGFD 2012
    c. County Level Linkage Assessments; AGFD, http://www.azgfd.gov/w_c/conn_whatGFDoing.shtml)
    d. TNC Human Use Intensity dataset, 2013

Appendix D. Criteria Used to Assess Impacts and Evaluate Options to Offset Impacts for Proposed Level II Segments. Green boxes indicate direct impacts found; cross-hatching indicates indirect impacts. Segments are sorted by 'Options to Offset' and then geographically from North to South.

Segment #	Segment Name	Segment Type	ESA Species	BLM Desert Tortoise Lands	Conservation Managed Area	Core/Limited Wildlife Habitat	Perennial Surface Waters	Riparian/Xero-Riparian Habitat	Sonoran Desert Habitat	Mojave Desert Habitat	Linkage/Unfrag. Habitat	Options to Offset
21	I-10	Existing										Impacts Limited
16	Hassy Fwy	New										Impacts Limited
46	US 93	Existing										Wildlife Linkages
43	I-40	Existing										Wildlife Linkages
95	US 93	Existing										Wildlife Linkages
35	I-40	Existing										Wildlife Linkages
36	US 93	Existing										Wildlife Linkages
87	SR 303	Expand										Wildlife Linkages
19	SR85	Expand										Wildlife Linkages
14	Hassy Fwy	New										Wildlife Linkages
83	I-8	Existing										Wildlife Linkages
10	I-8	Existing										Wildlife Linkages
18	Hassy Fwy	New										Minimize & Offset
20	SR85	Expand										Minimize & Offset
85	SR 30	Expand										Minimize & Offset
86	Hassy Fwy	New										Minimize & Offset
15	Hassy Fwy	New										Minimize & Offset
84	Hassy Fwy	New										Minimize & Offset
91	Chicken Sprs	New										Avoid
29	Hwy 60	Expand										Avoid
22	Sun Valley P	New/ Expand										Avoid
17	Hassy Fwy	New										Avoid
82	Vekol Valley	New										Avoid

Appendix E. Detailed Evaluation of Proposed I-11 Alignments, Including Overall Impact Assessment and Options for Offsetting impacts. Segments are sorted by recommended option, then from North to South.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
21	I-10 (9 miles)	Existing	N				X	Minimal new impacts.
16	Hassayampa Freeway (12 miles)	New	N				X	Minimal new impacts.
46	US 93 (70 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. This segment is in Mohave County, which has not yet completed a County-level Stakeholder Assessment; additional studies for wildlife connectivity are advised. ***Note:*** If the new multi-modal footprint is significantly greater than the existing highway, habitat loss or degradation to ESA Endangered and Candidate species, Bonytail Chub, Razorback Sucker and Sonoran Desert Tortoise, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
43	I-40 (23 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. This segment is in Mohave County, which has not yet completed a County-level Stakeholder Assessment; additional studies for wildlife connectivity are advised. ***Comparison***: Segments 95 & 43 have fewer impacts than 91 & 35. Existing routes offer transportation connectivity with less impact. ***Note:*** If the new multi-modal footprint is significantly greater than the existing interstate, habitat loss or degradation to Candidate species, Sonoran Desert Tortoise, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
95	US 93 (32 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. This segment is in Mohave County, which has not yet completed a County-level Stakeholder Assessment; additional studies for wildlife connectivity are advised. ***Comparison***: Segments 95 & 43 have fewer impacts than 91 & 35. Existing routes offer transportation connectivity with less impact. ***Note:*** If the new multi-modal footprint is significantly greater than the existing highway, habitat loss or degradation to ESA Candidate species, Sonoran Desert Tortoise, and to an area acquired and/or managed for conservation purposes (Carrow-Stephens Ranches ACEC) could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
35	I-40 (25 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. This segment is in Mohave County, which has not yet completed a County-level Stakeholder Assessment; additional studies for wildlife connectivity are advised. ***Comparison***: Segments 95 & 43 have fewer impacts than 91 & 35. Existing routes offer transportation connectivity with less impact. ***Note:*** If the new multi-modal footprint is significantly greater than the existing interstate, habitat loss or degradation to Candidate species, Sonoran Desert Tortoise, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
36	US 93 (65 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. ***Note:*** This segment traverses the groundwater basin supporting perennial surface flows in Burro Creek, Big Sandy River, Santa Maria River and Upper Hassayampa River. The Water Resources Development Commission in 2011 (WRDC 2011) found that water demand in the Hassayampa basin would exceed supplies by 2035 under a low-growth scenario. Given the current status of groundwater and surface flows in the Hassayampa basin, additional development and associated groundwater pumping facilitated by a new transportation corridor would increase impacts to wildlife and habitat above baseline conditions assessed by the WRDC. Given the rarity of perennial surface water, riparian habitat, and associated wildlife, it would be difficult if not infeasible to offset impacts through mitigation measures. Additionally, if the new multi-modal footprint is significantly greater than the existing highway, habitat loss or degradation to ESA Endangered and Candidate Species, Southwestern Willow Flycatcher, Roundtail Chub, and Sonoran Desert Tortoise, and to areas acquired and/or managed for conservation purposes (Burro Creek and Poachie Desert Tortoise ACECs) are likely to occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
87	SR 303 (14 miles)	Expand	N			X		Opportunity to study and improve wildlife linkages.
19	SR-85 (21 miles)	Expand	Y		X	X		Opportunity to study and improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. ***Note:*** If the new multi-modal footprint is significantly greater than the existing highway, habitat loss or degradation to ESA Candidate species, Tucson-Shovel-nosed Snake, and to desert tortoise habitat could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.
14	Hassayampa Freeway (32 miles)	New	N			X		Opportunity to study and improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
83	I-8 (29 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. ***Note:*** If the new multi-modal footprint is significantly greater than the existing interstate, habitat loss or degradation to ESA Candidate species, Sonoran Desert Tortoise, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
10	I-8 (33 miles)	Existing	Y		X	X		Opportunity to study and improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. ***Note:*** If the new multi-modal footprint is significantly greater than the existing interstate, habitat loss or degradation to ESA Candidate species, Sonoran Desert Tortoise, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
18	Hassayampa Freeway (7 miles)	New	N		X	X		We recommend minimizing and offsetting impacts for this segment, including conducting studies to improve wildlife linkages. ***Comparison***: Segments 17 & 18 have fewer impacts than 22 & 29. There are options to offset impacts to habitat resources in the 17/18 area, whereas impacts to rivers and riparian areas along the segment 29 route would be difficult to offset. ***Note:*** This segment traverses the groundwater basin supporting the Hassayampa River near Wickenburg. The Water Resources Development Commission in 2011 found that water demand in the basin would exceed supplies by 2035 under a low-growth scenario. Given the current status of groundwater and surface flows in the Hassayampa basin, additional development and associated groundwater pumping facilitated by a new transportation corridor would increase impacts to wildlife and habitat above baseline conditions assessed by the WRDC. Given the rarity of perennial surface water, riparian habitat, and associated wildlife, it would be difficult if not infeasible to offset impacts through mitigation measures.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
20	SR-85 (17 miles)	Expand	Y		X	X		We recommend minimizing and offsetting impacts for this segment, including conducting studies to improve wildlife linkages. Habitat loss or degradation to ESA Endangered and Proposed Threatened species, Yuma Clapper Rail and Western Yellow-Billed Cuckoo, to desert tortoise habitat, and to areas acquired and/or managed for conservation purposes (Gila River and Robbins Butte Wildlife Areas) could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.
85	SR 30 (23 miles)	Expand	Y		X	X		We recommend minimizing and offsetting impacts for this segment, including conducting studies to improve wildlife linkages. Habitat loss or degradation to ESA Endangered and Proposed Threatened species, Yuma Clapper Rail and Western Yellow-Billed Cuckoo, could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
86	Hassayampa Freeway (16 miles)	New	Y		X	X		We recommend minimizing and offsetting impacts for this segment and also conducting studies to improve wildlife linkages. The level of new construction required to establish an interstate along this segment would result in habitat loss or degradation to ESA Endangered and Candidate species, Southwestern Willow Flycatcher, Yuma Clapper Rail and Sonoran Desert Tortoise, to areas acquired and/or managed for conservation purposes (Arlington and Powers Butte Wildlife Areas), and to native habitat, in particular riparian, xero-riparian, and Sonoran Desert habitats could occur. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
15	Hassayampa Freeway (12 miles)	New	Y		X	X		We recommend minimizing and offsetting impacts for this segment and also conducting studies to improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. The level of new construction required to establish an interstate along this segment could result in habitat loss or degradation to desert tortoise habitat and native habitat, in particular riparian, xero-riparian, and Sonoran Desert habitats. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. Additionally, new construction would have the effect of isolating wildlife populations in the northern portion of the Sonoran Desert National Monument (i.e., north of I-8), from the critical native habitats in Buckeye Hills. The extent of this effect and options for restoring connectivity should be carefully studied.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
84	Hassayampa Freeway (19 miles)	New	Y		X	X		We recommend minimizing and offsetting impacts for this segment and also conducting studies to improve wildlife linkages. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 14, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. The level of new construction required to establish an interstate along this segment could result in habitat loss or degradation to native habitat, in particular xero-riparian and Sonoran Desert habitats and to ESA Candidate species, Sonoran Desert Tortoise. If these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. Construction of an interstate along this route would the effect of isolating wildlife populations in the northern portion of the Sonoran Desert National Monument (i.e., north of I-8), from the critical native habitats in Buckeye Hills. The extent of this effect and options for restoring connectivity should be carefully studied.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
91	Chicken Springs Rd (42 miles)	New	Y	X	X			We recommend that the construction of an interstate along this segment should be avoided because of the direct and indirect impacts to the resources in this area cannot be adequately mitigated. If, however, these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation, including conducting studies to improve wildlife linkages. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. ***Comparison***: Segments 95 & 43 have fewer impacts than 91 & 35. Existing routes offer transportation connectivity with less impact. Construction of an interstate along this segment would fragment an area of regional importance, at 357,760 acres representing the 11th largest unfragmented intact area in the state and the 4th largest in the Apache Highlands (TNC 2013). This area also straddles the boundaries of three ecoregions (Apache Highlands, Sonoran Desert, Mojave Desert), indicating its importance to landscape scale habitat connectivity and potentially to resilience. This segment would also fragment two areas identified as ecologically core areas in the 2010 TNC Mojave Desert Ecoregional Assessment (Randall et al. 2010). Habitat loss or degradation to ESA Endangered and Candidate species, Southwestern Willow Flycatcher, Yuma Clapper Rail, Sonoran Desert Tortoise, and Roundtail Chub, to rare plant species, White Margined Penstemon, to an area acquired and/or managed for conservation purposes (McCracken Desert Tortoise ACEC), and to perennial waters (Big Sandy River) important to wildlife could occur. ***Note:*** The November 2013 revision to this segment traverses the Bill Williams groundwater basin supporting the Big Sandy River. The Water Resources Development Commission in 2011 found that water demand within this basin would exceed supplies by 2035 under a low-growth scenario. Given the current status of groundwater and surface flows in the Bill Williams basin, additional development and associated groundwater pumping facilitated by a new transportation corridor would increase impacts to wildlife and habitat above baseline conditions assessed by the WRDC. Given the rarity of perennial surface water, riparian habitat, and associated wildlife, it would be difficult if not infeasible to offset impacts through mitigation measures.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
29	US93 (26 miles)	Expand	Y	X	X	X		We recommend that the expansion of this segment should be avoided because direct and indirect impacts to the perennial waters and associated riparian areas that support important wildlife, including threatened and endangered species, cannot be adequately mitigated. If, however, these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation, including conducting studies to improve wildlife linkages. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. ***Comparison***: Segments 17 & 18 have fewer impacts than 22 & 29. There are options to offset impacts to habitat resources in the 17/18 area, whereas impacts to rivers and riparian areas along the segment 29 route cannot be offset. ***Note:*** This segment traverses the groundwater basin supporting the Lower Hassayampa River near Wickenburg. The Water Resources Development Commission in 2011 found that water demand in the basin would exceed supplies by 2035 under a low-growth scenario. Given the current status of groundwater and surface flows in the Hassayampa basin, additional development and associated groundwater pumping facilitated by a new transportation corridor would increase impacts to wildlife and habitat above baseline conditions assessed by the WRDC. Given the rarity of perennial surface water, riparian habitat, and associated wildlife, it would be difficult if not infeasible to offset impacts through mitigation measures. Additionally, habitat loss or degradation to perennial surface waters (Hassayampa River) and riparian areas important for wildlife, notably ESA Endangered and Proposed Threatened species, Bonytail, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, to ESA Candidate species Sonoran Desert Tortoise, to an area acquired and/or managed for conservation purposes (Hassayampa River Preserve), and to a genetically distinct and resilient population of Lowland Leopard Frog (Savage et al. 2011) could occur.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
22	Sun Valley Pkwy (30 miles)	New & Expand	Y	X	X	X		We recommend that the construction of an interstate along this segment should be avoided because of the direct and indirect impacts to the resources in this area cannot adequately be mitigated. If, however, these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation, including conducting studies to improve wildlife linkages. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. ***Comparison***: Segments 17 & 18 have fewer impacts than 22 & 29. There are options to offset impacts to habitat resources in the 17/18 area, whereas impacts to rivers and riparian areas along the segment 29 route would be difficult to offset. Habitat loss or degradation to ESA Candidate species, Sonoran Desert Tortoise, and to native habitat, in particular xero-riparian and Sonoran Desert habitats could occur. ***Note:*** We classified southern half of this segment as 'expand' because there is existing infrastructure and northern half as 'new'.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
17	Hassayampa Freeway (33 miles; 3 options, spaced 5km apart)	New	Y	X	X	X		We recommend that the construction of an interstate along this segment should be avoided because of the direct and indirect impacts to the resources in this area cannot adequately be mitigated. We evaluated alternative parallel alignments 3 miles to west and 3 miles to east of this segment and found similar impacts. If, however, these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation, including conducting studies to improve wildlife linkages. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. ***Comparison***: Segments 17 & 18 have fewer impacts than 22 & 29. There are options to offset impacts to habitat resources in the 17/18 area, whereas impacts to rivers and riparian areas along segments 22 & 29 route cannot be offset. Habitat loss or degradation to ESA Candidate species, Sonoran Desert Tortoise, to an area acquired and/or managed for conservation purposes (Vulture Mountains ACEC), and to native habitat, in particular xero-riparian and Sonoran Desert habitats could occur depending on final alignment.

Proposed Segment Number	Proposed Segment Name	Proposed Change in Infrastructure	Are Resources covered by Statute, Regulation, or Policy Impacted?	Opportunities				Assessment & Recommendation Description
				Avoid Impacts	Minimize & Offset Impacts*	Study & Improve Wildlife Linkages+	Impacts Limited	
82	SR 303 Ext – Vekol Valley (13 miles)	New	Y	X	X	X		We recommend that the construction of an interstate along this segment should be avoided because of the direct and indirect impacts to the resources in this area cannot adequately be mitigated. If, however, these impacts are unavoidable, measures should be taken to minimize or offset loss or degradation, including conducting studies to improve wildlife linkages. Opportunities exist to offset impacts to Sonoran Desert Tortoise habitat through existing BLM Desert Tortoise Mitigation Policy. ***Comparison***: Segments 10, 83, & 19 have fewer impacts than 10, 82, 84, & 15. Existing routes offer transportation connectivity with less impact to wildlife connectivity than new routes north of Sonoran Desert National Monument. Habitat loss or degradation to desert tortoise habitat and to native habitats, in particular riparian, xero-riparian, and Sonoran Desert habitats could occur. Additionally, the Vekol Valley is important habitat for Sonoran Desert Toads, representing the northern extent of this species' range (Sullivan et al. 1996). Similar to Segments #84 and 15 construction of an interstate along this route could contribute to isolating the northern portion of the Sonoran Desert National Monument (i.e., north of I-8). The extent of these effects and options for mitigation should be carefully studied.

* Any new construction, whether minor or major expansion of existing routes or construction of entirely new roads, could result in habitat loss or degradation to native habitat, in particular riparian, xero-riparian, Sonoran and Mojave Desert habitats. Methods to offset impacts to these native habitats should be considered for every route.

[+] For detailed information on Opportunities to Improve Wildlife Linkages examine data and reports available from AZ Game and Fish Department (at http://www.azgfd.gov/w_c/conn_whatGFDoing.shtml), and consult with experts at AZ Game and Fish Department. Additional studies for wildlife connectivity are advised for all proposed segments, in particular for those segments where new construction is planned and in Mohave County, which has not yet completed a County-level Stakeholder Assessment.

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Appendix D
Sonoran Institute Interstate 11 Priority Corridor Analysis – Phoenix to Las Vegas

Interstate 11

PRIORITY CORRIDOR ANALYSIS—PHOENIX TO LAS VEGAS

Figure 1: This area near Ship Rock is one of many amazing environmental resources that lie along the proposed Interstate 11 route. Careful avoidance and mitigation are necessary to protect this and other amazing features of Arizona.

The proposed Interstate 11 priority corridor from the area of Interstate 10 at Casa Grande north to the crossing of the Colorado River on U.S. 93 presents unique opportunities and challenges for the freight industry, renewable energy advocates, transportation engineers, environmentalists and all Arizonans concerned with the state's economic development. This preliminary evaluation of the priority corridor identifies challenges, constraints, and stakeholders who should have a greater role in the project planning process and establishes a framework for future considerations.

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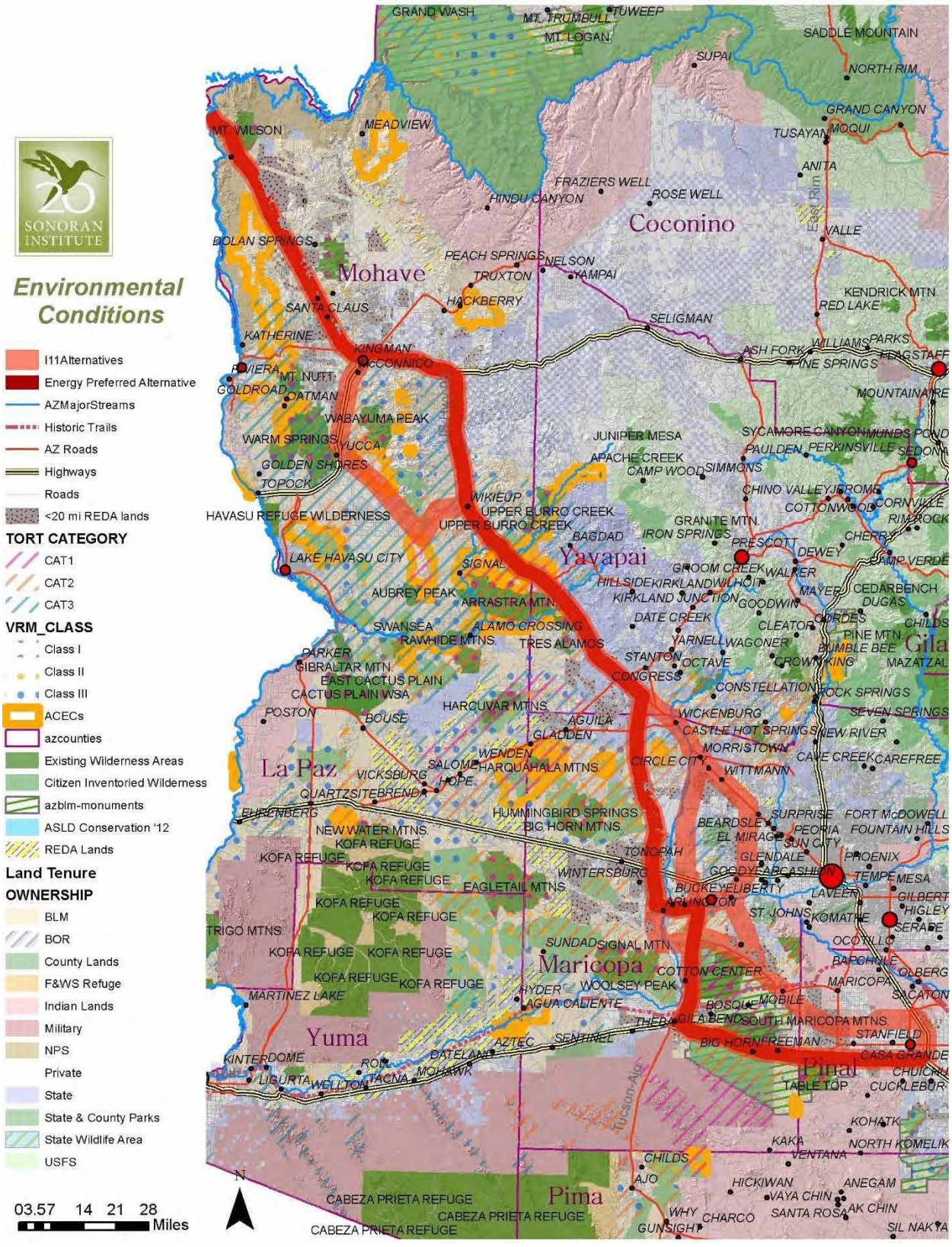


Figure 2: The Interstate 11 is proposed to go along US 93 south from Las Vegas and through the western Maricopa County communities of Wickenburg, Surprise, and Buckeye. The highlighted route is an alternative that, pending further analysis, seems to provide the most value for renewable energy development.

Vision

The proposed Interstate 11 is envisioned as a multi-modal "smart corridor" that may include elements such as an interstate highway, passenger and/or freight rail, electrical and other energy transmission facilities, and state-of-the-art data infrastructure such as fiber-optic cable. These features make the proposed corridor appealing to conservation interests as it provides the opportunity to embark upon a more sustainable approach to corridor planning and development. The current model of infrastructure typically mandates parallel yet distant infrastructure elements that compound the impacts on environmental resources; by placing transmission lines, rail corridors, and highways parallel, yet separate from each other—and thereby exponentially increasing the harm to natural landscapes and wildlife. The Interstate 11, as proposed, further distinguishes itself by providing a significant opportunity for local communities to benefit from trade stimulated by the CANAMEX corridor and renewable energy development that would be served by integrated electrical transmission infrastructure.

Location and History

The proposed Interstate 11 is a segment of the CANAMEX corridor that was initially envisioned in 1996. More than two decades later, it remains highly popular with communities that could benefit from associated economic development brought by increased international trade and industrial development. In 2012, Congress approved a transportation omnibus bill (MAP-21) that included funding for planning and study of corridors throughout Arizona and Nevada that could become portions of the future CANAMEX route.

Today, a key segment of CANAMEX is embodied in the proposed Interstate 11 which is to connect Phoenix to Las Vegas and eventually to undetermined points in Mexico and the northern Nevada border. In Arizona, Interstate 93 is considered to be the logical location for the I-11, taking advantage of the recently completed Mike O'Callaghan-Pat Tillman Memorial Bridge that bypasses the Hoover Dam crossing while connecting Phoenix and Las Vegas—the two largest cities in the U.S. that are currently not connected by an interstate highway. From Wickenburg south, existing roads and facilities become less capable of accommodating the proposed interstate, making it necessary to either perform significant and costly upgrades to constrained roadways or to find alternative locations for the highway.

Renewable Energy along the I-11

The I-11 "smart corridor" concept is attractive to renewable energy advocates due to the large amount of lands suitable for solar and wind development with few environmentally sensitive resources located near the proposed highway. These lands were screened through the Bureau of Land Management's (BLM) Restoration Design Energy Project (RDEP), a statewide assessment that was supported by environmental and wildlife groups, renewable energy developers, and utilities in Arizona. RDEP officially designated suitable BLM lands as Renewable Energy Development Areas (REDAs). However, because the assessment extended to other Arizona lands (excluding military and tribal lands), federal, state, and private lands with REDA-like qualities were also identified. As indicated in the table below, over 700,000 acres of REDA-quality lands are located within 20 miles of the highway. Significant renewable energy development of these lands will require additional electrical transmission lines to get power to markets, a costly but necessary measure in order to provide a more balanced and sustainable energy future.

Over the past year, the Arizona Solar Working Group (ASWG), comprised of environmental and wildlife advocates, utility companies, and solar energy developers, has been working to evaluate possible

corridors for renewable energy transmission throughout Arizona. Recently, a settlement with environmental advocates required the Departments of Energy and Interior to reevaluate corridors identified as West Wide Energy Corridors throughout 11 western states. The ASWG is evaluating and preparing recommendations for viable corridors with low ecological impacts. The proposed I-11 is one of the alignments likely to emerge as a preferred location for a transmission line; other locations near Interstates 10 and 8 are strong candidates as well. On December 17, 2013 five members of ASWG co-signed and submitted a letter to ADOT further articulating the need for energy transmission within the corridor.

Renewable Energy Development Area Lands				
Within 10 Miles of I-11	**Acres**	**Energy Potential[1] (MW)**	**Homes Powered[2]**	**Carbon Displaced[3] (tons)**
Non-BLM Nominated Sites	1,307	139	115,601	4,577,784
BLM Nominated Sites	1,606	170	142,046	5,625,036
Non-BLM REDA Lands	379,857	40,317	33,597,324	1,330,454,023
BLM REDA Lands	68,452	7,265	6,054,394	239,754,010
Solar Energy Zone	2,618	278	231,555	9,169,579
Total Energy Development Lands	**453,840**	**48,169**	**40,140,920**	**1,589,580,431**
Within 20 Miles of I-11	**Acres**	**Energy Potential[1] (MW)**	**Homes Powered[2]**	**Carbon Displaced[3] (tons)**
Non-BLM Nominated Sites	9,847	1,045	870,941	34,489,244
BLM Nominated Sites	4,616	490	408,273	16,167,599
Non-BLM REDA Lands	581,444	61,713	51,427,149	2,036,515,081
BLM REDA Lands	106,232	11,275	9,395,933	372,078,945
Solar Energy Zone	2,618	278	231,555	9,169,579
Total Energy Development Lands	**704,757**	**74,801**	**62,333,850**	**2,468,420,448**

[1]Energy potential assumes the development will achieve a realized .1061 MW/Acre which is the mean planned production of approved BLM Solar applications as of 6/2013

[2]Assumes estimated energy demand of 12MW/10,000 homes

[3]Assumes 33,000 tons/MW photovoltaic panels

Initial Evaluation

In September 2013, the Sonoran Institute (SI) performed an initial evaluation of the I-11 corridor through GIS analysis which included consideration of conflicts to Areas of Critical Environmental Concern (ACECs), Sonoran desert tortoise habitat, wilderness areas, citizen proposed wilderness, Arizona State Land Department (ASLD) lands with conservation value, riparian zones, Visual Resource Management (VRM) zones, and REDA lands. In addition, SI embarked on a three-day field tour for a first-hand look at the I-11 alternatives extending from Phoenix to Nevada while meeting with local stakeholders along the way. This preliminary evaluation seemed to provide enough information to

demonstrate that the I-11, at least through this alignment, could be accomplished with limited and potentially mitigatable environmental impacts. More research is needed.

The "Energy Preferred Alternative"

The Sonoran Institute has identified an alternative for purposes of further analysis that seems to align with limiting and mitigating environmental impacts, while providing easy access to lands with renewable energy development potential. This alternative meets the performance criteria of the transportation modes, and optimizes the corridor for multiple other uses including energy transmission. The following considerations illustrate the merits of this alignment for evaluation:

1. **Gila Bend:** This small town has become the leader and incubator of the most progressive utility-scale renewable energy-friendly policy in the United States. The combination of electrical transmission infrastructure with the I-11 will allow the town to flourish and provide needed economic development and regional clean energy supply. It can also benefit from increased access and the economic development that would be enabled by the proximity of this corridor.
2. **Buckeye:** This community has prepared to take advantage of the freight industry that could come as a result of the I-11. Vast swaths of land near SR-85 and the Union Pacific Railway have been allocated for heavy industry including warehouse and distribution centers.
3. **SR-85:** Utilizing the SR-85 north from Gila Bend allows this highway, recently expanded to four lanes throughout most of its stretch, to become better utilized. Traffic congestion is less likely to occur in this remote area, making it less necessary to develop a new corridor north of the Sonoran Desert National Monument.
4. **SR-801:** The I-10 bypass (SR-801), located north and parallel to the Gila River in Buckeye, is a perfect candidate to connect the I-11 off of the SR-85 while keeping traffic off of the congested I-10. This location is preferable to the proposed Hassayampa Freeway alternative south of the Buckeye Hills near the historic Old US-80 Bridge and Gillespie Dam for a variety of reasons including conflicts with the Arlington State Wildlife area and the Gila River riparian zone, which is among the most valuable desert waterways in the state.
5. **Hassayampa Freeway (North of I-10):** The Hassayampa Framework Study was completed over three years ago after a lengthy and deliberative process that included the Town of Buckeye, City of Surprise, Maricopa County, the Town of Wickenburg, and a host of stakeholders including local developers. One of the outcomes of the Framework Study was this freeway alignment, located west of the Hassayampa River, which would provide a valuable missing transportation link between I-10 and the US-60 and SR-93. This proposed facility would be developed largely on private lands in rights-of-way that have been set aside by private developers solely for this purpose. However, this alignment poses challenges that need detailed design treatments to resolve.
6. **BLM Lands:** Once the Hassayampa Freeway leaves private developments it enters a segment of BLM land that has some environmental conflicts, including Category 2 Sonoran desert tortoise habitat. Mitigation measures would need to be implemented to limit the damage to this species. Also, the new Vulture Mountain recreation area is near this alignment alternative. Careful articulation of the roadway and access management, along with robust environmental mitigation will need to be implemented throughout these public lands.
7. **State Lands:** ASLD lands are prevalent west of Wickenburg. Development of the I-11 in this location could provide long-term benefit to the beneficiaries of the Trust and immediate revenue through rights-of-way sales.
8. **US-93:** The existing roadway is an excellent location for the I-11 from Wickenburg north to the I-40 and then north from Kingman to Nevada. The US-93 is in need of safety and convenience

improvements for the benefit of travelers between Phoenix and Las Vegas. Though some environmentally sensitive lands will be traversed by highway construction and other proximate infrastructure, these impacts will likely be limited and subject to mitigation.

Segment Analysis

A wide variety of factors must be considered when selecting the appropriate corridor for Interstate 11. The following qualitative analysis provides a baseline for further evaluation. Not only should the environmental factors be carefully examined for avoidance and mitigation, but the complex social and cultural dynamics of communities throughout the study area should also be a major part of the alternative selection process. For example, the reliance of the Town of Wickenburg on their equestrian heritage, or the strong agrarian history of Buckeye and their unique ambitions and goals, among others should be factors into alignment selection and design features. Other factors that are unique to every community include ambitions for growth, desires for environmental protection, and capacity to embrace infrastructure development. This analysis provides a list of key stakeholders to be included in the discussion of how the Interstate 11 corridor should be articulated through this dynamic region. The West Valley, though ambitious, remains the home of some of Arizona's most precious natural resources; that must be respected.

Important Note on Modes and Engineering Feasibility

The Interstate 11 corridor is a project with a very long implementation horizon as it may not be fully realized for fifty or more years. For this reason, it is essential that certain constraints have less of an impact on the selection of appropriate modes and features of the corridor since it is impossible to determine whether adequate solutions will be developed by the time the corridor is fully utilized. Improvements in materials and changes in engineering approaches may resolve some of the challenges that may limit the successful integration of certain modes in various areas. For example, it may seem unfeasible to have electrical transmission parallel to the highway through areas where the road curves as the current design and cost considerations would declare it impractical. In fifty years, however, materials and design of this infrastructure could change significantly, thereby alleviating this concern entirely. Similarly, heavy rail was not considered practical along US-93 due to the slopes of the roadway but in the future, these concerns may be resolved. Engineering constraints need to be allocated to the roadway segments through the engineering process, not the high level planning. The Sonoran Institute advises that if a segment is adequate to accommodate the mode, enable it for planning purposes and allow future work to determine its feasibility at the appropriate time.

Segment 46—Pat Tillman-Mike O'Callaghan Memorial Bridge to Kingman

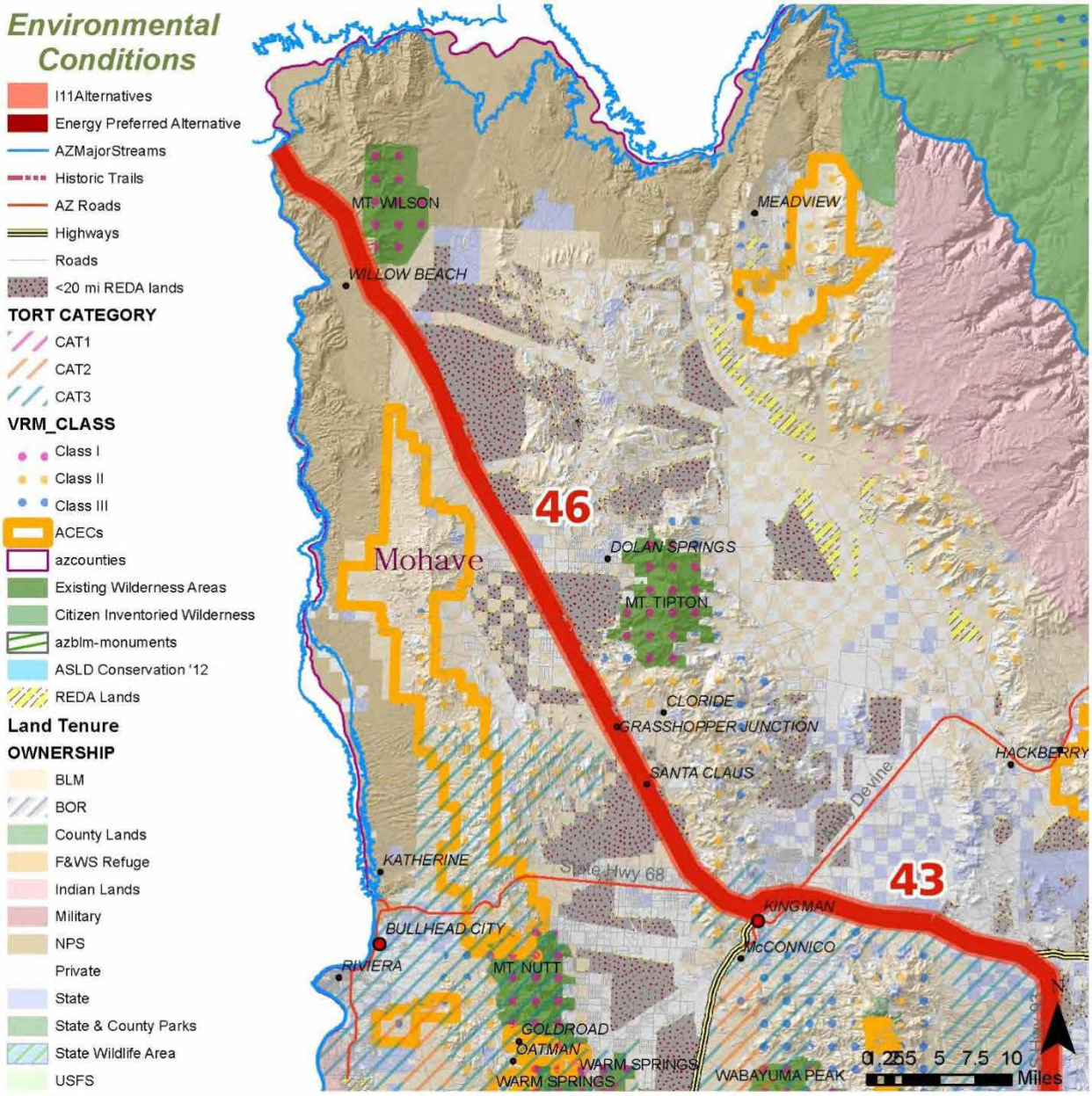


Figure 3: Segment 46 traverses the Lake Mead National Recreation Area and some impressive stretches of Mohave Desert. It also is adjacent to some valuable REDA lands and a proposed massive wind energy facility.

Segment 46
Opportunities
Provides an important connection to Nevada across the recently constructed Pat Tillman-Mike O'Callaghan Memorial Bridge.
Utilizes a corridor that has already been outfitted with wildlife crossing infrastructure over the roadway to minimize additional habitat fragmentation.
Is adjacent to significant REDA-quality lands that can benefit from an energy transmission corridor that can help move the energy to populous demand centers like Las Vegas, Phoenix, and California.
Much of the land is owned by the Bureau of Land Management

Challenges
The Lake Mead NRA has interest in protecting their view corridors which increases the complexity of aligning electrical transmission within the I-11.
Views from the Mt. Tipton and Mt. Wilson wilderness areas should a consideration as the roadway is designed.
Additional wildlife crossings may be necessary from the mountainous region east of the corridor to the Lake Mead NRA.
The interchange from I-11 to I-40 should be carefully designed to respect the community of Kingman and the recreation and natural resources in the mountains west of the city.
Stakeholders
Mohave Wind Energy: Has a large wind farm approved south of Lake Mead NRA and north of the proposed I-11
City of Kingman: Residents and town leaders should be engaged to help identify important design and alignment considerations.
Mohave County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Centennial West transmission line: Planned to cross northern Arizona from northeast New Mexico to California.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Wilderness Coalition: Has particular interest in Wilderness areas and should be consulted on visual resource impacts of the roadway with respect to Mt. Tipton and Mt. Wilson.
Arizona Game and Fish Department: Has data on wildlife movements that should be consulted to develop strategies to avoid and mitigate impacts.
Modal Considerations
Electrical transmission is challenging to articulate through this area though we feel it is important. The following comment was received from Jim Charters, Chairman of the Southwest Area Transmission Sub-Regional Planning Group (SWAT) with respect to transmission lines crossing the Colorado River. The full text of his comments will be included in the appendix to this report: *"The crossing of the Colorado River at Hoover is not trivial. Only one line crosses at this time, upstream. When the lake is up (it does this occasionally) all boat traffic must be restricted due to arc hazard. When the bridge was being designed Western considered additional crossings. There was a significant resistance to crossing in the recreation area downstream and very little space for crossing upstream because of the lake. Crossing the Colorado River south of the Recreation area and into the El Dorado Valley from the south via Searchlight was a logical path for the lines, if not for the highway."* Considering this comment, it may be worthwhile to study various crossing opportunities for the electrical transmission line separate from the Pat Tillman-Mike O'Callaghan Bridge.
Rail: It seems logical to locate rail freight and/or transit along the US-93 from Las Vegas to further enhance both tourism and freight connectivity. There are no known reasons why this segment is incompatible with rail development and operation though engineering constraints may be a factor.
Highway: The presence of the existing infrastructure along this corridor along with the limited environmental impacts known to be present seems to indicate that the highway portion of the I-11 is appropriately sited along the US-93 through this area.

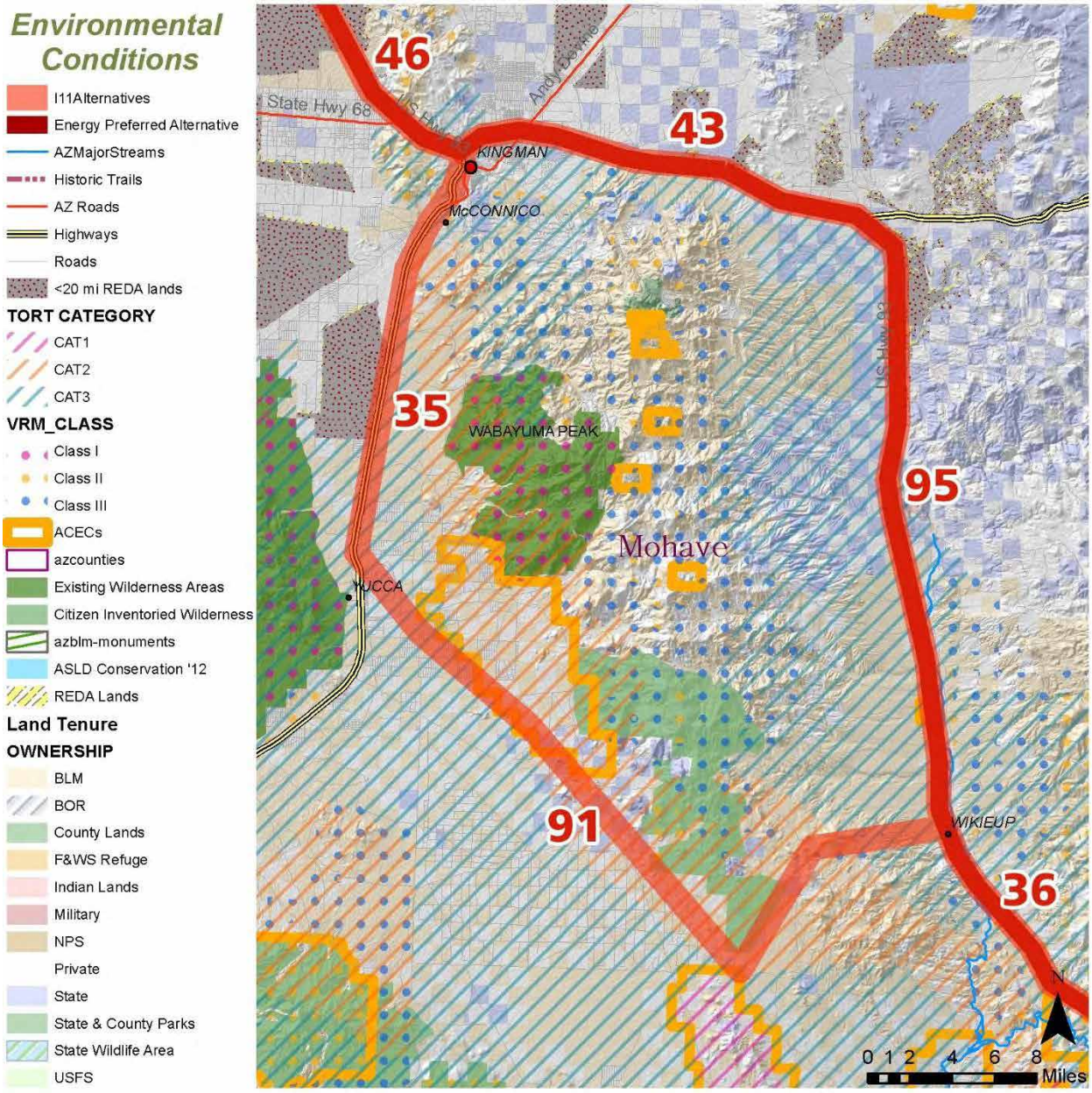


Figure 4: Segments 43, 95, 91, and 35 surround the Wabayuma Peak Wilderness area and a large number of other valuable environmental resources.

Segment 43—I-40 from Kingman East to US-93

Segment 43
Opportunities
Uses an existing highway corridor thereby reducing the impacts of creating a new segment.
Has a nearby railroad that could be used and/or upgraded for the multimodal aspect of the corridor.
Can utilize existing freeway interchange designs at each I-40—US-93 junction.
Provides economic development opportunity for the City of Kingman on private and state lands east of the developed area.
Has limited impact with Sonoran desert tortoise habitat though category 3 lands exist to the south.
Challenges
Private and state lands will need to be acquired which may present challenges to public opinion and concerns from impacted landowners.

Views from the Wabayuma Peak Wilderness area should a consideration as the roadway is designed.
The corridor may need wildlife infrastructure to respect historical migration patterns.
Stakeholders
Mohave Wind Energy: Has a large wind farm approved south of Lake Mead NRA and north of the proposed I-11
City of Kingman: Residents and town leaders should be engaged to help identify important design and alignment considerations.
Mohave County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Centennial West transmission line: Planned to cross northern Arizona from northeast New Mexico to California.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Wilderness Coalition: Has particular interest in Wilderness areas and should be consulted on visual resource impacts of the roadway with respect to Wabayuma Peak Wilderness area.
Arizona Game and Fish Department: Has data on wildlife movements that should be consulted to develop strategies to avoid and mitigate impacts.
A number of private developers have projects along this roadway that should be consulted to determine areas of collaboration and/or conflict.
The Hualapai Tribe has been engaged in projects in this area to protect their cultural resources. They should be consulted.
Modal Considerations
With the existing presence of rail, transmission, and a highway along this corridor it seems to reasonably accommodate all the considered modes within this smart corridor. Limited impacts to important wildlife and ecological resources are expected at this time.

Segment 35—I-40 from Kingman South to Approximately Yucca

Segment 35
Opportunities
Uses an existing highway corridor thereby reducing the impacts of creating a new segment.
Has a nearby railroad that could be used and/or upgraded for the multimodal aspect of the corridor.
Can utilize existing freeway interchange designs at the US-93 junction.
Provides economic development opportunity for the City of Kingman on private and state lands south of the developed area.
Has limited impact with Sonoran desert tortoise habitat though category 3 lands exist to the south.
REDA lands exist to the west of the corridor.
Provides access to developable private and state lands to the east.
Much of this corridor is under federal ownership, reducing the impact on private land owners.
Challenges
Private and state lands will need to be acquired which may present challenges to public opinion and concerns from impacted landowners.
Views from the Wabayuma Peak Wilderness area should a consideration as the roadway is designed.
The corridor may need wildlife infrastructure to respect historical migration patterns.
This segment can only connect to US-93 through an additional east/west roadway that currently does not exist. Segment 91, discussed in more detail below, has significant impacts on environmental resources.
Stakeholders
Lake Mead NRA: Needs to be consulted about how electrical transmission could be articulated through their lands toward Nevada.
City of Kingman: Residents and town leaders should be engaged to help identify important design and alignment considerations.
Mohave County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Community of Yucca should engaged in a discussion about the opportunities and challenges that the corridor would bring to them.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.

Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Wilderness Coalition: Has particular interest in Wilderness areas and should be consulted on visual resource impacts of the roadway with respect to Wabayuma Peak Wilderness area.
Arizona Game and Fish Department: Has data on wildlife movements that should be consulted to develop strategies to avoid and mitigate impacts.
A number of private developers have projects along this roadway that should be consulted to determine areas of collaboration and/or conflict.
Modal Considerations
The presence of rail and highway infrastructure are nice, though they remain difficult to connect with the Phoenix area. Based on comments cited with Segment 46, this corridor segment could be used to get electrical transmission to the Searchlight area to cross Lake Mead NRA.

Segment 91—US-93 to I-40 around Chicken Springs Rd

Segment 91
Opportunities
Provides access to developable private and state lands near Golden Valley.
Challenges
This segment impacts or is directly adjacent to a number of critical environmental resources including: Sonoran desert tortoise Categories 1, 2 and 3 lands, two ACECs, Citizen Inventoried Wilderness, and BLM Visual Resource Management Zone 2 and 3.
The roadway if built along the terrain and slopes going up and over the Hualapai Mountains will cause significant environmental degradation.
Private lands will need to be acquired for this roadway to be built in this location.
Stakeholders
Mohave County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Community of Wikieup: Needs to be involved to help articulate the corridor around their community.
Community of Yucca should engaged in a discussion about the opportunities and challenges that the corridor would bring to them.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
US Fish and Wildlife Service: Should be engaged in discussions around impacts to Sonoran desert tortoise habitat.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Wilderness Coalition: Has particular interest in Wilderness areas and should be consulted on visual resource impacts of the roadway with respect to Wabayuma Peak Wilderness area.
Arizona Game and Fish Department: Has data on wildlife movements that should be consulted to develop strategies to avoid and mitigate impacts.
A number of private developers have projects along this roadway that should be consulted to determine areas of collaboration and/or conflict.
Modal Considerations
This segment is not a good candidate for any of the modes, especially rail and highway due to environmental constraints and slopes.

Segment 95—US-93 from I-40 south to Wikieup

Segment 95
Opportunities
Uses an existing highway corridor thereby reducing the impacts of creating a new segment.
Has existing electrical transmission infrastructure nearby.
Can utilize existing freeway interchange designs at the I-40—US-93 junction.
Provides opportunity for the small community of Wikieup
Has limited impact with Sonoran desert tortoise habitat though category 3 lands exist to the west.
Provides opportunity to some private and state lands on the northern section of the corridor.

Some of the impacted lands are under BLM ownership which may be easier and/or less expensive to acquire.
Some REDA lands exist on the northern extent of the segment.
Challenges
Private and state lands will need to be acquired which may present challenges to public opinion and concerns from impacted landowners.
Sonoran desert tortoise habitat will be impacted.
Wildlife corridors are impacted throughout this segment.
This segment runs parallel to the Big Sandy River which is an important riparian area.
Stakeholders
Community of Wikieup: The US-93 currently runs through this small town. Future designs should take into account the interests of the community.
Arizona Wilderness Coalition: Has worked throughout the state on river preservation and should be engaged in how the proposal may impact the Big Sandy.
Mohave County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Audubon Society: Has interest in river preservation and should be engaged with how the corridor is designed with respect to riparian areas.
Modal Considerations
This segment may be appropriate for highway and utility infrastructure including electrical transmission.
Rail does not currently exist nearby but could, depending on the complexity of engineering the track and how much additional impacts are created around sensitive areas like the Big Sandy river.

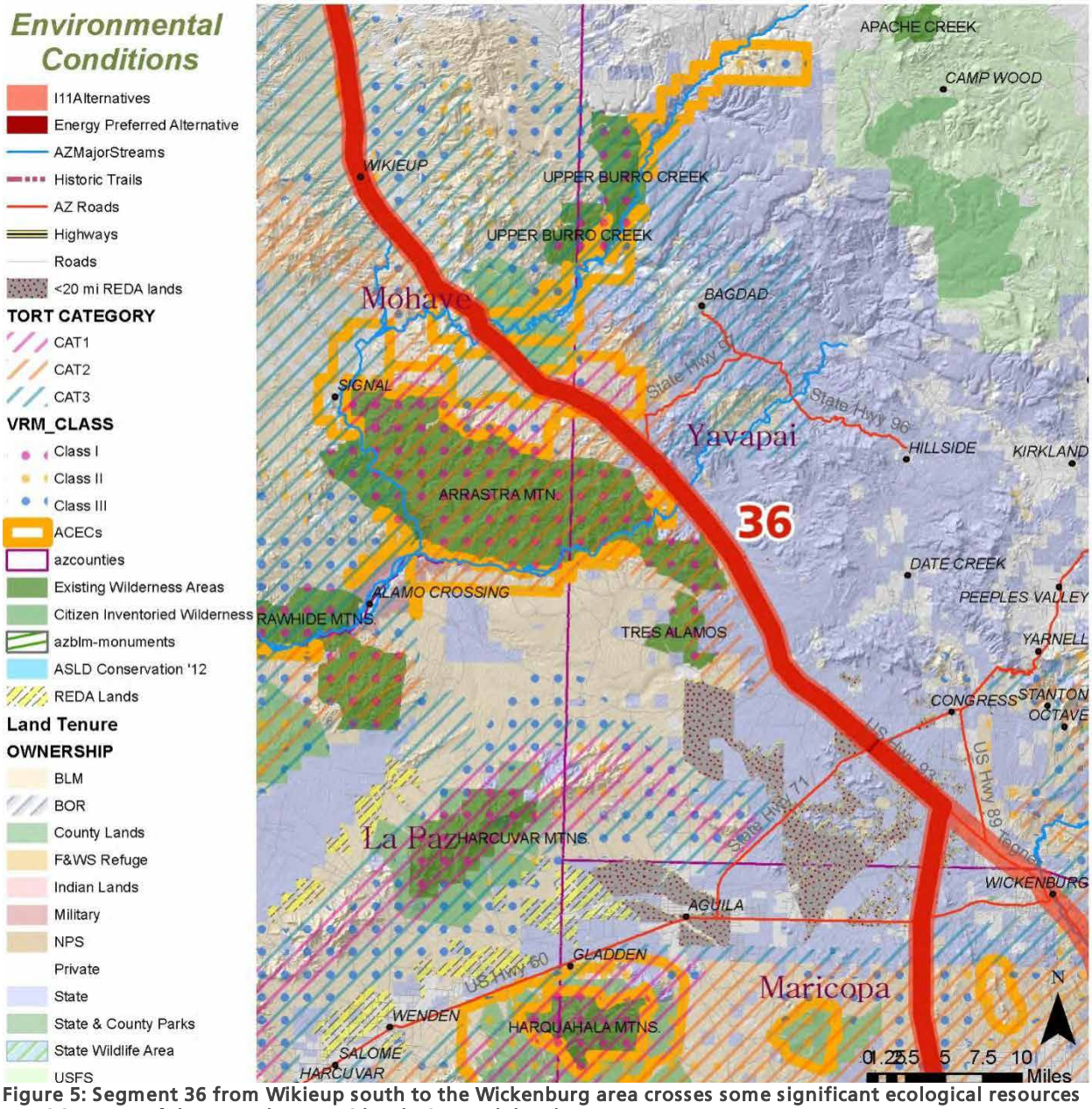


Figure 5: Segment 36 from Wikieup south to the Wickenburg area crosses some significant ecological resources requiring a careful approach to corridor design and development.

Segment 36—US-93 Wikieup South to the Wickenburg Area

Segment 36
Opportunities
Uses an existing highway corridor thereby reducing the impacts of creating a new segment.
Has existing electrical transmission infrastructure nearby.
Some of the impacted lands are under BLM ownership which may be easier and/or less expensive to acquire.
Can use existing upgraded bridge infrastructure over the Burro Creek and Santa Maria Rivers.
Some REDA lands exist on the southern extent of the segment near Wickenburg.
Challenges
Significant amounts of state lands will need to be acquired through much of this segment.
Sonoran desert tortoise habitat of Categories 1, 2, and 3 will be impacted by this corridor segment.
Wildlife corridors are impacted throughout this segment.

The Big Sandy River, Burro Creek, and the Santa Maria River are all crossed by this segment requiring significant care and disturbance avoidance.
Three different ACECs are impacted by this corridor.
A Citizen Inventoried Wilderness unit is directly adjacent to this segment along the east side of the corridor.
The Arrastra Mountain and Tres Alamos Wilderness areas are within view of this segment requiring care to avoid impacts to the solitude and visual values of these resources.
In a few areas, Visual Resource Management zones 1, 2, and 3 are near the corridor requiring care with how the facility is designed.
Stakeholders
Community of Wikieup: The US-93 currently runs through this small town. Future designs should take into account the interests of the community.
Arizona Wilderness Coalition: Has inventoried a proposed wilderness unit near Burro Creek on the east side of the corridor. Additionally, it is interested in the health and protection of the Santa Maria and Big Sandy rivers as well as Burro Creek. The Arrastra Mountain and Tres Alamos wilderness units are under their stewardship as well and may be impacted by views from this corridor.
Yavapai County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
American Rivers: May be interested in how the corridor can be articulated around these three challenging river crossings.
Town of Wickenburg: As the corridor gets closer to this community and enters their planning area, it will be important that they be engaged so they can plan the land uses and transportation elements around it.
Arizona State Land Department: A significant amount of ASLD lands are around the corridor around Wickenburg. They should be engaged to determine appropriate alignments to respect the value of lands for the Trust.
Audubon Society: Has interest in river preservation and should be engaged with how the corridor is designed with respect to riparian areas.
Modal Considerations
This segment requires significant design considerations to both integrate all modes and respect sensitive ecological features that are present throughout the corridor.
Electrical transmission is located near the corridor and could, with appropriate design considerations, be integrated into the highway design.
Rail does not currently exist nearby but could, depending on the complexity of engineering the track and how much additional impacts are created around sensitive areas like the Big Sandy, Santa Maria, and Burro Creek riparian areas.

Segments in Western Maricopa County

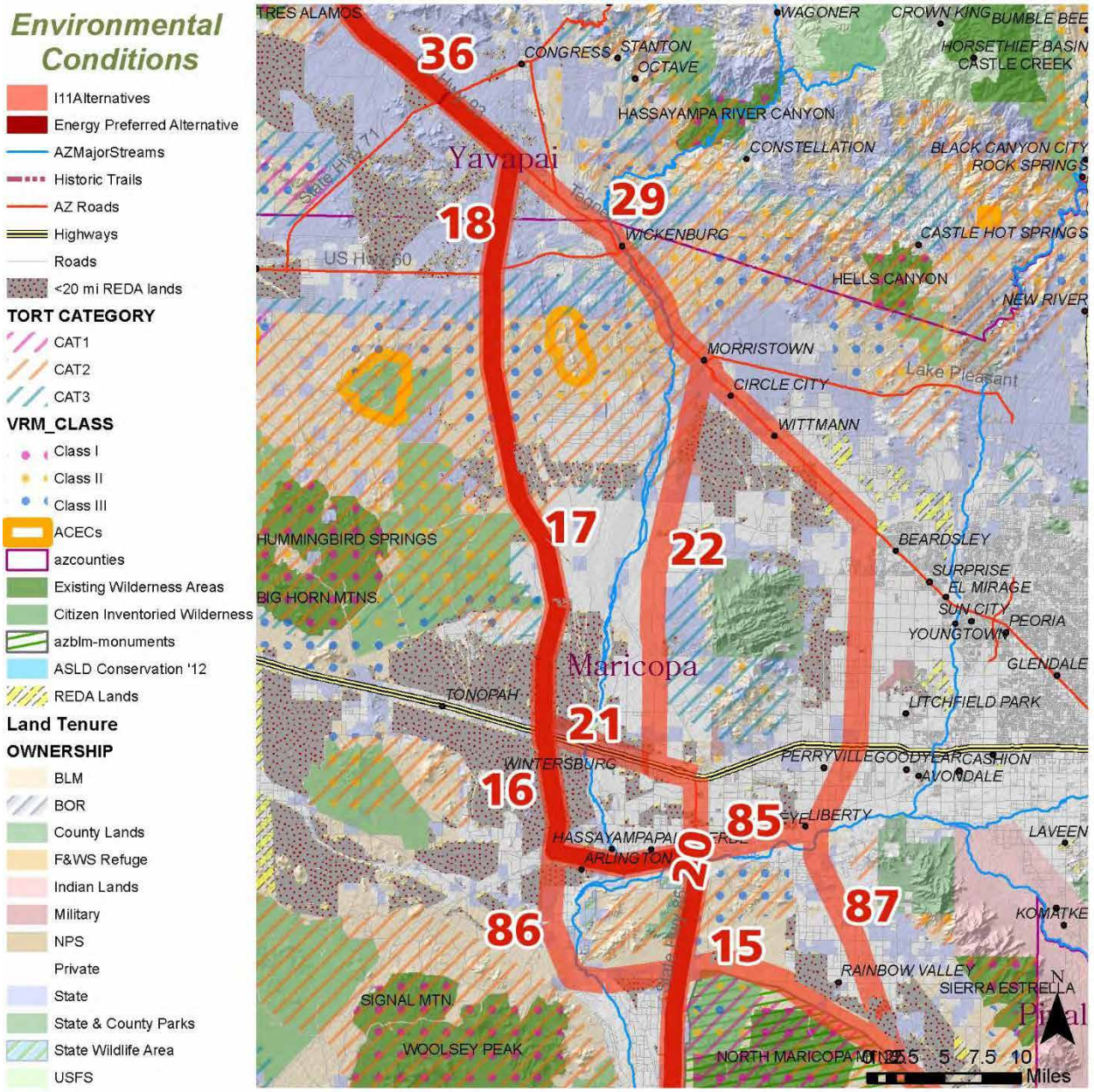


Figure 6: The corridor as it extends into Maricopa County becomes much more urban, going through areas that have been planned for development for many years. Notable areas of concern exist, however, including lands around Wickenburg and the Gila River.

Segment 18—Hassayampa Freeway Extended from US-60 to US-93
Opportunities
Bypasses the heart of Wickenburg allowing the community to expand into nearby state land parcels.
Has existing electrical transmission infrastructure nearby.
The development of this western highway connection will allow traffic to more easily bypass the Phoenix region and will provide access to US-93 from I-10 that is currently inadequate.
Some REDA lands exist west of the corridor on primarily state lands.
Challenges
Significant amounts of state lands will need to be acquired through much of this segment.

The community of Wickenburg could be adversely impacted if the corridor does not adequately respect their needs for access and tourism. Recent transportation efforts the community have resulted in negative views around infrastructure planning and development that need to be respected.
This segment relies on the development of the planned Hassayampa Freeway corridor through lands in segment 17 that are of high ecological value.
Stakeholders
Yavapai and Maricopa Counties: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Town of Wickenburg: As the corridor gets closer to this community and enters their planning area, it will be important that they be engaged so they can plan the land uses and transportation elements around it.
Arizona State Land Department: A significant amount of ASLD lands are around the corridor around Wickenburg. They should be engaged to determine appropriate alignments to respect the value of lands for the Trust.
Arizona Game and Fish Department (AZGFD): Has interest in preserving wildlife corridors in northern Maricopa County.
Modal Considerations
This segment could feasibly accommodate all modes.
Electrical transmission is located near the corridor and could, with appropriate design considerations, be integrated into the highway design.
Rail does not currently exist nearby but could, depending on the complexity of engineering the track. Currently rail takes another route through Wickenburg and north to Prescott.

Segment 17—Hassayampa Freeway from I-10 to US-60
Opportunities
Bypasses the heart of Wickenburg allowing the community to expand into nearby state land parcels.
Has existing electrical transmission infrastructure nearby.
Some REDA lands exist around the corridor on primarily state lands.
Utilizes land set aside by private developers for the corridor which will reduce the cost of property acquisition.
Provides access to growing segments of the City of Buckeye and surrounding Maricopa County.
The development of this western highway connection will allow traffic to more easily bypass the Phoenix region and will provide access to US-93 from I-10 that is currently inadequate.
Challenges
Significant amounts of state lands will need to be acquired through much of this segment.
The community of Wickenburg could be adversely impacted if the corridor does not adequately respect their needs for access and tourism. Recent transportation efforts the community have resulted in negative views around infrastructure planning and development that need to be respected.
This segment goes through some lands with high ecological value near the Vulture Mountain ACEC.
Impacts a large swath of Sonoran desert tortoise habitat Categories 2 and 3.
The corridor would disturb lands in visual resource management category 3.
The corridor could negatively impact ongoing efforts to develop the Vulture Mountain Cooperative Recreation Management Area (CRMA).
Lands west of segment 17 are included in legislation (HR 1799) to permanently designate a National Conservation Area and new wilderness units. The roadway needs to be located outside of this area.
Important wildlife corridors exist between the Belmont Mountains and the Hassayampa River. They will be interrupted by this corridor.
Equestrian access is an important feature of the Wickenburg culture and should be considered with corridor location and design.

Stakeholders
Wickenburg Conservation Foundation: A small group of individuals who are interested in protecting Wickenburg's unique sense of place and equestrian recreation opportunities. They are concerned about the development of a highway that may impact the Vulture Peak ACEC and the planned Vulture Mountain Cooperative Recreation Management Area (CRMA).
Maricopa County Parks: Leading the process to plan and implement the Vulture Mountain CRMA.
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations including a major project in the southern portion of this segment.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Game and Fish Department (AZGFD): Has interest in preserving wildlife corridors in northern Maricopa County.
Sonoran Desert Heritage Coalition: A collection groups and individuals who are advocating for the protection of about 1 million acres west of Phoenix and near this highway segment.
Town of Wickenburg: As the corridor gets closer to this community and enters their planning area, it will be important that they be engaged so they can plan the land uses and transportation elements around it.
Arizona State Land Department: A significant amount of ASLD lands are around the corridor around Wickenburg. They should be engaged to determine appropriate alignments to respect the value of lands for the Trust.
Town of Buckeye: Has lands and major developments near and adjacent to the roadway.
Modal Considerations
This segment could feasibly accommodate all modes.
Electrical transmission is located near the corridor and could, with appropriate design considerations, be integrated into the highway design.
Rail could be integrated into a corridor at this location which would also remove the need for goods and passengers to go through the heart of Phoenix to get to Wickenburg and points north.
The corridor may need to be wider than current development plans allow through the Douglas Ranch and Belmont communities. Design of the corridor should be coordinated with the community plans to ensure that there is adequate space for all modes.

Segment 29—US-60 from Sun Valley Parkway Extended to US-93
Opportunities
May be designed to integrate with the Town of Wickenburg to allow increased tourism and traffic for the community.
Uses an existing highway corridor allowing for reduced impacts of construction.
REDA lands exist adjacent to the corridor.
Has existing rail infrastructure in the corridor.
Challenges
Topography and natural resource constraints may restrict the full development of the corridor.
The community of Wickenburg could be adversely impacted as the corridor is large and may be difficult to navigate through the Town while preserving its unique identity and character.
This segment goes through some lands with high ecological value around the Hassayampa River Preserve.
Impacts a large swath of Sonoran desert tortoise habitat Categories 2 and 3.
The corridor may disturb lands in visual resource management categories 2 and 3.
Electrical transmission may be difficult to navigate through this segment due to ecological and environmental constraints.
Important wildlife corridors exist between the Hieroglyphic Mountains on the north and the Hassayampa River. These would need to be addressed.
Equestrian access is an important feature of the Wickenburg culture and should be considered with corridor location and design.
The Hassayampa River is an important feature to the ecology of this region. Impacts could be devastating to wildlife and the broader environment.

Stakeholders
Wickenburg Conservation Foundation: A small group of individuals who are interested in protecting Wickenburg's unique sense of place and equestrian recreation opportunities.
City of Surprise: A good portion of this segment goes through their planning area.
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Game and Fish Department (AZGFD): Has interest in preserving wildlife corridors in northern Maricopa County.
The Nature Conservancy: Has acquired land and manages the Hassayampa River Preserve. They should be consulted on the impacts of this corridor on their interests.
Town of Wickenburg: As the corridor gets closer to this community and enters their planning area, it will be important that they be engaged so they can plan the land uses and transportation elements around it.
BNSF Railroad: Should be integrated into the development and integration of the rail component of this segment.
Communities of Morristown, Whitman, and Circle City lay along the route and should be integrated into the design and routing discussions.
Modal Considerations
This segment could feasibly accommodate rail and highway as they already exist in this area.
Electrical transmission may be difficult to articulate through sensitive lands along the Hassayampa River through areas under VRM 2 classification.

Segment 22—Sun Valley Parkway Extended from I-10 to US-60
Opportunities
Provides a missing link between I-10 and US-60 west of the White Tank Mountains.
REDA lands exist adjacent to the corridor.
Existing electrical transmission and a natural gas pipeline are nearby this segment.
Challenges
Planned communities along the route could be significantly impacted by this corridor as it will be much larger than the existing infrastructure that has already been accommodated.
Important wildlife corridors exist between the White Tank Mountains and the Hassayampa River that will need to be addressed.
Stakeholders
City of Surprise: Some of this segment goes through their planning area.
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Wildlife Federation: A conservation group that is interested in protecting wildlife resources and finding win-win solutions for habitat protection and appropriate recreation.
Defenders of Wildlife: Should be engaged to evaluate and seek solutions for habitat loss and connectivity issues.
Arizona Game and Fish Department (AZGFD): Has interest in preserving wildlife corridors in northern Maricopa County. A significant linkage west of the White Tank Mountains is of high priority to them.
Town of Buckeye: Has significant interest in this corridor as it traverses a major growth area.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
Modal Considerations
This segment could feasibly accommodate all modes though the corridor width required may not be feasible considering long-standing development entitlements that exist along the segment.

Segment 21—Interstate 10 from SR-85 to Hassayampa Freeway
Opportunities
Uses an existing corridor.
Challenges
This segment of I-10 will be over capacity in the coming years, requiring significant upgrades to keep a marginal level of service.
Using this segment passes up the opportunity to develop additional east-west highway connections that are desperately needed.
This area may not be suitable for additional utility construction as much of the corridor is constrained by existing development plans.
Stakeholders
Maricopa County Flood Control: Has flood structures on the north side of the I-10 and should be involved in the discussion about the future of this corridor.
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Town of Buckeye: Has significant interest in this corridor as it traverses a major growth area.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
Modal Considerations
This segment may not be a good candidate to serve rail and utility modes, though both are present nearby.

Segment 16—Hassayampa Freeway from SR 801 (SR-30) to I-10
Opportunities
Serves a growth area in unincorporated Maricopa County.
REDA lands exist along this segment.
Relieves traffic off of I-10 through Buckeye.
Existing electrical transmission is in this area along with the Palo Verde Nuclear Generating Station.
Challenges
Wildcat development nearby may pose challenges to locating the corridor.
Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Arizona Game and Fish Department (AZGFD): Has interest in preserving wildlife corridors in western Maricopa County.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
Modal Considerations
This segment could feasibly accommodate all modes.

Segment 20—SR-85 from Hassayampa Freeway to I-10
Opportunities
Uses an existing highway corridor thereby reducing impacts.
Provides an important connection for rail and utilities from Gila Bend and I-8 north.
Connects the renewable energy development occurring in Gila Bend to regional markets.
Integrates freight, employment, and industrial development plans in Buckeye into regional transportation planning.
Challenges
Will need to be designed to protect the ecological values of the Gila River which is undergoing restoration efforts by Maricopa County, Buckeye, Goodyear, and a number of other organizations.
Is adjacent to Sonoran desert tortoise habitat Category 2.
Crosses the Gila River.

Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
Audubon Society: Has interest in the Gila River corridor and should be involved in the planning and design of this segment.
Defenders of Wildlife: Should be engaged to discuss ways the corridor can avoid impacts on desert tortoise.
Arizona Game and Fish Department: Has interest in protecting the ecological values of the Gila River and related wildlife benefits.
Modal Considerations
This segment could feasibly accommodate all modes.

Segment 86—Hassayampa Freeway from SR-85 to SR-801 (SR-30)
Opportunities
Provides connectivity to the community of Arlington.
Challenges
Crosses the Gila River in an ecologically sensitive area around the Arlington State Wildlife Area, the historic Old US-80 bridge and the Gillespie Dam.
Fragments critical wildlife connectivity from the Gila Bend Mountains to the Gila River and Buckeye Hills.
Adjacent to Sonoran desert tortoise habitat Category 2.
Within the viewshed of Woolsey Peak Wilderness and Signal Mountain Wilderness which are VRM 1 areas.
Located adjacent to lands in the Sonoran Desert Heritage conservation proposal (HR1799) and should be articulated to remove conflict with these protection areas.
Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
Audubon Society: Has interest in the Gila River corridor and should be involved in the planning and design of this segment.
Arizona Game and Fish Department: Has interest in protecting the ecological values of the Gila River and related wildlife benefits.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Great Bend of the Gila National Monument Coalition: Should be engaged to determine how this segment would conflict with this effort at a National Monument including lands in and around the Gila River.
Modal Considerations
All modes seem ill suited within this segment due to the cultural resources, historic heritage, and natural constraints.

Segment 87—SR-303 from SR-801 (SR-30) to Hassayampa Freeway
Opportunities
Serves a growth area through Buckeye and unincorporated Maricopa County.
REDA lands exist along this segment.
Provides a new connection from Mobile, SR-238 and I-8. Which also will serve the Cities of Goodyear and Avondale and their southernmost growth areas.
Existing electrical transmission is in this area.

Challenges
Will need to be designed to protect the ecological values of the Gila River which is undergoing restoration efforts by Maricopa County, Buckeye, Goodyear, and a number of other organizations.
May be challenged to go through the Rainbow Valley community which has scattered development.
Crosses the Gila River.
Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
City of Goodyear: The eastern edge of this corridor extends into Goodyear.
Audubon Society: Has interest in the Gila River corridor and should be involved in the planning and design of this segment.
Arizona Game and Fish Department: Has interest in protecting the ecological values of the Gila River and related wildlife benefits.
Community of Rainbow Valley: This unincorporated area of Maricopa County has a rural identity that should be considered in the planning process.
Modal Considerations
This segment could feasibly accommodate all modes.

Segments in Southern Maricopa County/Western Pinal County

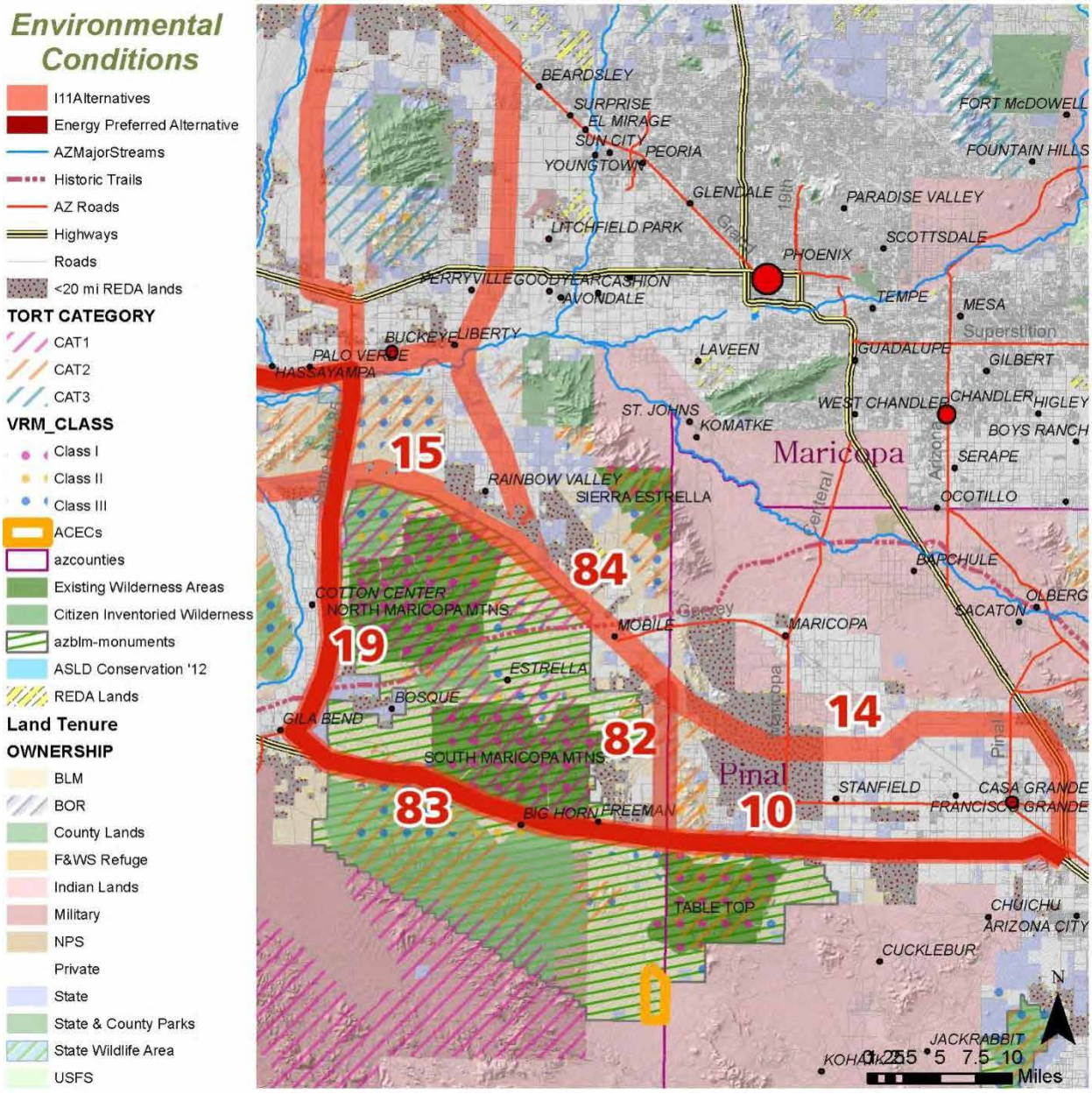


Figure 7: This portion of the corridor study centers around connecting Pinal and Maricopa Counties while avoiding impacts to the Sonoran Desert National Monument.

Segment 15—Hassayampa Freeway from SR-85 to SR-303
Opportunities
Has electrical transmission and natural gas infrastructure near the corridor.
REDA lands and the approved Sonoran Solar project exist adjacent to this segment.
Connects Rainbow Valley and surrounding areas to the regional transportation network.
Does not cross the Gila River which reduces impacts and cost.
Much of the land is under BLM ownership thereby reducing the costs of acquisition.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Interrupts wildlife connectivity from the SDNM north to the Gila River.
Adjacent to Sonoran desert tortoise habitat Category 1 and 2.

Within the viewshed of the North Maricopa Mountains and the Sierra Estrella Wilderness areas.
Adjacent to lands that are VRM zones 1, 2 and 3 which could impact the experience of users of the land.
Some of the lands are under private and state ownership which may increase the cost of development.
Citizen Inventoried Wilderness areas are near this proposal.
Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Maricopa County.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Arizona Wilderness Coalition: Has interest in protecting the quality of Arizona's wilderness areas including those near this segment.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Segment 19—SR-85 from the Hassayampa Freeway to Interstate 8
Opportunities
Uses an existing transportation corridor thereby reducing impacts and costs.
Has electrical transmission infrastructure near the corridor.
Connects Gila Bend to the regional transportation network and provides new economic opportunities to the community.
Provides an additional corridor to transmit renewable energy from Gila Bend: the leader in solar energy development.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Interrupts wildlife connectivity from the SDNM west to the Gila River and Gila Bend Mountains.
Adjacent to Sonoran desert tortoise habitat Category 1.
Within the viewshed of the North Maricopa Mountains Wilderness area.
Adjacent to lands that are VRM zones 1, 2 and 3 which could impact the experience of users of the land.
Much of these lands are under private and state ownership which may increase the cost of development.
Citizen Inventoried Wilderness areas are near this proposal.
Stakeholders
Maricopa County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
Town of Gila Bend: Should be engaged to coordinate the corridor with city planning efforts and policies.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Maricopa County.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Arizona Wilderness Coalition: Has interest in protecting the quality of Arizona's wilderness areas including those near this segment.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Segment 83—I-8 from SR-85 to Hassayampa Freeway/Vekol Freeway
Opportunities
Has rail infrastructure near the corridor.
REDA lands exist adjacent to this segment.
Uses an existing transportation corridor, thereby reducing costs and impacts.
Much of the land is under BLM ownership thereby reducing the costs of acquisition.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Interrupts wildlife connectivity across the SDNM.
Adjacent to Sonoran desert tortoise habitat Category 1 and 2.
Within the viewshed of the South Maricopa Mountains Wilderness area.
Adjacent to lands that are VRM zones 1, 2 and 3 which could impact the experience of users of the land.
Citizen Inventoried Wilderness areas are near this proposal.
Stakeholders
Maricopa and Pinal Counties: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Town of Gila Bend: Should be engaged to coordinate the corridor with city planning efforts and policies.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
City of Maricopa: Their planning area extends to the east side of the SDNM. They should be engaged to discover how the corridor would impact them.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Maricopa County.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Arizona Wilderness Coalition: Has interest in protecting the quality of Arizona's wilderness areas including those near this segment.
Modal Considerations
Highway and Rail modes seem to be feasibly developed in this segment with appropriate design and mitigation considerations.
Electrical transmission may prove challenging due to the high amount of visual sensitivity in wilderness nearby and to protect the character of the SDNM.

Segment 84—Hassayampa/Vekol Freeway from SR-303 to Segment 82
Opportunities
Has electrical transmission and natural gas infrastructure near the corridor.
REDA lands exist adjacent to this segment.
Connects Rainbow Valley and Mobile to the regional transportation network.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Interrupts wildlife connectivity across the Rainbow Valley linkage which is a high priority wildlife corridor.
Adjacent to Sonoran desert tortoise habitat Category 1 and 2.
Within the viewshed of the Sierra Estrella Wilderness area.
Much of the lands are under private and state ownership which may increase the cost of development.
Stakeholders
Maricopa and Pinal Counties: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
Developers and Landowners: Have existing entitlements on land near this corridor that would be significantly impacted by its development.
City of Buckeye: Roadway should integrate with city planning efforts and policies.
City of Maricopa: Roadway should integrate with city planning efforts and policies.

Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Maricopa County and has special interest in the Rainbow Valley linkage.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Arizona Wilderness Coalition: Has interest in protecting the quality of Arizona's wilderness areas including those near this segment.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Segment 82—From Hassayampa/Vekol Fwy to I-8
Opportunities
REDA lands exist adjacent to this segment.
Connects two major transportation corridors.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Conflicts with Sonoran desert tortoise habitat Category 2.
Stakeholders
Maricopa and Pinal Counties: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
City of Maricopa: Roadway should integrate with city planning efforts and policies.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Maricopa and Pinal Counties.
Sonoran Desert Heritage Coalition: Should be engaged to determine areas of conflict and/or concern.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Segment 10—I-8 from Segment 82 to I-10
Opportunities
Has rail infrastructure near the corridor.
REDA lands exist adjacent to this segment.
Uses an existing transportation corridor.
Challenges
Runs parallel to the Sonoran Desert National Monument (SDNM).
Conflicts with Sonoran desert tortoise habitat Category 2.
Within the viewshed of the Table Top Wilderness area.
Within or adjacent to VRM zones 1, 2 and 3 in the SDNM.
Much of the lands are under private and state ownership which may increase the cost of development.
Stakeholders
Pinal County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
City of Maricopa: Roadway should integrate with city planning efforts and policies.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Pinal County.

Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Arizona Wilderness Coalition: Has interest in protecting the quality of Arizona's wilderness areas including those near this segment.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Segment 14—Vekol/Hidden Valley Fwy from Segment 82 to I-10
Opportunities
Urban corridor with few environmental conflicts.
REDA lands exist adjacent to this segment.
Challenges
Adjacent to Sonoran desert tortoise habitat Category 2.
Much of the lands are under private and state ownership which may increase the cost of development.
Stakeholders
Pinal County: Should be engaged to allow the I-11 to respond to regional plans and considerations.
Sierra Club: Has shared specific concerns about the highway corridor and should be engaged to discover how the design and location can be better implemented to respect environmental issues.
City of Maricopa: Roadway should integrate with city planning efforts and policies.
Friends of Sonoran Desert National Monument: Are stewards of the monument and should be engaged with any proposal that would impact it.
Arizona Game and Fish Department: Has interest in protecting wildlife corridors in this area of Pinal County.
Gila River and Tohono O'odham Indian Communities: Some portions of this area have significant Native American ruins and heritage sites.
Modal Considerations
All modes can be feasibly accommodated in this segment.

Summary

Qualitative Segment Analysis Results

Though this analysis is purely qualitative, it is necessary to develop an approach to allow each segment to be compared with another. Some have greater impacts on private lands and development plans while others interrupt wildlife migration patterns. Indeed, all of the conflicts are important to be considered though the importance of each will vary depending on an individual's values. The following considerations should be noted while reviewing the results:

1. As this is a qualitative analysis the scores are given as a "gut instinct" result and are not intended to be a definitive judgment.
2. In most cases the scores are comparisons with other alternatives with similar impacts. For example, a segment that gets a very poor rating of 9 for riparian impacts simply means it is the worst among similarly situated alternatives. A 1 would indicate it is the best or among the best.
3. In many cases not enough information is available to judge an alternative, especially around complex and unknown development plans and cultural resources. In these cases a 0 was awarded.
4. As with any high level planning exercise, the true impacts will be determined based upon site-specific solutions to these conflicts. Appropriate wildlife crossing infrastructure, for example, could mitigate and reduce a poor score for wildlife corridor impacts.
5. The priority is to avoid impacts; mitigating only as a last resort.

	I-11 Corridor Segment											
Category	**46**	**43**	**35**	**91**	**95**	**36**	**29**	**18**	**17**	**22**	**21**	**16**
Private Property/Development Planning Alignment	1	3	2	1	1	1	8	1	1	9	1	3
Desert Tortoise Habitat	1	3	6	8	3	8	5	1	6	1	1	1
Citizen Inventoried Wilderness	1	1	1	5	1	5	1	1	3	1	1	1
Wilderness Areas	1	1	2	2	1	3	1	1	1	1	1	1
Wildlife Corridors	2	1	4	9	3	5	7	2	6	3	1	1
Riparian Areas	1	1	1	1	3	5	8	1	1	1	1	1
Use of Existing Corridor	1	1	1	9	1	1	1	5	5	7	5	5
Enhances Transportation Connectivity	1	1	1	1	1	1	5	1	1	8	9	2
Enhances Renewable Energy Development	1	2	5	1	1	1	4	1	1	7	6	1
Historic/ Cultural Resources	1	1	1	0	0	0	3	0	2	1	1	0
Visual Resources	3	1	4	8	2	6	5	2	4	1	1	1
Enhancing State Land Value	0	2	1	1	2	1	4	1	1	1	1	1
Appropriate Modes (Rail:R, Highway: H, Utilities: U)	UHR	UHR	UHR		UH	UH	UHR	UHR	UHR	H	UHR	UHR
Total: Higher value denotes higher conflict/harm	**14**	**18**	**29**	**46**	**19**	**37**	**52**	**17**	**32**	**41**	**29**	**18**

	I-11 Corridor Segment										
Category	**86**	**85**	**20**	**15**	**87**	**84**	**14**	**10**	**82**	**83**	**19**
Private Property/Development Planning Alignment	1	1	1	1	3	2	0	1	0	1	1
Desert Tortoise Habitat	2	1	3	2	1	3	1	2	4	5	1
Citizen Inventoried Wilderness	1	1	1	3	1	1	1	1	1	3	2
Wilderness Areas	1	1	1	3	1	1	1	2	1	3	2
Wildlife Corridors	9	1	3	3	1	9	1	3	2	5	1
Riparian Areas	9	3	4	1	3	1	1	1	1	1	1
Use of Existing Corridor	9	1	1	5	5	5	5	1	5	1	1
Enhances Transportation Connectivity	1	1	1	2	1	1	1	1	2	3	1
Enhances Renewable Energy Development	5	5	1	1	1	1	4	1	1	3	1
Historic/ Cultural Resources	9	4	3	3	1	4	0	0	0	0	1
Visual Resources	5	3	2	5	1	4	1	3	3	4	3
Enhancing State Land Value	1	1	1	1	1	1	1	1	1	1	1
Appropriate Modes (Rail:R, Highway: H, Utilities: U)		UHR	UHR	UHR	UHR	UHR	UHR	UHR	UHR	HR	UHR
Total: Higher value denotes higher conflict/harm	**53**	**23**	**22**	**30**	**20**	**33**	**17**	**17**	**21**	**30**	**16**

Key:	
Beneficial/Low Conflict	1-3
Moderate Conflict	4-6
Harmful/High Conflict	7-9
Unknown/Mixed Bag	0
N/A	

Figure 8: This chart summarizes in a numeric way the qualitative analysis that was performed on the alternative segments. Low numbers indicate lower conflict or higher benefit.

Conclusion

In conclusion, it appears that the I-11 corridor could serve a valuable purpose to communities all throughout Arizona. Clearly, if economic projections are realized resulting from enhanced international trade, more serviceable regional transportation, and renewable energy development, the region could benefit greatly. These benefits however, should not be viewed separate from the potential impacts on Arizona's wildlife, culture, and heritage. Some corridor segments appear to pose significant risks to irreplaceable treasures like wildlife, scenic areas, and riparian zones. Significant impacts to these resources would result in a loss of identity, opportunity, and economic value. Priority should be placed on protecting our resources and values before looking to enhance and capitalize on new opportunities.

The Interstate 11, in its broadest sense: with the successful integration of multiple modes including utilities, rail, and highway infrastructure, presents an incredible opening not only to capture new economic opportunities but also to define a new approach to infrastructure development that searches for win-win answers, seeks to provide transparent choices, and avoids impacts while mitigating the unpreventable. Through our research and analysis it appears that the I-11, though impactful in many instances, provides opportunity and could be articulated in ways that would allow such conflicts to be appropriately resolved.

The Sun Corridor and Interstate 11

The Sonoran Institute retains a pragmatic yet powerful vision of the future of the Sun Corridor which includes promoting a vibrant and diverse economy while enabling an environmentally-conscious, sustainable, and resilient community. The I-11 in its multi-modal sense fits within this vision if it meets the following conditions:

1. It is planned and implemented with a transparent public process that respects all people and communities;
2. It avoids impacts with natural and cultural resources to the extent practicable;
3. It mitigates harms that occur to natural and cultural resources;
4. It contributes to enhanced renewable energy development and utilization;
5. It enables choice in transportation options by establishing a framework for multiple modes to utilize the corridor;
6. It is malleable to a range of possible though uncertain future outcomes; and
7. It connects underserved and underrepresented people and communities to new opportunities and transportation options.

This region of western Arizona has experienced decades of explosive growth resulting in profound associated cumulative environmental impacts. The addition of a new interstate, if not prudently planned for, could further contribute to the degradation of the fragile Sonoran Desert landscape and ecosystem. Planning for I-11 provides an opportunity to effectively promote numerous economic development objectives in a collaborative, integrated, and environmentally sound fashion. By working together, Arizonans can leverage this important opportunity to bring a more sustainable future AND a more vibrant and resilient economy—a future we can all agree upon.

Appendix E
Nevada Department of Wildlife Comment Letter on the Level 2 Analysis

BRIAN SANDOVAL
Governor

STATE OF NEVADA
DEPARTMENT OF WILDLIFE
1100 Valley Road
Reno, Nevada 89512
(775) 688-1500 • Fax (775) 688-1595

TONY WASLEY
Director

RICHARD L. HASKINS, II
Deputy Director

PATRICK O. CATES
Deputy Director

December 10, 2013

Dan Andersen
Planner
CH2M Hill
2485 Village View Drive, Suite 350
Henderson, Nevada 89074

Re: I-11 Corridor Study – Alternative BB-QQ

Dear Mr. Andersen:

I am responding to your request for information from the Nevada Department of Wildlife (NDOW) on the known or potential occurrence of wildlife resources in the vicinity of the I-11 Corridor Study – Alternative BB-QQ located in Clark County, Nevada. In order to fulfill your request an analysis was performed using the best available data from the NDOW's wildlife occurrences, raptor nest sites and ranges, greater sage-grouse leks and habitat, and big game distributions databases. No warranty is made by the NDOW as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data. These data should be considered **sensitive** and may contain information regarding the location of sensitive wildlife species or resources. All appropriate measures should be taken to ensure that the use of this data is strictly limited to serve the needs of the project described on your GIS Data Request Form. Abuse of this information has the potential to adversely affect the existing ecological status of Nevada's wildlife resources and could be cause for the denial of future data requests.

To adequately provide wildlife resource information in the vicinity of the proposed project the NDOW delineated an area of interest that included a four-mile buffer around the project area provided by you (email, December 02, 2013). Wildlife resource data was queried from the NDOW databases based on this area of interest. The results of this analysis are summarized below.

Big Game – Occupied bighorn sheep distribution exists within portions of the project area and four-mile buffer area. No known occupied elk, mule deer, or pronghorn antelope distributions exist in the vicinity of the project area. Please refer to the attached maps for details regarding big game distributions relative to the proposed project area.

Greater Sage-Grouse – There is no known greater sage-grouse habitat in the vicinity of the project area.

Raptors – Various species of raptors, which use diverse habitat types, may reside in the vicinity of the project area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, flammulated owl, golden eagle, great horned owl, long-eared owl, merlin, northern goshawk, northern harrier, northern pygmy owl, northern saw-whet owl, osprey, peregrine falcon, red-tailed hawk, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk, turkey vulture, and western screech owl have distribution ranges that include the project area and four-mile buffer area. Furthermore, the following raptor species have been directly observed in the vicinity of the project area:

American kestrel
bald eagle
black-shoulder kite
burrowing owl
Cooper's hawk
flammulated owl
golden eagle
great horned owl
northern saw-whet owl
osprey
peregrine falcon
prairie falcon
red-shouldered hawk
red-tailed hawk
Swainson's hawk
turkey vulture

Raptor species are protected by State and Federal laws. In addition, bald eagle, burrowing owl, California spotted owl, ferruginous hawk, flammulated owl, golden eagle, northern goshawk, peregrine falcon, prairie falcon, and short-eared owl are NDOW species of special concern and are target species for conservation as outlined by the Nevada Wildlife Action Plan. Per the *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance* (United States Fish and Wildlife Service 2010) we have queried our raptor nest database to include raptor nest sites within ten miles of the proposed project area. There are 64 known raptor nest sites within ten miles of the project area. Please refer to Appendix 1 for details.

Other Wildlife Resources

A number of other species have also been observed in the vicinity of the project area. Please refer to Appendix 2 for details.

The above information is based on data stored at our Reno Headquarters Office, and does not necessarily incorporate the most up to date wildlife resource information collected in the field. Please contact the Habitat Division Supervising Biologist at our Southern Region Las Vegas Office (702.486.5127) to discuss the current environmental conditions for your project area and the interpretation of our analysis. Furthermore, it should be noted that the information detailed above is preliminary in nature and not necessarily an identification of every wildlife resource concern associated with the proposed project. Consultation with the Supervising Habitat biologist will facilitate the development of appropriate survey protocols and avoidance or mitigation measures that may be required to address potential impacts to wildlife resources.

Brad Hardenbrook - Southern Region Supervising Habitat Biologist (ext. 3600)

Federally listed Threatened and Endangered species are also under the jurisdiction of the United States Fish and Wildlife Service. Please contact them for more information regarding these species. The Nevada Department of Wildlife does not maintain information on the known or potential existence of wildlife resources in the State of Arizona. Please contact the Arizona Game and Fish Department for more information.

If you have any questions regarding the results or methodology of this analysis please do not hesitate to contact our GIS office at (775) 688-1565.

Sincerely,

Timothy M. Herrick

Timothy M. Herrick
Biologist

Appendix 1: Raptor Nest Sites

Probable Use	Last Check	Last Active	Township/Range/Section
Buteo	5/13/1982	5/13/1982	21 0240S 0650E 003
Buteo	5/7/2004		21 0200S 0590E 010
Buteo	4/29/2011		21 0240S 0620E 010
Buteo	4/30/2012		21 0180S 0640E 004
Buteo	4/30/2012		21 0180S 0640E 007
Buteo	4/30/2012		21 0180S 0640E 030
Buteo	4/30/2012		21 0180S 0640E 033
Buteo	4/30/2012		21 0210S 0630E 020
Buteo	4/30/2012		21 0230S 0630E 001
Eagle	3/1/1993	3/1/1993	21 0200S 0590E 010
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	5/25/2012		21 0240S 0650E 001
Eagle/Buteo	4/30/2012		21 0200S 0630E 032
Eagle/Buteo	4/30/2012		21 0230S 0630E 029
Eagle/Buteo	7/15/2012	6/1/2007	21 0200S 0590E 010
Falcon	5/22/1974		21 0180S 0640E 020
Falcon	2/19/1975	2/19/1975	21 0240S 0650E 011
Falcon	5/9/1981	5/9/1981	21 0180S 0620E 016
Falcon	5/9/1981	5/9/1981	21 0200S 0620E 013
Falcon	5/9/1981	5/9/1981	21 0200S 0630E 016
Falcon	5/9/1981	5/9/1981	21 0200S 0630E 032
Falcon	5/9/1981	5/9/1981	21 0210S 0630E 016
Falcon	6/13/1981	6/13/1981	21 0210S 0610E 009
Falcon	5/11/1982	5/11/1982	21 0200S 0590E 009
Falcon	5/13/1982	5/13/1982	21 0240S 0650E 021
Falcon	4/1/1996		21 0200S 0610E 030
Falcon	1/1/1997		21 0200S 0620E 013
Falcon	1/1/2001	1/1/2001	21 0200S 0600E 006
Falcon	1/1/2001	1/1/2001	21 0200S 0620E 016
Falcon	1/1/2001		21 0200S 0630E 032
Falcon	1/1/2003		
Falcon	5/1/2009		21 0230S 0650E 007
Falcon	3/13/2010	3/13/2010	21 0230S 0620E 027
Falcon	4/9/2010	4/9/2010	21 0170S 0600E 027
Falcon	5/1/2010	5/1/2010	21 0240S 0650E 021
Falcon	5/25/2010	6/21/2007	21 0210S 0610E 010
Falcon	6/9/2010	6/9/2010	21 0200S 0590E 010
Falcon	2/10/2012	5/22/2009	21 0200S 0630E 009
Falcon	3/3/2012		21 0200S 0590E 019
Falcon	5/27/2012	5/1/2010	21 0220S 0640E 016
Falcon	6/6/2012	6/29/2010	21 0230S 0620E 027
Falcon	6/18/2012	5/1/2010	21 0230S 0650E 007
Falcon	6/26/2012	6/1/2007	
Falcon	6/26/2012	5/1/2010	21 0230S 0650E 021
Falcon	6/26/2012	5/1/2010	
Falcon	6/26/2012	5/1/2010	

Falcon	6/26/2012	5/1/2010	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 016
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 032
Falcon	7/1/2012	5/1/2010	21 0250S 0650E 011
Falcon	7/1/2012	6/11/2010	21 0200S 0630E 032
Falcon	7/1/2012		
Unknown	5/7/2004		21 0190S 0590E 020
Unknown	5/7/2004		21 0190S 0590E 027
Unknown	5/7/2004		21 0200S 0590E 007
Unknown	5/7/2004		21 0200S 0590E 010
Unknown	5/7/2004		21 0200S 0590E 016
Unknown	5/3/2006		21 0170S 0630E 027
Unknown	5/3/2006		21 0170S 0630E 034
Unknown	5/8/2006		21 0190S 0590E 033
Unknown	4/30/2012		21 0170S 0630E 027

Appendix 2: Other Wildlife Resources

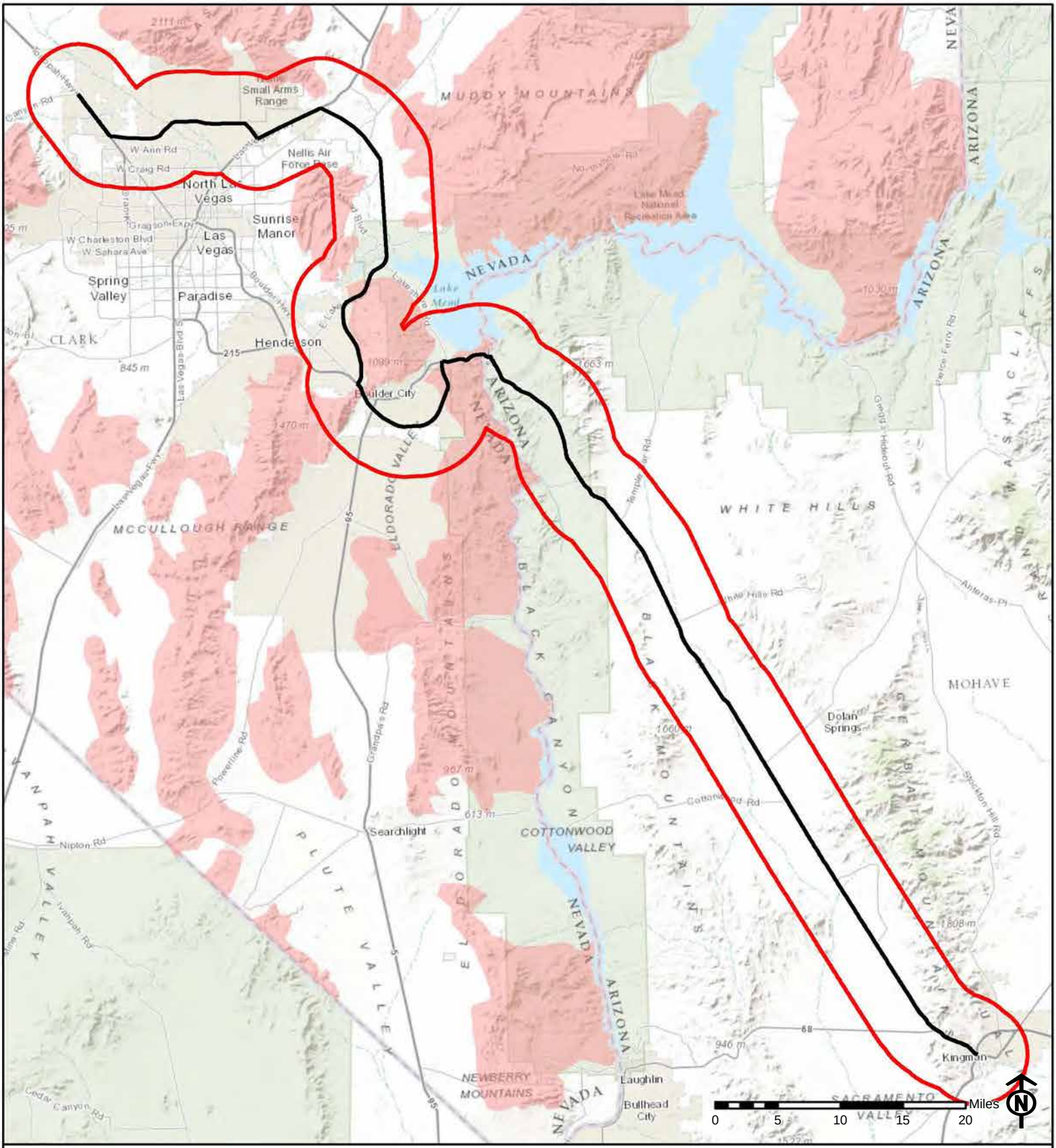
Common Name	ESA	State	SWAP_SoCP
Abert's towhee			
American avocet			Yes
American coot			
American gizzard shad			
Anna's hummingbird			
banded Gila monster		Protected	Yes
barn swallow			
black-legged kittiwake			
black-necked stilt			
black-tailed gnatcatcher			
black-throated sparrow			
black bullhead			
black crappie			
blue tilapia			
bluegill			
Brazilian (Mexican) free-tailed bat		Protected	Yes
brown pelican			
brush deermouse			
bullfrog			
bushy-tailed woodrat			
cactus deermouse			
California myotis			
canyon bat			
canyon deermouse			
canyon towhee			
cattle egret			
channel catfish			
cliff swallow			
coachwhip			
coho salmon			
common carp			
common chuckwalla			Yes
common kingsnake			
common loon			Yes
common merganser			
common moorhen			
common raven			
common side-blotched lizard			
common yellowthroat			
cordilleran flycatcher			
Costa's hummingbird			
coyote			
crappie (unknown)			
crissal thrasher			
cutbow trout			
deermouse (unknown)			
desert banded gecko			Yes
desert glossy snake			

desert horned lizard			Yes
desert night lizard			Yes
desert pocket mouse			Yes
desert tortoise	Threatened	Threatened	Yes
desert woodrat			
Devil's Hole pupfish	Endangered	Endangered	Yes
fathead minnow			
flannelmouth sucker			Yes
frog (unknown)			
Gambel's quail			
glossy snake			
golden shiner			
gophersnake			
gray fox			
Great Basin collared lizard			Yes
Great Basin fence lizard			
Great Basin gophersnake			
Great Basin rattlesnake			
Great Basin whiptail			
great blue heron			
greater roadrunner			
greater sandhill crane			Yes
greater short-horned lizard			Yes
green heron			
green sunfish			
hermit thrush			
hoary bat			Yes
house mouse			
house sparrow			
killdeer			
kit fox			
largemouth bass			
loggerhead shrike		Sensitive	Yes
long-nosed leopard lizard			Yes
long-nosed snake			
long-tailed pocket mouse			
MacGillivray's warbler			
magnificent frigatebird			
mallard			
Mandarin duck			
marsh wren			
Mediterranean gecko			
Merriam's kangaroo rat			
Mojave Desert sidewinder			Yes
Mojave patch-nosed snake			
Mojave rattlesnake			
Mojave shovel-nosed snake			Yes
mountain bluebird			
mourning dove			
myotis (unknown)			

Nevada shovel-nosed snake			Yes
Nevada side-blotched lizard			
North American deermouse			
North American racer			
northern desert horned lizard			Yes
northern desert iguana			Yes
northern desert nightsnake			
northern flicker			
northern mockingbird			
northern pintail			Yes
northern zebra-tailed lizard			
orange-crowned warbler			
Pacific Loon			
pallid bat		Protected	
Panamint rattlesnake			
phainopepla			
pocket mouse (unknown)			
quagga mussel			
rainbow trout			
razorback sucker	Endangered	Endangered	Yes
red-necked grebe			
red-spotted toad			
red-winged blackbird			
red shiner			
red swamp crayfish			
relict leopard frog	Candidate	Protected	Yes
ring-necked duck			
ruby-crowned kinglet			
ruddy duck			
sage sparrow			Yes
Sierra gartersnake			
smallmouth bass			
snow bunting			
song sparrow			
sora			
southern desert horned lizard			Yes
southwestern speckled rattlesnake			
southwestern willow flycatcher	Endangered	Endangered	Yes
speckled rattlesnake			
spiny softshell			
spotted leaf-nosed snake			Yes
striped bass			
suckermouth catfish			
tadpole (unknown)			
threadfin shad			
tiger whiptail			
Townsend's big-eared bat		Sensitive	Yes
variable groundsnake			
verdin			
western banded gecko			Yes

western diamond-backed rattlesnake			
western fence lizard			
western grebe			
western harvest mouse			
western long-tailed brush lizard			Yes
western meadowlark			
western mosquitofish			
western shovel-nosed snake			Yes
western small-footed myotis			Yes
western snowy plover			Yes
western threadsnake			Yes
western yellow-billed cuckoo	Candidate	Sensitive	Yes
western yellow bat			
white-crowned sparrow			
white-faced ibis			Yes
white-tailed antelope squirrel			
white-throated sparrow			
wood duck			
Woodhouse's toad			
yellow-backed spiny lizard			
yellow-breasted chat			
yellow-headed blackbird			
yellow bullhead			
Yuma clapper rail	Endangered	Endangered	Yes
Yuma myotis			
zebra-tailed lizard			

ESA: Endangered Species Act Status
State: State of Nevada Special Status
SWAP_SoCP: Nevada State Wildlife Action Plan (2012) Species of Conservation Priority



Project Area

Four Mile Buffer Area Boundary

Bighorn Sheep Distribution

I-11 Corridor Study BB QQ
Bighorn Sheep Distribution

December 09, 2013

Projection: UTM Zone 11 North, NAD83

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STATE OF NEVADA

DEPARTMENT OF WILDLIFE

1100 Valley Road
Reno, Nevada 89512
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BRIAN SANDOVAL
Governor

TONY WASLEY
Director

RICHARD L. HASKINS, II
Deputy Director

PATRICK O. CATES
Deputy Director

December 10, 2013

Dan Andersen
Planner
CH2M Hill
2485 Village View Drive, Suite 350
Henderson, Nevada 89074

Re: I-11 Corridor Study – Alternative Y

Dear Mr. Andersen:

I am responding to your request for information from the Nevada Department of Wildlife (NDOW) on the known or potential occurrence of wildlife resources in the vicinity of the I-11 Corridor Study – Alternative Y located in Clark County, Nevada. In order to fulfill your request an analysis was performed using the best available data from the NDOW's wildlife occurrences, raptor nest sites and ranges, greater sage-grouse leks and habitat, and big game distributions databases. No warranty is made by the NDOW as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data. These data should be considered **sensitive** and may contain information regarding the location of sensitive wildlife species or resources. All appropriate measures should be taken to ensure that the use of this data is strictly limited to serve the needs of the project described on your GIS Data Request Form. Abuse of this information has the potential to adversely affect the existing ecological status of Nevada's wildlife resources and could be cause for the denial of future data requests.

To adequately provide wildlife resource information in the vicinity of the proposed project the NDOW delineated an area of interest that included a four-mile buffer around the project area provided by you (email, December 02, 2013). Wildlife resource data was queried from the NDOW databases based on this area of interest. The results of this analysis are summarized below.

Big Game – Occupied bighorn sheep distribution exists within portions of the project area and four-mile buffer area. No known occupied elk, mule deer, or pronghorn antelope distributions exist in the vicinity of the project area. Please refer to the attached maps for details regarding big game distributions relative to the proposed project area.

Greater Sage-Grouse – There is no known greater sage-grouse habitat in the vicinity of the project area.

Raptors – Various species of raptors, which use diverse habitat types, may reside in the vicinity of the project area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, flammulated owl, golden eagle, great horned owl, long-eared owl, merlin, northern goshawk, northern harrier, northern pygmy owl, northern saw-whet owl, osprey, peregrine falcon, red-tailed hawk, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk, turkey vulture, and western screech owl have distribution ranges that include the project area and four-mile buffer area. Furthermore, the following raptor species have been directly observed in the vicinity of the project area:

American kestrel	golden eagle	osprey
bald eagle	great horned owl	peregrine falcon
barn owl	Harris's hawk	prairie falcon
black-shoulder kite	long-eared owl	red-shouldered hawk
burrowing owl	northern harrier	red-tailed hawk

California condor	northern saw-whet owl	Swainson's hawk
Cooper's hawk		

Raptor species are protected by State and Federal laws. In addition, bald eagle, burrowing owl, California spotted owl, ferruginous hawk, flammulated owl, golden eagle, northern goshawk, peregrine falcon, prairie falcon, and short-eared owl are NDOW species of special concern and are target species for conservation as outlined by the Nevada Wildlife Action Plan. Per the *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance* (United States Fish and Wildlife Service 2010) we have queried our raptor nest database to include raptor nest sites within ten miles of the proposed project area. There are 102 known raptor nest sites within ten miles of the project area. Please refer to Appendix 1 for details.

Other Wildlife Resources

The following species have also been observed in the vicinity of the project area. Please refer to Appendix 2 for details.

The above information is based on data stored at our Reno Headquarters Office, and does not necessarily incorporate the most up to date wildlife resource information collected in the field. Please contact the Habitat Division Supervising Biologist at our Southern Region Las Vegas Office (702.486.5127) to discuss the current environmental conditions for your project area and the interpretation of our analysis. Furthermore, it should be noted that the information detailed above is preliminary in nature and not necessarily an identification of every wildlife resource concern associated with the proposed project. Consultation with the Supervising Habitat biologist will facilitate the development of appropriate survey protocols and avoidance or mitigation measures that may be required to address potential impacts to wildlife resources.

Brad Hardenbrook - Southern Region Supervising Habitat Biologist (ext. 3600)

Federally listed Threatened and Endangered species are also under the jurisdiction of the United States Fish and Wildlife Service. Please contact them for more information regarding these species. The Nevada Department of Wildlife does not maintain information on the known or potential existence of wildlife resources in the State of Arizona. Please contact the Arizona Game and Fish Department for more information.

If you have any questions regarding the results or methodology of this analysis please do not hesitate to contact our GIS office at (775) 688-1565.

Sincerely,

Timothy M. Herrick

Timothy M. Herrick
Biologist

Appendix 1: Raptor Nest Sites

Probable Use	Last Check	Last Active	Township/Range/Section
Accipiter/Buteo	7/18/1981	7/18/1981	21 0220S 0590E 007
Accipiter/Buteo	6/26/1993	6/26/1993	21 0220S 0580E 003
Accipiter/Buteo	6/26/1993		21 0220S 0580E 003
Accipiter/Buteo	1/1/1998		21 0220S 0590E 007
Buteo	5/13/1982	5/13/1982	21 0240S 0650E 003
Buteo	1/1/1993	1/1/1993	21 0210S 0590E 036
Buteo	6/26/1993		21 0220S 0590E 012
Buteo	6/27/1993	6/27/1993	21 0220S 0590E 017
Buteo	7/3/1993	7/3/1993	21 0200S 0590E 031
Buteo	7/10/1993		21 0210S 0580E 013
Buteo	5/7/2004		21 0200S 0590E 010
Buteo	4/29/2011		21 0240S 0620E 010
Buteo	5/3/2011	5/3/2011	21 0230S 0600E 007
Buteo	4/30/2012		21 0210S 0630E 020
Buteo	4/30/2012		21 0230S 0630E 001
Buteo/Corvid	5/3/2011	5/3/2011	21 0210S 0590E 033
Buteo/Corvid	5/3/2011		21 0210S 0590E 028
Buteo/Corvid	5/3/2011		21 0220S 0590E 008
Buteo/Corvid	5/3/2011		21 0220S 0590E 017
Buteo/Corvid	5/3/2011		21 0230S 0590E 024
Buteo/Corvid	5/3/2011		21 0230S 0590E 024
Buteo/Corvid	5/3/2011		21 0230S 0590E 024
Eagle	3/1/1993	3/1/1993	21 0200S 0590E 010
Eagle	5/23/1993	5/23/1993	21 0210S 0580E 009
Eagle	5/23/1993		21 0210S 0580E 009
Eagle	5/12/2009		21 0230S 0600E 007
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	5/3/2011	5/22/1993	21 0230S 0600E 007
Eagle	5/3/2011		21 0220S 0590E 005
Eagle	5/3/2011		21 0230S 0590E 006
Eagle	5/3/2011		21 0230S 0600E 006
Eagle	5/3/2011		21 0230S 0600E 007
Eagle	5/3/2011		21 0230S 0600E 007
Eagle	5/3/2011		21 0230S 0600E 007
Eagle	5/3/2011		21 0230S 0600E 007
Eagle	5/25/2012		21 0240S 0650E 001
Eagle/Buteo	5/3/2011		21 0210S 0590E 028
Eagle/Buteo	5/3/2011		21 0230S 0600E 007
Eagle/Buteo	5/3/2011		21 0230S 0600E 007
Eagle/Buteo	4/30/2012		21 0230S 0630E 029
Eagle/Buteo	7/15/2012	6/1/2007	21 0200S 0590E 010
Falcon	2/19/1975	2/19/1975	21 0240S 0650E 011
Falcon	1/1/1977		21 0210S 0590E 012
Falcon	5/9/1981	5/9/1981	21 0200S 0630E 032
Falcon	5/9/1981	5/9/1981	21 0210S 0630E 016
Falcon	6/13/1981	6/13/1981	21 0210S 0610E 009
Falcon	5/11/1982	5/11/1982	21 0200S 0590E 009

Falcon	5/11/1982	5/11/1982	21 0230S 0590E 013
Falcon	5/13/1982	5/13/1982	21 0240S 0650E 021
Falcon	1/1/1993	1/1/1993	21 0220S 0590E 001
Falcon	5/22/1993	5/22/1993	21 0230S 0600E 006
Falcon	6/26/1993	6/26/1993	21 0220S 0580E 003
Falcon	4/1/1996		21 0200S 0610E 030
Falcon	1/1/1998		21 0210S 0580E 017
Falcon	1/1/2001	1/1/2001	21 0200S 0600E 006
Falcon	1/1/2001		21 0200S 0630E 032
Falcon	1/1/2003		
Falcon	5/1/2009		21 0230S 0650E 007
Falcon	3/13/2010	3/13/2010	21 0230S 0620E 027
Falcon	4/9/2010	4/9/2010	21 0170S 0600E 027
Falcon	5/1/2010	5/1/2010	21 0240S 0650E 021
Falcon	5/25/2010	6/21/2007	21 0210S 0610E 010
Falcon	6/9/2010	6/9/2010	21 0200S 0590E 010
Falcon	6/22/2011		21 0210S 0580E 018
Falcon	3/3/2012		21 0200S 0590E 019
Falcon	4/27/2012		21 0200S 0580E 024
Falcon	5/27/2012	5/1/2010	21 0220S 0640E 016
Falcon	6/6/2012	6/29/2010	21 0230S 0620E 027
Falcon	6/18/2012	5/1/2010	21 0230S 0650E 007
Falcon	6/26/2012	6/1/2007	
Falcon	6/26/2012	5/1/2010	21 0230S 0650E 021
Falcon	6/26/2012	5/1/2010	
Falcon	6/26/2012	5/1/2010	
Falcon	6/26/2012	5/1/2010	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	6/22/2009	21 0220S 0590E 008
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 016
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 032
Falcon	7/1/2012	5/1/2010	21 0250S 0650E 011
Falcon	7/1/2012	6/11/2010	21 0200S 0630E 032
Falcon	7/1/2012		
Falcon	7/4/2012		21 0230S 0600E 007
Falcon	7/7/2012	6/10/2009	21 0200S 0580E 036
Owl	6/26/1993	6/26/1993	21 0220S 0580E 003
Owl	5/22/1997	5/22/1997	21 0220S 0610E 021
Unknown	5/7/2004		21 0190S 0590E 020
Unknown	5/7/2004		21 0190S 0590E 027
Unknown	5/7/2004		21 0200S 0590E 007
Unknown	5/7/2004		21 0200S 0590E 010
Unknown	5/7/2004		21 0200S 0590E 016
Unknown	5/7/2004		21 0220S 0590E 001
Unknown	5/7/2004		21 0230S 0600E 007
Unknown	5/8/2006		21 0190S 0590E 033
Unknown	5/8/2006		21 0200S 0580E 029
Unknown	5/12/2009		21 0230S 0590E 013
Unknown	5/12/2009		21 0230S 0590E 024

Unknown	5/12/2009		21 0230S 0590E 024
Unknown	5/12/2009		21 0230S 0590E 024
Unknown	5/12/2009		21 0230S 0600E 006
Unknown	5/12/2009		21 0230S 0600E 007

Appendix 2: Other Wildlife Resources

Common Name	ESA	State	SWAP_SoCP
American avocet			Yes
American beaver			
American white pelican			Yes
Anna's hummingbird			
banded Gila monster		Protected	Yes
Bewick's wren			
big brown bat			
black-and-white warbler			
black-chinned hummingbird			
black-headed grosbeak			
black-necked stilt			
black-tailed gnatcatcher			
black-throated gray warbler			
black-throated sparrow			
black bullhead			
black crappie			
blue-headed vireo			
blue tilapia			
bluegill			
Brewer's blackbird			
Brewer's sparrow		Sensitive	Yes
brown creeper			
brown pelican			
brush deermouse			
bullfrog			
Bullock's oriole			
bushtit			
bushy-tailed woodrat			
cactus deermouse			
cactus wren			
California kingsnake			
California myotis			
canyon bat			
canyon deermouse			
Cassin's finch			Yes
channel catfish			
chipping sparrow			
coachwhip			
coho salmon			
common carp			
common chuckwalla			Yes
common kingsnake			
common loon			Yes
common merganser			
common moorhen			
common poorwill			
common raven			
common side-blotched lizard			

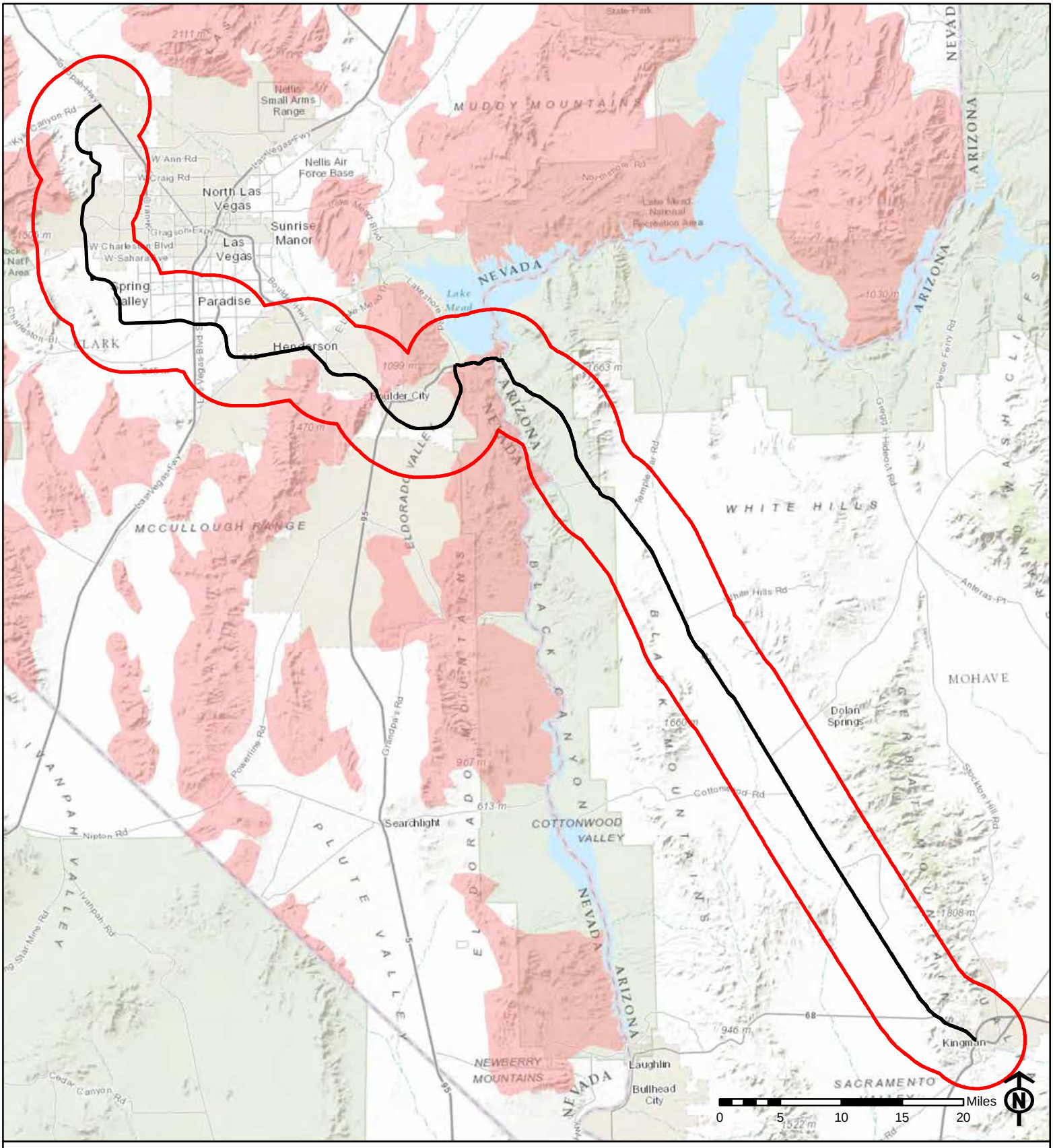
common yellowthroat			
Costa's hummingbird			
coyote			
crappie (unknown)			
crissal thrasher			
cutbow trout			
desert banded gecko			Yes
desert glossy snake			
desert horned lizard			Yes
desert night lizard			Yes
desert pocket mouse			Yes
desert tortoise	Threatened	Threatened	Yes
desert woodrat			
Devil's Hole pupfish	Endangered	Endangered	Yes
Dumeril's boa constrictor			
dusky flycatcher			
eastern collared lizard			
European starling			
flannelmouth sucker			Yes
flycatcher (unknown)			
Forster's tern			
Gambel's quail			
glossy snake			
golden-crowned kinglet			
golden shiner			
gophersnake			
Grace's warbler			
gray flycatcher			
gray fox			
gray vireo			
great-tailed grackle			
Great Basin collared lizard			Yes
Great Basin fence lizard			
Great Basin gophersnake			
Great Basin rattlesnake			
Great Basin whiptail			
great blue heron			
greater roadrunner			
greater sandhill crane			Yes
greater short-horned lizard			Yes
green-tailed towhee			
green heron			
green sunfish			
hawk (unknown)			
hermit thrush			
hermit warbler			
hoary bat			Yes
hooded warbler			
house finch			
house mouse			

house sparrow		
hummingbird (unknown)		
Inca dove		
juniper titmouse		
killdeer		
kit fox		
ladder-backed woodpecker		
largemouth bass		
Le Conte's thrasher		Yes
lesser goldfinch		
Lincoln's sparrow		
lizard (unknown)		
loggerhead shrike	Sensitive	Yes
long-billed dowitcher		Yes
long-nosed leopard lizard		Yes
long-nosed snake		
long-tailed pocket mouse		
Lucy's warbler		
MacGillivray's warbler		
magnificent frigatebird		
mallard		
marsh wren		
Mediterranean gecko		
Merriam's kangaroo rat		
Mojave Desert sidewinder		Yes
Mojave patch-nosed snake		
Mojave rattlesnake		
Mojave shovel-nosed snake		Yes
mountain chickadee		
mountain lion		
mourning dove		
Nevada shovel-nosed snake		Yes
Nevada side-blotched lizard		
North American deermouse		
North American racer		
northern desert horned lizard		Yes
northern desert iguana		Yes
northern desert nightsnake		
northern flicker		
northern mockingbird		
northern parula		
northern pintail		Yes
northern sagebrush lizard		
northern zebra-tailed lizard		
orange-crowned warbler		
Oregon junco		
oriole (unknown)		
Pacific Loon		
Panamint rattlesnake		
phainopepla		

plumbeous vireo			
pygmy nuthatch			
quagga mussel			
rainbow trout			
razorback sucker	Endangered	Endangered	Yes
red-breasted nuthatch			
red-necked grebe			
red-spotted toad			
red crossbill			
relict leopard frog	Candidate	Protected	Yes
ring-necked duck			
rock dove			
roof rat			
Ross's goose			
ruby-crowned kinglet			
ruddy duck			
sage sparrow			Yes
savannah sparrow			
Say's phoebe			
Scott's oriole			Yes
Sierra gartersnake			
slate-colored junco			
snow goose			
Sonoran lyre snake			
sora			
southwestern speckled rattlesnake			
sparrow (unknown)			
spotted bat		Threatened	Yes
spotted leaf-nosed snake			Yes
spotted towhee			
Steller's jay			
striped bass			
Tennessee warbler			
threadfin shad			
tiger whiptail			
Townsend's solitaire			
Townsend's warbler			
variable groundsnake			
verdin			
vermilion flycatcher			
Virginia's warbler			Yes
warbling vireo			
western banded gecko			Yes
western bluebird			
western diamond-backed rattlesnake			
western fence lizard			
western grebe			
western harvest mouse			
western kingbird			
western least bittern			Yes

western long-tailed brush lizard	Yes
western scrub-jay	
western shovel-nosed snake	Yes
western snowy plover	Yes
white-breasted nuthatch	
white-crowned sparrow	
white-faced ibis	Yes
white-tailed antelope squirrel	
white-throated sparrow	
white-throated woodrat	
Wilson's warbler	
wood duck	
Woodhouse's toad	
yellow-backed spiny lizard	
yellow-headed blackbird	
yellow-rumped warbler	
zebra-tailed lizard	

ESA: Endangered Species Act Status
State: State of Nevada Special Status
SWAP_SoCP: Nevada State Wildlife Action Plan (2012) Species of Conservation Priority



Project Area

Four Mile Buffer Area Boundary

Bighorn Sheep Distribution

I-11 Corridor Study Y
Bighorn Sheep Distribution

December 09, 2013

Projection: UTM Zone 11 North, NAD83

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STATE OF NEVADA

DEPARTMENT OF WILDLIFE

1100 Valley Road
Reno, Nevada 89512
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BRIAN SANDOVAL
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Deputy Director

PATRICK O. CATES
Deputy Director

December 10, 2013

Dan Andersen
Planner
CH2M Hill
2485 Village View Dr., Suite 350
Henderson, Nevada, 89074

Re: I-11 Corridor Study – Alternative Z

Dear Mr. Andersen:

I am responding to your request for information from the Nevada Department of Wildlife (NDOW) on the known or potential occurrence of wildlife resources in the vicinity of the I-11 Corridor Study – Alternative Z located in Clark County, Nevada. In order to fulfill your request an analysis was performed using the best available data from the NDOW's wildlife occurrences, raptor nest sites and ranges, greater sage-grouse leks and habitat, and big game distributions databases. No warranty is made by the NDOW as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data. These data should be considered **sensitive** and may contain information regarding the location of sensitive wildlife species or resources. All appropriate measures should be taken to ensure that the use of this data is strictly limited to serve the needs of the project described on your GIS Data Request Form. Abuse of this information has the potential to adversely affect the existing ecological status of Nevada's wildlife resources and could be cause for the denial of future data requests.

To adequately provide wildlife resource information in the vicinity of the proposed project the NDOW delineated an area of interest that included a four-mile buffer around the project area provided by you (email, December 02, 2013). Wildlife resource data was queried from the NDOW databases based on this area of interest. The results of this analysis are summarized below.

Big Game – Occupied bighorn sheep distribution exists within portions of the project area and four-mile buffer area. No known occupied elk, mule deer, or pronghorn antelope distributions exist in the vicinity of the project area. Please refer to the attached maps for details regarding big game distributions relative to the proposed project area.

Greater Sage-Grouse – There is no known greater sage-grouse habitat in the vicinity of the project area.

Raptors – Various species of raptors, which use diverse habitat types, may reside in the vicinity of the project area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, flammulated owl, golden eagle, great horned owl, long-eared owl, merlin, northern goshawk, northern harrier, northern pygmy owl, northern saw-whet owl, osprey, peregrine falcon, red-tailed hawk, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk, turkey vulture, and western screech owl have distribution ranges that include the project area and four-mile buffer area. Furthermore, the following raptor species have been directly observed in the vicinity of the project area:

American kestrel	great horned owl	red-shouldered hawk
bald eagle	merlin	red-tailed hawk
barn owl	northern harrier	sharp-shinned hawk
black-shoulder kite	northern saw-whet owl	Swainson's hawk
burrowing owl	osprey	turkey vulture

Cooper's hawk	peregrine falcon	western screech-owl
golden eagle	prairie falcon	

Raptor species are protected by State and Federal laws. In addition, bald eagle, burrowing owl, California spotted owl, ferruginous hawk, flammulated owl, golden eagle, northern goshawk, peregrine falcon, prairie falcon, and short-eared owl are NDOW species of special concern and are target species for conservation as outlined by the Nevada Wildlife Action Plan. Per the *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance* (United States Fish and Wildlife Service 2010) we have queried our raptor nest database to include raptor nest sites within ten miles of the proposed project area. There are 65 known raptor nest sites within ten miles of the project area. Please refer to Appendix 1 for details.

Other Wildlife Resources

A number of other species have also been observed in the vicinity of the project area. Please refer to Appendix 2 for details.

The above information is based on data stored at our Reno Headquarters Office, and does not necessarily incorporate the most up to date wildlife resource information collected in the field. Please contact the Habitat Division Supervising Biologist at our Southern Region Las Vegas Office (702.486.5127) to discuss the current environmental conditions for your project area and the interpretation of our analysis. Furthermore, it should be noted that the information detailed above is preliminary in nature and not necessarily an identification of every wildlife resource concern associated with the proposed project. Consultation with the Supervising Habitat biologist will facilitate the development of appropriate survey protocols and avoidance or mitigation measures that may be required to address potential impacts to wildlife resources.

Brad Hardenbrook - Southern Region Supervising Habitat Biologist (ext. 3600)

Federally listed Threatened and Endangered species are also under the jurisdiction of the United States Fish and Wildlife Service. Please contact them for more information regarding these species. The Nevada Department of Wildlife does not maintain information on the known or potential existence of wildlife resources in the State of Arizona. Please contact the Arizona Game and Fish Department for more information.

If you have any questions regarding the results or methodology of this analysis please do not hesitate to contact our GIS office at (775) 688-1565.

Sincerely,

Timothy M. Herrick

Timothy M. Herrick
Biologist

Appendix 1: Raptor Nest Sites

Probable Use	Last Check	Last Active	Township/Range/Section
Buteo	5/13/1982	5/13/1982	21 0240S 0650E 003
Buteo	1/1/1993	1/1/1993	21 0210S 0590E 036
Buteo	6/26/1993		21 0220S 0590E 012
Buteo	7/3/1993	7/3/1993	21 0200S 0590E 031
Buteo	5/7/2004		21 0200S 0590E 010
Buteo	4/29/2011		21 0240S 0620E 010
Buteo	4/30/2012		21 0210S 0630E 020
Buteo	4/30/2012		21 0230S 0630E 001
Buteo/Corvid	5/3/2011		21 0210S 0590E 028
Eagle	3/1/1993	3/1/1993	21 0200S 0590E 010
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	4/29/2011		21 0240S 0620E 010
Eagle	5/25/2012		21 0240S 0650E 001
Eagle/Buteo	5/3/2011		21 0210S 0590E 028
Eagle/Buteo	4/30/2012		21 0200S 0630E 032
Eagle/Buteo	4/30/2012		21 0230S 0630E 029
Eagle/Buteo	7/15/2012	6/1/2007	21 0200S 0590E 010
Falcon	2/19/1975	2/19/1975	21 0240S 0650E 011
Falcon	1/1/1977		21 0210S 0590E 012
Falcon	5/9/1981	5/9/1981	21 0200S 0620E 013
Falcon	5/9/1981	5/9/1981	21 0200S 0630E 016
Falcon	5/9/1981	5/9/1981	21 0200S 0630E 032
Falcon	5/9/1981	5/9/1981	21 0210S 0630E 016
Falcon	6/13/1981	6/13/1981	21 0210S 0610E 009
Falcon	5/11/1982	5/11/1982	21 0200S 0590E 009
Falcon	5/13/1982	5/13/1982	21 0240S 0650E 021
Falcon	1/1/1993	1/1/1993	21 0220S 0590E 001
Falcon	4/1/1996		21 0200S 0610E 030
Falcon	1/1/1997		21 0200S 0620E 013
Falcon	1/1/2001	1/1/2001	21 0200S 0600E 006
Falcon	1/1/2001	1/1/2001	21 0200S 0620E 016
Falcon	1/1/2001		21 0200S 0630E 032
Falcon	1/1/2003		
Falcon	5/1/2009		21 0230S 0650E 007
Falcon	3/13/2010	3/13/2010	21 0230S 0620E 027
Falcon	4/9/2010	4/9/2010	21 0170S 0600E 027
Falcon	5/1/2010	5/1/2010	21 0240S 0650E 021
Falcon	5/25/2010	6/21/2007	21 0210S 0610E 010
Falcon	6/9/2010	6/9/2010	21 0200S 0590E 010
Falcon	2/10/2012	5/22/2009	21 0200S 0630E 009
Falcon	3/3/2012		21 0200S 0590E 019
Falcon	4/27/2012		21 0200S 0580E 024
Falcon	5/27/2012	5/1/2010	21 0220S 0640E 016
Falcon	6/6/2012	6/29/2010	21 0230S 0620E 027
Falcon	6/18/2012	5/1/2010	21 0230S 0650E 007
Falcon	6/26/2012	6/1/2007	
Falcon	6/26/2012	5/1/2010	21 0230S 0650E 021
Falcon	6/26/2012	5/1/2010	

Falcon	6/26/2012	5/1/2010	
Falcon	6/26/2012	5/1/2010	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	5/1/2009	
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 016
Falcon	7/1/2012	5/1/2010	21 0220S 0650E 032
Falcon	7/1/2012	5/1/2010	21 0250S 0650E 011
Falcon	7/1/2012	6/11/2010	21 0200S 0630E 032
Falcon	7/1/2012		
Owl	5/22/1997	5/22/1997	21 0220S 0610E 021
Unknown	5/7/2004		21 0190S 0590E 020
Unknown	5/7/2004		21 0190S 0590E 027
Unknown	5/7/2004		21 0200S 0590E 007
Unknown	5/7/2004		21 0200S 0590E 010
Unknown	5/7/2004		21 0200S 0590E 016
Unknown	5/7/2004		21 0220S 0590E 001
Unknown	5/8/2006		21 0190S 0590E 033

Appendix 2: Other Wildlife Resources

Common Name	ESA	State	SWAP_SoCP
Abert's towhee			
American avocet			Yes
American beaver			
American coot			
American crow			
American white pelican			Yes
Anna's hummingbird			
ash-throated flycatcher			
banded Gila monster		Protected	Yes
bat (unknown)			
belted kingfisher			
big brown bat			
black-and-white warbler			
black-chinned hummingbird			
black-necked stilt			
black-tailed gnatcatcher			
black-throated sparrow			
black bullhead			
black crappie			
blue-headed vireo			
blue tilapia			
bluegill			
bobcat			
Brazilian (Mexican) free-tailed bat		Protected	Yes
Brewer's blackbird			
Brewer's sparrow		Sensitive	Yes
brown pelican			
brush deermouse			
bullfrog			
bullhead (unknown)			
Bullock's oriole			
bushy-tailed woodrat			
cactus deermouse			
cactus wren			
California myotis			
California toad			Yes
Canada goose			
canyon bat			
canyon deermouse			
canyon towhee			
cattle egret			
channel catfish			
coachwhip			
coho salmon			
common carp			
common chuckwalla			Yes
common kingsnake			

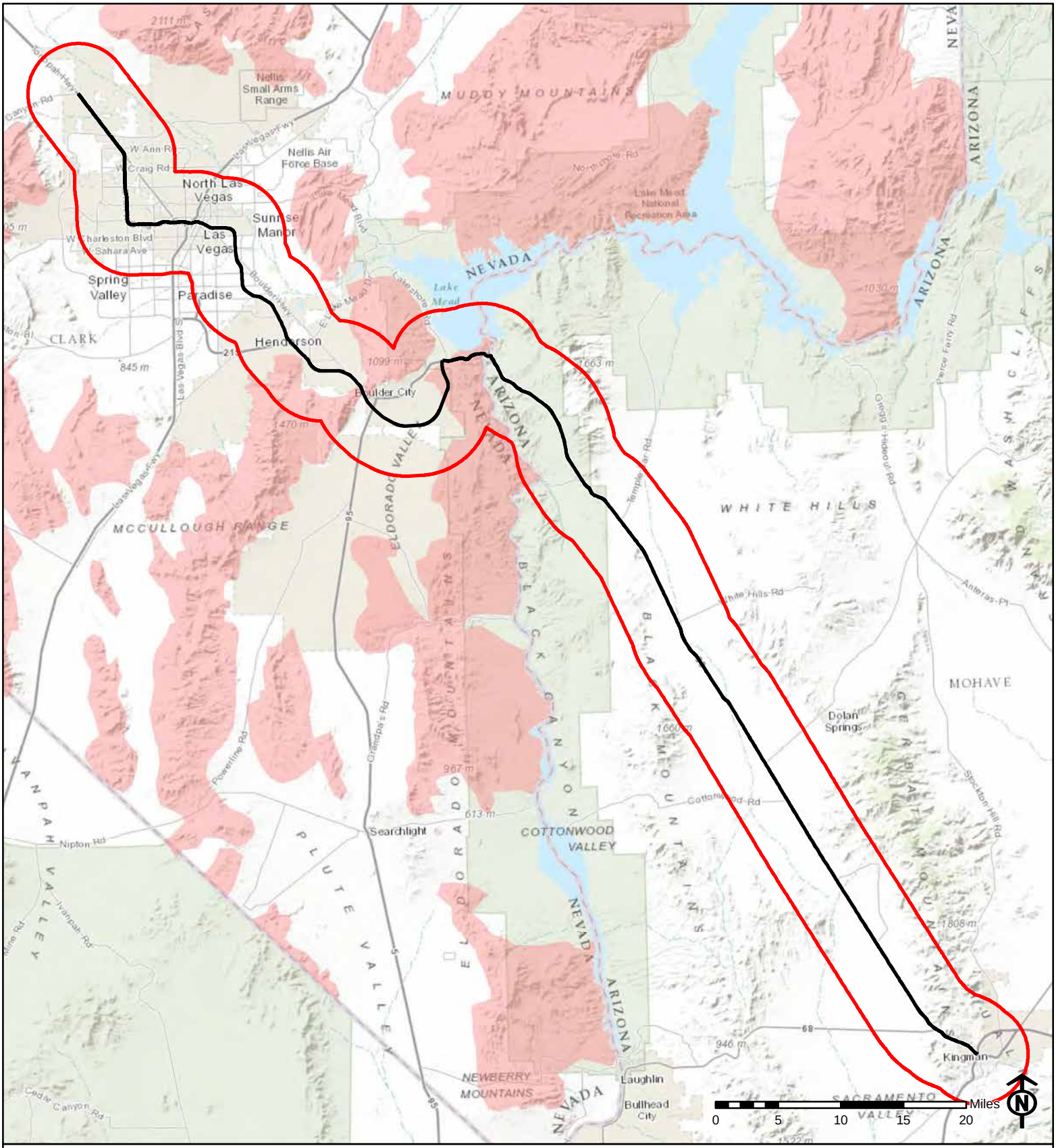
common merganser			
common moorhen			
common poorwill			
common raven			
common side-blotched lizard			
common yellowthroat			
Costa's hummingbird			
crappie (unknown)			
crissal thrasher			
cutbow trout			
deermouse (unknown)			
desert banded gecko			Yes
desert cottontail			
desert glossy snake			
desert horned lizard			Yes
desert night lizard			Yes
desert pocket mouse			Yes
desert spiny lizard			
desert sucker			
desert tortoise	Threatened	Threatened	Yes
desert woodrat			
Devil's Hole pupfish	Endangered	Endangered	Yes
duck (unknown)			
Dumeril's boa constrictor			
eared grebe			
European rabbit			
European starling			
fathead minnow			
flannelmouth sucker			Yes
frog (unknown)			
Gambel's quail			
glossy snake			
golden shiner			
gophersnake			
gray fox			
gray vireo			
great-tailed grackle			
Great Basin collared lizard			Yes
Great Basin gophersnake			
Great Basin rattlesnake			
Great Basin whiptail			
great blue heron			
greater flamingo			
greater roadrunner			
greater sandhill crane			Yes
greater short-horned lizard			Yes
green-tailed towhee			
green heron			
green sunfish			
hermit thrush			

hoary bat		Yes
hoary marmot		
hooded warbler		
house finch		
house mouse		
house sparrow		
Inca dove		
killdeer		
kit fox		
largemouth bass		
Le Conte's thrasher		Yes
Lewis's woodpecker		Yes
little pocket mouse		
lizard (unknown)		
loggerhead shrike	Sensitive	Yes
long-billed dowitcher		Yes
long-nosed leopard lizard		Yes
long-nosed snake		
long-tailed pocket mouse		
Lucy's warbler		
MacGillivray's warbler		
magnificent frigatebird		
mallard		
marsh wren		
Mediterranean gecko		
Merriam's kangaroo rat		
Mojave Desert sidewinder		Yes
Mojave patch-nosed snake		
Mojave rattlesnake		
Mojave shovel-nosed snake		Yes
mountain bluebird		
mourning dove		
myotis (unknown)		
Nevada shovel-nosed snake		Yes
Nevada side-blotched lizard		
North American deermouse		
North American porcupine		
North American racer		
northern cardinal		
northern desert horned lizard		Yes
northern desert iguana		Yes
northern desert nightsnake		
northern flicker		
northern mockingbird		
northern Mojave rattlesnake		
northern parula		
northern pintail		Yes
northern zebra-tailed lizard		
orange-crowned warbler		
Oregon junco		

oriole (unknown)			
Pacific Loon			
pallid bat		Protected	
phainopepla			
pied-billed grebe			
pocket mouse (unknown)			
quagga mussel			
rainbow trout			
razorback sucker	Endangered	Endangered	Yes
red-necked grebe			
red-spotted toad			
red-winged blackbird			
red crossbill			
red racer			
red shiner			
red swamp crayfish			
relict leopard frog	Candidate	Protected	Yes
ring-necked duck			
rock dove			
roof rat			
Ross's goose			
ruby-crowned kinglet			
ruddy duck			
sage sparrow			Yes
savannah sparrow			
Say's phoebe			
Scott's oriole			Yes
shortfin molly			
Sierra gartersnake			
Smith's black-headed snake			Yes
snow goose			
song sparrow			
Sonoran lyre snake			
sora			
southern desert horned lizard			Yes
southwestern speckled rattlesnake			
speckled dace			
spiny softshell			
spotted bat		Threatened	Yes
spotted leaf-nosed snake			Yes
striped bass			
suckermouth catfish			
tadpole (unknown)			
Tennessee warbler			
thick-billed parrot			
threadfin shad			
tiger salamander			
tiger whiptail			
Townsend's big-eared bat		Sensitive	Yes
variable groundsnake			

verdin			
vermilion flycatcher			
vesper sparrow			
waterfowl (unknown)			
western banded gecko			Yes
western diamond-backed rattlesnake			
western fence lizard			
western harvest mouse			
western kingbird			
western least bittern			Yes
western long-tailed brush lizard			Yes
western meadowlark			
western mosquitofish			
western shovel-nosed snake			Yes
western small-footed myotis			Yes
western snowy plover			Yes
western tanager			
western yellow-billed cuckoo	Candidate	Sensitive	Yes
western yellow bat			
white-crowned sparrow			
white-faced ibis			Yes
white-tailed antelope squirrel			
white-throated sparrow			
Williamson's sapsucker			
Wilson's warbler			
wood duck			
Woodhouse's toad			
yellow-backed spiny lizard			
yellow-breasted chat			
yellow-headed blackbird			
yellow-rumped warbler			
Yuma clapper rail	Endangered	Endangered	Yes
Yuma myotis			
zebra-tailed lizard			

ESA: Endangered Species Act Status
State: State of Nevada Special Status
SWAP_SoCP: Nevada State Wildlife Action Plan (2012) Species of Conservation Priority



Project Area

Four Mile Buffer Area Boundary

Bighorn Sheep Distribution

I-11 Corridor Study Z
Bighorn Sheep Distribution

December 09, 2013

Projection: UTM Zone 11 North, NAD83

V:\ActiveProjects\DataRequests\Consultants\CH2MHill\I-11\I-11_Z\Data Request - I-11_Z.mxd

Appendix F
Bureau of Reclamation's Comments for the Level 2 Alternative Screening for the I-11 and Intermountain West Corridor Study

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:
LC-2620
ENV-6.00

DEC 10 2013

VIA ELECTRONIC MAIL ONLY

Ms. Sandra Rosenberg, PIP
Nevada Department of Transportation
1263 South Stewart Street
Carson City, NV 89712
Email: srosenberg@dot.state.nv.us

Subject: Bureau of Reclamation's Comments for the Level 2 Alternative Screening for the Interstate 11 (I-11) and Intermountain Corridor Study (Study)

Dear Ms. Rosenberg:

Thank you for the opportunity to participate as a Stakeholder on the Study and to provide information for the Level 2 analysis. We understand that the Level 2 analysis will further evaluate Priority Corridor alternatives that were found to be feasible in the Level 1 analysis. The Level 2 analysis will aid in identifying a reasonable range of alternatives that are carried forward for future planning and environmental work, including evaluation through the National Environmental Policy Act Process (NEPA). We offer the enclosed comments and additional evaluation criteria, provided verbally to Mr. Dan Anderson of CH2M HILL on December 4, 2013, for use in the Level 2 screening of alternatives.

Reclamation's primary area of interest related to Priority Section 3, Las Vegas Metropolitan Area, is Alternative BB-QQ. This alternative on the east side of the Las Vegas Valley would bisect Reclamation lands withdrawn for the Robert B. Griffith Project located east of Henderson, Nevada. Although the specific alignment has not been identified yet, we understand that the corridor under consideration is approximately 1000 feet wide. Although no fundamental incompatibility with Reclamation project use (43 CFR 429.14) has been identified that would preclude initial consideration of this alignment, our initial review has identified potential conflicts and impacts.

While we anticipate that mitigation for impacts would be needed if Alternative BB-QQ is selected, specific mitigations for these identified conflicts and impacts are not identified at this point and would require analysis through the NEPA process. We appreciate the opportunity to provide this input and look forward to continuing to work with you on the Study.

If you have questions regarding the enclosed comments, please contact Ms. Faye Streier, National Environmental Policy Act Coordinator, at 702-293-8132 or fstreier@usbr.gov.

Sincerely,

For Valerie E. Simon, Chief
Resources Management Office

Enclosure

cc: Mr.Dan Andersen
CH2M HILL
2485 Village View Drive, Suite 350
Henderson, NV 89074
Dan.Andersen@ch2m.com
(w/enclosure via email only)

Appendix G
Bureau of Land Management – Southern Nevada District Office Comment Letter

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Southern Nevada District Office
Las Vegas Field Office
4701 N. Torrey Pines Drive
Las Vegas, Nevada 89130
http://www.blm.gov/nv/st/en.html

In Reply Refer To:
2800/2900 (NVS0056)

DEC 0 5 2013

Ms. Sondra Rosenberg, PTP
Nevada Department of Transportation
1263 South Stewart Street
Carson City, Nevada 89712

Dear Ms. Rosenberg:

The Bureau of Land Management (BLM), Las Vegas Field Office appreciates the opportunity to provide comments on the Interstate 11 and Intermountain West Corridor Study (Study). It is important that BLM is involved in the evaluation process for the Nevada studies since BLM manages a majority of the public lands in Nevada.

Our BLM office would like to remain involved in the planning process concerning the proposal segments which involve southern Nevada. Southern Nevada consists of several areas that are withdrawn for special purposes (military or state), or set aside for protection of Threatened and Endangered Species (T&E) or wilderness; and these are defined as Areas of Critical Environmental Concern (ACEC), Instant Study Areas (ISA), Wilderness Study Areas (WSA), and Desert Conservation Areas (DCA). There are also protected areas set aside for public enjoyment such as the Red Rock Canyon National Conservation Area (RRCNCA). We are unable to give you an in-depth report since this will require more time in order for the BLM to evaluate these areas effectively. For the moment, until we can evaluate the segments in more detail, the following points are noted. For those proposals mentioned in the Environmental and Resource Agency Coordination Meeting held November 21, 2013:

Priority Section #3, Las Vegas Metropolitan Area – Alternative Y, Z – the northwest section of the proposed segment which connects from Bruce Woodbury Beltway 215 to United States Highway 95 may run through the RRCNCA recreation area, which could be a problem since it conflicts with the Land Use Plan for the RRCNCA; also T&E plant/animal species may be in this area. Further evaluation will be necessary.

Priority Section #3, Las Vegas Metropolitan Area – Alternative BB/QQ – the proposed segment traveling north to south from United States Highway 15 to United States Highway 515 by Boulder City travels through a private mine area and the critical habitat Rainbow Gardens ACEC

area, through the Lake Mead National Recreation Area, and through the River Mountains ACEC. These areas have been set aside for critical habitat and T&E species protection. These areas are of critical concern (maps enclosed).

At this beginning level of evaluation, it is difficult without further evaluation, to identify all the critical elements within these areas. Due to the extent of critical T&E species and habitat in these areas, the BLM would prefer the expansion of existing roads and already disturbed areas as opposed to the development of new roads.

The BLM appreciates the opportunity to comment and would like to continue to be involved in the planning process. The BLM looks forward to continuing to partner with the Nevada Department of Transportation on this important Study. If you have any questions, you may contact Dorothy Jean Dickey, Realty Specialist, by e-mail at ddickey@blm.gov or by phone at (702) 515-5119.

Sincerely,

Catrina Williams
Assistant Field Manager
Division of Lands

Enclosures

Appendix H
I-11 Corridor Alternative Evaluation – Travel Demand Model Methodology and Approach

I-11 and Intermountain West Corridor Study

Alternative Evaluation Travel Demand Model Methodology and Approach

Prepared for

Nevada DOT and ADOT

April 2014

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Appendices

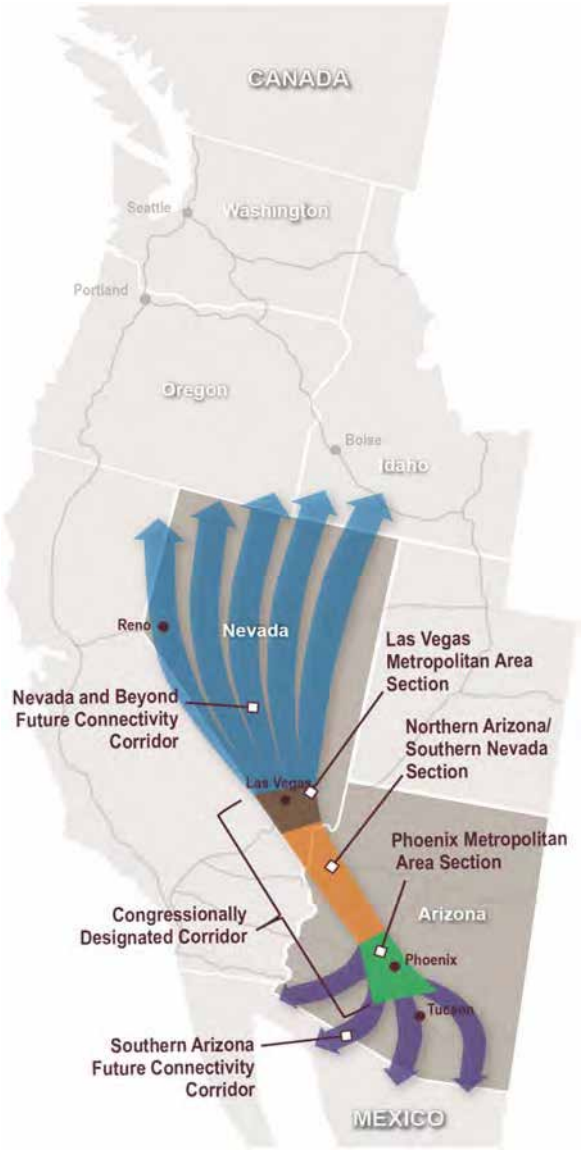
A I-11 Level 2 Corridor Alternatives

Introduction and Background

The purpose of this memorandum is to document the travel demand model methodology used to evaluate the I-11 and Intermountain West Corridor alternative performance by study area segmentation.

Figure 1 shows the study area segmentation within the States of Arizona and Nevada. The Phoenix Metropolitan Area Section includes the corridor alternatives from I-10/I-8 junction to Wickenburg; The Northern Arizona/Southern Nevada Section includes the area from Wickenburg to Boulder City and the Las Vegas Metropolitan Area Section encompasses the greater Las Vegas Metropolitan area. Southern Arizona covers the area from Casa Grande to Mexico, and Northern Nevada covers the area north of the Las Vegas Metropolitan area. Regional travel demand model outputs were used to evaluate the corridor alternative performance for the Congressionally Designated Corridor section alternatives that were shown in Level 1 to be feasible and potentially beneficial to the two states. Various I-11 and Intermountain West Corridor alternatives by segment area were ranked based on their performance.

Figure 1. Study Area



Travel Demand Model Approach

The study team used two different travel demand models to prepare the more detailed Level 2 corridor evaluations. For corridor alternatives within Arizona, the team used the Arizona Department of Transportation (ADOT) September 2011 version of the Arizona Statewide Travel Demand Model (AZTDM2), which is maintained by ADOT. For the corridor alternatives in southern Nevada, the study team used the Regional Transportation Commission of Southern Nevada's (RTCSNV) 2012 regional travel demand model.

For Arizona, the study team coded the corridor alternatives into the statewide travel demand model's 2035 model network and provided this information to ADOT. The ADOT travel demand modeling group used these model networks to conduct model runs using the 2035 population and employment projections. The planned roadway improvements in the adopted regional transportation plan are incorporated in 2035 AZTDM2 model. ADOT provided the results of these model runs to the study team for evaluation.

For the southern Nevada alternatives, the study team coded the corridor alternatives into the RTCSNV travel demand model 2035 model network. This 2035 model network included existing roads and transit and planned improvements as reflected in the adopted regional transportation plan. The study team conducted the RTC model runs and evaluated the results.

As a reasonableness check of modeling output; the Maricopa Association of Governments (MAG) model was consulted. MAG provided model outputs within the Phoenix Metropolitan area to the study team. The MAG model provides a detailed look at the Phoenix Metropolitan area. The socioeconomic data used in the MAG model was updated in September 2013. The MAG model results were compared to the AZTDM2 model output. The overall results for both models were very comparable.

The model area of AZTDM2 encompasses the entire state of Arizona plus major connectivity throughout the nation. To capture the trip interactions with neighboring states especially the long distance and heavy truck travel, AZTDM2 model results were used to evaluate corridor performance within the Southern Arizona, Phoenix Metropolitan Area and Northern Arizona sections. **Appendix A** shows the excerpts of I-11 Level 2 corridor alternatives by the various segment areas.

Roadway Network

The travel demand model network for 2035 included existing and planned facilities as reflected in the adopted regional transportation plans. The improvement plans are mostly funded or programmed within the horizon year. For the Level 2 alternative evaluation process, the new sections of the I-11 and Intermountain West Corridor assumed a 4-lane Interstate facility with a posted speed limit of 65 miles per hour (mph). The portions of the Corridor, concurrent with the existing Interstate facilities (e.g., I-10 and I-8), assumed no additional improvements besides the improvements currently planned/proposed. When the proposed I-11 and Intermountain West Corridor follows federal and state facilities (e.g., SR 85, US 93, and US 95), the functional classification in the model was set to 'Interstate facility' with a higher posted speed limit. For this evaluation, traffic interchanges were assumed at two mile intervals to improve regional connectivity. In the case of Alternatives Y and Z, which follow existing roadways through the Las Vegas Metropolitan area, roadways were assumed to be widened to a 10-lane corridor. Appendix A shows the 2035 base roadway network assumptions, extracted from the AZTDM2 and RTCSNV model.

Performance Measures

A performance measure provides a way to evaluate the effectiveness of each corridor alternative over another. The study team evaluated each corridor for overall travel time savings compared to a no-build condition. Other criteria included corridor vehicle miles of travel and corridor vehicle hours of delay. AZTDM2 also provided measures for long distance travel.

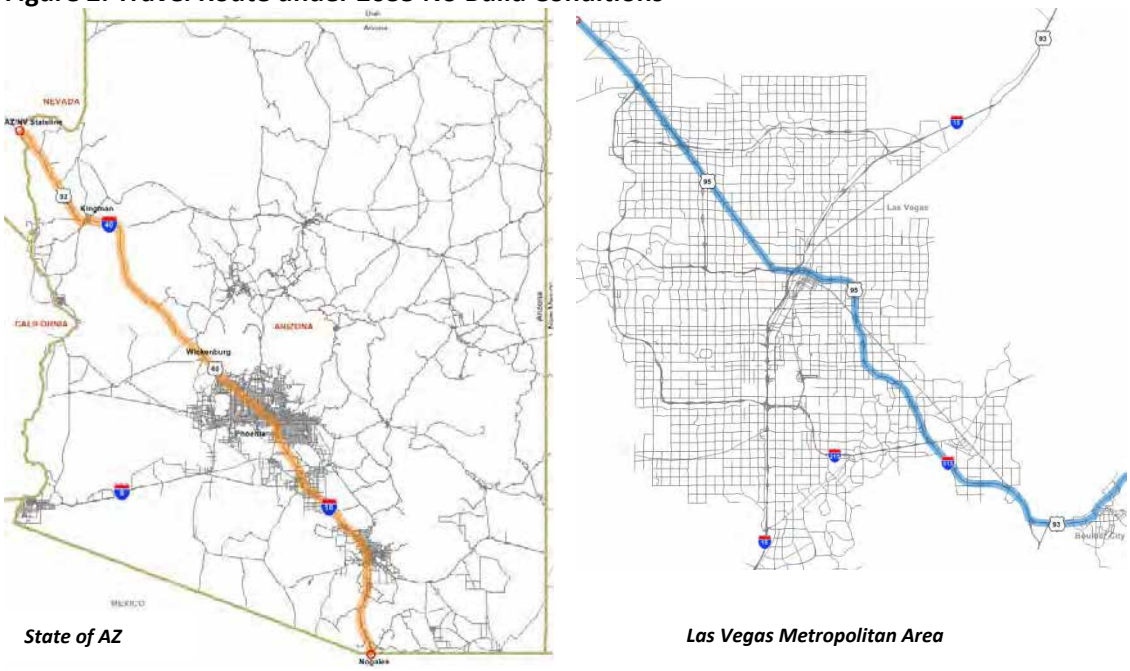
Evaluating the various alternatives with the respective models (e.g., AZTDM2 within Arizona) the study team was able to provide relative corridor performance by alternative. Ranking was conducted by segment area on a scale from 1 to 5, with 1 being the best performing and 5 being the least performing alternative. The congestion relief on the background system roadway network as a result of the implementation of I-11 and Intermountain West Corridor was evaluated from the model outputs. From this cursory evaluation the difference in relief of system congestion between model outputs for the alternatives was found to be insignificant. Considering the large model area and the alternatives being located outside the major urban setting, the results did not contribute to distinguishing among the alternatives. Therefore, relative performance evaluation of the alternatives on system congestion relief was not included in the analysis.

The model results were analyzed to evaluate the following four performance criteria:

1. **Travel Time Saving Over No Build Condition:** Total congested travel time was calculated from the travel demand model outputs for each corridor alternative. Typically congestion during the afternoon peak period is the worst. Therefore, afternoon peak period congestion to the heavier travel direction was calculated and compared to the travel time in the same direction, during the same peak period, with the no-build conditions. No-build conditions assumed no I-11 and Intermountain West Corridor (unless such a corridor segment was defined in the model network – such as the Hassayampa Freeway between I-10 and US 93/Wickenburg). The no-build condition travel time was calculated based on the congested travel time along the shortest and fastest route. Though the alignment of each alternative corridor varies, the beginning and ending point of the alternatives remain the same in each segment area.

Figure 2 shows the model shortest/fastest calculated route used for computing travel time under the no-build condition. The travel time for the no-build condition was then compared with the travel time along various I-11 and Intermountain West Corridor alternatives and the time savings were calculated. Under the no-build condition the model calculated route within the State of Arizona (traveling from Nogales to AZ/NV Border near the Hoover Dam) used I-19, I-10, US 60, I-40 and US 93; within the Southern Nevada/Las Vegas Metropolitan area (traveling from Boulder City to the northwest corner of Las Vegas Metro area) the model calculated route primarily involved US 93, I-515 and US 95 corridors.

Figure 2. Travel Route under 2035 No Build Conditions



State of AZ *Las Vegas Metropolitan Area*

Source: AZTDM2, ADOT (2011), AZ; RTCSNV, NV (2012)

Table 1 summarizes the travel time savings over no-build conditions for each segment area. A relative ranking shows that Alternative I has the highest travel time savings over no-build conditions within the Phoenix Metropolitan area; in the Las Vegas Metropolitan area, Alternative BB-QQ showed the highest travel time savings.

Table 1. Travel Time Savings (minutes) Over No Build Condition

Segment Area	Alternative	Distance (mile)	Average Travel Time (minute)	Travel Time Savings over No Build (minute)	Ranking
Southern Arizona (1)	Alternative C	124	108	n/a	n/a
Phoenix Metropolitan Area	No Build	152	174	n/a	n/a
	Alternative G	191	169	5	4
	Alternative H	183	172	3	5
	Alternative I	171	160	14	1
	Alternative LL	192	165	9	3
	Alternative MM	185	162	13	2
Northern Arizona/Southern Nevada	No Build	181	167	n/a	n/a
	Alternative Q	181	167	0	2
	Alternative UU	185	162	5	1
Las Vegas Metropolitan Area	No Build	59	114	n/a	n/a
	Alternative Y	68	93	21	3
	Alternative Z	64	88	26	2
	Alternative BB-QQ	80	81	33	1

(1) Follows existing I-19, I-10 corridor. No alternative corridor analyzed; AZTDM2 and RTCSNV Travel Demand model were used to gather data. Ranking is from 1 to 5, with 1 being the best performing and 5 being the least performing corridor. Source: HDR Engineering, Inc., February 2014

2. **Total Vehicle Miles of Travel (VMT):** VMT was calculated by multiplying the total daily traffic on a roadway segment by the length of the segment. Using this approach, total VMT for each of the alternatives was calculated. AZTDM2 provides a long distance travel component as a model output; long distance trips being those trips travelling longer than 50 miles. This is a critical component of regional travel, as freight and inter-state long distance commercial vehicles, as well long-distance personal vehicle trips, fall into this category. VMT for long-distance travel by the I-11 and Intermountain West Corridor alternatives were ranked within the AZTDM2 model area (Southern Arizona, Phoenix Metro and Northern Arizona).

The RTCSNV model does not provide long distance travel as an output. Therefore, ranking by long distance VMT within the Las Vegas Metropolitan area segment area was limited to corridor VMT analysis only. Each alternative was compared against the alternative with the lowest VMT. The higher the VMT, the higher the ranking. Lower VMT along the corridor represents less utilization of that particular corridor. Therefore, the results show a lower ranking for the alternative with lower VMT.

Table 2 shows the I-11 and Intermountain West Corridor alternative ranking by segment area based on the corridor and long distance VMT. For the Phoenix Metropolitan area; Alternative I shows the highest ranking by corridor VMT and second ranking by long distance VMT. For the Northern Arizona area; Alternative Q performs better than Alternative UU. For the Las Vegas Metropolitan area; Alternative Y showed the highest corridor VMT, therefore, the highest ranking. Overall, the alternative corridor aligned through the urban settings showed higher

VMT due to the higher traffic volumes when comparing to the alternative aligned through rural areas with relatively lower traffic volumes.

Table 2. I-11 and Intermountain West Corridor Alternative Rankings by VMT

Segment Area	Alternative	Ranking by Corridor VMT	Ranking by Long Distance VMT
Southern Arizona (1)	Alternative C	n/a	n/a
Phoenix Metropolitan Area	Alternative G	4	3
	Alternative H	2	1
	Alternative I	1	2
	Alternative LL	3	5
	Alternative MM	5	4
Northern Arizona/Southern Nevada	Alternative Q	1	1
	Alternative UU	2	2
Las Vegas Metropolitan Area	Alternative Y	1	RTC model does not provide model output under this category
	Alternative Z	2	
	Alternative BB-QQ	3	

(1) No alternative corridor analyzed; AZTDM2 and RTCSNV Travel Demand model were used to gather data. Ranking is from 1 to 5, with 1 being the best performing and 5 being the least performing corridor. Source: HDR Engineering, Inc., February 2014

3. **Vehicle Hours of Delay (VHD):** A comparative analysis of the alternatives was calculated for total VHD using the AZTDM2 and RTC model. Delay is the difference of travel time between the congested and free flow time. Higher delay represents a congested roadway corridor over free flow traffic conditions. The alternative corridors thru the urban settings are likely to experience higher delay than those in the rural area, and therefore rank lower. **Table 3** shows the relative ranking of I-11 and Intermountain West Corridor alternatives by each segment area. The lower the total VHD, the higher the ranking.

Table 3. Rankings by Total Vehicle Hours of Delay

Segment Area	Alternative	Ranking
Southern Arizona (1)	Alternative C	n/a
Phoenix Metropolitan Area	Alternative G	4
	Alternative H	3
	Alternative I	5
	Alternative LL	2
	Alternative MM	1
Northern Arizona/Southern Nevada	Alternative Q	2
	Alternative UU	1
Las Vegas Metropolitan Area	Alternative Y	2
	Alternative Z	3
	Alternative BB-QQ	1

(1) No alternative corridor analyzed; AZTDM2 and RTCSNV Travel Demand model were used to gather data. Ranking is from 1 to 5, with 1 being the best performing and 5 being the least performing corridor. Source: HDR Engineering, Inc., February 2014

The results indicate that Alternative MM has the highest ranking by total vehicle hours of delay within the Phoenix Metropolitan area meaning this corridor experiences the least vehicle hours of delay amongst other alternatives. Within the northern Arizona area, total vehicle hours of delay is less in Alternative UU (rank 1) than the delay along Alternative Q. Within the Las Vegas Metropolitan area, Alternative BB-QQ has the least vehicle hours of delay (rank 1).

4. **Congested Speed and Long Distance Travel Reliability:** The estimated average PM peak-period, peak-direction, travel speed for each alternative, derived from the AZTDM2 and RTC models were used as an indicator of the reliability of the corridor. It is assumed that the higher the travel speed, the more reliable the corridor is for long distance travel. Increased congestion reduces speed and increases the travel time, which causes delay and provides less reliability on long distance travel, especially related to freight and heavy commercial vehicles.

The I-11 and Intermountain West Corridor alternative rankings by average travel speed are summarized in **Table 4**. In the Phoenix Metropolitan area, the results show that Alternative LL will have the highest travel speed. However, the overall difference of travel speed by corridor is relatively insignificant within the Phoenix Metropolitan area (less than 5 mph). In the Las Vegas Metropolitan area, Alternative BB-QQ will offer the highest travel speed amongst other alternatives.

Table 4. I-11 and Intermountain West Corridor Alternative Rankings by Travel Speed

Segment Area	Alternative	Average Travel Speed (mph)	Rank
Southern Arizona (1)	Alternative C	67	n/a
Phoenix Metropolitan Area	Alternative G	64	2
	Alternative H	62	4
	Alternative I	63	3
	Alternative LL	66	1
	Alternative MM	64	2
Northern Arizona/Southern Nevada	Alternative Q	61	2
	Alternative UU	63	1
Las Vegas Metropolitan Area	Alternative Y	49	2
	Alternative Z	43	3
	Alternative BB-QQ	60	1

(1) No alternative corridor analyzed; AZTDM2 and RTCSNV Travel Demand model were used to gather data. Ranking is from 1 to 5, with 1 being the best performing and 5 being the least performing corridor. Source: HDR Engineering, Inc., February 2014

Conclusion

Within the urban settings, the alternatives display higher VMT, and operate at slower speeds with higher congestion. Within the rural areas, the alternatives experienced lower VMT, and operate at higher speeds with lower congestion, relative to the urbanized areas. The results of the travel demand model in the Phoenix Metropolitan area showed that no one particular corridor alternative performed the best in all four performance evaluation categories. In Northern Arizona, Alternative UU performs better than Alternative Q, providing the most direct route. Within the Las Vegas Metropolitan area, Alternative BB-QQ performs the best.

Appendix A
I-11 Level 2 Corridor Alternatives

Source: Interstate 11 and Intermountain West Corridor Study Draft Candidate Corridor Alternatives for Level 1 Screening, September 2013

Alternative Q
(Northern AZ)

Alternative UU
(Northern AZ)

Alternative C
(Southern AZ)

I-11 AND INTERMOUNTAIN WEST CORRIDOR ALTERNATIVES IN NORTHERN AND SOUTHERN ARIZONA

I-11 AND INTERMOUNTAIN WEST CORRIDOR ALTERNATIVES IN PHOENIX METROPOLITAN AREA

Alternative Y

Alternative Z

Alternative BB-QQ

I-11 AND INTERMOUNTAIN WEST CORRIDOR ALTERNATIVES IN LAS VEGAS METROPOLITAN AREA

List of projects* incorporated in the 2035 Arizona Department of Transportation (ADOT) September 2011 version of the Arizona Statewide Travel Demand Model (AZTDM2)

*This is a partial listing of projects identifying the major improvements

(Source: ADOT Multimodal Planning, February 2014)

Partial list of projects incorporated in the 2035 ADOT Arizona Statewide Travel Demand Model (AZTDM2, September 2011)			
County	**Facility**	**From-To**	**Source [1]**
Coconino	SR-89 Bypass	I-40 to north of Townsend-Winona Road.	RTP
Maricopa	Hassayampa Freeway	White Tank Freeway to I-10 (Buckeye)	bqAZ, FS, SP
Maricopa	Hassayampa Freeway	White Tank Freeway to US-93	bqAZ, FS,SP
Maricopa	SR 202L (So. Mountain)	I-10 West to I-10 East	bqAZ, FS,SP,RTP
Maricopa	SR 303L	SR 801 to I-17	bqAZ, FS,SP,RTP
Maricopa	SR 303L	Hassayampa Fwy to SR 801	bqAZ, FS,SP,RTP
Maricopa	SR 801	SR-303L to SR-202L (S Mountain)	bqAZ, FS,SP,RTP
Maricopa	SR 801	SR-303L to SR-85	bqAZ, FS,SP,RTP
Maricopa	SR-74	US-60 to Hassayampa Freeway	bqAZ,FS
Maricopa	White Tank Freeway	Hassayampa Fwy to US-60/SR-303L	bqAZ,SP
Maricopa/Pinal	SR 802	SR-202L (Santan) to Pinal N-S FWY	bqAZ,SP,RTP
Mohave	SR 95 Bypass	I-40 – SR68	bqAZ
Pima	SR 210 Extension	Palo Verde Rd to I-10	bqAZ,SP,RTP
Pinal	Montgomery Freeway	Hassayampa Fwy to I-8	bqAZ,SP
Pinal	Pinal N-S Corridor	US-60 to I-10	bqAZ,SP
Pinal	SR 238	Hassayampa Fwy to SR 347	bqAZ,SP
Pinal	SR 303S	Hassayampa Fwy to I-8	bqAZ
Yavapai	Western Bypass	I-40-US-89	bqAZ
Yavapai	Great Western Extension	SR 89A to SR-89 at Route 5	bqAZ,SP,RTP
Yavapai	Chino Valley Extension	Outer Loop Road to SR-89	bqAZ,SP,RTP
Yavapai	Fain Road Extension	SR-169 to Fain Road	bqAZ,SP,RTP
Yavapai	Fain Road Extension II	I-17 to Fain Road	bqAZ,RTP
Yuma	East Yuma Freeway	SR-195 – CA State Line	bqAZ,SP,RTP,FS

List of projects* excerpted from the Regional Transportation Commission of Southern Nevada's Regional Transportation Plan, 2013-2035

(Source: RTCSNV, RTP: Street and Highway Projects, 2012)

Street and Highway Improvements

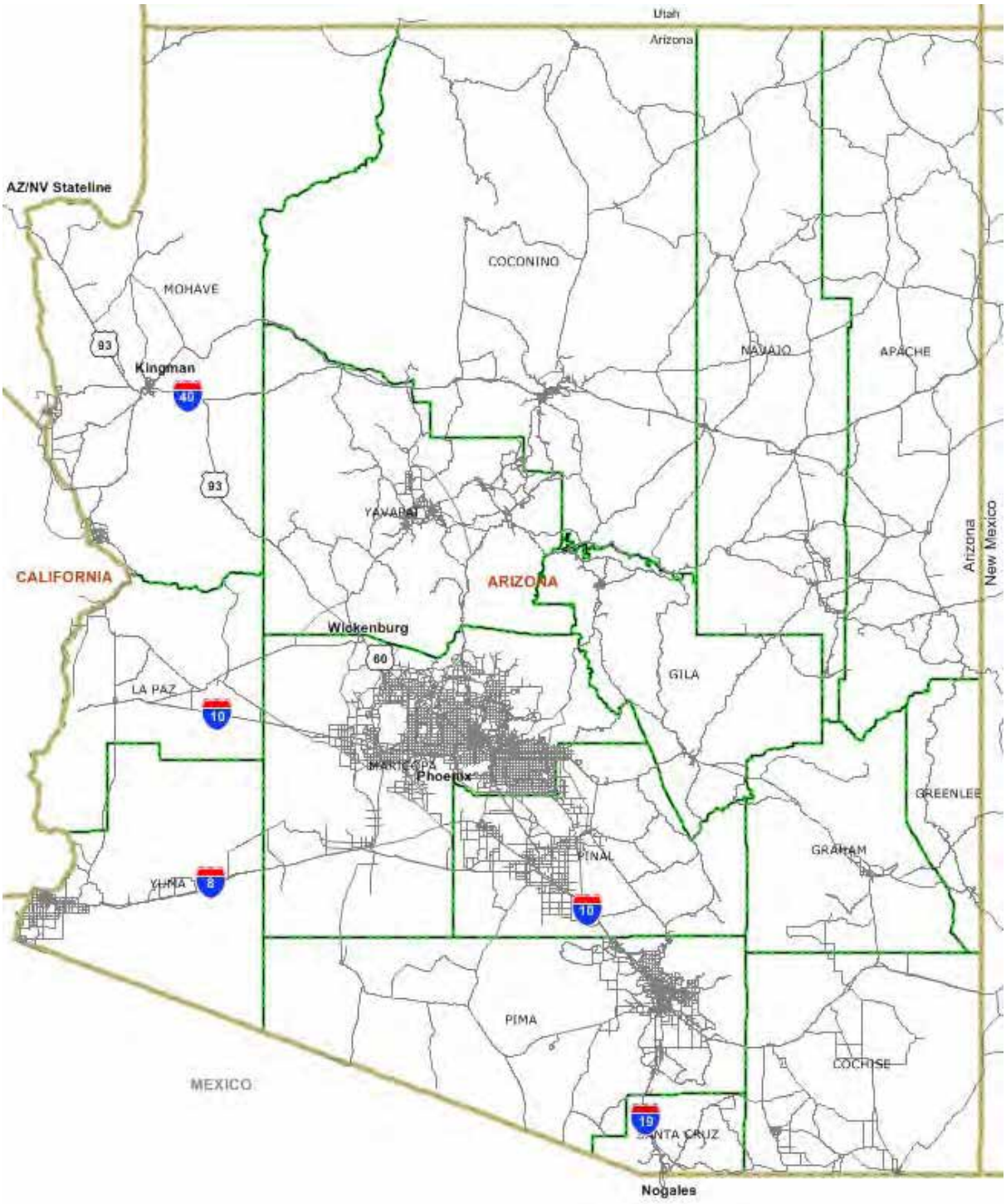
Project costs include all funded phases including planning, preliminary engineering (PE), right-of-way acquisition (RW) and construction. Project costs over $1 million are rounded to the nearest million
For additional information and details of fund sources, see Table 2 in Appendix 1 of the RTP

Items in brown include construction of carpool lanes or ramps.
Items in grey involve only planning, PE and/or RW. Some projects are not funded for construction in the RTP.

	Cost in $ million in year of expenditure	Date in operation
► Alta Dr from Rancho Dr to Main St: Widen to 6 lanes	3	2015
► Ann Rd from Camino El Dorado to Lamb Blvd: Widen to 6 lanes	14	2035
► Area wide improvements: Repair 47 miles of road used for recreation near CA state line	0.05	2013
► Boulder City Bypass from US93/95 to Hoover Dam Access Rd: Study new 4 lane freeway	2	2013
► Boulder City Bypass from US93/95 to I-515: Construct realigned 4 lane freeway and bridge	56	2020
► Boulder City Bypass from US93/95 to Railroad Pass: Construct 4 lane freeway	34	2025
► CC-215 from I-215 Airport Connector to I-15 North: Design beltway interchanges	1	2015
► CC-215 Northern Beltway at I-15 interchange	124	2025
► CC-215 Northern Beltway at US95 interchange (package 1)	72	2020
► CC-215 Northern Beltway at US95 interchange (package 2)	105	2035
► CC-215 Northern Beltway at US95 interchange (package 3)	85	2035
► CC-215 Northern Beltway from Decatur Blvd to Range Rd: Widen to 6 lanes w/ interchanges	164	2020
► CC-215 Western Beltway at Summerlin Parkway interchange	35	2020
► CC-215 Western Beltway from Craig Rd. to Hualapai Way: Widen to 6 lanes w/ interchanges	136	2020
► Centennial Pkwy from Camino El Dorado to Losee Rd: Widen to 6 lanes	7	2035
► Centennial Pkwy from Losee Rd to Lamb Blvd: Widen to 6 lanes	13	2035
► Charleston Blvd from Maryland Pkwy to Pecos Rd: Widen to 6 lanes	5	2035
► I-11 Study: Evaluate need for interstate between Las Vegas and Phoenix	3	2013
► I-15 area wide widening and interchange improvements	4	2015
► I-15 at I-215: System to system direct connector HOV ramps	75	2020
► I-15 at Pioneer Blvd: Construct interchange	21	2015
► I-15 at Sloan Rd interchange	65	2030
► I-15 at Starr Ave interchange	78	2025
► I-15 at US 93 North: Design interchange	1	2013
► I-15 from Blue Diamond to Sahara: Study and construct HOV access ramps	405	2035
► I-15 from Blue Diamond to Tropicana Ave: Widen to 10 lanes	274	2030
► I-15 from I-215 to I-515: Design to widen to 14 lanes with HOV lanes	4	2013
► I-15 from Sloan Rd to Blue Diamond Rd: Widen to 8 lanes	62	2020
► I-15 from Spaghetti Bowl to Sahara Ave: Neon Ph 3 - New bridges & local access roads	262	2025
► I-15 from Spaghetti Bowl to Sahara Ave: Neon Ph 4 - Construct ramps & local access roads	192	2025
► I-15 from Spaghetti Bowl to Sahara Ave: Neon Ph 5 - Construct NB I-15 ramps	342	2015
► I-15 North from Craig Rd to Speedway Blvd: Widen to 6 lanes	15	2020
► I-15 North from Speedway Blvd to Apex Interchange: Widen to 6 lanes	4	2020
► I-15 South from Sloan Rd to Blue Diamond Rd: Widen to 8 lanes	4	2015
► I-15 South from Sloan Rd to CA State line: Reconstruct interchanges & other improvements	52	2015
► I-15/US 95 from Oakey Blvd to Rancho Dr: Neon Ph 1 - Widen I-15 and HOV ramps	450	2020
► I-215 Southern Beltway at Airport Connector interchange	52	2015
► I-215 Southern Beltway from Eastern Ave. to Windmill Ln: Widen to 8 lanes	33	2020
► I-515 Charleston Ave to US 95 at Rancho Dr: Widen to 10 lanes, HOV lanes & interchanges	1390	2030
► I-515 from Charleston Ave to US 95 at Rancho Dr: Study widening possibilities	10	2020
► Jones Blvd from Blue Diamond Rd. to Windmill Ln: Construct 4 lanes and bridge over UPRR	29	2020
► Kyle Canyon Rd at US 95: Construct bridge w/ 2 lanes heading west and 1 lane east	8	2025
► Kyle Canyon Rd: Construct intersections and roadside drainage improvements	3	2015
► Lake Mead Blvd from Losee Rd. to Las Vegas Blvd: Widen to 8 lanes, interchange upgrade	16	2035
► Lake Mead Recreational Area: Reconstruct protection for the West End Wash culvert	0.70	2013
► Las Vegas Blvd South from St. Rose Pkwy to Sloan Interchange: Construct 4 lanes	6	2035
► Las Vegas Blvd. South from S. NV Supplemental Airport to Jean: Construct 2 lanes	5	2025
► Las Vegas Blvd. South from St. Rose Pkwy to Silverado Ranch: Widen to 6 lanes	13	2020
► Laughlin Bridge over the CO River from Needles Highway to Bullhead City, AZ (phase 1)	18	2020
► Laughlin Bridge over the CO River from Needles Highway to Bullhead City, AZ (phase 2)	17	2035
► Losee Rd from Craig Rd to CC-215: Widen to 6 lanes	15	2030
► Martin Luther King Blvd/Industrial Rd. Connector: Widen MLK and Grand Central to 4 lanes	122	2035
► MLK Blvd/Industrial Rd. Connector: Neon Ph 2 - Grade separation at Oakey/Wyoming	8	2013
► N 5th St from Carey Ave to Cheyenne: Construct 4 lane road with overpass at I-15	25	2015
► N 5th St from Carey Ave to Cheyenne: Widen to 8 lanes including transit lanes	58	2030
► N 5th St from Craig Rd to CC-215: Widen to 8 lanes w/ bus lanes & bike/ped amenities	65	2025
► Pahrump Valley Rd from Red Rock Canyon Rd to Mountain Springs: Widen to 4 lanes	96	2020
► Peace Way bridge over CC-215	12	2035
► Rainbow Blvd. from CC-215 Southern Beltway to Tropicana Ave: Widen to 6 lanes	3	2015
► Rancho Dr from Bonanza to Rainbow Blvd: Widen to 8 lanes	45	2035
► S. NV Supplemental Airport interchange at I-15	23	2030
► S. NV Supplemental Airport super arterial from I-15 to airport: Construct 4 lanes	353	2030
► Sheep Mtn Pkwy from CC-215 Western Beltway to SR 145: Construct 4 lanes, interchanges	86	2035
► Silverado Ranch Blvd from Jones to Dean Martin Dr: Widen to 6 lanes	12	2025
► Simmons St from Cary Ave to Lone Mtn Rd: Widen to 6 lanes	36	2035
► Stephanie St from Russell Rd to Galleria Dr: Widen to 6 lanes, bridge rehabilitation	21	2020
► Summerlin Pkwy from CC-215 Western Beltway to US 95: Widen to 8 lanes	34	2030
► Sunset Rd from Decatur Blvd to Durango Dr: Widen to 6 lanes	6	2020
► Tropicana Ave from Decatur Blvd to Polaris: Construct fourth westbound lane	40	2025
► Tropicana Ave from Polaris to I-15: Widen to 8 lanes with grade separation at Dean Martin	40	2030
► Tropicana Ave from Swenson St. to Maryland Pkwy: Widen to 8 lanes	9	2025
► US 95 from Ann Rd to Durango Dr: Widen to 8 lanes with HOV lanes	33	2020
► US 95 from Durango Dr to Kyle Canyon Rd: Widen to 6 lanes with auxiliary lanes	37	2020
TOTAL STREET & HIGHWAY PROJECTS	**5,948**	

2035 Travel Demand Model Base Roadway Network

Source: AZTDM2, ADOT (2011), AZ; RTCSNV, NV (2012).Travel Demand Model



2035 Base Travel Demand Model Network within the State of Arizona

2035 Base RTCSNV Travel Demand Model Network

Appendix I
Preliminary Cost Estimate Assumptions

Segment/Limit	Improvement Description	Full Cost ($000)
Phoenix Metropolitan Area		
Alternative G/H/LL/MM North		
Hassayampa Freeway North	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$2,707,900
Alternative I North		
Hassayampa Freeway North	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$1,415,500
Alternative G South		
Hassayampa Freeway (I-8 to US 93)	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$4,645,000
I-8 from I-10 to Montgomery Rd	▪ Widen to 6 lanes, construct I-8/I-10 system interchange	$127,400
	Total	**$4,772,400**
Alternative H South		
I-8*	▪ Widen to 6-lanes, construct I-8/I-10 system interchange	$1,095,000
SR 85	▪ Upgrade to freeway, construct SR 85/I-10 and SR85/I-8 System Interchanges	$1,041,900
I-10 from SR 85 to Hassayampa Fwy North	▪ Widen to 6-lanes	$396,000
	Total	**$2,532,900**
Alternative I South		
Hassayampa Freeway (I-8 to SR 85)	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$2,685,100
SR 85, Komatke Rd/Hassayampa Freeway to I-10	▪ Upgrade to freeway, construct SR 85/I-10 System Interchange	$593,200
I-8 from I-10 to Montgomery Rd	▪ Widen to 6 lanes, construct I-8/I-10 system interchange	$127,400
I-10 from SR 85 to Sun Valley Parkway	▪ Widen to 6-lanes	$282,600
	Total	**$3,688,300**
Alternative LL South		
I-8 from I-10 to West of SR 84	▪ Widen to 6-lanes, construct I-8/I-10 system interchange	$605,700
Hassayampa Freeway from west of Ak-Chin to SR 303	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$621,300
SR 303 south of MC-85	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$915,300
SR 303 Extension to Vekol Valley north of I-8	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$556,900
SR 30 from SR 303 to Hassayampa Freeway	▪ New 4-lane Highway	$1,209,800
Hassayampa Freeway from SR 30 to I-10	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$596,400
	Total	**$4,505,400**
Alternative MM South		
I-8*	▪ Widen to 6-lanes, construct I-8/I-10 system interchange	$1,095,000
SR 85 north of Gila Bend to Komatke Rd/Hassayampa Freeway	▪ Upgrade to freeway, construct SR 85/I-8 System Interchange	$448,700
Hassayampa Freeway (SR 85 to I-10)	▪ New 6-lane freeway with full interchange build-out and related features/upgrades (alignment to be determined in future study)	$1,044,600
	Total	**$2,588,300**

Segment/Limit	Improvement Description	Full Cost ($000)
Northern Arizona/Southern Nevada		
Alternative Q		
US 93 (Wickenburg to I-40)	▪ Upgrade to 4-lane freeway, full interchange build-out, Wikieup Bypass, and related features/upgrades	$1,684,500
US 93 co-location with I-40	▪ Widen to 6-lane freeway, construct East Kingman TI and Rattlesnake Wash TI, with related features/upgrades	$407,600
US 93, Kingman/I-40 to Pat Tillman/Mike O'Callaghan Bridge	▪ Upgrade to 4-lane freeway (from SR 68 to Kingman Wash) and 6-lane freeway (SR 68 to I-40) with interchanges and related features/upgrades, including West Kingman TI	$813,400
US 93/Boulder City Bypass, Pat Tillman/Mike O'Callahan Bridge to I-515/Foothills grade separation	▪ Boulder City Bypass: New 4-lane Freeway with related interchanges and features	$433,600
	Total	**$3,339,100**
Alternative UU		
US 93 (Wickenburg to Signal Rd.)	▪ Upgrade to 4-lane freeway, full interchange build-out, and related features/upgrades	$653,900
Signal and Alamo Rds, US93 to I-40	▪ New 4-lane divided highway	$1,520,500
I-40 (Alamo Rd to US93/Beale St in Kingman)	▪ Widen to 6-lane freeway	$137,900
US 93, Kingman/I-40 to Pat Tillman/Mike O'Callaghan Bridge	▪ Upgrade to 4-lane freeway (from SR 68 to Kingman Wash) and 6-lane freeway (SR 68 to I-40) with interchanges and related features/upgrades, including West Kingman TI	$1,002,600
US 93/Boulder City Bypass, Pat Tillman/Mike O'Callahan Bridge to I-515/Foothills grade separation	▪ Boulder City Bypass: New 4-lane Freeway with related interchanges and features	$433,500
	Total	**$3,748,400**
Las Vegas Metropolitan Area		
Alternative BB-QQ		
New Eastern Corridor (Boulder City Bypass [I-515 and Foothills grade separation] to I-15)	▪ New 4 lane freeway with 3 new interchanges	$613,200
I-15, Eastern Corridor to Northern Beltway	▪ Widen from 6 to 8 lanes	$50,900
Northern Beltway, I-15 to US 95	▪ Widen from 6 to 8 lanes	$436,400
US 95, Northern Beltway to SR 157	▪ US 95: Widen to 6 to 8 lanes, CC-215 to SR157	$60,100
	Total	**$1,160,600**
Alternative Y		
I-515/US 93, Foothills Grade Separation to I-215	▪ Widen from 8 to 10 lanes	$153,400
I-215, I-515 to I-15	▪ Widen from 8 to 10 lanes	$274,900
CC 215, I-15 to future Sheep Mountain Parkway	▪ Widen from 8 to 10 lanes, I-15 to future Sheep Mountain Parkway	$502,700
Future Sheep Mountain Parkway, CC 215 to US 95	▪ Widen from 6 to 8 lanes	$164,000
	Total	**$1,095,000**
Alternative Z		
I-515/US 93, Foothills Grade Separation to I-215	▪ Widen from 8 to 10 lanes	$153,400
I-515, I-215 to I-15 (including Spaghetti Bowl)	▪ Widen 8 to 10 lanes from I-215 to Charleston	$2,351,300
US 95, I-15 to CC 215/Northern Beltway	▪ Widen to 10 lanes, Rainbow to I-215	$298,100
US 95, Northern Beltway to SR 157	▪ US 95: Widen to 6 to 8 lanes, CC-215 to SR157	$60,100
	Total	**$2,862,900**

* Cost estimate from Key Commerce Corridor