

# The Vital Role of GIS in Solving Controversial Transportation Issues

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## Abstract

For nearly 40 years, long range transportation plans have conceived a north-south connector roadway in Reno, Nevada. The blameless line on assorted maps has generated a controversy of epic proportions, pitting neighbors against neighbors, environmentalists against developers, even city against city. To prove a point, roadway proponents and opponents offer highly inaccurate and crude maps. All of this suspect information has left the local politicians in a quandary. Who and what do we believe? Fortunately, GIS has proven to be the vital piece that provides factual and accurate information and helps solve the ongoing debate. GIS supplies community leaders and citizens with a level of confidence in the data presented. The community now has the tools to make informed decisions about the roadway. Without GIS, the controversy would remain unresolved for the next 40 years, leaving the public at each other's throats.

## **Introduction to the Tahoe Pyramid Link (TPL) Controversy**

- Controversy – A dispute characterized by the expression of opposing views.

There are two key words in the definition of controversy. The first is dispute and the second is opposing. The dispute (defined as to argue or debate) involving the Tahoe-Pyramid Link (hereafter mostly referred to as the TPL) centers upon one simple question: *Should the TPL be built?*

On one side of the controversy, you have groups of existing citizens that surround the proposed road, environmental and open space advocates, and wildlife groups arguing against the TPL. On the opposing side, you have the development community, the traffic experts, and residents concerned about increasing levels of congestion and the impacts of congestion on traffic delay and degradation of air quality. The second group argues for the construction of the TPL. Therefore, just mention the letters TPL in our region, and all the necessary ingredients of a controversy are in place: a dispute with opposing views.

### **The Tahoe-Pyramid Link – 1960-1985**

Nearly fifty years ago, the TPL name was applied by planners to convey the simple concept of a connection between two of northern Nevada most famous lakes: Lake Tahoe and Pyramid Lake.

Lake Tahoe is called the jewel of the Sierra Mountains. A lake surrounded by magnificent forests and known for its amazing clarity, Lake Tahoe is visited by thousands each year for both winter and summer time sports. Sixty-five miles northeast of Lake Tahoe sits Pyramid Lake. This blue water oasis is mostly undeveloped and lies in the treeless but pristine Nevada desert. The views are spectacular including the “pyramid shaped” rock island on the east shore of the lake that gave Pyramid Lake its name. Though considered primitive and desolate by many, it is still a popular destination for fisherman, bird watchers, and watersports enthusiasts.

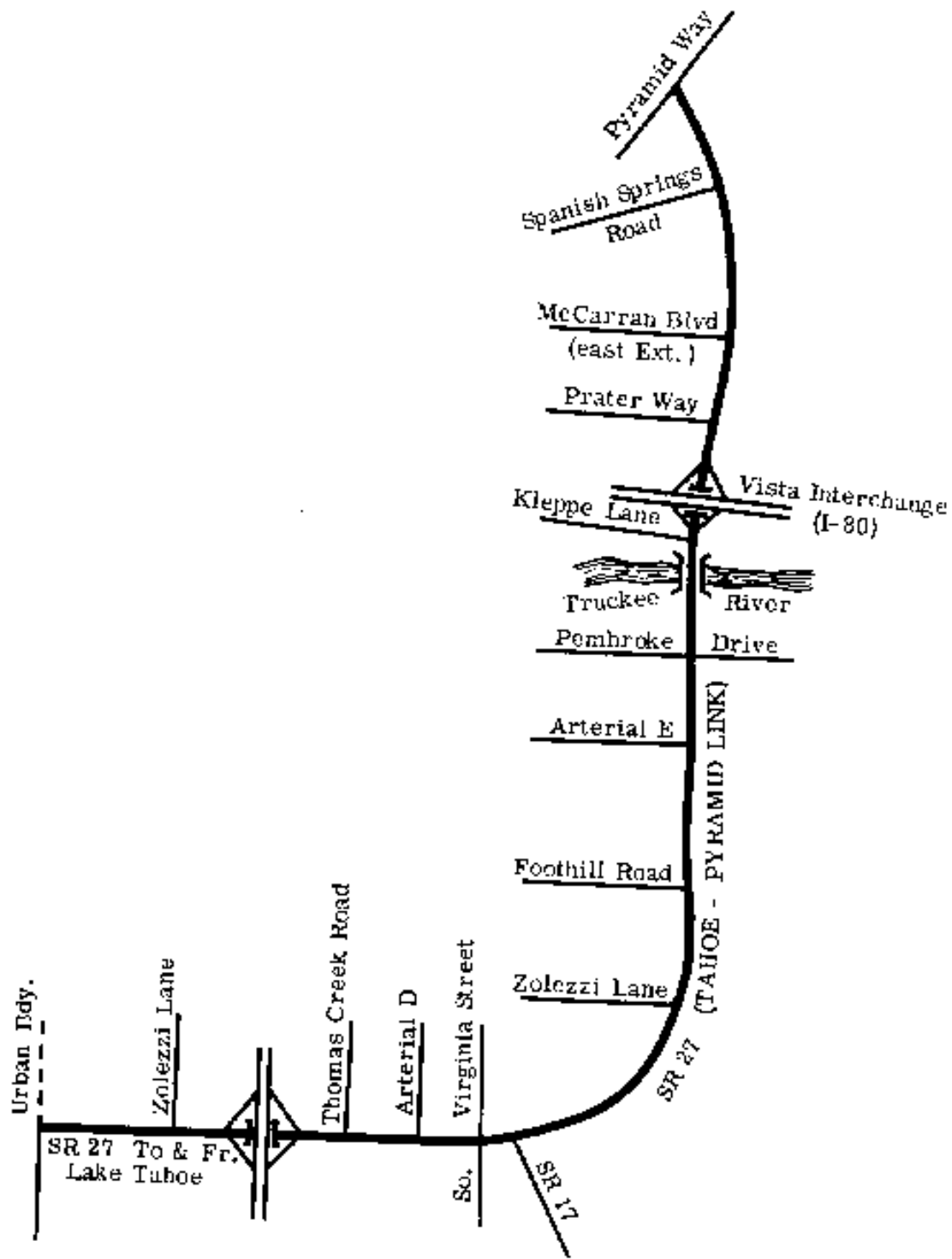
The TPL map from the 1960s (Figure 1) was grossly simplistic, no matter how nostalgic it makes some old time residents feel or what value some want to attach to it. The map shows a line between two points envisioned by planners more than 40 years ago. Today’s proponents of the TPL anguish over the question, why was the TPL not built when it was “on the books” as early

as the 1960s. The primary reason the TPL lay dormant for so long was that few people lived in the southeast portion of Reno in the 1960s. The line on the map was just that, a line. Other issues were more important in a community that was about to begin a period of rapid growth. Because there was no significant demand for the TPL, no perceived need for the TPL, and no voices calling for the TPL, there was no controversy.

Without controversy, the 85% of the TPL outside of the southeast area of Reno, was actually put into place over the years (55 out of 65 miles). State Highway 431 connects Incline Village on the shores of Lake Tahoe, to the southern end of Reno at US Highway 395 (25 miles). The Pyramid Highway/Sparks Boulevard connects Pyramid Lake, to just south of Interstate 80 in the City of Sparks (30 miles) at the Truckee River. Here the road terminates.

Only ten of the original sixty-five miles remains to complete the vision of planners. In a perfect world, the final ten miles of the TPL would have been designed and constructed with no controversy, and the story of the TPL would have faded into history as just another roadway. But it didn't happen that way.

Figure 1 – 1960 Map of Tahoe Pyramid Link



## **The Tahoe-Pyramid Link – 1985-2005**

Between 1985 and 2005, the simple blameless line conceived in the early 1960s, adopted by the Reno, Sparks, and Washoe County in 1970, and mostly completed in various pieces over decades, evolved into the biggest and most complex transportation controversy in the region.

There are two primary reasons for the controversy. First is that over time, no significant demand for travel between Lake Tahoe and Pyramid Lake ever materialized. The community realized the lack of demand and the original vision of a "Tahoe-Pyramid Link" slowly passed away. The general regional road network absorbed the 55 miles of the TPL constructed. Again, the TPL concept had every right to fade into the history books as just another idea whose time and purpose had never come to fruition. But it didn't happen that way. The proposed ten mile section of the TPL through southeast Reno created in the 1960s quietly remained and was never removed from regional plans.

The second reason the TPL evolved into the region's biggest transportation controversy was simple: growth. With the original concept of the TPL gone, the catalyst for renewal of the TPL controversy has been rapid growth in southeast Reno that has occurred over the last 20 years and growth that has been master planned for the next 25 years. In many minds, the TPL has renewed life as a much needed north-south suburban arterial serving a projected 50,000+ new residents and 30,000+ new jobs in southeast Reno and the City of Sparks. This mindset is stoked by future forecasts for the only north-south freeway (I-580) in the region. Even with massive expansion, I-580 will be at or near its capacity by 2030.

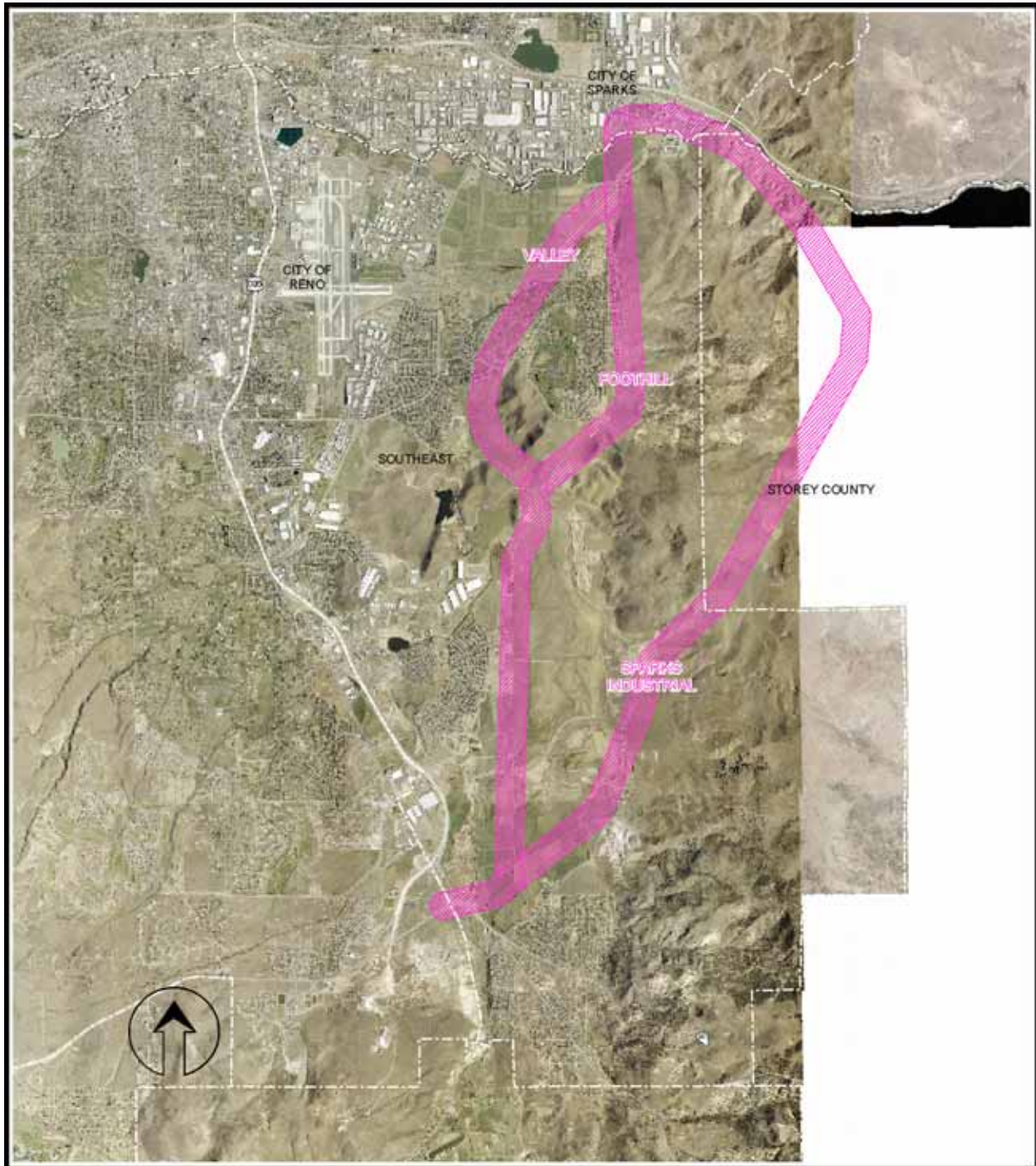
The new role and need for the TPL seems logical given existing and planned growth statistics in southeast Reno. The need for a major north-south arterial conflicts, however, with the desires of residents in older, established, unincorporated neighborhoods (namely Hidden Valley), who wish to retain their community's character. It is these two competing values (congestion relief and community character) that have created an atmosphere of fear/anger/paranoia of almost epic proportions throughout our region.

As of 2005, some portions of the ten mile right-of-way for the TPL have actually been secured. Some portions are also being built as new development occurs. In other areas, however, political

decisions made during the 1990s have altered or even removed some portions of the TPL corridor. Homes, a golf course and even wetlands have been placed along the TPL corridors. Though the TPL corridor was battered and bruised during the 1990s, there remained eleven potential TPL alternatives on the table in 1997. This number was whittled down to five alternatives by 2001. In 2004, as part of the Regional Transportation Plan Update, the number of proposed TPL corridors was further reduced to three: the Valley Corridor (preferred by most proponents of the TPL and following the old 1960s route); the Foothill Corridor; and the Sparks Industrial Corridor (preferred by most Hidden Valley residents and veers east into neighboring Storey County). The remaining three potential TPL corridors are shown in Figure 2.

With only three remaining alternative corridors, there is renewed hope that the controversy, which has gone on for so long and pitted portions of the community against each other, can ultimately result in the best solution for the entire region.

Figure 2 – Tahoe Pyramid Link Corridor Alternatives



**Elements of the TPL Controversy**

An unfortunate side effect of any controversy like the TPL is that the proponents and opponents can often (through inexperience, insufficient information, emotions, or even sometimes unintentionally) generate misinformation, rumor, inaccuracies, or distortion of the facts, in an

attempt to argue or debate their position. The TPL controversy has been an unlucky victim of these phenomena.

The unfortunate recipients of this deluge of misinformation are the very group of people who have the fate of the controversy in their hands: the decision makers. Though decision makers are often pressured to answer to their constituency, the hope remains that the best decision for the entire region will in the end prevail and the controversy will be resolved. *This is where it becomes critical that transportation professionals provide the best available data and analysis to the decision makers to help them make informed decisions.* The ultimate decision on the TPL will have ramifications throughout the region for decades to come.

### **GIS to the Rescue**

Despite all the regrettable aspects associated with any controversy, there are new tools that assist transportation planners in providing information to decision makers, as well as performing key educational benefits to the general public. Fortunately for the Reno/Sparks region, there has been growth in computer software technology. In addition to all the population and employment growth, all the arguments over the role of the TPL, and the ongoing controversy, there has been development of Geographic Information Systems (GIS) resources. GIS will certainly play a vital function in ending the controversy of the TPL that has embraced the region for decades.

### **GIS Technology**

The 1960s TPL map shown in Figure 1 was obviously inadequate to play any role in resolving the TPL controversy that began to develop in 1980s and continues today. In a typical roadway controversy such as the TPL, some of the first actions taken (mostly from opponents of the TPL) include defining a wide range of issues that distinguish “fatal flaws” to the implementation of the road. As the original 1960s map cannot address any of them, it becomes immediately ineffective as an information tool. However, as an historical artifact, it can still serve a purpose of showing people how far GIS technology has come in solving difficult transportation issues.

While there are many issues central to the TPL controversy, five key factors show the power GIS can exert in working toward a resolution. These are:



1. Existing and Future Land Uses
2. Floodplains
3. Wetlands
4. Hillside
5. Parks and Open Space

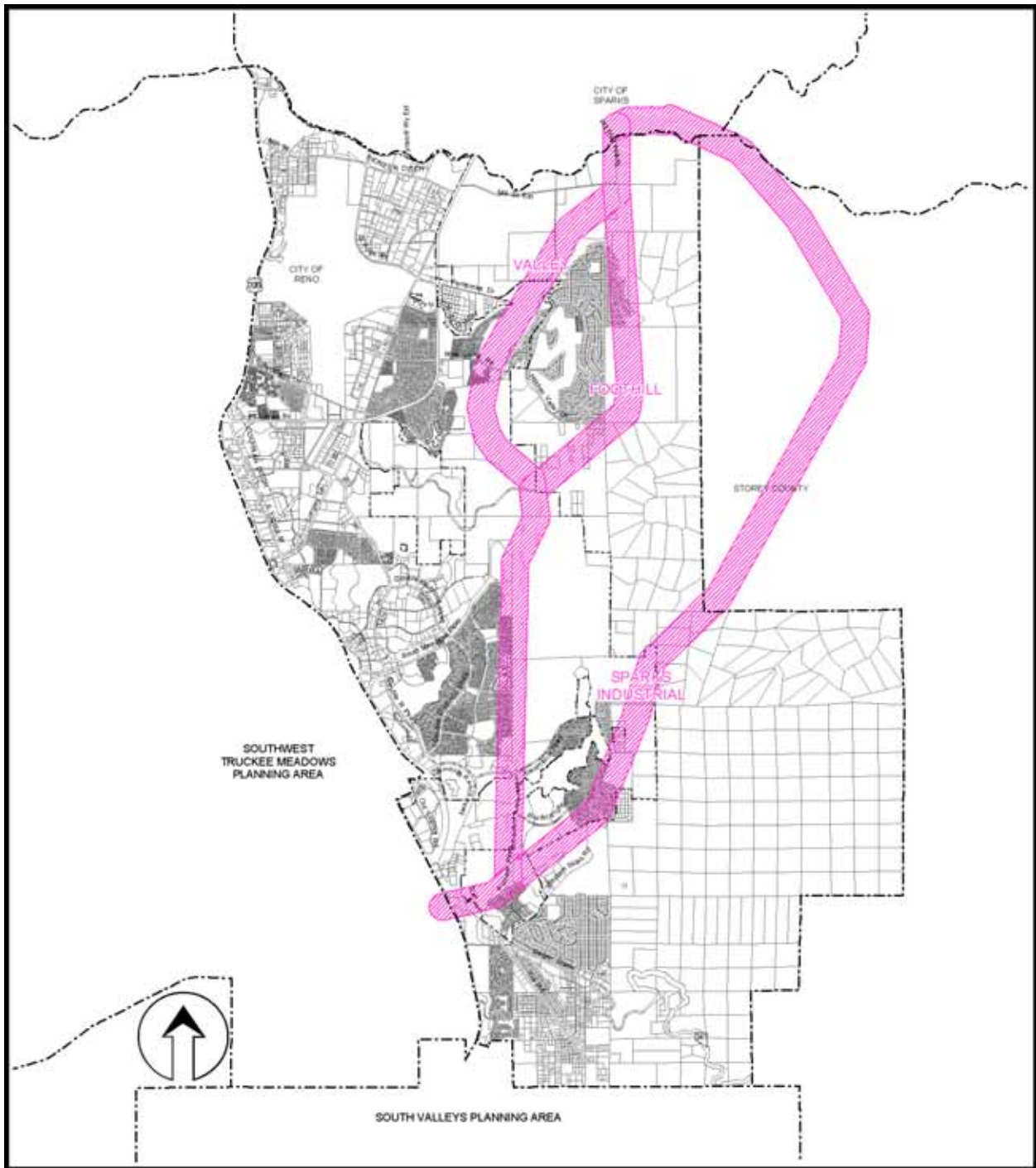
With GIS technology, these five factors can be portrayed graphically and used to compare the three remaining TPL corridors. These maps can help the public and decision makers understand the potential impacts. GIS maps can also help eliminate much of the misinformation generated by both sides of the controversy.

### **Existing and Future Land Uses**

A key concern of citizens involved in the TPL controversy is the direct impacts of a potential roadway on existing homes and businesses. At public forums, planning commissions, and elected board meetings, claims that “hundreds of homes” will be lost, devalued, or impacted is not uncommon. Contrary opinions minimize the potential impacts and rebut the amount of homes and businesses impacted, and suggest that most of the impacts can be mitigated.

GIS coverages with parcel data can provide valuable information to decision makers on the magnitude of potential impact on existing homes and businesses. When the three remaining TPL corridors are overlaid on the current parcel base, the location and general number of affected properties can be seen. Refer to Figure 3.

Figure 3 – TPL Alternatives Compared with Parcel Base



In a review of Figure 3, each TPL Alternative will impact varying numbers of homes and businesses. The Valley and Foothill Corridors impact homes in the Hidden Valley and Rosewood Lakes Developments, but the Sparks Industrial Alternative impacts homes in the Damonte Ranch Development. The number of homes, homesites, and acres of commercial area within each corridor can be documented using GIS data. GIS maps with parcel overlays also helped convince

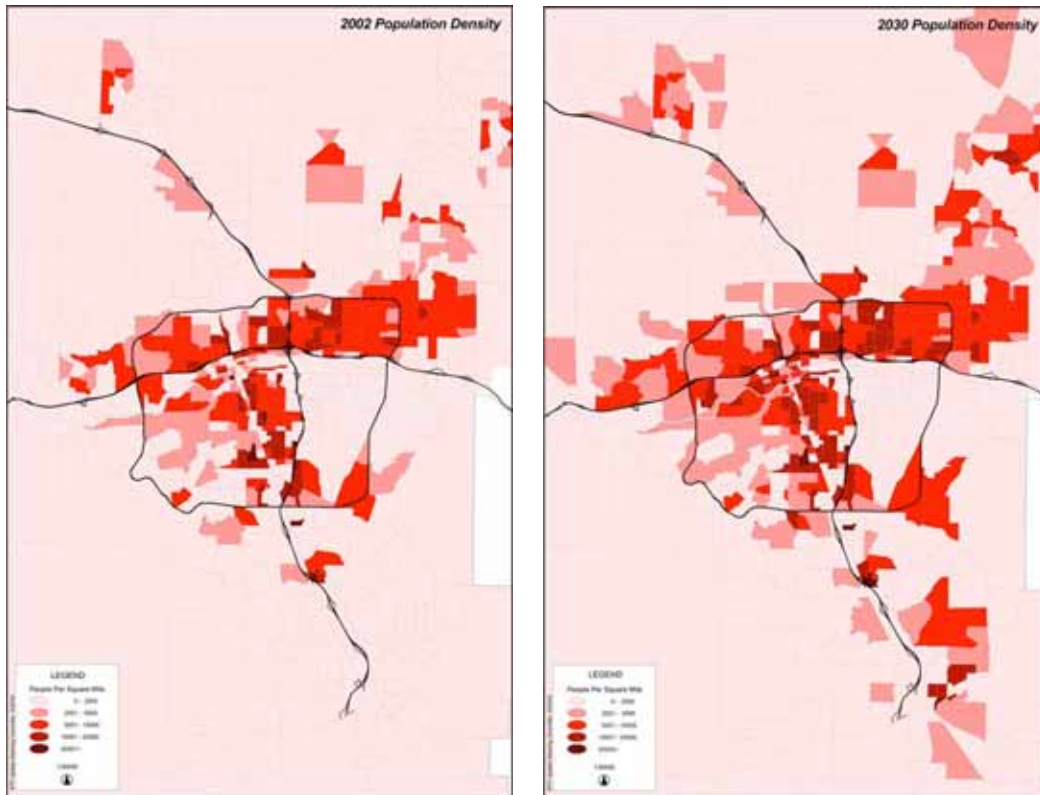
developers to move the TPL alignment in portions of southeast Reno to avoid direct impacts to homes and home sites.

Another frequently asked question about the TPL involves future land uses and whether the TPL is really needed to serve regional growth. Planners communicate statistics, forecasts, projections, lists of developments, and numbers. Opponents and even proponents, depending on their position on the matter, will question the statistical data provided. Back and forth debate on strictly statistical data does not portray the “picture” necessary to show decision makers the magnitude of planned growth. GIS can graphically portray and provide an answer to many of the growth questions raised.

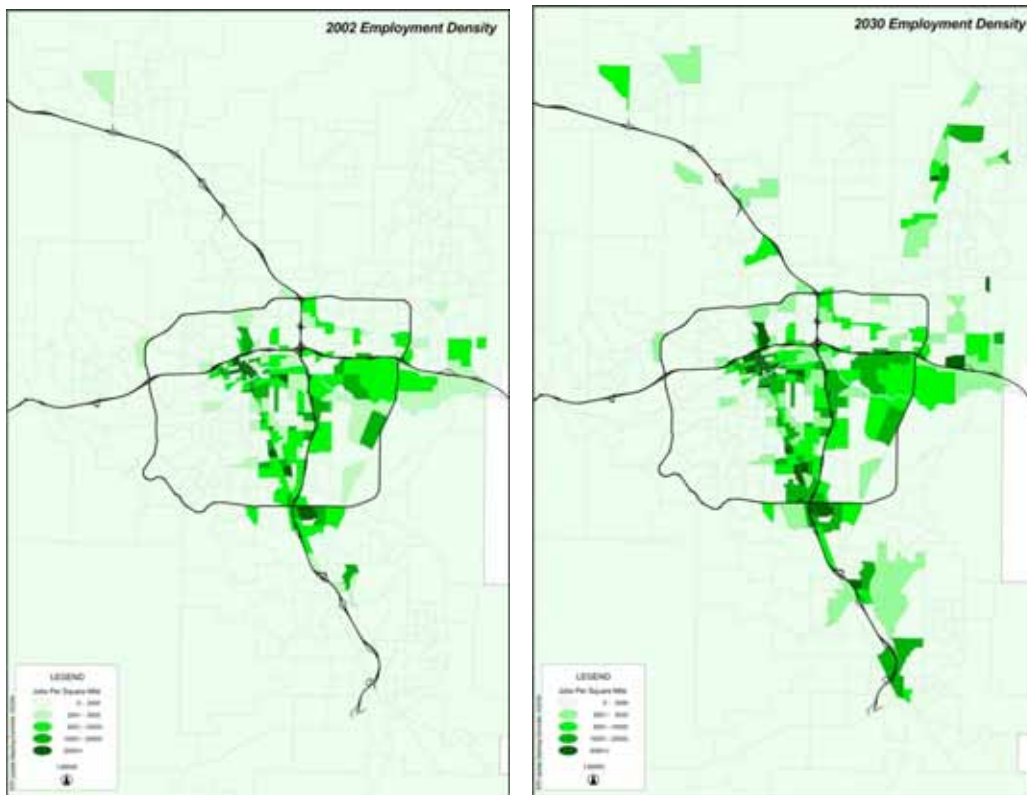
One simple GIS map portrays population and employment densities for the years 2002 and 2030 (using Traffic Analysis Zone data). Refer to Figures 4-6.

In a review of Figures 4-6, the differences in population and employment densities between 2002 and 2030 are clearly visible. In 2002 the majority of the southeast Reno area is noticeably void of major land use concentrations. This significantly changes as time goes forward. Large nodes of population and employment densities appear in the 2030 map in the southeast Reno area. The GIS maps provide clear evidence of increased demand for travel over the next 25 years.

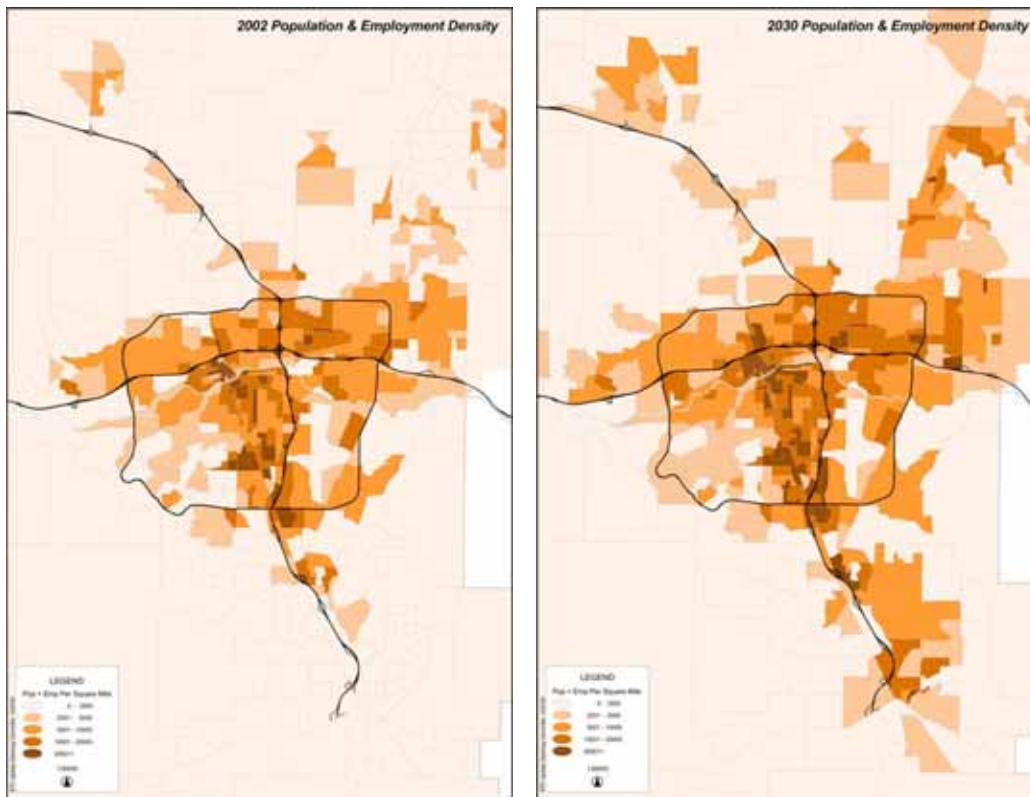
Figures 4a and 4b – 2002 and 2030 Population Densities



Figures 5a and 5b – 2002 and 2030 Employment Densities



**Figures 6a and 6b – 2002 and 2030 Population/Employment Densities**



### **Floodplains**

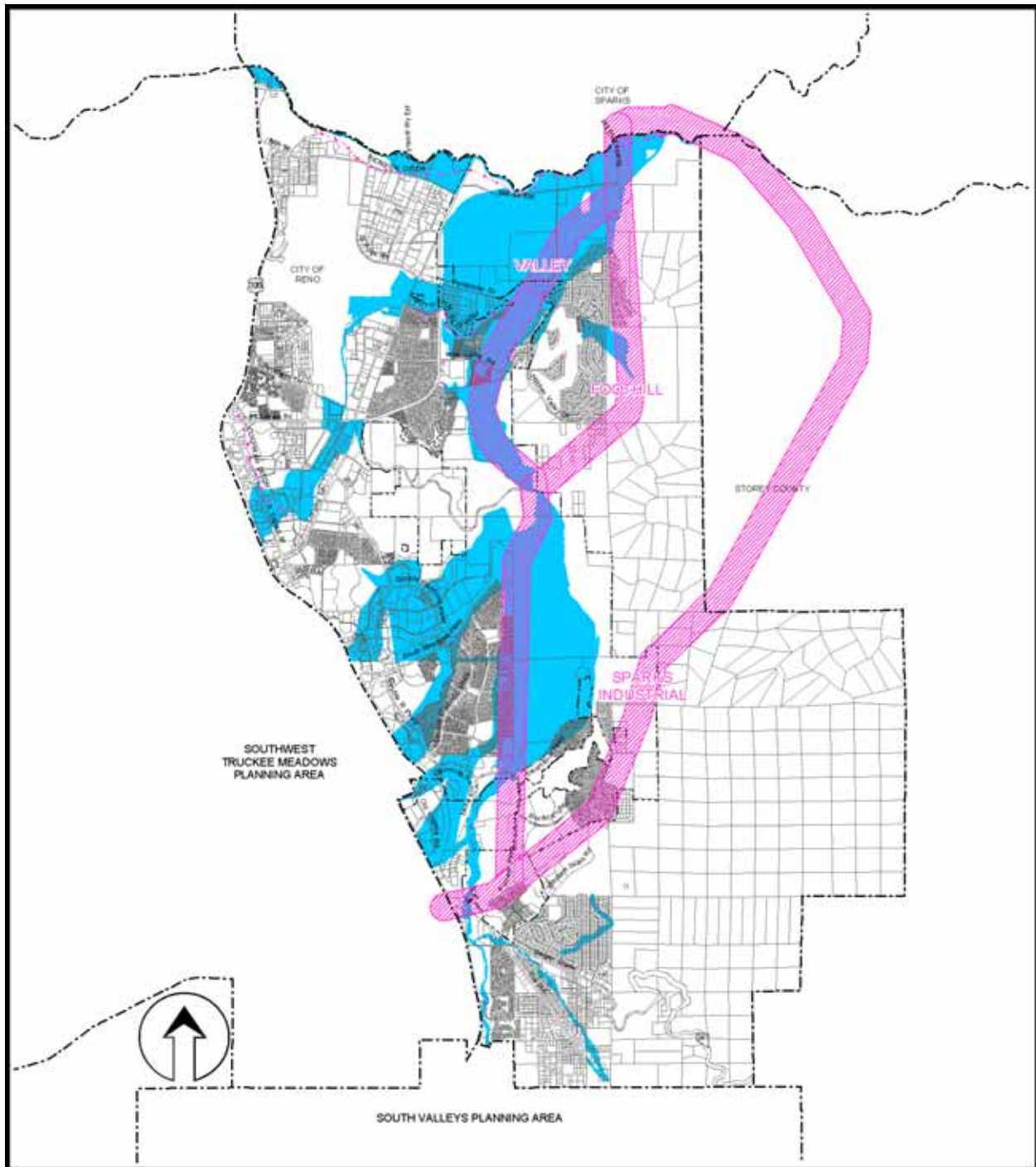
One of the most debated issues in the TPL controversy is the issue of floods and floodplains. The debate has been enhanced ever since the 1997 flood of the Truckee River, which bisects the Reno/Sparks area. Throughout the debate, opponents state that the TPL should not be built because it would disrupt flood planning efforts. Frequent comments are made that constructing the TPL would leave the southeast area vulnerable to future floods. Proponents offer opposing views that flood issues are not related to the TPL and that flood concerns are just an obstacle placed in the way of building a badly needed roadway. Proponents offer engineering studies that claim no flood storage will be lost if: a viaduct is constructed or flood detention areas are deepened to offset storage area lost from an above-grade roadway. If the road is built at grade, no flood storage area would be lost and the road would simply be closed during rare major flood events.

Fortunately GIS can provide answers of where the floodplains are and what areas can expect to be impacted if a future flood occurs. The three potential TPL corridors can be overlain on the GIS floodplain coverage and areas of impact identified. Refer to Figure 7.

In review of Figure 7, two of the three TPL corridors contact the floodplain in southeast Reno (Valley and Foothill). Notably, extensive flood mitigation has already taken place in this part of the region to accommodate large residential developments. The third corridor (Sparks Industrial Corridor) avoids the majority of the floodplain as it rises into the mountains. GIS has provided vital information pertaining to flood issues and the TPL.



Figure 7 – TPL Alternatives Compared with Floodplain



### Wetlands

With the rapid growth in the Reno/Sparks region, valuable wetland resources have been threatened or removed as development occurs. In the late 1980s, the City of Reno approved the temporary installation of wetlands along the TPL corridor through the Rosewood Lakes Golf Course. Opponents to the TPL cite the threat to the wetlands as one reason not to build it.

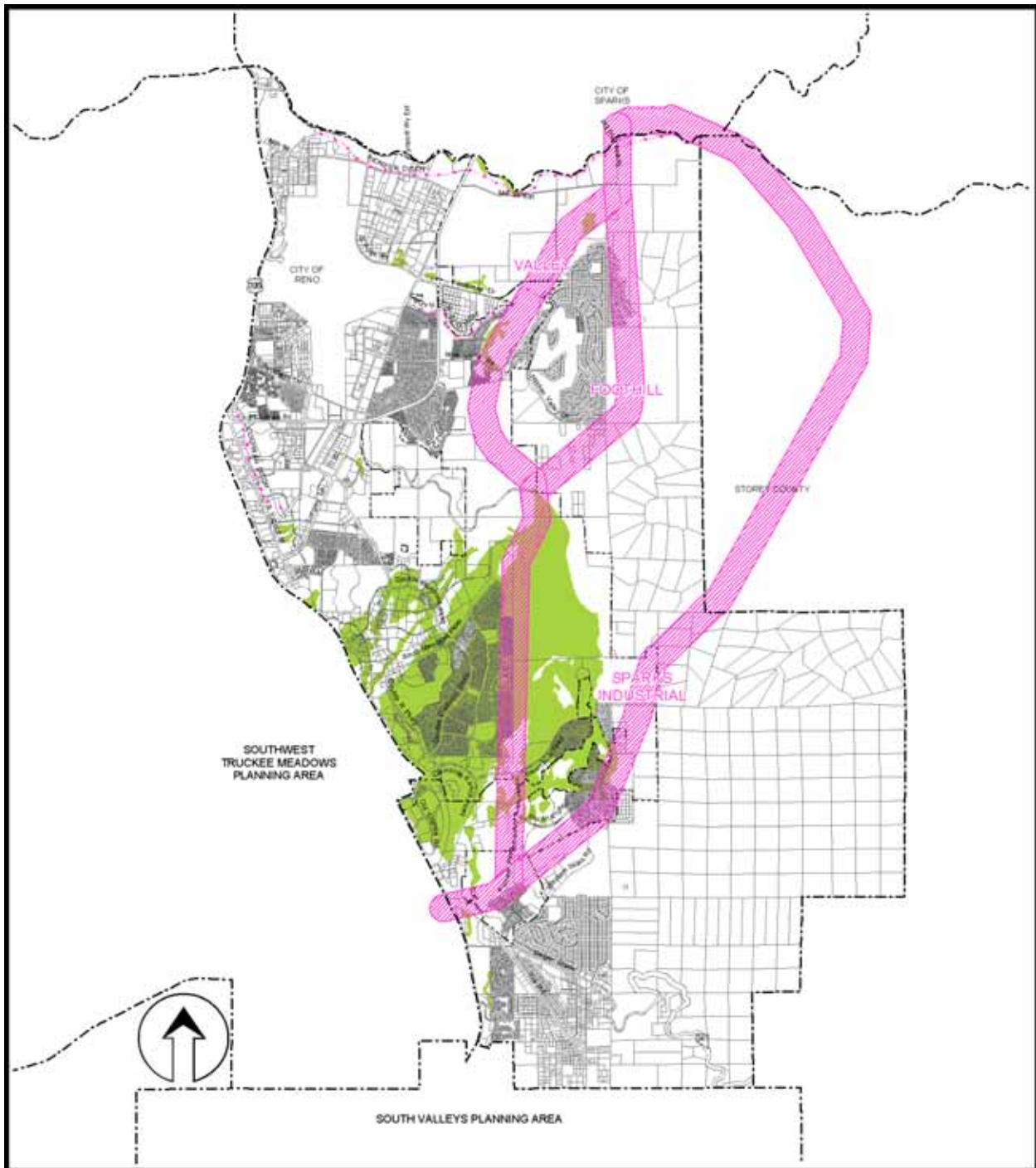
Proponents argue that wetlands mitigation is possible and that federal processes are in place to relocate wetlands, often in amounts above and beyond what may be impacted by a potential TPL.

Fortunately GIS can provide the answer to the wetland question. The GIS wetland coverage can be overlaid by the three TPL alternatives and areas of impact can be identified. Refer to Figure 8.

In a review of Figure 8, the Valley and Foothill Corridors traverse wetlands in the southern sections of the proposed roadway. The Sparks Industrial Corridor misses the majority of wetlands as it climbs into the mountains. With certainty, the Valley and Foothill Corridors will have to go through extensive wetlands mitigation. Again, wetlands mitigation has already taken place in the southeast to serve large residential developments.



Figure 8 – TPL Alternatives Compared with Wetlands



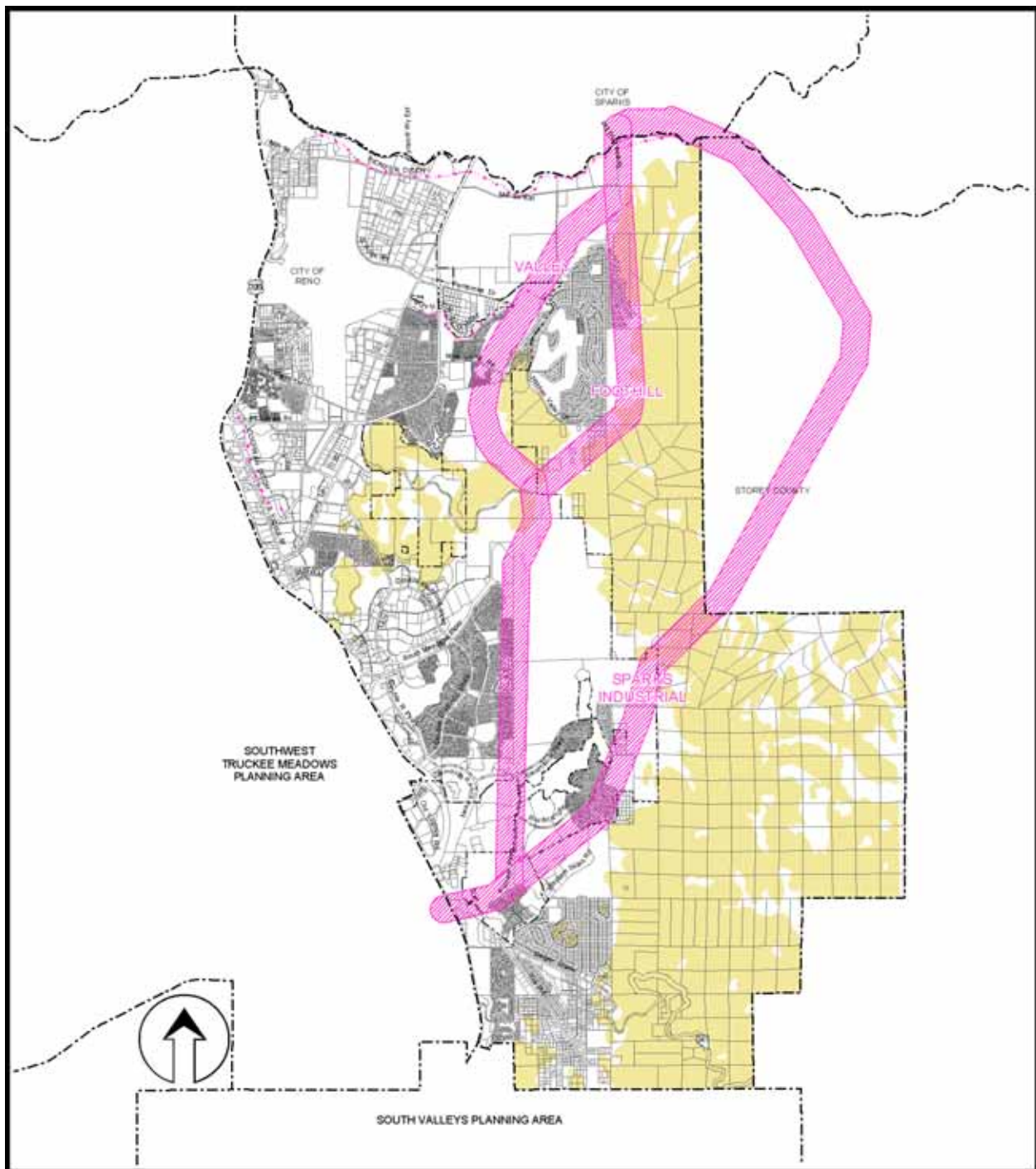
### Hillsides

Another area of debate is the TPL impact to hillsides and slopes along the eastern side of the region. Opponents claim the TPL will forever scar the hillsides of the Virginia Range. Proponents claim the roadway can be mitigated to blend in with the surrounding landscape.

Fortunately, there are GIS coverages that can quantify the impacts of the TPL corridors on hillsides and steep slopes. Refer to Figure 9.

In a review of Figure 9, the Valley Corridor misses most of the hillsides. The Foothill Corridor travels at the base of the Virginia Range and does impact some hillsides and slopes. The greatest amount of hillside impact is seen under the Sparks Industrial Corridor. The need to climb into and out of the Virginia Range, to miss the Hidden Valley community, creates significant impacts to the hillsides and slopes.

Figure 9 – TPL Alternatives Compared with Hillside



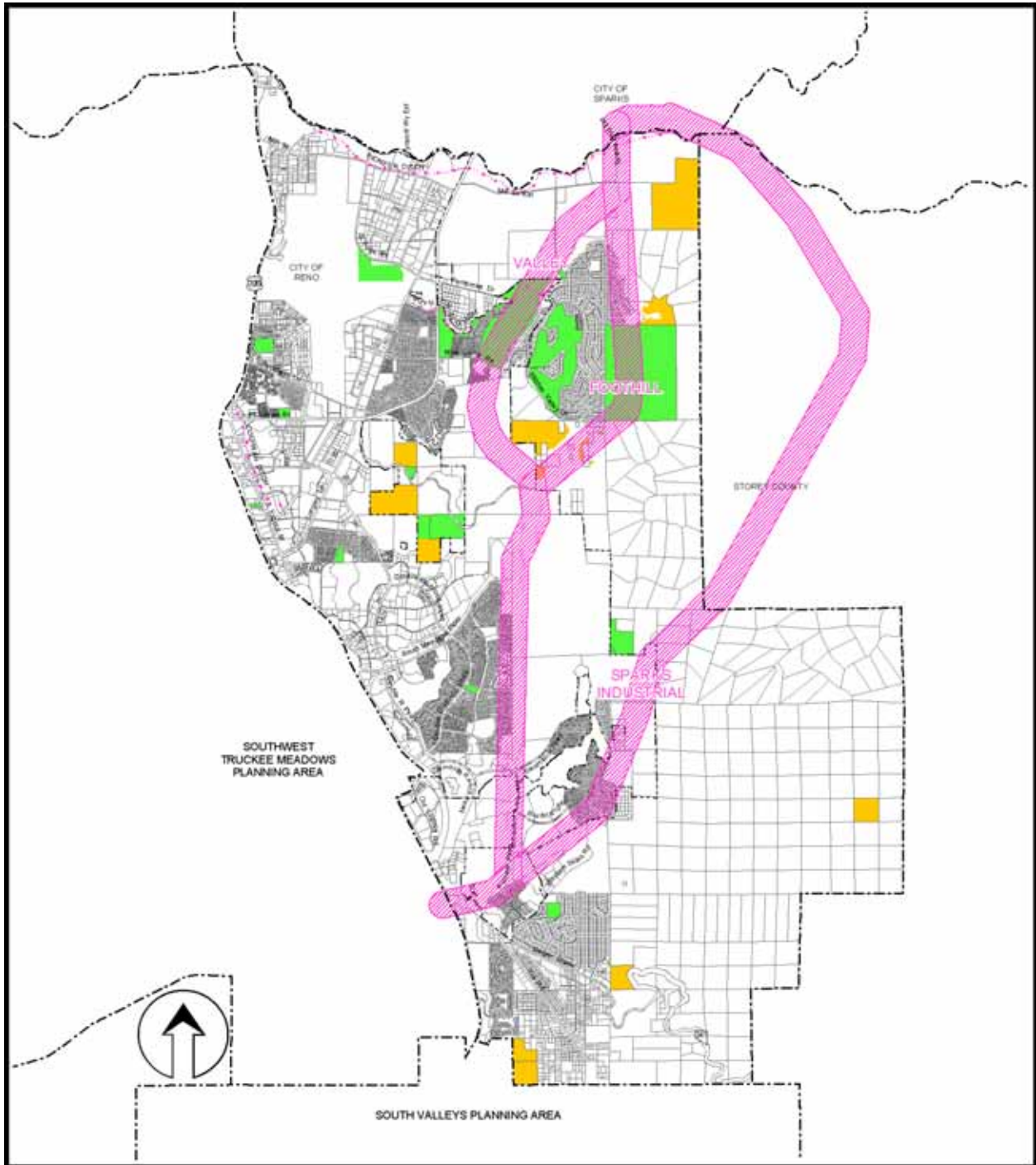
The GIS slope information also provides support information for another key question when comparing the three TPL corridors: what is the cost? The Valley Corridor is estimated to cost approximately half of the Sparks Industrial Corridor (\$130 million versus \$260 million) with the Foothill Corridor in the middle of the other two. The significant cost difference can be traced to the need to climb over 1500 feet into the Virginia Range under the Sparks Industrial Corridor.

### **Parks and Open Space**

With fast paced growth throughout the region, the protection of parks and open space for recreational and public uses is an important issue to the entire community. Opponents of the TPL point out that the road construction will remove or negatively impact large amounts of valuable parks and open space. GIS coverages can illustrate the location and general amount of parks and open space that will be impacted by the TPL. Refer to Figure 10.

In a review of Figure 10, the Foothill Corridor bisects the Hidden Valley Regional Park. The Valley Corridor bisects the Rosewood Lakes Golf Course. Master planned open space is mostly missed by each of the three alternatives. To maintain the integrity of the Rosewood Lakes Golf Course, several holes would need to be relocated. The Hidden Valley Regional Park would require extensive mitigation or alteration under the Foothill Alternative.

Figure 10 – TPL Alternatives Compared with Parks and Open Space



## **Summary**

In terms of time, controversies can be resolved in minutes, hours, or sometimes even days. Over the years, the Tahoe-Pyramid Link controversy has defied resolution and has prolonged nearly 50 years. The dispute still continues with opposing viewpoints as strong as ever. There is, however, the proverbial light at the end of the tunnel. This light shines thanks in a large part to the advent and power of Geographic Information Systems. GIS has helped reduce more than a dozen roadway alternatives down to three. GIS has provided valuable information on some of the most critical issues regarding the TPL. The time will soon come when decision makers can make their final decisions using well-developed and clear data, graphically portrayed as a powerful tool. GIS has provided vital new ammunition against controversy. And while politics have and always will play a role in the outcome, GIS will help the region move forward, heal differences, and finally put to rest the controversy that has existed for more than nearly 50 years.

## **Acknowledgements**

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