

2011 DOUGLAS COUNTY MASTER PLAN

VOLUME II EXISTING CONDITIONS



Table of Contents

Volume II

	Page
<u>Chapter 1: Douglas County Profile</u>	
Location	1-1
Population	1-2
Housing	1-7
Economy	1-8
 <u>Chapter 2: Population</u>	
Population Growth	2-1
Race and Ethnicity	2-3
Douglas County Demographic Characteristics	2-3
Economic Activity	2-7
Future Population Growth.....	2-8
 <u>Chapter 3: Land Use</u>	
Land Area.....	3-1
Future Land Use.....	3-3
Zoning Districts	3-3
Population Density.....	3-5
 <u>Chapter 4: Housing</u>	
Housing Units in Douglas County	4-1
Subsidized Housing Inventory in Douglas County.....	4-2
Supportive, Transitional and Temporary Emergency Housing	4-3
Household Tenure	4-4
Affordable Housing Defined.....	4-5
Ownership Affordability in Douglas County.....	4-16
Homebuyer Assistance Programs in Douglas County	4-22
Affordable Housing Barriers and Impediments to Fair Housing.....	4-23
Housing Demand by Income and Tenure	4-27
 <u>Chapter 5: Transportation</u>	
Streets and Highways.....	5-1
Tahoe Transportation District.....	5-10
Transportation Revenues	5-13
Minden-Tahoe Airport.....	5-14
Douglas County Trails	5-15

Chapter 6: Growth Management

Introduction.....	6-1
Receiving Areas.....	6-1
Sending Areas.....	6-4
Carson Valley.....	6-7
Topaz.....	6-10
Issues.....	6-10

Chapter 7: Environmental Resources and Conservation

Air Quality.....	7-1
Geology/Seismic.....	7-1
Soils.....	7-9
Slopes-Hillsides-Ridgelines.....	7-16
Climate.....	7-23
Flooding and Drainage.....	7-24
Carson River Tributary Basin Flooding.....	7-32
Federal Emergency Management Agency Floodplains.....	7-33
Flooding Frequency.....	7-36
Flood Insurance Rate Map Description.....	7-36
Flood Insurance Zones.....	7-36
Carson River Flood Management.....	7-37
Tributary Basin Floodplain Management.....	7-38
Alluvial Fan Floodplain Management.....	7-42
Development Considerations.....	7-44
Point and Non-Point Pollution.....	7-44
Potential Wetlands.....	7-45
Water Resources.....	7-45
Water Quality.....	7-46
Carson Valley (Carson River Basin).....	7-47
Antelope Valley (Topaz Lake and West Walker River Basin).....	7-48
Water Quantity.....	7-49
Carson Valley (Carson River Basin).....	7-49
Antelope Valley (Topaz Lake and West Walker River Basin).....	7-51
Water Rights and Ground Water Pumping.....	7-52
Wildlife/Vegetation.....	7-55
Energy.....	7-60
Noise.....	7-62

<u>Chapter 8: Public Services and Facilities Element (2007).....</u>	8-1
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List of Figures

	Page
Figure 1.1	Douglas County Population 1900 to Present 1-2
Figure 1.2	Population Growth by Decade 1-2
Figure 1.3	2010 Age Compositions..... 1-4
Figure 1.4	2010 Educational Attainment 1-6
Figure 1.5	Douglas County Housing Inventory 1-7
Figure 1.6	Household Tenure in Douglas County and Surrounding Jurisdictions... 1-7
Figure 1.7	Unemployment Rate in Douglas County, Nevada, and United States.... 1-8
Figure 1.8	Percentage of Employees by Industry..... 1-9
Figure 1.9	2005-2010 Employment by Industry 1-10
Figure 1.10	Commuting Patterns..... 1-10
Figure 1.11	Largest Employers in Douglas County 1-11
Figure 1.12	Number of Douglas County Employers Ranked by Size..... 1-12
Figure 1.13	Median Household Income Trend 2002-2009 1-13
Figure 2.1	Douglas County Population Growth: 2000-2010 2-1
Figure 2.2	Population Change in Douglas County and Douglas County CDPs 2-2
Figure 2.3	Douglas County Race and Ethnicity: 2000-2010..... 2-3
Figure 2.4	Population Age 65 and Older in Douglas County 2-4
Figure 2.5	Median Age by County in the State of Nevada: 1990, 2000, and 2010 .. 2-4
Figure 2.6	Households in Douglas County and Nevada, 2000 and 2010..... 2-6
Figure 2.7	Douglas County School Enrollment 2-7
Figure 2.8	Comparative Economic Measures 2-8
Figure 2.9	Douglas County Population Forecasts: 2010-2030..... 2-9
Figure 3.1	Douglas County Total Area, by Acreage and Square Miles 3-1
Figure 3.2	Public Land Ownership in Douglas County 3-1
Figure 3.3	Land Area in Douglas County, by Future Land Use 3-3
Figure 3.4	Land Area in Douglas County, by Zoning District..... 3-4
Figure 3.5	Douglas County Land Area, by Regional Plan..... 3-5
Figure 3.6	Population Density by Community Plan 3-5
Figure 4.1	Housing Inventory in Douglas County and Surrounding Communities.. 4-1
Figure 4.2	Subsidized Rental Inventory in Douglas County 4-2
Figure 4.3	Tenure of Occupied Units 4-4
Figure 4.4	Affordable Rents in Douglas County, by Household Income 4-6
Figure 4.5	HOME and Fair Market Maximum Gross Rents..... 4-8
Figure 4.6	Gross Rents as a Percentage of Household Income..... 4-8
Figure 4.7	HUD CHAS Data Book for Douglas County, 2000 4-10
Figure 4.8	Low Income Households and Housing Problems 4-11
Figure 4.9	Douglas County Average Rents 2007-2009 4-12
Figure 4.10	Percent of Douglas County Households Paying More than 30 Percent Of Income on Rents By Income Level: 2009 4-13
Figure 4.11	Percent of Douglas County Households Paying More than 30 Percent Of Income on Rents by Income Level and Age of Householder: 2009 4-14
Figure 4.12	Rents Available in Carson Valley and Lake Tahoe: 2011 4-15
Figure 4.13	Affordable Housing Prices for Owners, Douglas County 2011 4-17
Figure 4.14	Single Family Housing Sales 4-18

Figure 4.15	Percent of Owner Households Paying More than 30 Percent of Income On Housing Related Costs by Income Level:2009.....	4-19
Figure 4.16	Selected Monthly Owner Costs	4-20
Figure 4.17	Douglas County Single-Family and Condominium Sales	4-21
Figure 4.18	Foreclosures, Trustee Sales and Defaults, 2011	4-21
Figure 4.19	Lending Activity in Douglas County	4-22
Figure 4.20	Vacant Parcels Available	4-27
Figure 4.21	Housing Demand Forecast, State Demographer’s	4-28
Figure 4.22	Housing Demand Forecast, Historic Population Growth	4-29
Figure 5.1	Lineal Miles of Roads Maintained.....	5-2
Figure 5.2	Average Daily Trips.....	5-9
Figure 5.3	Description of Nevada Stateline-to-Stateline Bikeway	5-10
Figure 5.4	Nevada Stateline-to-Stateline Bikeway Cost Estimate and Phasing.....	5-10
Figure 5.5	Description of the U.S. 50 South Shore Project.....	5-11
Figure 5.6	Douglas County Transportation Revenues	5-13
Figure 5.7	Summary of Local and Itinerant Operations.....	5-14
Figure 6.1	Receiving Area Status.....	6-1
Figure 6.2	TDR Calculator.....	6-4
Figure 6.3	Carson Valley Sending Areas	6-5
Figure 6.4	Topaz Sending Areas	6-6
Figure 6.5	Transfer Development Rights Activity.....	6-7
Figure 6.6	Carson Valley TDRs Needed to Support Approved Projects	6-8
Figure 6.7	Carson Valley TDR Requirements	6-9
Figure 6.8	Topaz Receiving Area Zoning	6-10
Figure 7.1	Geologic Conditions	7-3
Figure 7.2	Areas Dominated by Soils on Floodplains	7-9
Figure 7.3	Areas Dominated by Well Drained Soils on Alluvial Fans	7-10
Figure 7.4	Areas Dominated by Well Drained Soils on Foothills.....	7-10
Figure 7.5	Areas Dominated by Well Drained Soils on Mountains.....	7-11
Figure 7.6	Generalized Slope Characteristics	7-18
Figure 7.7	High Priority	7-40
Figure 7.8	Medium Priority.....	7-41
Figure 7.9	Low Priority	7-42
Figure 7.10	Treated Effluent – Carson Valley	7-51
Figure 7.11	Characteristics of Carson Valley Geothermal Waters	7-61

List of Maps

	Page
Map 1.1	Douglas County and Surrounding Jurisdictions 1-1
Map 1.2	2010 Population of Census Designated Places in Douglas County 1-3
Map 1.3	2010 Population by Census Block Group 1-3
Map 3.1	Federal/State Ownership in Douglas County 3-2
Map 3.2	Carson Valley Regional Plan and Community Plan Boundaries 3-6
Map 3.3	Pinenut Regional Plan Boundary 3-7
Map 3.4	Sierra Regional Plan Boundary 3-8
Map 3.5	Tahoe Regional Plan Boundary 3-9
Map 3.6	Topaz Regional Plan Boundary 3-10
Map 5.1	Douglas County Maintenance Index 5-1
Map 5.2	Douglas County Maintenance Zone 1 5-3
Map 5.3	Douglas County Maintenance Zone 2 5-4
Map 5.4	Douglas County Maintenance Zone 3 5-5
Map 5.5	Douglas County Maintenance Zone 4 5-6
Map 5.6	Douglas County Maintenance Zone 5 & 6 5-7
Map 5.7	Douglas County Maintenance Zone 7 5-8
Map 5.8	Location of U.S. 50 South Shore Community Revitalization Project ... 5-11
Map 5.9	Tahoe Transportation District’s Capital Projects 5-12
Map 5.10	Proposed Genoa Trail 5-15
Map 5.11	Douglas County Trails 5-16
Map 6.1	Receiving Areas in the Carson Valley Regional Plan 6-2
Map 6.2	Receiving Areas in the Topaz Regional Plan 6-3
Map 7.1	Sierra Geologic Features 7-5
Map 7.2	Carson Valley Geologic Features 7-6
Map 7.3	Pinenut Geologic Features 7-7
Map 7.4	Topaz Geologic Features 7-8
Map 7.5	Sierra Soils 7-12
Map 7.6	Carson Valley Soils 7-13
Map 7.7	Pinenut Soils 7-14
Map 7.8	Topaz Soils 7-15
Map 7.9	Sierra Moderate to Steep Slopes 7-19
Map 7.10	Carson Valley Moderate to Steep Slopes 7-20
Map 7.11	Pinenut Moderate to Steep Slopes 7-21
Map 7.12	Topaz Moderate to Steep Slopes 7-22
Map 7.13	Tahoe and Sierra Floodplain 7-26
Map 7.14	Carson Valley Floodplain 7-27
Map 7.15	Pinenut Floodplain 7-28
Map 7.16	Topaz Floodplain 7-29
Map 7.17	Hydrology 7-35
Map 7.18	Carson Valley Drainage 7-39
Map 7.19	Carson Valley Alpine Decree Lands 7-54
Map 7.20	Sierra Mule Deer Migration 7-57
Map 7.21	Carson Valley Mule Deer Migration 7-58
Map 7.22	Pinenut Mule Deer Migration 7-59

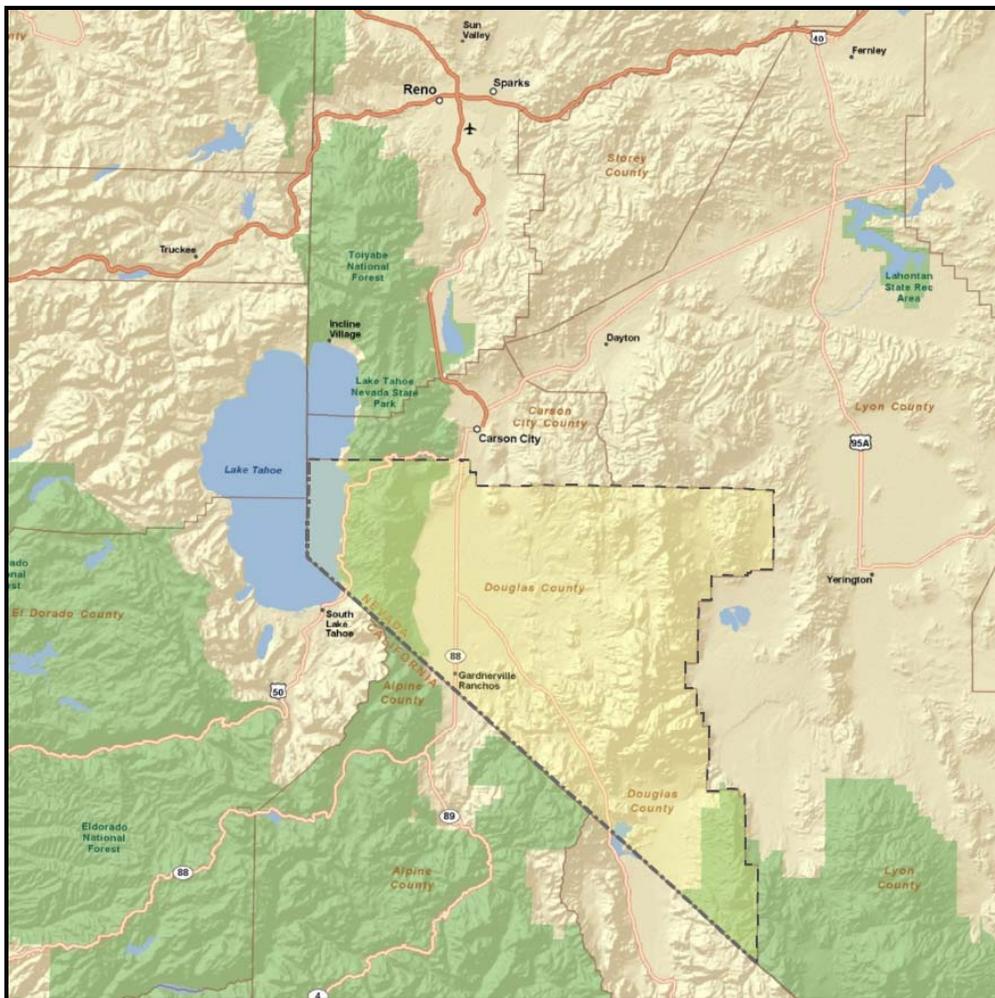
Chapter 1 County Profile

The County Profile provides a brief introduction to Douglas County and includes information related to population, housing, and the economy. More detailed information on population and housing may be viewed in Chapters 2 and 4, respectively.

Location

Douglas County is located in Northern Nevada and contains a total area of 737.7 square miles, or 472,133 acres. The County is bordered by Carson City, the State Capital, to the north, Lyon County to the south and east, and the State of California to the southwest. Douglas County includes a portion of Lake Tahoe. Map 1.1 depicts the location of the County in relation to adjacent jurisdictions in Northern Nevada.

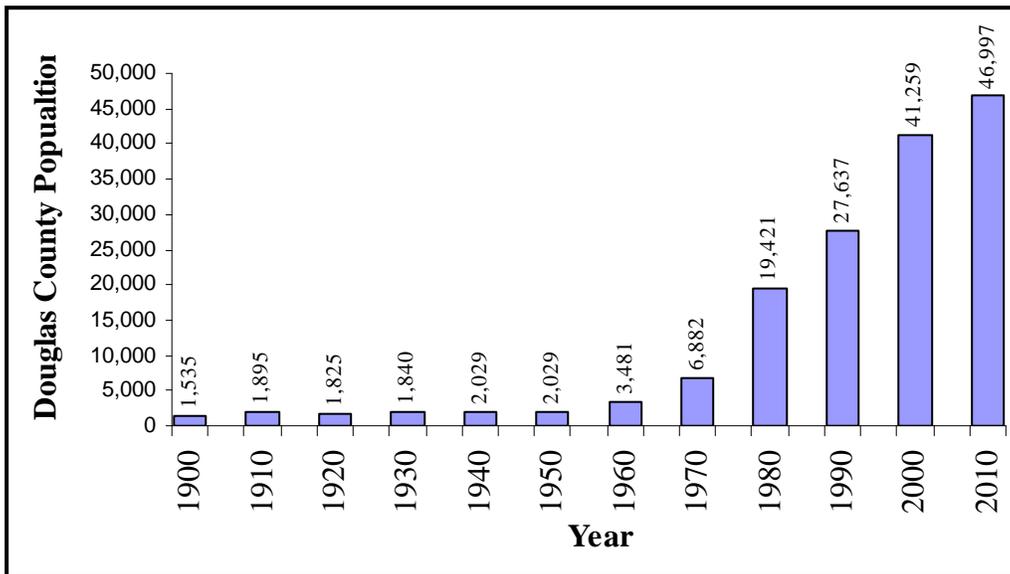
**Map 1.1
Douglas County and Surrounding Jurisdictions**



Population

Since the 1960's, Douglas County has grown from a small predominantly agricultural community to a mid size community comprised of both urban and rural areas. The population boom began in the 1960's with the greatest growth rate between 1970 and 1980. As shown in Figure 1.1, the population increased from 6,882 in 1970 to 19,421 in 1980. As of the 2010 Census, the population of Douglas County has reached 46,997.

**Figure 1.1
 Douglas County Population 1900 to Present**



Source: 2010 Census

Compared to previous decades, for the years between 2000 and 2010, the growth rate of the County began to decline. Figure 1.2 displays the change in population for each decennial census. For the 2000-2010 period, Douglas County increased by only 14 percent, the lowest growth rate since 1940.

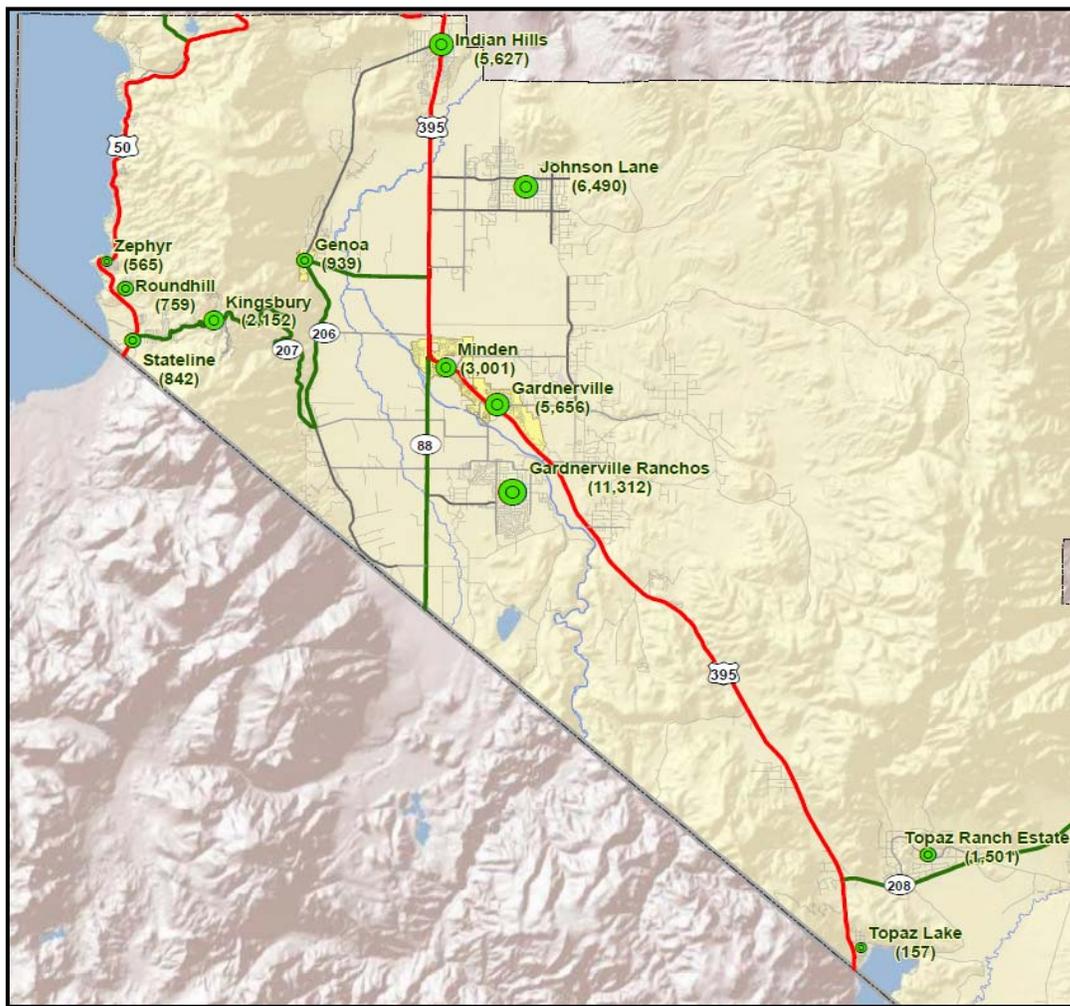
**Figure 1.2
 Population Growth by Decade**

Decade	Population Change	Percentage Change
1950 to 1960	1,452	72%
1960 to 1970	3,401	98%
1970 to 1980	12,539	182%
1980 to 1990	8,216	42%
1990 to 2000	13,622	49%
2000 to 2010	5,738	14%

Source: 2010 Census

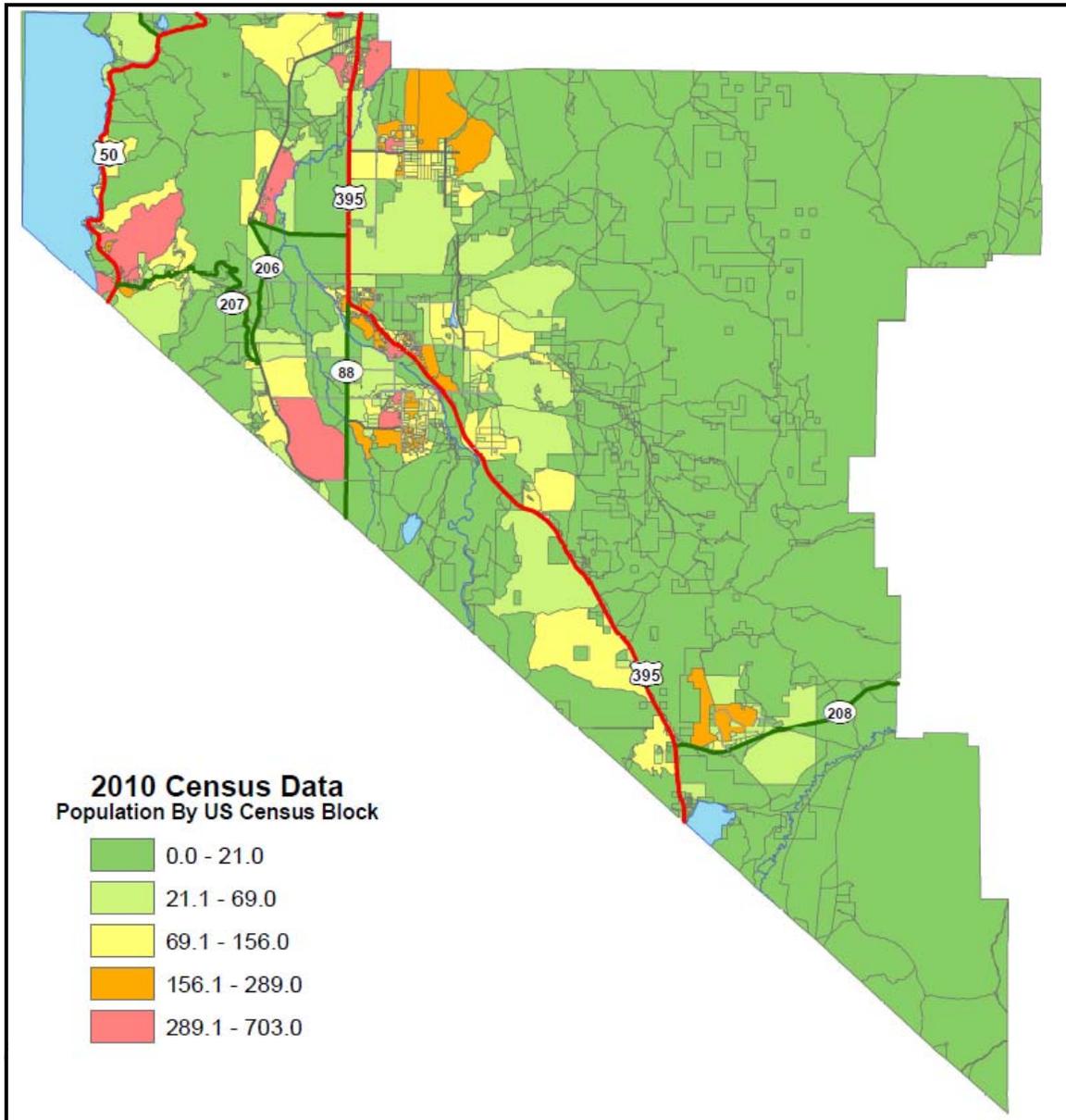
Douglas County's development pattern has largely been dictated by natural geography. Formed by the Sierra Nevada and Pinenut mountain ranges, Lake Tahoe, Topaz Lake, and the Carson and Walker Rivers, the geological features have carved the County into three primary geographical areas. The three geographical areas include the Lake Tahoe Basin, the Carson Valley, and the Topaz Lake area. The bulk of the population is located in the Carson Valley, which contains three unincorporated towns, Gardnerville, Genoa, and Minden, and two general improvement districts, Gardnerville Ranchos and Indian Hills General Improvement Districts. The Lake Tahoe Basin portion of Douglas County contains 13 general improvement districts. The Topaz Lake/Topaz Ranch Estates area is located approximately fifteen miles south of Gardnerville and is the least populated of the three areas. Map 1.2 depicts the Census Designated Places (CDP) in Douglas County and the 2010 Census Population for each CDP.

Map 1.2
2010 Population of Census Designated Places in Douglas County



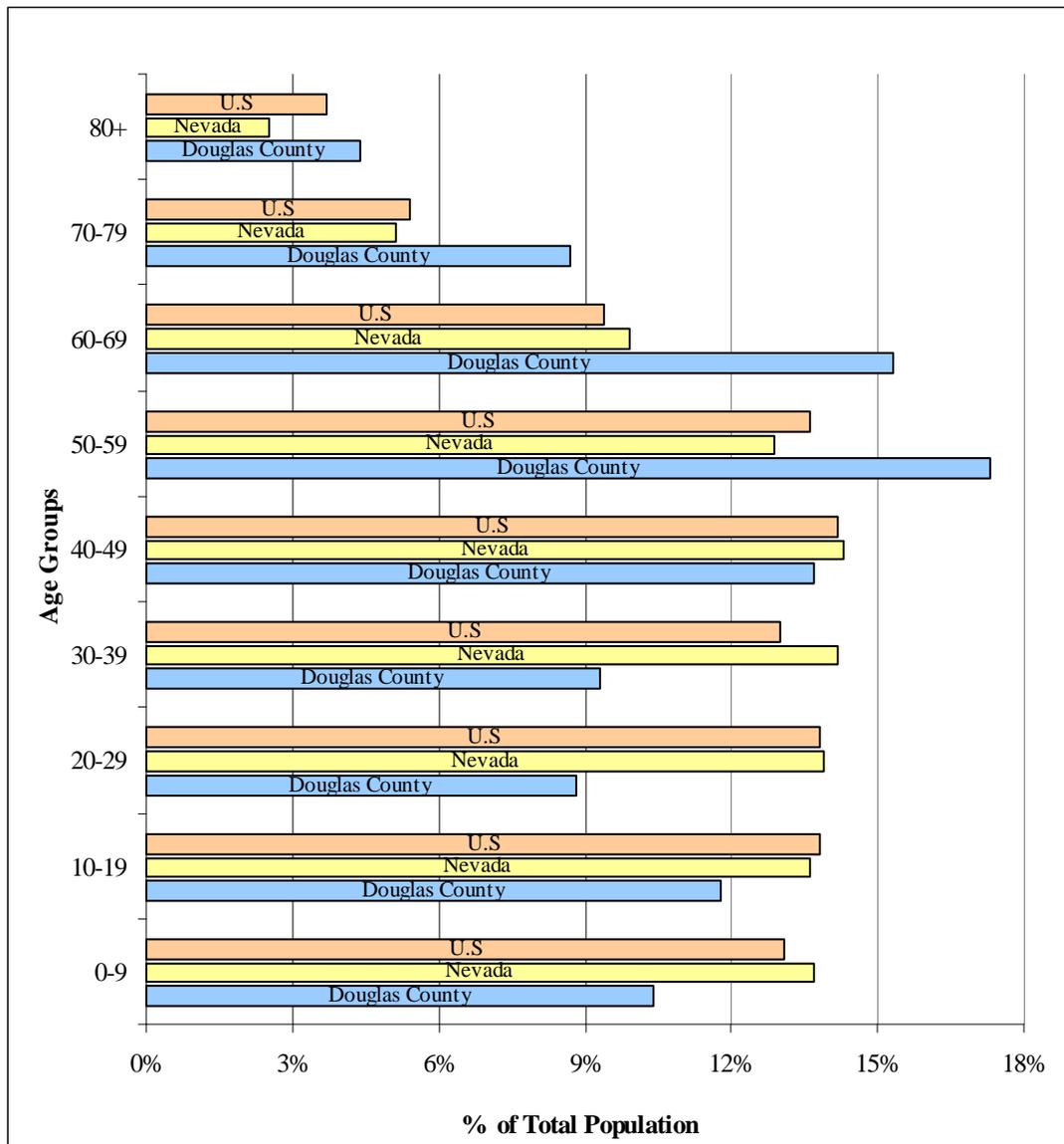
Population concentrations are depicted on Map 1.3, which shows population ranges by census block (2010 Census). The vast majority of the County's land area is very sparsely populated.

Map 1.3
Population by the 2010 Census Blocks



The age composition chart, as shown in Figure 1.3 below, compares Douglas County to the United States and the State of Nevada. The 2010 Census shows Douglas County as having a higher percentage than the Country and State of Nevada for any age group over 50 years old. Conversely, the age groups below the age of 50 in Douglas County make up a smaller percentage of the population than usual when compared to the Country and State of Nevada.

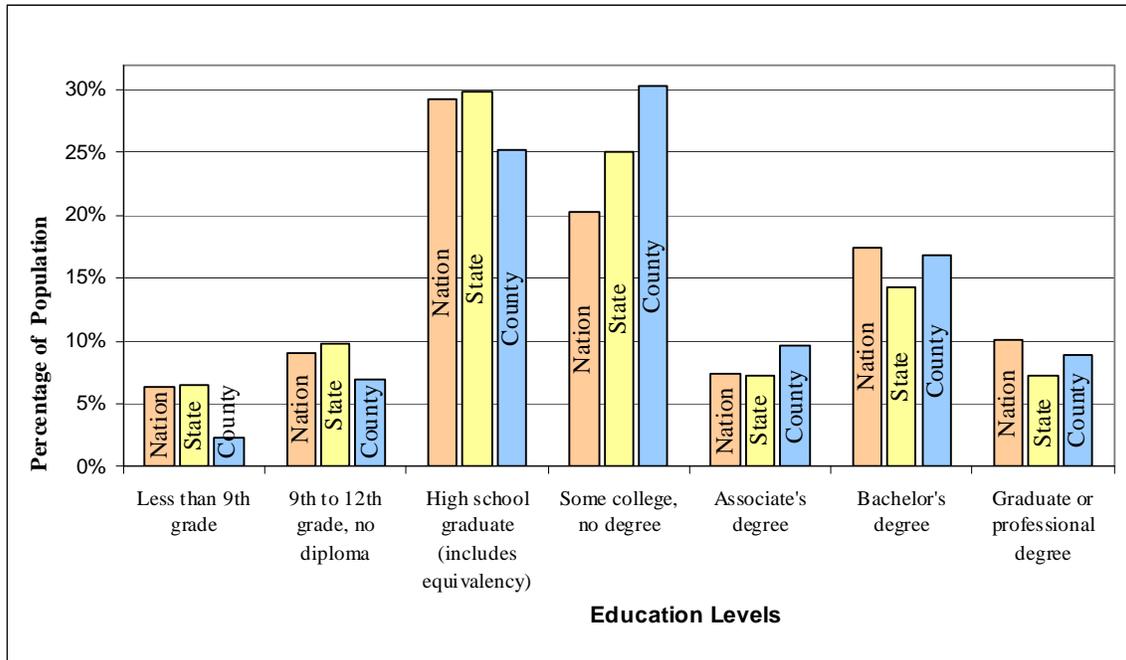
Figure 1.3
2010 Age Compositions



Source: Nevada Department of Employment, Training, and Rehabilitation

The education attainment chart as shown in Figure 1.4 below compares Douglas County with the State of Nevada and the United States. Douglas County exceeds the State of Nevada for percentage of population with some college education or other higher level educational attainment.

Figure 1.4
2010 Education Attainment



Source: Nevada Department of Employment, Training, and Rehabilitation

Housing

The total number of housing units in Douglas County increased from 22,657 units in 2005 to 24,095 units in 2010, according to the Douglas County Assessor’s Office. The housing inventory remains dominated by single-family detached units accounting for 73.6 percent of the total units. Manufactured Homes have decreased from 11.4 percent of the housing inventory in 2005 to 7.6 percent of the total in 2010. Figure 1.5 depicts the 2010 housing inventory in Douglas County, by type of housing. It should be noted that many of the multi-family and single-family attached units include condominiums and second homes in the Tahoe Regional Plan area. Of the 1,448 multi-family dwelling units in Douglas County, 446 of these units, or 30.8 percent, are located in Lake Tahoe. The same is true with single-family attached units. Of the 3,062 single-family attached units in the County, 2,056 units are located at Lake Tahoe, or 67.1 percent of the total single-family attached units in the County.

**Figure 1.5
 Douglas County Housing Inventory, 2010**

Housing Type	Number of Units	Percentage of Total
Single-Family Detached	17,744	73.6%
Single-Family Attached	3,062	12.7%
Manufactured Home	1,841	7.6%
Multi-Family	1,448	6.0%
Total	24,095	100.0%

Based on the 2010 Census, 71.8 percent of the occupied units in the County are owner-occupied while 28.2 percent are renter-occupied. Figure 1.6 compares household tenure in Douglas County with Carson City and the State of Nevada. Carson City and the State of Nevada both have a higher percentage of renter-occupied housing units than Douglas County.

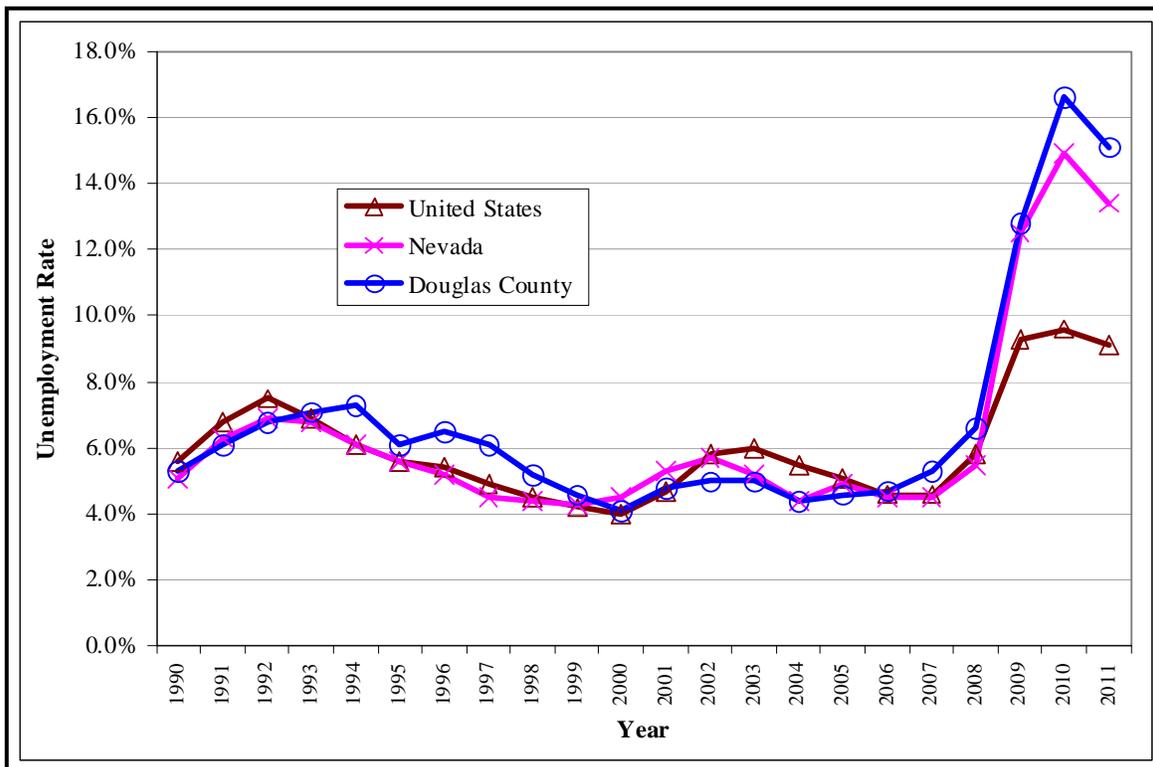
**Figure 1.6
 Households Tenure in Douglas County and Surrounding Jurisdictions, 2010**

Jurisdiction	Owner-Occupied Units	Percentage	Renter-Occupied Units	Percentage
Douglas County	14,105	71.8%	5,533	28.2%
Carson City	12,728	59.4%	8,699	40.6%
Nevada	591,480	58.8%	414,770	41.2%

Economy

Since 1990, the unemployment rates for the United States, the State of Nevada, and Douglas County have been similar. As shown in Figure 1.7, this similarity ended after 2009 as the unemployment rate in Douglas County and Nevada increased significantly. While unemployment in the United States has stayed under 10 percent, Douglas County's unemployment rate reached a peak of 16.04 percent in 2010.

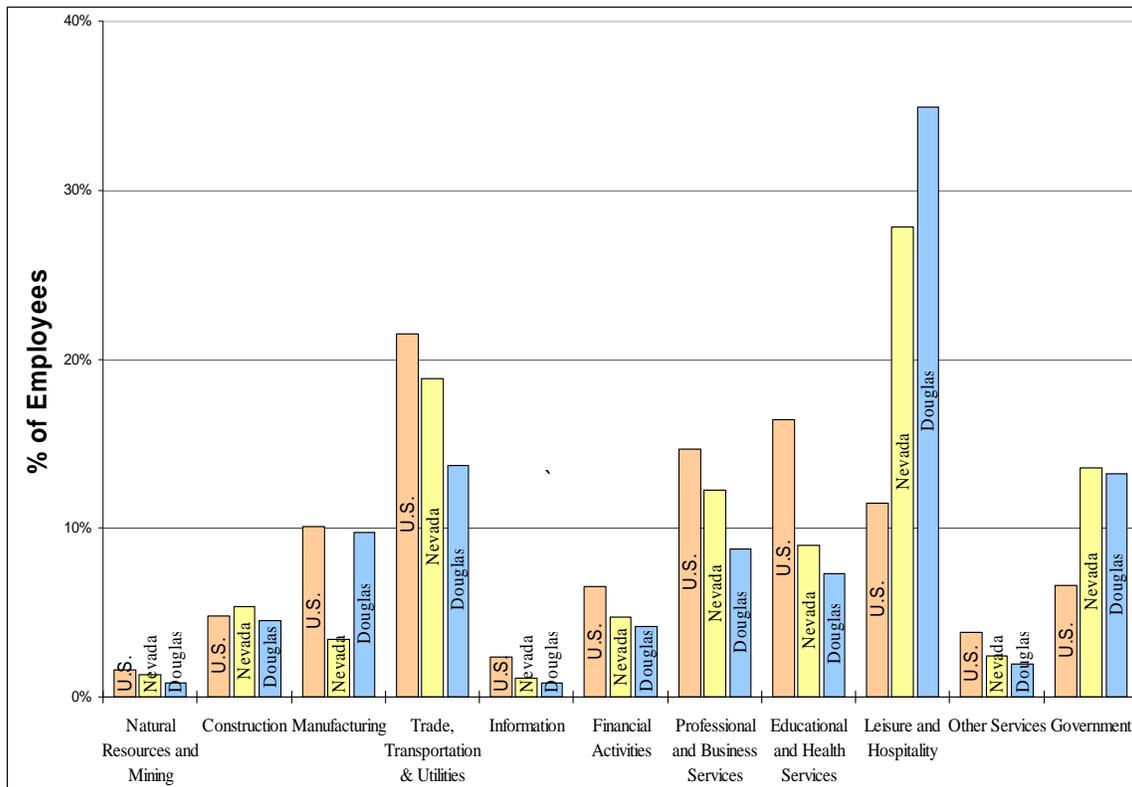
Figure 1.7
Unemployment Rate in Douglas County, Nevada, and United States



Source: Nevada Department of Employment, Training, and Rehabilitation; Not Adjusted

Figure 1.8 compares the percentage of employees employed in a particular industry in Douglas County to the State of Nevada and the United States. Comparing Douglas County's economy to the United States, the industries which have the greatest disparity are the Leisure and Hospitality industry, with a 23 point disparity, the Educational and Health Services industry, with a 9 point disparity, and the Trade, Transportation, and Utilities industry, with an 8 point disparity.

Figure 1.8
Percentage of Employees by Industry

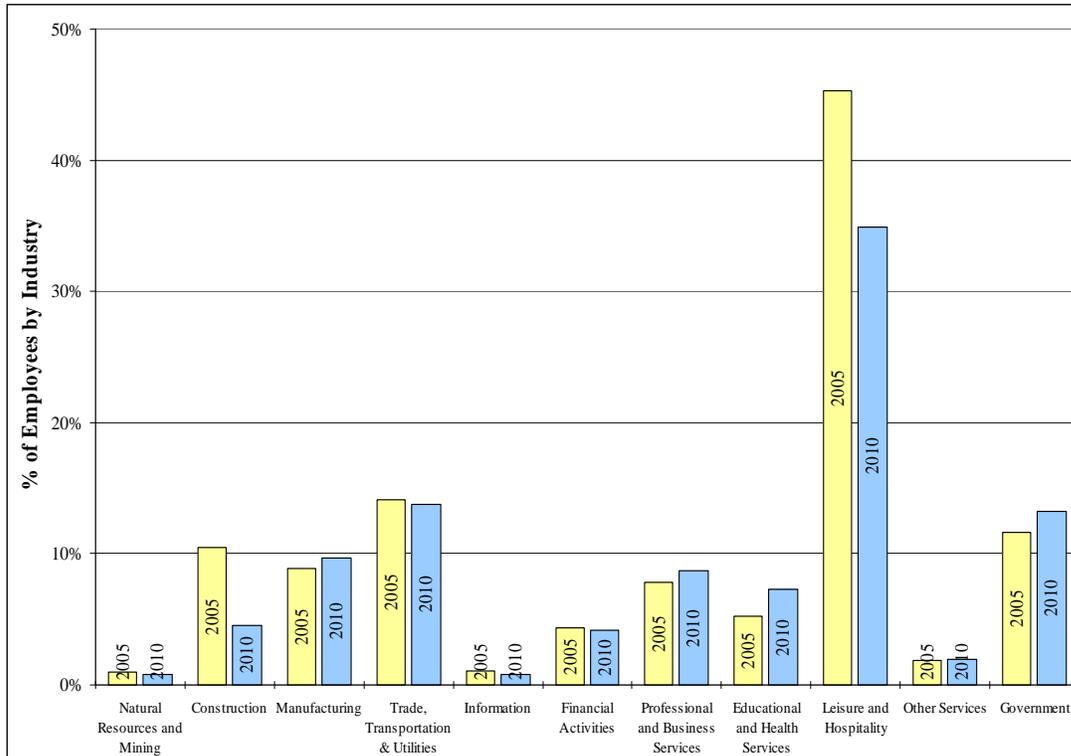


Source: Nevada Department of Employment, Training, and Rehabilitation

In 2010, the leading employment sector for Douglas County was the Leisure and Hospitality industry.

Figure 1.9 compares the 2005 and 2010 percentage of employment by industry for Douglas County. The Leisure and Hospitality industry and the Construction industry have experienced the greatest shrinkage among all the industries. The manufacturing, trade, transportation, and utilities, professional and business services, education and health services, and government have shown marginal growth between 2005 and 2010.

Figure 1.9
2005-2010 Employment by Industry



Source: Nevada Department of Employment, Training, and Rehabilitation

Figure 1.10 shows regional commuting patterns. In 2009, there were 5,456 people commuting into Douglas County for employment and 9,963 people commuting from Douglas County into nearby counties for employment.

Figure 1.10
2009 Commuting Patterns

Place of Residence	Place of Employment				
	Douglas County	Carson City	El Dorado County	Lyon County	Washoe County
Douglas County	9,215	3,532	2,884	336	3,211
Carson City	1,977	11,951	181	859	5,301
El Dorado County	966	132	26,837	11	291
Lyon County	732	3,513	56	10,227	6,001
Washoe County	1,781	5,173	321	1,597	189,017

Source: <http://lehmap.did.census.gov/2009>

Figure 1.11 identifies the largest employers in Douglas County. Of the top five largest employers, three are within the Leisure and Hospitality industry.

**Figure 1.11
 Largest Employers in Douglas County 2010**

Ownership	Industry	# of Employees	Trade Name	City
Private	Casino Hotels	1000 to 1499 employees	HARRAH'S STATELINE	STATELINE
Local Government	Elementary and Secondary Schools	900 to 999 employees	DOUGLAS COUNTY SCHOOL DISTRICT	MINDEN
Private	Casino Hotels	600 to 699 employees	HARVEY'S RESORT HOTEL CASINO	STATELINE
Private	Casino Hotels	600 to 699 employees	MONTBLEU RESORT CASINO AND SPA	STATELINE
Local Government	Executive & Legislative Offices Combined	600 to 699 employees	DOUGLAS COUNTY	MINDEN
Private	Industrial Process Variable Instruments	600 to 699 employees	BENTLY NEVADA	MINDEN
Private	Warehouse Clubs and Supercenters	400 to 499 employees	WAL-MART SUPERCENTER	CARSON CITY
Private	Casino Hotels	300 to 399 employees	CARSON VALLEY INN	MINDEN
Private	Casino Hotels	200 to 299 employees	LAKESIDE INN & CASINO	STATELINE
Private	General Medical and Surgical Hospitals	200 to 299 employees	CARSON VALLEY MEDICAL CENTER	GARDNERVILLE
Private	Skiing Facilities	200 to 299 employees	HEAVENLY VALLEY LTD PTRSHIP	STATELINE
Private	Hotels (except Casino Hotels) and Motels	200 to 299 employees	RIDGE RESORTS / RESORTS WEST	STATELINE
Private	Coffee and Tea Manufacturing	100 to 199 employees	STARBUCKS COFFEE	CARSON CITY
Private	Janitorial Services	100 to 199 employees	FULL SERVICE SYSTEMS CORP	STATELINE
Private	Home Centers	100 to 199 employees	THE HOME DEPOT	CARSON CITY
Local Government	Tribal Governments	100 to 199 employees	WASHOE TRIBE OF NV & CALIF	GARDNERVILLE
Private	Casino Hotels	100 to 199 employees	TAHOE HORIZON	STATELINE
Private	Food Service Contractors	100 to 199 employees	TRAVEL SYSTEMS LIMITED	ZEPHYR COVE
Private	Radio, TV & Other Electronics Stores	100 to 199 employees	BEST BUY STORES L.P.	CARSON CITY
Private	Full-Service Restaurants	100 to 199 employees	HARD ROCK CAFE #1167	STATELINE

Source: Nevada Department of Employment, Training, and Rehabilitation

Figure 1.12 provides information on employers within Douglas County by size of the business. In Douglas County, there are four businesses that have between 600 and 699 employees. These businesses have a total of 2,566 employees and make up 15.21 percent of the total number of employees. The second largest category is businesses between 10 and 19 employees. These businesses employ 2,458 employees, or 14.57 percent of the total number of employees.

Figure 1.12
Number of Douglas County Employers Ranked by Size

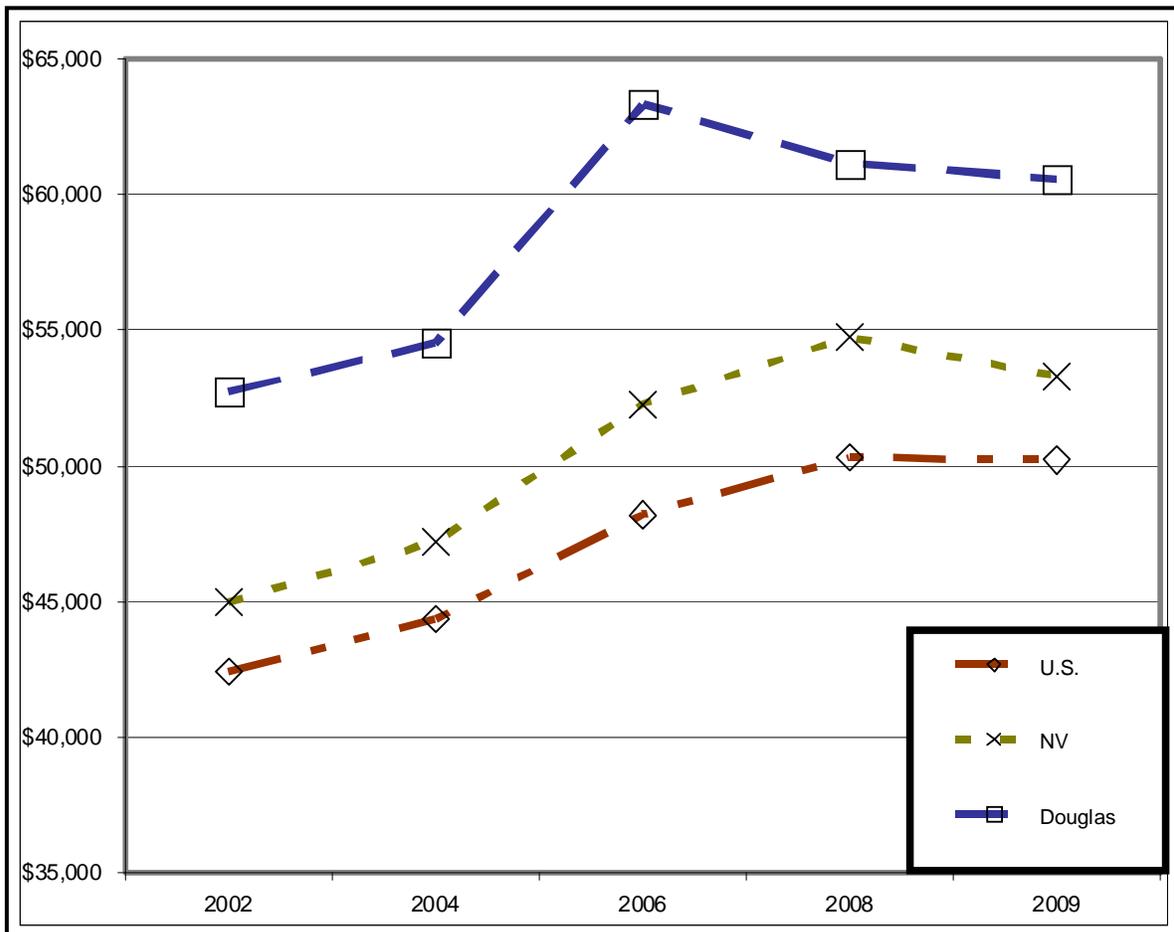
Size of Businesses	# of Firms	Total # of Employees
1000 to 1499 employees	1	1,335
900 to 999 employees	1	998
600 to 699 employees	4	2,566
400 to 499 employees	1	421
300 to 399 employees	1	341
200 to 299 employees	4	1,041
100 to 199 employees	9	1,181
80 to 89 employees	4	338
70 to 79 employees	3	222
60 to 69 employees	8	505
50 to 59 employees	6	318
40 to 49 employees	8	358
30 to 39 employees	13	448
20 to 29 employees	39	950
10 to 19 employees	181	2,458
5 to 9 employees	258	1,703
1 to 4 employees	899	1,692
zero; no employment	309	0
Total	1,749	16,875

Source: Nevada Department of Employment, Training, and Rehabilitation

Firms with zero employment may result for several reasons. Sometimes a company ends its business and stops reporting employment, or they report zero employment. It can take a few quarters of non-reporting for the employer to be removed from the books. It also may be a seasonal employer, who operates at certain times of the year and reports zero employment in non-operating quarters.

Figure 1.13 compares the median household income for Douglas County, the State of Nevada, and the United States for the past seven years, 2002 through 2009. Since 2006, the median household income in Douglas County declined by 4.51 percent. Despite this decrease, Douglas County's median household income is still significantly higher than the State of Nevada and the United States.

Figure 1.13
Median Household Income Trend 2002-2009



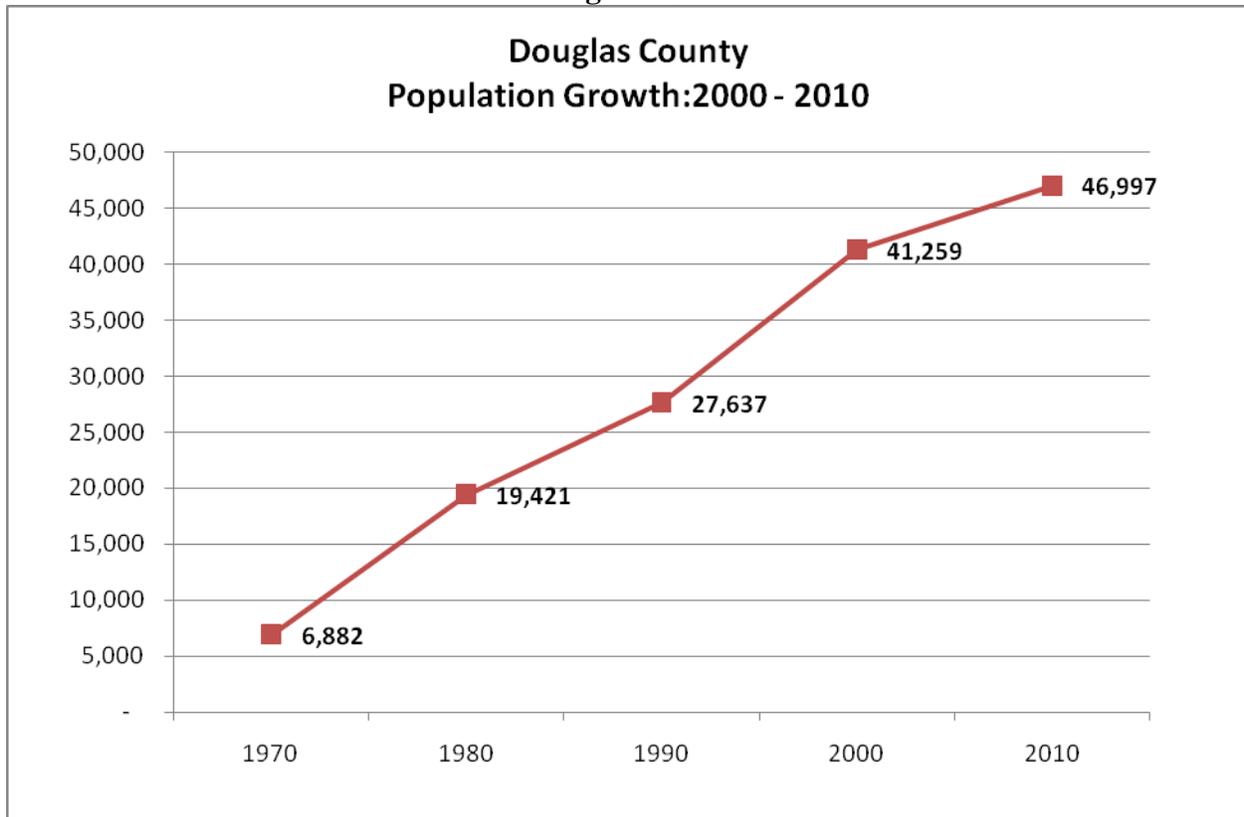
Source: 2010 Census

Chapter 2 Population

Population Growth

Over the past 40 years, the population of Douglas County has increased significantly. From 1970 to 2010, the population of Douglas County increased by 582.9 percent. Douglas County's population growth over the last 40 years is shown in Figure 2.1. The fastest rate of growth occurred between 1970 and 1980 and 1990 and 2000. From 2000 to 2010 population growth slowed significantly, increasing by just 5,738 people during the last 10 years.

Figure 2.1



The majority of growth in Douglas County between 2000 and 2010 occurred in and around urbanized areas in the Carson Valley, especially in Gardnerville, Indian Hills, and Johnson Lane. In Lake Tahoe, the full-time permanent population actually declined between 2000 and 2010. The declines were primarily due to increases in the level of second and vacation home ownership. The increase in vacation rental permits at Lake Tahoe is one indication of this trend. Douglas County now has 395 active vacation home rentals at Lake Tahoe and the number of permits is expected to increase.

Population change within Douglas County between 2000 and 2010 and the County's Census Designated Places (CDP's) are depicted in Figure 2.2.

Figure 2.2
Population Change in Douglas County and Douglas County
Census Designated Places (CDP's), 2000 to 2010

Area	2000	2010	2000-2010 Change	Percentage Change
Douglas County	41,259	46,997	5,738	13.9%
<i>CDP's in Carson Valley Regional Plan</i>				
Minden CDP	2,836	3,001	165	5.8%
Gardnerville CDP	3,357	5,656	2,299	68.5%
Indian Hills CDP	4,407	5,627	1,220	27.7%
Johnson Lane CDP	4,837	6,490	1,653	34.2%
Gardnerville Ranchos CDP	11,054	11,312	258	2.3%
<i>CDP's in Tahoe Regional Plan</i>				
Kingsbury	2,624	2,152	(472)	-18.0%
Stateline CDP	1,215	842	(373)	-30.7%
Zephyr Cove/Roundhill CDP	1,649	1,324	(325)	-19.7%
<i>CDP's in Topaz Lake Regional Plan</i>				
Topaz Ranch Estates CDP	na	1,501		
Topaz Lake CDP	na	157		

Source: 2010 Census, CDP-Census Designated Place. In 2000, Topaz Ranch Estates and Topaz Lake CDP's did not exist. CDP's do not have the same geographies as the Douglas County Community Plans.

Several factors account for this pattern of population growth in Douglas County:

- Public facilities and services are concentrated in Minden, Gardnerville, Indian Hills, Gardnerville Ranchos, and Johnson Lane, allowing higher density residential development.
- Much of the growth corresponds to receiving areas for transfer of development rights.
- Environmental constraints such as floodplains, slopes, as well as farm and ranch operations, will continue to shape growth patterns in the County.
- Proximity to regional employment opportunities. The northern areas of Douglas County are in closer proximity to regional employment centers including those in Carson City and southern Washoe County.

This pattern of population distribution and growth is likely to continue into the future with a few notable exceptions. Lake Tahoe will likely continue to trend toward fewer permanent residents

over the long-term. Employment gains at Lake Tahoe due to redevelopment efforts along the U.S. 50 Corridor are unlikely to provide population growth unless workforce housing initiatives increase. Wages paid in the general services, tourism, and retail trade sectors of the economy are unlikely to provide a level of compensation needed to buy housing in the Douglas County portion of the Lake Tahoe Basin. As a result, additional employment at Stateline may only serve to drive population gains outside the Douglas County portion of Lake Tahoe.

Race and Ethnicity

The race and ethnicity of Douglas County is shown in Table Figure 2.3. Overall, the racial composition of the County has changed little over the last ten years. However, there have been increases in the number of Hispanics in Douglas County. In 2010, the Hispanic population made up just over 10 percent of the Douglas County population. Statewide, Hispanics comprise the largest ethnic group reaching nearly 27 percent of the population in 2010.

Figure 2.3
Douglas County
Race and Ethnicity: 2000 and 2010

Race	2000		2010	
White	38,732	93.9%	43,524	92.6%
Black	210	0.4%	402	0.9%
American Indian/Alaska	1,015	2.5%	1,469	3.1%
Asian	789	1.9%	1,176	2.5%
Native Hawaiian	146	0.4%	212	0.5%
Other Race	1,334	3.2%	1,819	3.9%
Ethnicity				
Hispanic	3,057	7.4%	5,103	10.9%

Source: 2010 Census

Douglas County Demographic Characteristics

Recent population growth has influenced the demographic composition of Douglas County. Several distinct attributes are evident starting with the age of the population.

Age of Population

Figure 2.4 shows the percentage of the population in Douglas County which is age 65 and older. The percentage of the population in Douglas County age 65 and older is substantially higher than the State of Nevada, the United States, and other western Nevada communities. Not only is the Douglas County population older, but the percentage of the population age 65 and older increased more between 2000 and 2010 than other communities included in Figure 2.4.

Figure 2.4
Population Age 65 and Older in Douglas County, Adjacent Counties, Nevada, and United States, 2000 and 2010

Area	2010	2000
Douglas County	20.2%	15.2%
Carson City	16.5%	14.9%
Washoe County	12.1%	10.5%
Lyon County	15.8%	13.7%
Nevada	12.0%	11.0%
United States	13.0%	12.4%

Source: 2010 and 2000 U.S. Census

Figure 2.5 shows the median age of the population in Nevada counties. From 1990 to 2010 the median age of Douglas County residents increased by 11.2 years, from 36.2 to 47.4 years. The median age in Carson City and Washoe County for 2010 is 41.7 and 37.0, respectively.

Figure 2.5
Median Age by County in the State of Nevada: 1990, 2000 and 2010

County	1990 years of age	2000 years of age	2010 Years of age
Carson City	36.6	38.7	41.7
Churchill	33.0	34.7	39.0
Clark	33.1	34.4	35.5
Douglas	36.2	41.7	47.4
Elko	29.4	31.2	33.4
Esmeralda	35.8	45.1	52.9
Eureka	33.3	38.3	42.4
Humboldt	30.6	33.4	36.2
Lander	28.7	34.1	37.1
Lincoln	33.4	38.8	39.9
Lyon	36.4	38.2	40.9
Mineral	33.9	42.9	49.2
Nye	36.5	42.9	48.4
Pershing	31.7	34.4	41.0
Storey	37.6	44.5	50.5
Washoe	33.6	35.6	37.0
White Pine	33.8	37.7	40.8
State Of Nevada	33.3	35.0	36.3
U.S.	32.9	35.3	37.2

Source: U.S. Department of Commerce. "Census 2000 and 2010 Redistricting Data (PL-94-171) Summary File, Table PL1 and 1990 Census." Bureau of Census: Washington D.C. 2010, 2000 and 1990.

The median age in the United States increased from 35.3 in 2000 to 37.2 in 2010, with the proportion of older Americans increasing. The 1.9-year increase between 2000 and 2010 was a more modest increase than the 2.4-year increase in median age that occurred between 1990 and 2000. The aging of the baby boom population, along with stabilizing birth rates and longer life expectancy, have contributed to the increase in median age nationally.

Certain factors have contributed to the aging of the population in Douglas County. Strong population growth over the past several decades means that the influx of the population into Douglas County is disproportionately older than the existing population. As shown in Figure 2.6, family households with children in Douglas County declined substantially between 2000 and 2010 whereas family households with children in the State of Nevada changed very little as a percentage of the population. Another distinguishing characteristic in Douglas County is the percentage of husband and wife households only. In 2010, the percentage of Douglas County households with a husband and wife only was almost 10 percent higher than the State of Nevada (55.5% vs. 46.0%).

From 2000 to 2010 the percentage of family households and family households with children under 18 also declined in Douglas County. Family households with children in Douglas County represented only 24 percent of all households in 2010. In fact, the number of Douglas County households with children actually declined from 5,031 households in 2000 to 4,714 households in 2010.

Figure 2.6
Households in Douglas County and Nevada, 2000 and 2010

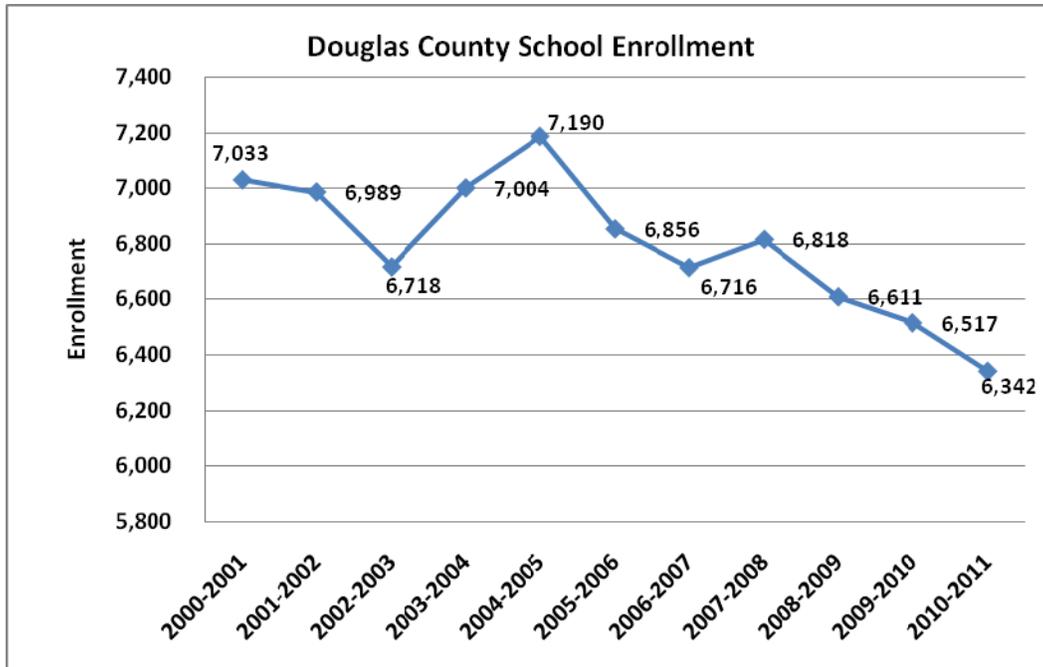
Type of Household	State of Nevada				Douglas County			
	2010		2000		2010		2000	
Total households	1,006,250	100.0%	751,165	100.0%	19,638	100.0%	16,401	100.0%
Family households (families) [7]	656,621	65.3%	498,333	66.3%	13,519	68.8%	11,894	72.5%
With own children under 18 years	301,400	30.0%	238,846	31.8%	4,714	24.0%	5,031	30.7%
Husband-wife family	462,509	46.0%	373,201	49.7%	10,905	55.5%	9,930	60.5%
With own children under 18 years	197,148	19.6%	166,072	22.1%	3,322	16.9%	3,767	23.0%
Male householder, no wife present	66,525	6.6%	41,650	5.5%	876	4.5%	645	4.0%
With own children under 18 years	33,343	3.3%	22,099	3.0%	466	2.4%	394	2.4%
Female householder, no husband present	127,587	12.7%	83,482	11.1%	1,738	8.9%	1,319	8.0%
With own children under 18 years	70,909	7.0%	50,675	6.7%	926	4.7%	870	5.3%
Non-Family Households	349,629	34.7%	252,832	33.7%	6,119	31.2%	4,507	27.5%
Average Household Size	2.65		2.62		2.38		2.5	
Average Family Size	3.20		3.14		2.8		2.88	

Source: 2000 and 2010 Census.

Reductions in family households with children and the loss of permanent population in the Lake Tahoe Basin contributed to the decline of Douglas County public school enrollment. Changes in school enrollment further highlight the demographic trends in Douglas County. One factor influencing school enrollment is the continuing transition of the Lake Tahoe area from permanent to part-time ownership thereby reducing the number of children enrolling in Douglas County schools.

In 2000, students enrolled in Douglas County schools accounted for 17 percent of the population. By 2010, students enrolled in Douglas County schools only accounted for 13.5 percent of the County's population. Douglas County school enrollment includes chartered schools as well. Figure 2.7 depicts the Douglas County school enrollment figures from 2000 to 2011. Enrollment has declined from 7,033 students in 2000-2001 to 6,342 students in 2010-2011.

Figure 2.7
Douglas County School Enrollment, 2000 to 2011



Source: Nevada Department of Education 2000-2010.

Economic Activity

Economic development and regional job creation influences local population demographics by attracting a larger number of working age (19 to 55) people to Douglas County communities. The working age population have more children and depending upon overall wage levels have an influence on housing markets and the types of facilities and services provided by local governments. Areas within Nevada with high levels of job creation over the last ten years, such as Washoe and Clark counties, as well as the northeastern Nevada mining communities, have more children, a higher average household size, lower median age, and a higher percentage of family households. As a result, economic activity can substantially influence local population demographics.

Figure 2.8 provides comparative economic measures. Again, Douglas County has a small average household size, the smallest employment per population, one of the lowest average weekly wage levels, but the highest per capita income in Nevada. According to the Fiscal Year (FY) 2011 U.S. Department of Housing and Urban Development (HUD) Median Family Income figures for Nevada, Douglas County has the second highest median family income at \$75,900 in the State. The employment per population ratio again demonstrates that Douglas County has the fewest number of workers per population.

**Figure 2.8
 Comparative Economic Measures**

	Douglas Co.	Carson City	Washoe Co.	Nevada
HUD Median Family Income, FY 2011	\$75,900	\$68,300	\$70,500	N/A
Per Capita Income-2009	\$55,080	\$40,218	\$42,499	\$37,670
Average Weekly Wage-2010	\$763/wk.	\$844/wk.	\$815/wk.	\$818/wk.
Employment/Population	.395	.445	.449	.426
Avg. Household Size	2.38	2.41	2.55	2.65

Source: Bureau of Labor Statistics, Nevada Department of Employment and Rehabilitation U.S. Census, U.S. Department of Housing and Urban Development. The HUD Median Family Income figures for Washoe Co. are for the Reno-Sparks MSA

Future Population Growth

A number of socioeconomic forces including national demographic trends shape the composition of the Douglas County population. The Douglas County population is older with declining family household formations, lower school enrollments, and smaller household size. Three general factors have probably contributed to such conditions:

1. Retail trade, tourism and support services are relatively low paying sectors in the State of Nevada. Although Douglas County has the highest per capita income among all Nevada, the wage level in the County is below the State of Nevada’s average weekly wage for all industries.
2. The recent “Housing Bubble” resulted in an in-migration of affluent retirees and accelerated the transition from full-time permanent residents at Lake Tahoe to more seasonal and part-time residents and second home ownership. At the same time, relatively high housing prices in Douglas County created an economic barrier for many younger working age households, particularly those with children.
3. General trends in national demographics with lower household formation rates, fewer children and more single persons, smaller households, and fewer married coupled households with children also influence Douglas County.

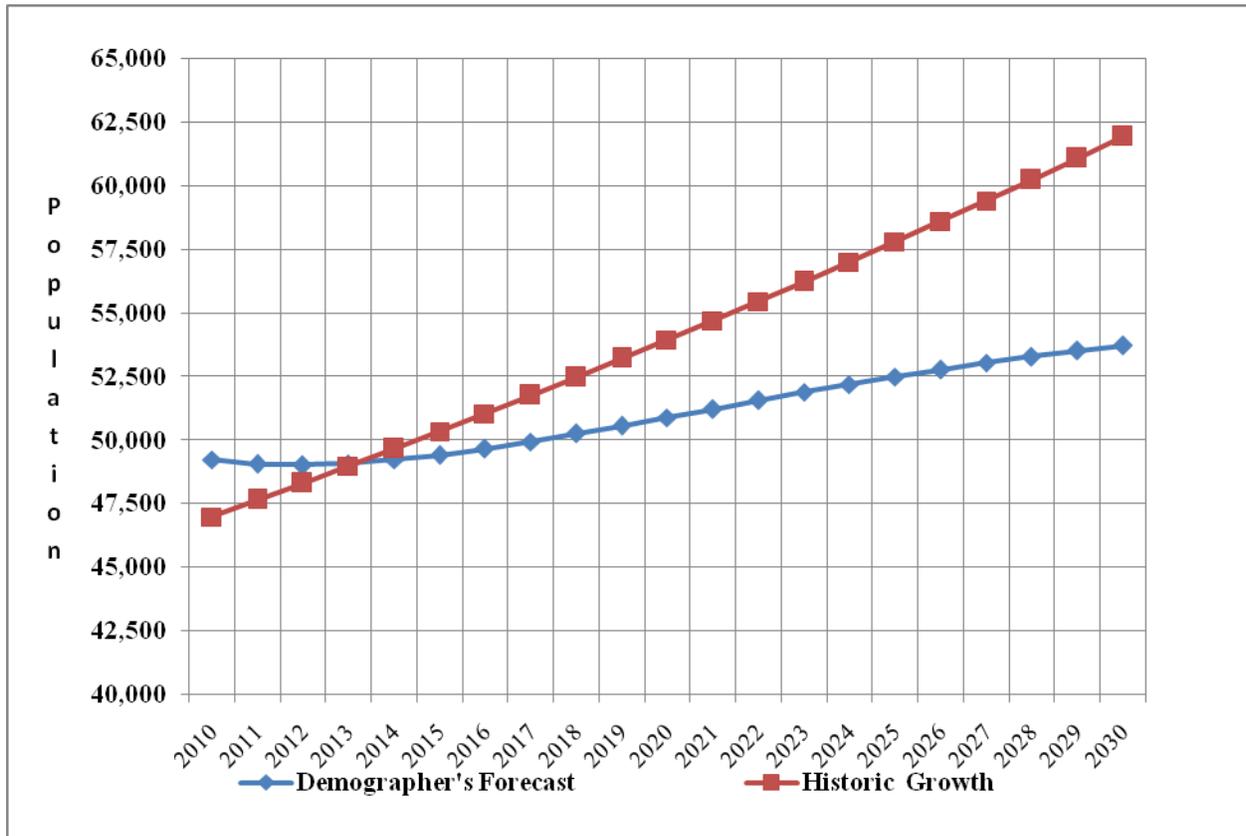
Changing the demographic trends of Douglas County will depend largely upon the ability of the area to attract business activity and employment in higher paying industrial sectors. Economic development in the Lake Tahoe Basin is not likely to contribute in a significant way to reversing or slowing the changes in the permanent population without initiatives to increase the availability of moderate priced housing in the Basin. Consistent with historic trends, Douglas County will continue to see retiree in-migration. Regional transportation improvements (US Highway 395

extension) will make Douglas County more accessible to surrounding employment centers, including southern Washoe County, which may contribute to population gains in the future.

Population Forecasts

Population forecasts for Douglas County include a historic growth rate based on the 1.39 percent growth rate between 2000 and 2010 and the State Demographer’s annual forecast. Figure 2.9 shows both the historic growth rate and the August 2011 State Demographer’s forecast.

Figure 2.9
Douglas County Population Forecasts: 2010-2030



Historic growth rate. Douglas County’s population continues to grow at a level commensurate with historic patterns. In order for this situation to occur, new employment is needed both locally and regionally, particularly jobs with higher wage levels which will serve to attract more working age households with children to Douglas County. In the near-term (2-3 years), national economic conditions will likely limit growth. The historic growth rate is set at 1.39 percent annual average increase which represents the Douglas County growth rate from 2000 to 2010.

State Demographer’s Forecasts. Annually, the Nevada State Demographer develops local area population forecasts. The most recent forecast for Douglas County shows limited population growth over a twenty year period. With a continuation of relatively high housing prices, retiree

in-migration, declining family households with children, and limited economic development and job creation; the State Demographer's forecasts represents a realistic scenario for Douglas County. Over the last ten years, the rate of growth in Douglas County slowed. The August 31, 2010, projections from the State Demographer show Douglas County reaching a total population of 53,724 by 2030.

Chapter 3 Land Use

Land Area

Douglas County is 737.7 square miles in area, including 711.4 square miles of land and 26.3 square miles of water. Figure 3.1 depicts the total area for the County in acreage and square miles.

**Figure 3.1
 Douglas County Total Area, by Acreage and Square Miles**

	Acres	Square Miles
Land Area	455,291.0	711.4
Water Area	16,842.5	26.3
Total Area	472,133.5	737.7

A significant portion of land in Douglas County is under public ownership. As shown in Figure 3.2, 64.8 percent of the area is under the control of a federal or state agency. The largest landowner in Douglas County is the Bureau of Land Management (BLM) with 161,380 acres, or 34.2 percent of the total area.

**Figure 3.2
 Public Land Ownership in Douglas County, by Federal and State Agencies**

Public Entity	Acres	Percentage of Total County Area (Total = 472,133 acres)
Bureau of Land Management	161,830	34.2
Bureau of Indian Affairs	59,275	12.6
US Forest Service	83,080	17.6
State of Nevada	1,641	.3
Total Acreage	305,826	64.8

Map 3.1 depicts the public land ownership patterns in Douglas County. US Forest Service lands are located predominantly in the Lake Tahoe Basin while BLM and Bureau of Indian Affairs (BIA) lands are located in the eastern and southern portions of Douglas County.

Future Land Use

Figure 3.3 provides information on the future land use designations of all properties within Douglas County, based on the County’s Master Plan, as amended. Future land use information is provided by parcels as well as by acreage.

The single family residential and single family estates future land uses contain the highest percentage of parcels in Douglas County at 28 percent and 21.6 percent, respectively. The future land use with the highest number of acres, however, is Forest Range at 75.2 percent of the total land acreage in Douglas County. The Forest and Range land use category includes federal lands under the control of the BLM, the US Forest Service, and the BIA.

Figure 3.3
Land Area in Douglas County, by Future Land Use*

Future Land Use Category	Total Parcels	%	Total Acres	%
Recreation	41	.2	481.4	.2
Forest and Range	1,962	7.2	338,651.2	75.2
Agriculture	983	3.6	38,498.2	8.5
Washoe Tribal Lands	20	.1	3,456.4	.7
Rural Residential	1,831	6.7	19,848.5	4.4
Single Family Estates	5,868	21.6	9,500.9	2.1
Single Family Residential	7,620	28.0	2,742.4	.6
Multi-Family Residential	1,503	5.5	469.2	.1
Commercial	714	2.6	1,487.5	.3
Industrial	390	1.4	1,990.2	.4
Community Facilities	273	1.0	5,866.6	1.3
Receiving Areas	1,170	4.3	5,918.8	1.3
Tahoe Regional Plan Parcels	4,834	17.8	21,514.4	4.8
Total	27,209	100.0	450,425.7	100.0

*Does not include Water Bodies or Right-of-Way. Percentages may not total 100% due to rounding.

Zoning Districts

Figure 3.4 provides information on the current zoning districts or zoning categories within Douglas County, by parcel and by acreage. The low density residential category, which includes .5 acre, 1 acre, and 2 acre zoning districts, has the highest percentage of parcels at 28.8 percent. The average parcel size is 1.5 acres. The Forest Range – 40 acre Zoning District covers 215,005 acres in the County with an average parcel size of 1,004.7 acres.

**Figure 3.4
 Land Area in Douglas County, by Zoning District***

Zoning Category or Zoning District	Parcels	%	Acreage	%	Average Parcel Size
Forest Range- 19 acre Zoning District	1,809	6.6	125,773	28.1	69.5 Acres
Forest Range – 40 acre Zoning District	214	7.9	215,005	48.1	1,004.7 Acres
Agriculture-19 acre Zoning District	1,057	3.9	39,178	8.8	37.07 Acres
Rural Residential Category (RA-5, RA-10 Zoning Districts)	1,729	6.3	20,190	4.5	11.7 Acres
Low Density Residential Category (SFR 1, SFR 2, SFR 1/2)	7,853	28.8	12,046	2.7	1.5 Acres
Medium Density Residential Category (SFR-12,000, SFR-8,000 Zoning Districts)	6,703	24.6	2,395	.5	.4 Acres
High Density Residential (MFR) Zoning District	1,590	5.8	577	2.7	.4 Acres
Commercial Category (NC, OC, GC, MUC, TC Zoning Districts)	784	2.9	2,376	5.3	3.0 Acres
Industrial Category (LI, SC, GI Zoning Districts)	391	1.4	1,990	.4	5.1 Acres
Community Facility Category (Airport, Public Facility Zoning Districts)	280	1.0	5,896	1.3	21.1 Acres
Tahoe Regional Plan Parcels	4,834	17.7	21,514.4	4.8	4.5 Acres
Total	27,244	100%	446,940	100%	

* Does not include Water Bodies or Right-of-Way. There are no parcels zoned as SFR-T 3,000-SFR-T 8,000

Figure 3.5
Douglas Land Area by Regional Plan
(Total Land Acreage = 455,291.0 Acres)

Regional Plan	Acres	Percentage
Carson Valley	111,968	24.59
Pinenut	222,253	48.82
Sierra	19,363	4.25
Tahoe	23,456	5.15
Topaz	78,251	17.19
Total	455,291	100.00

Population Density

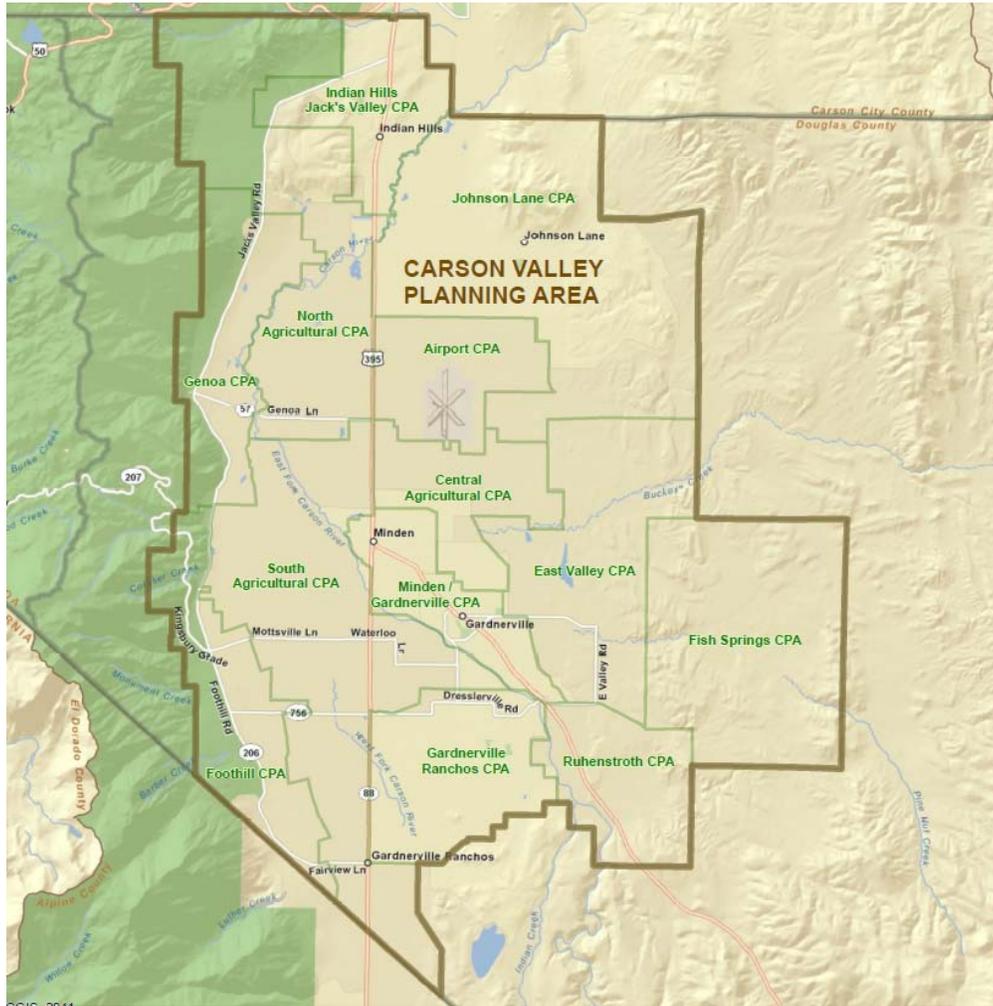
As depicted on Map 3.2, the Carson Valley Regional Plan is comprised of 11 separate Community Plans, including the Agriculture (South, Central, and North), Airport, East Valley, Fish Springs, Foothill, Gardnerville Ranchos, Genoa, Indian Hills/Jacks Valley, Johnson Lane, Minden/Gardnerville, and Ruhenstroth Community Plans. The total land area in the Carson Valley Regional Plan is 111,968 acres.

The population density for each of the Community Plans in depicted in Figure 3.6. The Airport Community Plan has the lowest density at 12 persons per square mile. The highest population density is in the Gardnerville Ranchos Community Plan at 1,061 persons per square mile. The overall density for the entire Carson Valley Regional Plan is 220 persons per square mile.

Figure 3.6
Population Density, by Community Plan

Community Plan	Total Acreage	Square Miles	2010 Population	Population Density (Persons/Sq. Mile)
Agriculture	33,272	51.98	733	14 persons/sq. mile
Airport	4,678	7.31	85	12 persons/sq. mile
East Valley	9,922	15.50	1,524	98 persons/sq. mile
Fish Springs	12,197	19.06	685	36 persons/sq. mile
Foothill	6,679	10.44	1,337	128 persons/sq. mile
Gardnerville Ranchos	6,673	10.43	11,065	1,061 persons/sq. mile
Genoa	6,363	9.94	935	94 persons/sq. mile
Indian Hills/Jacks Valley	5,056	7.90	5,406	684 persons/sq. mile
Johnson Lane	17,984	28.10	6,496	231 persons/sq. mile
Minden/Gardnerville	4,052	6.33	8,619	1,362 persons/sq. mile
Ruhenstroth	5,092	7.96	1,650	207 persons/sq. mile
Total	111,968	174.95	38,535	220 persons/sq. mile

Map 3.2
Carson Valley Regional Plan and Community Plan Boundaries



The Sierra Regional Plan, which does not include any smaller Community Plans, is located between the Carson Valley Regional Plan and the Tahoe Regional Plan. The Sierra Regional Plan covers a total area of 19,363 acres. With a 2010 population of 169 people, the population density for the Sierra Regional Plan is 6 persons per square mile.

Map 3.4
Sierra Regional Plan Boundary



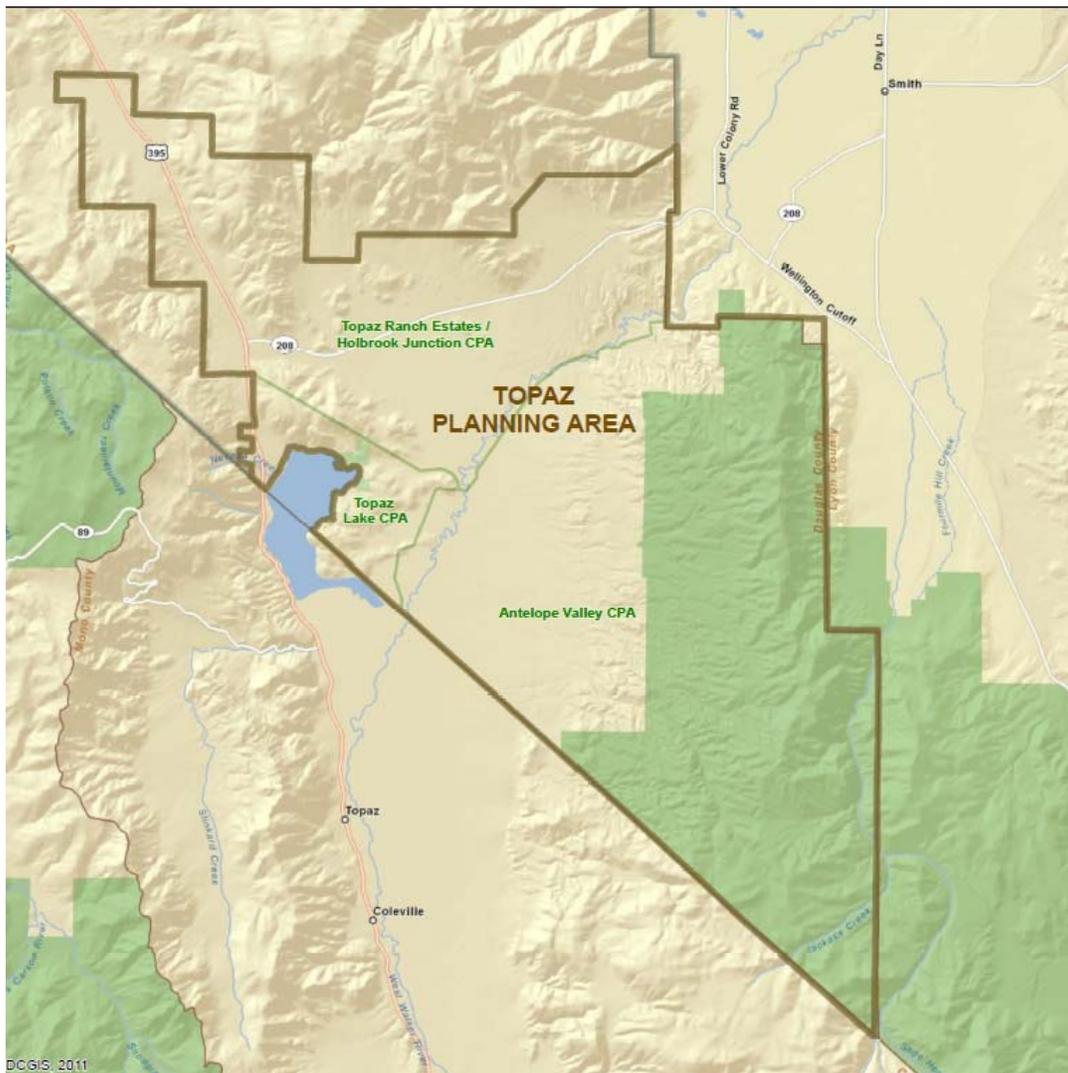
The Tahoe Regional Plan covers the portion of Douglas County that is under the jurisdiction of the Tahoe Regional Planning Agency (TRPA) and contains a total of 23,456 acres. The Tahoe Regional Plan includes the communities of Kingsbury, Roundhill, Stateline, and Zephyr Cove. Map 3.5 depicts the boundary for the Tahoe Regional Plan. Based on a 2010 population of 5,227, the population density is 143 persons per square mile.

Map 3.5
Tahoe Regional Plan Boundary



The Topaz Regional Plan is located at the southern portion of Douglas County and includes a total of 78,251 acres. The Topaz Regional Plan includes Community Plans for Topaz Lake and Topaz Ranch Estates/Holbrook Junction. Map 3.6 depicts the boundary for the Topaz Regional Plan. Based on a 2010 population of 2,071, the population density for the Topaz Regional Plan is 17 persons per square mile.

Map 3.6
Topaz Regional Plan Boundary



Chapter 4 Housing

Housing Units in Douglas County

Figure 4.1 shows housing units by type of structure for Douglas County and surrounding communities. In 2010, the total housing unit count in Douglas County was 24,095. The percent of the Douglas County housing stock which is multi-family units is quite low at 6 percent. The relatively large percentage of single-family attached housing units (duplexes and townhouses) in Douglas County is somewhat misleading since many of these units are located in Lake Tahoe and used by part-time or seasonal residents. Including Lake Tahoe, the total number of single-family attached units represents 12.7 percent of the housing stock in Douglas County.

**Figure 4.1
Housing Inventory in Douglas County
and Surrounding Communities, 2010**

Jurisdiction	Single-Family Detached	Single-Family Attached	Manufactured Home	Multi-Family	Total
Carson City	13,043	2,215	3,222	4,940	23,420
% of Total	55.7%	9.5%	13.8%	21.1%	
Churchill	6,195	305	2,982	1,059	10,541
% of Total	58.8%	2.9%	28.3%	10.0%	
Douglas	17,744	3,062	1,841	1,448	24,095
% of Total	73.6%	12.7%	7.7%	6.0%	
Lyon	14,402	343	6,829	1,320	22,894
% of Total	62.9%	1.5%	29.8%	5.8%	
Washoe County	110,036	14,476	10,716	49,729	184,957
% of Total	59.5%	7.8%	5.8%	26.9%	

Source: Nevada State Demographer, 2010 and Douglas County Assessor. Note: The 2010 Census reported 23,671 housing units in Douglas County.

Subsidized Housing Inventory in Douglas County

Project Based Subsidy

Figure 4.2 provides information on project based subsidized rental units in Douglas County. There are a total of 334 subsidized units in the County. Subsidized units generally have federal or state housing finance subsidy which requires a developer/owner to maintain rental rates at levels that are affordable to lower income households for a predetermined amount of time. Typically, subsidized units are available to households at or below 80 percent of the median household income. It is difficult to construct and operate affordable rental housing for households with incomes below 40 percent of the area’s income without direct tenant based subsidies. Project operating expenses and management costs will exceed the income generated by affordable rents. As a result, even a fully subsidized unit with no debt can have a negative cashflow unless the rents are sufficient to cover operating expenses, maintenance, and management costs.

As shown in Figure 4.2, there are no elderly or disabled project subsidized units in Douglas County.

**Figure 4.2
Subsidized Rental Housing Inventory in Douglas County
and Surrounding Areas: 2010**

Subsidized Housing	Carson	Churchill	Douglas	Lyon	Mineral	Pershing	Storey	Total
Project Subsidy:								
Elderly	236	168	0	195	0	24	0	623
Family	638	252	334	141	8	88	0	1,421
Disabled	24	0	0	0	0	0	0	24
Total Units	898	420	334	336	8	112	0	2,100

Source: Nevada Housing Division, Nevada Rural Housing Authority, USDA Rural Development

Tenant Based Subsidy

Housing choice vouchers allow tenants to select rental housing at or below the area’s fair market rent limits. The amount of the voucher is typically based upon the tenant’s ability to pay. Most rental vouchers are used for very low income households.

The Nevada Rural Housing Authority is responsible for administrating the U.S. Department of Housing and Urban Development’s (HUD) Housing Choice Voucher

program. As of August 1, 2011 the Nevada Rural Housing Authority was providing 455 households in Douglas County with vouchers, including:

- Elderly – 62 households
- Disabled – 72 households
- Elderly/Disabled – 2 households
- Family/Individuals – 319 (Includes Elderly/Disabled) households

Douglas County, as a member of the Western Nevada HOME Consortium (WNHC), allocates low income housing trust funds to the Nevada Rural Housing Authority for Housing Choice Vouchers. The voucher program funded by WNHC members gives priority to elderly and disabled households.

With project based rental subsidies and the Housing Choice Voucher program, there are approximately 789 affordable rental housing units available in Douglas County. It should be noted that some tenants with housing choice vouchers live in affordable housing developments in Douglas County. As a result, the total number of subsidized affordable housing units is actually less than 789.

The Nevada Rural Housing Authority also maintains a waiting list for the housing choice voucher program. As of August 1, 2011, the waiting list for rental vouchers in Douglas County included:

- Elderly – 48 households
- Disabled - 66 households
- Elderly/Disabled - 3 households
- Family/Individuals – 285 (Includes Elderly/Disabled) households

Supportive, Transitional and Temporary Emergency Housing

Four agencies in Douglas County provide transitional housing and emergency assistance to very low income households and single individuals:

- Douglas County Social Services provides emergency assistance for 25 – 30 households annually.
- State of Nevada Rural Clinics provides seven housing units for individuals with disabilities.
- Douglas County Family Support Council provides 10 emergency shelter beds for victims of domestic violence.
- Austin’s House provides shelter and care for up to ten children between the ages of birth to 18. The children are placed at Austin’s House after being removed from their homes due to abuse or neglect.

Household Tenure

Figure 4.3 shows the tenure of occupied housing units in Douglas County, surrounding counties and the State of Nevada. The homeownership rate in Douglas County remains high at 71.8 percent while the percentage of renter-occupied housing units is at 28.2 percent. With the limited availability of multi-family units in Douglas County, many renters rely upon single-family dwelling units. For example, the 2010 Census reported there were 1,374 multi-family units, but 5,533 renter households in Douglas County. As a result, a large number of renters in Douglas County are utilizing single-family detached and attached dwelling units as well as manufactured homes.

In the Gardnerville Ranchos area there were 777 units that were single-family attached or multi-family units in 2000. During the same period, there were 1,214 renter households in the Gardnerville Ranchos. Assuming all 777 units were renter occupied, at least 437 households utilized single family dwellings as rental units in 2000.

This trend in Douglas County has been amplified based upon recent market conditions which have resulted in more single-family housing being available at rents that are comparable with traditional apartment complexes. Single-family homes that are available at comparable rents are particularly attractive to larger households.

**Figure 4.3
Tenure of Occupied Units: Douglas County,
Surrounding Communities and the State of Nevada: 2010**

	Owners	% of Total	Renters	% of Total
Nevada	591,480	58.8%	414,770	41.2%
Douglas County	14,105	71.8%	5,533	28.2%
Carson City	12,728	59.4%	8,699	40.6%
Lyon County	14,379	72.6%	5,429	27.4%
Churchill County	6,216	64.3%	3,455	35.7%

Source: 2010 Census

Renter households in Douglas County are concentrated in specific areas. In 2000 approximately 45.3 percent of the renter households in Douglas County lived in Gardnerville and the Gardnerville Ranchos. At the same time, these two areas accounted for approximately 34 percent of the total Douglas County population.

Affordable Housing Defined

Housing affordability measures consider household income relative to the costs to rent or pay a mortgage. Housing affordability can be determined by a variety of measures for both renter and owner households. Housing affordability for renters focuses upon households with incomes at or below 80 percent or 60 percent of the area's median income. A broader income range (up to 120 percent of median family income) is often used to determine housing affordability for owners.

Cost burden for low-income households is defined as paying no more than 30 percent of income for housing costs, including utilities. A household is defined as having a severe cost burden if they must pay more than 50 percent of their income for housing.

Affordable Rental Housing in Douglas County

Figure 4.4 calculates affordable rents for different household income levels in Douglas County. In 2011, the Douglas County maximum affordable housing rents for households at or above 50 percent of the median area income starts around \$500 per month.

Also shown in Table 4.4 is the hourly wage level and income necessary to achieve affordable rents. To reach the 50 percent of median area income level for a single person or small household, an hourly wage between \$13 and \$16 per hour is necessary. According to the Nevada Department of Employment Training and Rehabilitation, the average weekly wage in the leisure and hospitality, other services, and trade sector in 2010 was \$13.35/hr., \$14.43/hr., and \$15.00 /hr., respectively.

Figure 4.5 contains information on the current Fair Market Rents (FMRs) for Douglas County. FMRs are gross rent estimates. They include the shelter rent plus the cost of all tenant-paid utilities, except telephone, cable or satellite television service, and internet service. HUD sets FMRs to assure that a sufficient supply of rental housing is available to program participants.

Figure 4.4
Affordable Rents in Douglas County,
by Household Income, FY 2011

Very-Low Income Households at 30% of Median Income					
Household Size	Household Income	Hourly Wage	Monthly Amt Available for Housing	Utilities/Mo.	Affordable Rent/Mo.
1	\$15,950	\$7.52	\$399	\$151	\$248
2	\$18,200	\$8.75	\$455	\$151	\$304
3	\$20,500	\$9.86	\$513	\$183	\$330
4	\$22,750	\$10.94	\$569	\$183	\$386
5	\$24,600	\$11.83	\$615	\$215	\$400
6	\$26,400	\$12.69	\$660	\$215	\$445
Low-Income Households at 50% of Median Income					
Household Size	Household Income	Hourly Wage	Monthly Amt. Available for Housing	Utilities/Mo.	Affordable Rent/Mo.
1	\$26,600	\$12.79	\$665	\$151	\$514
2	\$30,400	\$14.62	\$760	\$151	\$609
3	\$34,200	\$16.44	\$855	\$183	\$672
4	\$37,950	\$18.25	\$949	\$183	\$766
5	\$41,000	\$19.71	\$1,025	\$215	\$810
6	\$44,050	\$21.18	\$1,101	\$215	\$886
Moderate Income Households at 80% of Median Income					
Household Size	Household Income	Hourly Wage	Monthly Amt. Available for Housing	Utilities/Mo.	Affordable Rent/Mo.
1	\$42,500	\$20.43	\$1,063	\$151	\$912
2	\$48,600	\$23.37	\$1,215	\$151	\$1,064
3	\$54,650	\$26.27	\$1,366	\$183	\$1,183
4	\$60,700	\$29.18	\$1,518	\$183	\$1,335
5	\$65,600	\$31.54	\$1,640	\$215	\$1,425
6	\$70,450	\$33.87	\$1,761	\$215	\$1,546
Median Family Income Households					
Household Size	Household Income	Hourly Wage	Monthly Amt. Available for Housing	Utilities/Mo.	Affordable Rent/Mo.
1	\$53,130	\$25.54	\$1,328	\$151	\$1,177
2	\$60,720	\$29.19	\$1,518	\$151	\$1,367
3	\$68,310	\$32.84	\$1,708	\$183	\$1,525
4	\$75,900	\$36.49	\$1,898	\$183	\$1,715
5	\$82,000	\$39.42	\$2,050	\$215	\$1,835
6	\$88,063	\$42.34	\$2,202	\$215	\$1,987

Source: U.S. HUD-MFI 2011, Assumes rent includes sewer, water and garbage

To accomplish this objective, FMRs must be both high enough to permit a selection of units and neighborhoods and low enough to serve as many low-income families as possible. The level at which FMRs are set is expressed as a percentile point within the rent distribution of standard-quality rental housing units¹. The current definition used is the 40th percentile rent, the dollar amount below which 40 percent of the standard-quality rental housing units are rented². The 40th percentile rent is drawn from the distribution of rents of all units occupied by recent movers (renter households who moved to their present residence within the past 15 months).

HUD is required to ensure that FMRs exclude non-market rental housing in their computation. Figure 4.5 includes FY 2011 fair market rents for Douglas County and the maximum HOME rent levels for Douglas County households by bedroom size. Low HOME program rents are deemed affordable to households at or below 50 percent of the area's median household income. High HOME rents are the maximum affordable rents for households at or below 60 percent of the area's median income.

The rents shown in Figure 4.5 are gross rents. Gross rent is the tenant portion of rent plus tenant paid utilities (except phone and cable). For example, an affordable rental rate for a two bedroom unit at the high HOME rent is \$1,047 less \$183 in utility allowance yielding \$864 per in tenant paid rent. Whenever utility costs are paid directly by a tenant, gross rent must include an allowance for utilities.

¹ Standard-quality rental housing units have the following attributes: Occupied rental units paying cash rent; Specified renter on 10 acres or less; With full plumbing; With full kitchen; Unit more than 2 years old, and Meals not included in rent.

² FMRs were initially set at the 45th percentile, but were reduced to the 40th percentile, beginning with the FY1995 FMRs. The vast majority of areas remain at the 40th percentile rent. However, certain areas are assigned the 50th percentile rent. Fiftieth percentile FMRs were established by a rule published on October 2, 2000, that also established the eligibility criteria used to select areas that would be assigned 50th rather than the normal 40th percentile FMRs. The objective was to give PHAs a tool to assist them in de-concentrating voucher program use patterns. The three FMR area eligibility criteria were: 1. *FMR Area Size*: the FMR area had to have at least 100 census tracts. 2. *Concentration of Affordable Units*: 70 percent or fewer of the tracts with at least 10 two-bedroom units had at least 30 percent of these units with gross rents at or below the 40th percentile two-bedroom FMR; and, 3. *Concentration of Participants*: 25 percent or more of the tenant-based rental program participants in the FMR area resided in the 5 percent of census tracts with the largest number of program participants. The rule also specified that areas assigned 50th percentile FMRs were to be re-evaluated after three years, and that the 50th percentile rents would be rescinded unless an area has made at least a fraction of a percent progress in reducing concentration and otherwise remains eligible (*See* 24 CFR 888.113.).

Figure 4.5
HOME and Fair Market Maximum Gross Rents
Douglas County, 2011

	Efficiency	1 bedroom	2 bedroom	3 bedroom	4 bedroom
Low HOME Rent Limit (50% of AMI)	\$665	\$712	\$855	\$986	\$1,101
Tenant Rent*	\$514	\$561	\$672	\$803	\$ 918
High HOME Rent Limit (60% of AMI)	\$709	\$871	\$1,047	\$1,249	\$1,374
Tenant Rent	\$558	\$720	\$864	\$1,066	\$1,191
High HOME Rent Limit (65% of AMI)	\$844	\$906	\$1,089	\$1,249	\$1,374
Tenant Rent	\$693	\$755	\$906	\$1,066	\$1,191
Fair Market Rent	\$690	\$849	\$1,031	\$1,435	\$1,591
Tenant Rent	\$539	\$698	\$848	\$1,252	\$1,408

Source: U.S. Department of Housing and Urban Development, 2011. *Tenant rent is the amount paid by the tenant after deducting utility allowance.

Figure 4.6 shows the average gross rent as a percentage of household income for Douglas County during 2007 to 2009. Based upon Figure 4.6, there are 2,408 renter households in Douglas County that paid more than 30 percent of their gross income for rent. This total includes 825 renter households that paid more than 50 percent of their income for housing.

Table 4.6
Gross Rents as a Percentage of Household Income
Douglas County Average 2007-2009

Total:	4,771	% of Total	Cumulative Percent
Less than 10.0 percent	242	5.1%	5.1%
10.0 to 14.9 percent	278	5.8%	10.9%
15.0 to 19.9 percent	442	9.3%	20.2%
20.0 to 24.9 percent	687	14.4%	34.6%
25.0 to 29.9 percent	467	9.8%	44.4%
30.0 to 34.9 percent	557	11.7%	56.0%
35.0 to 39.9 percent	481	10.1%	66.1%
40.0 to 49.9 percent	545	11.4%	77.5%
50.0 percent or more	825	17.3%	94.8%
Not computed	247	5.2%	100.0%

Source: American Community Survey, 2009. Note: The 2010 Census reported 5,533 renter-occupied households in Douglas County.

In 2000, HUD prepared special cross tabulations of Census data to provide detailed information on housing problems, including cost burden. Known as the Comprehensive Housing Affordability Study (CHAS), the data depicts housing problems for renter and owner households, as shown in Figure 4.7. For households at or below 30 percent of the median income, most faced an affordability problem in that they were paying more than 30 percent of their income on rental housing in Douglas County. This situation is not unexpected. Most very low income households face similar housing affordability challenges unless they obtain a tenant based subsidy. Even a heavily subsidized rental apartment project will have difficulty meeting affordable rents for very low income households (at or below 30 percent Median Family Income).

Affordability challenges diminish for higher income households in Douglas County, particularly for households above 50 percent of the area's median income. About 43 percent of renters with incomes between 50 and 80 percent of the median income in 2000 faced a housing cost burden. Most households were elderly or small related families. Small related households were the largest group of renters experiencing a housing cost burden in 2000 followed by the elderly and all other households. In 2000, Gardnerville and Gardnerville Ranchos had the largest number of renter households facing a housing cost burden.

In 2000, about 36 percent of all renter households paid more than 30 percent of their income on housing. However, if the HUD CHAS data is examined more closely, it shows that in 2000, 61.10 percent of low-income renter households were experiencing a cost burden (1,417 households out of a total of 2,319 renter households). As shown in 2000, the greatest housing cost burden resided among households at or below 50 percent of median income.

Update on Cost Burden 2009

In Figure 4.8, low income households ("LI households") are those making less than 50 percent of the Douglas County area median income. The various housing problems are: lacking complete kitchen or plumbing facilities (substandard), having more than one person per room (overcrowded), and paying more than 30 percent of gross income towards housing costs (cost burdened). Lacking complete kitchen or plumbing facilities is the most severe housing problem, followed by overcrowding and then by cost burden. If a household has more than one of these problems they are described as a having severe housing problem.

Figure 4.7
HUD CHAS Data Book for Douglas County, Nevada, 2000

Household by Type, Income, & Housing Problem	Renters					Owners					Total Households
	Elderly	Small Related	Large Related	All	Total	Elderly	Small Related	Large Related	All	Total	
	(1 & 2 members)	(2 to 4 members)	(5 or more members)	Other	Renters	(1 & 2 members)	(2 to 4 members)	(5 or more members)	Other	Owners	
1. Household Income <= 50% MFI	218	608	103	364	1,293	783	427	71	342	1,623	2,916
2. Household Income <=30% MFI	164	305	25	215	709	339	214	24	214	791	1,500
3. % with any housing problems	69.5	78.7	100	81.4	78.1	60.2	86	100	81.3	74.1	76
4. % Cost Burden >30%	69.5	78.7	100	81.4	78.1	60.2	84.1	100	81.3	73.6	75.7
5. % Cost Burden >50%	63.4	63.9	100	74.4	68.3	39.5	63.1	100	79.4	58.5	63.1
6. Household Income >30 to <=50% MFI	54	303	78	149	584	444	213	47	128	832	1,416
7. % with any housing problems	63	78.5	94.9	63.1	75.3	42.6	78.9	83	68.8	58.2	65.3
8. % Cost Burden >30%	63	78.5	76.9	63.1	72.9	42.6	78.9	61.7	68.8	57	63.6
9. % Cost Burden >50%	37	26.1	12.8	32.9	27.1	22.5	51.6	53.2	53.9	36.5	32.6
10. Household Income >50 to <=80% MFI	150	434	104	338	1,026	784	603	117	259	1,763	2,789
11. % with any housing problems	46.7	57.4	61.5	48.2	53.2	33.7	61.9	66.7	71	51	51.8
12. % Cost Burden >30%	46.7	45.9	9.6	47	42.7	33.7	61.2	46.2	71	49.4	46.9
13. % Cost Burden >50%	0	0.9	0	1.2	0.8	13.4	18.9	16.2	19.3	16.3	10.6
14. Household Income >80% MFI	85	944	165	695	1,889	2,070	4,865	740	1,074	8,749	10,638
15. % with any housing problems	0	5.7	30.3	7.9	8.4	14	18.4	28.4	20.9	18.5	16.7
16. % Cost Burden >30%	0	3.2	6.1	5	4	14	17.6	19.6	20.9	17.3	14.9
17. % Cost Burden >50%	0	0	0	0	0	2.4	2.6	3.4	2.8	2.6	2.2
18. Total Households	453	1,986	372	1,397	4,208	3,637	5,895	928	1,675	12,135	16,343
19. % with any housing problems	48.1	39.3	57.3	34.9	40.4	26	27.5	37.8	40	29.6	32.4
20. % Cost Burden >30	48.1	35.6	28.2	33.1	35.5	26	26.7	27.2	40	28.4	30.2
21. % Cost Burden >50	27.4	14	9.4	15.2	15.4	10.7	8.2	10	19	10.6	11.8

During 2009, the estimated number of low income (LI) households (at or below 50 percent of median income) was 3,685, up from 2,916 in 2000. According to the 2009 CHAS data, 76 percent of the low-income renter and owner households experienced housing problems, or 2,800 households. The number of substandard units in Douglas County remains relatively minor.

Figure 4.8
Low Income Households and Housing Problems (Renters and Owners)
Douglas, Lyon, Carson City and Washoe Counties: 2009

	Douglas Co.	Lyon Co.	Carson City	Washoe Co.
Percentage of Low-Income (LI) Households with Housing Problems	76%	56%	84%	78%
Total (LI) Households	3,685	3,125	4,825	34,170
Substandard Units	70	35	230	1,145
Over Crowded Units	95	20	230	1,875
Units with Cost Burden	2,630	1,695	3,585	23,725

Source: HUD, CHAS Data Update, 2009

According to the American Community Survey, the majority of rents in Douglas County fall between \$500 and \$1,250 per month. Almost 90 percent of Douglas County rents fell within that range. Higher rents listed in Figure 4.9 (\$1,000 to \$1,249) most likely represent the large number of single family homes being rented in Douglas County. As seen in Figure 4.12, single-family homes generally fall into the higher rent ranges.

Figure 4.10 shows renter households who pay more than 30 percent of their income on rent by income level. Nearly all of the renter households with a household income at or below \$35,000 paid more than 30 percent of their income on housing in 2009. This is not surprising given the limited availability of rents below \$500 a month (Figure 4.9) and the affordable rent levels in Figure 4.4.

Figure 4.11 shows the percentage of renter households paying more than 30 percent of their income on rents by age of householder in Douglas County. The greatest housing cost burden exists among younger households age 15 to 24. Almost 66 percent of younger households in Douglas County faced a housing cost burden in 2009. Even a majority (53.4 percent) of elder households age 65 or older paid more than 30 percent of their income on rents in 2009.

Figure 4.9
Douglas County Average Rents 2007-2009

Total:	4,771		
With cash rent:	4,547	Percent of Total	Cumulative Percent
Less than \$100	80	1.8%	1.8%
\$100 to \$149	0	0.0%	1.8%
\$150 to \$199	9	0.2%	2.0%
\$200 to \$249	0	0.0%	2.0%
\$250 to \$299	7	0.2%	2.1%
\$300 to \$349	0	0.0%	2.1%
\$350 to \$399	0	0.0%	2.1%
\$400 to \$449	32	0.7%	2.8%
\$450 to \$499	28	0.6%	3.4%
\$500 to \$549	196	4.3%	7.7%
\$550 to \$599	161	3.5%	11.3%
\$600 to \$649	328	7.2%	18.5%
\$650 to \$699	355	7.8%	26.3%
\$700 to \$749	303	6.7%	33.0%
\$750 to \$799	344	7.6%	40.5%
\$800 to \$899	800	17.6%	58.1%
\$900 to \$999	342	7.5%	65.6%
\$1,000 to \$1,249	1,041	22.9%	88.5%
\$1,250 to \$1,499	354	7.8%	96.3%
\$1,500 to \$1,999	131	2.9%	99.2%
\$2,000 or more	36	0.8%	100.0%
No cash rent	224		

Source: American Community Survey, 2009

Figure 4.10
Percent of Douglas County Households Paying More than 30 Percent of Income on Rents
By Income Level: 2009

	Estimate	Percent	Margin of Error
Renter-occupied housing units:	4,771		+/-644
Less than \$20,000:	657		+/-259
Less than 20 percent	0	0.0%	+/-174
20 to 29 percent	0	0.0%	+/-174
30 percent or more	657	100.0%	+/-259
\$20,000 to \$34,999:	1,133		+/-384
Less than 20 percent	0	0.0%	+/-174
20 to 29 percent	48	4.2%	+/-56
30 percent or more	1,085	95.8%	+/-381
\$35,000 to \$49,999:	863		+/-289
Less than 20 percent	5	1%	+/-8
20 to 29 percent	410	48%	+/-199
30 percent or more	448	52%	+/-229
\$50,000 to \$74,999:	931		+/-245
Less than 20 percent	281	30.2%	+/-134
20 to 29 percent	447	48.0%	+/-190
30 percent or more	203	21.8%	+/-159
\$75,000 or more:	940		+/-312
Less than 20 percent	676	71.9%	+/-269
20 to 29 percent	249	26.5%	+/-151
30 percent or more	15	1.6%	+/-24
Zero or negative income	23		+/-41
No cash rent	224		+/-116

Source: U.S. Census Bureau, 2007-2009 American Community Survey

Figure 4.11
Percent of Douglas County Households Paying More than 30 Percent of Income on Rents
By Income Level and Age of Householder: 2009

	Estimate	Percent	Margin of Error
Total:	4,771		+/-644
Householder 15 to 24 years:	559		+/-197
Less than 20.0 percent	9	1.6%	+/-15
20.0 to 24.9 percent	82	14.7%	+/-85
25.0 to 29.9 percent	100	17.9%	+/-110
30.0 to 34.9 percent	10	1.8%	+/-18
35.0 percent or more	358	64.0%	+/-151
Not computed	0		+/-174
Householder 25 to 34 years:	1,007		+/-278
Less than 20.0 percent	258	25.6%	+/-152
20.0 to 24.9 percent	109	10.8%	+/-71
25.0 to 29.9 percent	70	7.0%	+/-67
30.0 to 34.9 percent	112	11.1%	+/-141
35.0 percent or more	442	43.9%	+/-227
Not computed	16		+/-28
Householder 35 to 64 years:	2,541		+/-452
Less than 20.0 percent	573	22.6%	+/-219
20.0 to 24.9 percent	418	16.5%	+/-201
25.0 to 29.9 percent	243	9.6%	+/-119
30.0 to 34.9 percent	353	13.9%	+/-178
35.0 percent or more	778	30.6%	+/-253
Not computed	176		+/-112
Householder 65 years and over:	664		+/-218
Less than 20.0 percent	122	18.4%	+/-120
20.0 to 24.9 percent	78	11.7%	+/-74
25.0 to 29.9 percent	54	8.1%	+/-58
30.0 to 34.9 percent	82	12.3%	+/-81
35.0 percent or more	273	41.1%	+/-169
Not computed	55		+/-54

Source: U.S. Census Bureau, 2007-2009 American Community Survey

Recent rent ranges can be found in Figure 4.12 for units in Carson Valley and Lake Tahoe. The rental ranges were based upon an informal survey of units for rent during August 2011. The rental range establishes the expected rents by bedroom size for the majority of available units. There will be units which are higher or lower than the rates shown in Figure 4.12.

As discussed previously, it is difficult to serve very low-income households without direct subsidy to tenants. Direct subsidies come in the form of a voucher which reduces rent payment by the tenant. Without a direct subsidy, the ability to provide housing to households at or below 30 percent of the median income is very difficult.

Figure 4.12
Rents Available in Carson Valley and Lake Tahoe: 2011

Type of Unit	Carson Valley	Lake Tahoe
Apartments/Duplex	Available Rents	Available Rents
1 bedroom	\$475-\$650/mo.	\$550-\$700
2 bedroom	\$625-\$900/mo.	\$750-\$850
3 bedroom	\$800+	\$900-\$1,100
Single Family Dwellings		
2 bedroom	\$700-\$1,000/mo.	\$850 - \$1,200
3 bedroom	\$875-\$1,250/mo.	\$1,200-\$1,800
4+ bedroom	\$1,800+	\$2,000+

Conclusions about rental rates in Douglas County:

- Rents for available units in Carson Valley are in line with affordable rental guidelines shown in Figure 4.4 for households at or above 50 percent of the area’s median income.
- Based upon existing demands for affordable rental housing as demonstrated by the Housing Choice Voucher waiting list, the availability of market rate rental housing, and Census information (Figures 4.7 and 4.8); it is reasonable to conclude that additional affordable rental housing for the elderly and small related family households is needed in Douglas County.
- It is difficult to gage availability of rental housing without conducting an extensive survey. However, there did appear to be sufficient units available during August. Based upon surveys conducted by the Nevada Housing Division, the Reno-Sparks area had a vacancy rate of 10 percent during the second quarter of 2010. Vacancy rates in the Rural areas including Minden and Gardnerville averaged nearly 12 percent during the second quarter of 2010.
- Rents in Lake Tahoe tend to mirror those in Carson Valley, but slightly higher in each category creating more pressure for affordable rental housing units.

Ownership Affordability in Douglas County

Affordable ownership housing is defined by the commonly accepted guideline for housing affordability, that is, housing costs do not exceed 30 percent of a household's gross income for households at or below 80 percent of the area's median income. Housing costs generally include principle, interest, taxes and insurance for owners, and include utility costs.

Figure 4.13 shows affordable housing prices based upon income and housing costs for households spending 30 percent or less of their annual gross income. Given land costs, site development costs and other entitlements as well as construction costs, it would be difficult to produce single-family detached homes in Douglas County for less than \$150,000 without subsidy. It is also important to note that 2010 sales prices are probably influenced by foreclosures and bank owned properties which are sometimes sold at or below replacement cost. Figure 4.13 assumes a loan to value ratio of 90 percent with a 30 fixed rate loan at 5.5 percent interest. Taxes are approximately one percent of the home sale value with taxes being .25 percent.

Figure 4.14 shows sales of single family homes for selected areas in Douglas County during 2010. There are several areas where the median sales price is at or below \$200,000. Homes priced at \$150,000 can be affordable to households at or below 80 percent of median income. A large number of sales in 2010 were substantially below the 203b limits for Douglas County which was \$350,750 in 2010. In fact, 50 to 90 percent of sales for selected areas within Douglas County were below \$300,000. Only three areas (Sunrise Estates, West Valley and Lake Tahoe) were above the 203b limits.

Single-family attached housing sales in Douglas County are strongly influenced by Lake Tahoe. During the first nine months of 2011, there were only 29 sales of condominiums in the Carson Valley. Sales information from the Assessor's database show a low price of \$33,424 and a high price of \$220,000. The median price for a condominium in Carson Valley was \$90,100 in 2011.

Figure 4.13
Affordable Housing Prices for Owners, Douglas County 2011

Household Size	Income	Amount Available for Housing	Mortgage	Affordable Price
Very Low-Income Households 30% of Median income: \$32,750				
1	\$15,650	\$391	\$50,580	\$56,200
2	\$18,200	\$455	\$58,770	\$65,300
3	\$20,500	\$513	\$66,330	\$73,700
4	\$22,750	\$569	\$73,530	\$81,700
5	\$24,600	\$615	\$79,560	\$88,400
6	\$26,400	\$660	\$85,275	\$94,750
Low-Income Households 50% of Median income: \$37,950				
Household Size				
1	\$26,600	\$665	\$85,950	\$95,500
2	\$30,400	\$760	\$98,280	\$109,200
3	\$34,200	\$855	\$110,520	\$122,800
4	\$37,950	\$949	\$122,670	\$136,300
5	\$41,000	\$1,025	\$132,525	\$147,250
6	\$44,050	\$1,101	\$142,425	\$158,250
Moderate Income 80% of Median Income: \$60,700				
Household Size				
1	\$42,500	\$1,063	\$137,475	\$152,750
2	\$48,600	\$1,215	\$157,050	\$174,500
3	\$54,650	\$1,366	\$176,625	\$196,250
4	\$60,700	\$1,518	\$196,290	\$218,100
5	\$65,600	\$1,640	\$212,040	\$235,600
6	\$70,450	\$1,761	\$227,700	\$253,000
Median Family Income: \$75,900				
Household Size				
1	\$53,130	\$1,328	\$171,675	\$190,750
2	\$60,720	\$1,518	\$196,290	\$218,100
3	\$68,310	\$1,708	\$220,680	\$245,200
4	\$75,900	\$1,898	\$245,475	\$272,750
5	\$82,000	\$2,050	\$265,050	\$294,500
6	\$88,063	\$2,202	\$284,760	\$316,400
120% of Median Income: \$91,080				
Household Size				
1	\$63,756	\$1,594	\$206,100	\$229,000
2	\$72,864	\$1,822	\$235,620	\$261,800
3	\$81,972	\$2,049	\$264,960	\$294,400
4	\$91,080	\$2,277	\$288,000	\$320,000
5	\$98,366	\$2,459	\$317,925	\$353,250
6	\$105,653	\$2,641	\$341,460	\$379,400

Figure 4.14
Single Family Housing Sales
Selected Areas in Douglas County: 2010

Area	High Price	Low Price	Median Price	Average Price	% of Sales below \$300K
Johnson Lane	\$750,000	\$101,850	\$273,500	\$300,960	49.5%
Indian Hills	\$430,585	\$ 67,601	\$195,000	\$200,323	93.4%
Topaz	\$650,000	\$ 87,302	\$195,500	\$235,289	76.0%
Minden/ Gardnerville	\$520,000	\$ 70,000	\$210,000	\$223,845	86.0%
Gardnerville Ranchos	\$475,000	\$ 65,691	\$163,114	\$182,706	94.1%
Ruhenstroth	\$365,000	\$172,850	\$297,000	\$297,000	50.0%
Sunrise Estates	\$750,000	\$100,000	\$255,000	\$366,287	50.0%
Foothills					
West Valley	\$900,000	\$325,000	\$437,000	\$496,960	0.0%
Lake Tahoe	\$5,100,000	\$218,820	\$600,000	\$1,000,750	

Source: Douglas County Assessors Sales Database for 2010.

In recent years, Douglas County struggled with homeowner affordability. Figure 4.15 shows the percentage of owner households paying more than 30 percent of their income on housing by income level. For households with less than \$35,000 in income, approximately 64 percent pay more than 30 percent of their income on housing. Table 4.15 includes households with and without a mortgage and it includes elderly homeowners who have limited incomes as compared to households with employed adults.

Figure 4.16 shows selected monthly owner costs as a percentage of household income for households with and without a mortgage. Approximately 39 percent of Douglas County owner households faced a housing cost burden in 2009. Households who paid more than 30 percent of their gross income on owner related costs by definition face a housing cost burden. For those with a mortgage approximately 52 percent of households faced a housing cost burden.

The distribution of the housing cost burden in Douglas County is very similar to renters. As seen in Figure 4.7, most of the housing cost burden was concentrated among elderly households and small related households during 2000. Elderly households comprised the largest number of owner households in Douglas County at or below 80 percent of the area’s median income. The fixed income nature of elderly households makes it difficult for them to meet increasing costs of ownership, most notably home maintenance and monthly utility expenses.

Figure 4.15
Percent of Owner Households Paying More than 30 Percent of Income on Housing Related Costs by Income Level: 2009

	Douglas County, Nevada		
	Estimate	Percent	Margin of Error
Owner-occupied housing units:	13,908		+/-552
Less than \$20,000:	1,297		+/-295
Less than 20 percent	108	8.3%	+/-89
20 to 29 percent	76	5.9%	+/-51
30 percent or more	1,113	85.8%	+/-264
\$20,000 to \$34,999:	1,603		+/-302
Less than 20 percent	587	36.6%	+/-211
20 to 29 percent	277	17.3%	+/-134
30 percent or more	739	46.1%	+/-221
\$35,000 to \$49,999:	1,646		+/-326
Less than 20 percent	690	41.9%	+/-224
20 to 29 percent	250	15.2%	+/-141
30 percent or more	706	42.9%	+/-224
\$50,000 to \$74,999:	3,151		+/-509
Less than 20 percent	994	31.5%	+/-302
20 to 29 percent	554	17.6%	+/-182
30 percent or more	1,603	50.9%	+/-392
\$75,000 or more:	6,067		+/-528
Less than 20 percent	3,165	52.2%	+/-472
20 to 29 percent	1,457	24.0%	+/-346
30 percent or more	1,445	23.8%	+/-373
Zero or negative income	144		+/-106

Source: American Community Survey

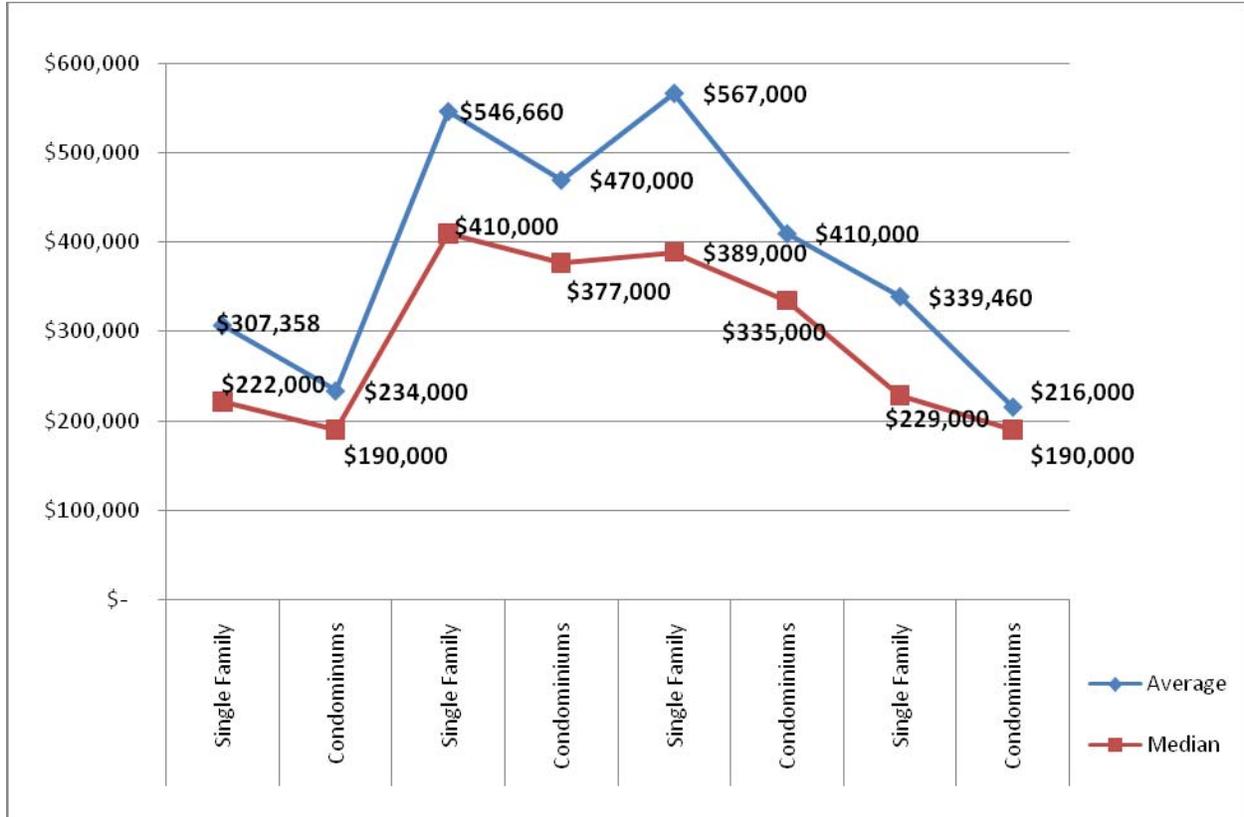
**Figure 4.16
Selected Monthly Owner Costs
as A Percentage of Household Income: 2007-2009**

Housing units with a mortgage (excluding units where SMOCAPI cannot be computed)	9,173	9,173
Less than 20.0 percent	2,222	24.20%
20.0 to 24.9 percent	804	8.80%
25.0 to 29.9 percent	1,311	14.30%
30.0 to 34.9 percent	1,296	14.10%
35.0 percent or more	3,540	38.60%
Not computed	74	(X)
Housing unit without a mortgage (excluding units where SMOCAPI cannot be computed)	4,591	4,591
Less than 10.0 percent	1,734	37.80%
10.0 to 14.9 percent	1,042	22.70%
15.0 to 19.9 percent	546	11.90%
20.0 to 24.9 percent	350	7.60%
25.0 to 29.9 percent	149	3.20%
30.0 to 34.9 percent	160	3.50%
35.0 percent or more	610	13.30%
Not computed	70	(X)

Source: American Community Survey, 2009

Gauging housing affordability in recent years is difficult given market conditions which generated large swings in housing prices. Douglas County is no different. Figure 4.17 shows median housing prices for 2002, 2006, 2007 and 2011. Current housing prices in Douglas County have retreated significantly over the last four years. Median and average prices for single-family detached and condominiums have returned to 2002 levels at a time when mortgage interest rates are hitting all time lows. If mortgage rates begin to increase, housing prices could decline further to offset rate increases, especially if there is still an excess supply of distressed properties. As the supply of distressed properties declines and the economic recession diminishes, home prices should move back to replacement value prices and above, assuming a return to more full employment and higher wages.

Figure 4.17
Douglas County Single-Family and
Condominium Sales: 2002, 2006, 2007 and 2011



Source: Douglas County Assessor Office Sales Records 2002, 2006, 2007, and 2011

Figure 4.18 shows the status of distressed properties in Douglas County and adjacent jurisdictions as of September 2011. According to Realty Trac, there were 222 notices of default in Douglas County during 2011.

Figure 4.18
Foreclosures, Trustee Sales and Defaults, 2011

Status	Douglas County	Carson City	Lyon County	Churchill County
Notice of Default	222	141	528	106
Trustee Sale	63	52	52	45
Bank Owned	215	167	727	141

Source: RealtyTrac, 2011

Figure 4.19 contains information on home purchases and mortgage refinancings in Douglas County and adjacent jurisdictions during 2010. A total of 453 home loans were approved with a median loan amount of \$216,000 during 2010. Of note is that Douglas County also showed a

total of 1,640 refinanced home loans at a median loan amount of \$247,000. The historic low mortgage interest rates are certainly a factor in the high volume of refinancing during 2010.

Figure 4.19
Lending Activity in Douglas County
HMDA Data 2010

	Home Purchase		Refinanced	
	No of Loans	Median Loan Amount	Number of Loans	Median Loan Amount
Douglas	453	\$216,000	1,640	\$247,000
Carson City	345	\$176,000	1,222	\$204,500
Lyon Co.	770	\$133,000	853	\$170,000
Washoe Co.	5,410	\$172,000	8,608	\$218,000

Homebuyer Assistance Programs In Douglas County

Six agencies provide homebuyer assistance programs in Douglas County. They include:

The Nevada Housing Division. The Division offers a down payment and closing cost loan program. The Division provides up to \$4,500 in assistance for qualified households who do not exceed the maximum income levels. The maximum income levels for Douglas County in 2011 were fairly high, \$91,080 for a 1-2 person household and \$106,260 for a three or more person household.

The Rural Nevada Housing Authority. In calendar year 2010, the Housing Authority provided 24 mortgages to Douglas County families. The total value was just over \$4.6 million. The Rural Nevada Housing Authority offers two homebuyer assistance programs. The HOME at Last Plus program offers a cash downpayment grant equal to three percent of the loan amount coupled with a below market rate 30 year fixed. The 2011 maximum income limit for Douglas County is \$91,080 for two persons or less or \$106,260 for three or more persons. The other program is the Home at Last Mortgage Credit Certificate which can be used toward federal income tax savings.

USDA Rural Development. USDA operates a direct loan and guaranteed loan program for single family home purchases in Douglas County. The County is a very active area for USDA. In FY 2010, USDA Rural Development loaned a total of \$15,466,743 for 87 homes (only 5 of those were direct loans – the other 82 were guaranteed). During FY 2011, USDA Rural Development provided 76 Single Family loans for a total of \$11,838,443.

Western Nevada HOME Consortium. The WHNC provided down payment assistance in the form of a loan to qualified homebuyers. WNHC can provide up to \$15,000 in assistance. The loan is repaid upon subsequent sale of the home given sufficient proceeds are available. In 2010, WNHC provided assistance to two Douglas County households for a total of \$65,493.

Sierra Nevada Community Land Trust and St. Joseph's Community Land Trust. Both agencies provide assistance to homebuyers in the form of subsidies. Deed restricted homes on land leased from the Land Trusts remain permanently affordable through resale provisions that balance a fair return on investment with future affordability. These resale provisions guarantee that the home remains permanently affordable and available to local communities.

Affordable Housing Barriers and Impediments to Fair Housing

Barriers to affordable housing development may include regulatory impediments, including development fees. Local governments can encourage the development of affordable housing, especially to households at or below 50 percent of the median area income, by reducing or waiving predevelopment costs and other financial impediments, including the following:

- Property tax abatement for a specified period of time.
- Modification of site development standards such as parking space requirements, lighting, and landscaping requirements.
- Donation of publicly owned lands.
- Utility connection fee abatement or deferral.

In addition, it is necessary to look at the availability of zoning for high density residential development. A recent analysis of the Community Plan areas in the Carson Valley, Sierra, and Topaz Regional Plans shows very few remaining vacant parcels with appropriate zoning. Figure 4.20 shows that there are 126.21 acres of vacant parcels which are zoned for multi-family development. The vast majority of these parcels are located in the Minden/Gardnerville Community Plan area.

Douglas County staff completed a fair housing survey in 2011 as part of the Housing Element for the 2011 Master Plan. Specifically the Douglas County results show:

- The development code should be amended to address reasonable accommodation.
- The zoning ordinance could contain a special provision making housing accessible to persons with disabilities.
- The planning and building codes currently make reference to the accessibility requirements contained in the 1988 amendment to the Fair Housing Act, but there are no provisions to monitor compliance.

Douglas County is a member of the WNHC. In 2010, the Consortium prepared an analysis of impediments for fair housing choice. Although there were no specific findings for Douglas County, the following recommendations were made for the Consortium area:

1. Continue to provide fair housing training, particularly for areas identified in the Analysis of Impediments. Work with housing providers and Silver State Fair Housing Council to identify needed trainings for WNHC partners, subrecipients, and others operating in the service area.
2. Monitor referrals and complaints filed and track trends in fair housing complaints.

-
3. Continue to encourage WNHC funded projects to implement universal design standards and provide additional accessible units.
 4. Continue to distribute fair housing information to subrecipients and those served by WNHC funding.
 5. Provide fair housing referral materials to property managers and on-site managers overseeing WNHC financed projects.

In an effort to better understand fair housing issues facing the service area, WNHC contacted the Silver State Fair Housing Council as part of the assessment. Discussions with Silver State staff resulted in the following findings:

1. Fair housing challenges still remain with family rental housing and with persons with disabilities. Landlords are often reluctant to rent to families due to perceptions of costs and potential damage to rental housing units.
2. Disabled households can face discrimination from landlords due to potential requests for reasonable accommodations making landlords reluctant to rent to persons and households with disabilities.
3. Discrimination based upon race and ethnicity occurs, but not to the extent seen with familial status and disabilities.

In April 2011, the State of Nevada completed a new *Analysis of Impediments to Fair Housing Choice*. Much of the analysis focuses on affordable housing. It does not, however, demonstrate how potential impediments to affordable development might affect fair housing choice in any specific community. The Douglas County Development Code addresses many of the issues identified as barriers to affordable housing development. The State's *Analysis of Impediments* found:

- Barriers to housing development exist because of land use and zoning policies. Although an exhaustive review of land use and zoning codes for the many jurisdictions was beyond the scope of this study, the Denver planning firm Clarion Associates conducted a detailed review of the codes in Douglas and Elko counties to provide the framework for good land use and zoning guidelines. This review found that the counties could improve fair housing by lowering minimum lot sizes, removing density limitations, adding flexibility in mixed-use and manufactured housing permits and introducing incentives for affordable housing (e.g., density bonuses/height allowances, reduced parking standards).

Action Item 3 (Review land use and zoning codes for best practices in reducing housing barriers) identified specific strategies to remove potential barriers to local government regulation and affordable housing development, as described below.

Purpose statement. The code should reflect the county's purpose to provide housing choice for its residents and to comply with applicable federal and state law regarding housing choice.

Allowance of small lots. At least one zone district (or overlay district, or permit system) that allows small lots for single family detached housing in some locations. While the appropriate minimum lot size will vary with the character of the county, a zone allowing minimum lot sizes

in the 3,000-6,000 square foot range would be appropriate for more urbanized areas of many counties. In addition, lot width requirements should be reasonable and consistent with minimum lot sizes; while some codes require minimum lot widths of 70 feet or more, small homes can be constructed on lots as narrow as 40 feet (or even less). Minimum lot size requirements are the type of regulation most responsible for increasing housing costs.

Allowance of multifamily development. At least one zone district (or overlay district, or permit system) that allows the construction of multi-family housing, and mapping enough land into this district to allow a reasonable chance that some multi-family housing will be developed. In many rural counties, these mapped areas may be close to incorporated or urbanized areas. Maximum heights should be reasonable and consistent with the maximum density permitted; avoid mapping areas for multi-family densities and then imposing height restrictions that prohibit efficient development at those densities. Failure to provide opportunities for multi-family development has been identified as one of the four leading regulatory causes of increased housing costs.

Provisions for manufactured homes. Manufactured housing meeting HUD safety standards should be allowed somewhere (per the federal Manufactured Housing Act of 1974). While restricting these homes to manufactured home parks is common, the better practice is to allow them in at least one residential zone where the size and configuration matches the scale and character of the area.

No minimum home sizes. The zoning and subdivision regulations should not establish minimum house or dwelling unit sizes (beyond those in the building code). Minimum house size requirements have also been identified as a significant cause of increased housing price in those communities where they are in place.

Allowance of group housing. The code should clarify that housing for groups protected by the Fair Housing Act Amendments of 1988 are treated as residential uses, and should generally allow those group housing uses in at least one residential district. While some communities require a special permit for these uses, others find that they can be allowed by right provided that they comply with standards limiting scale, character, and parking. Failure to provide for these uses in the code could subject the county to a developer's request for "reasonable accommodation" under the Act, and failure to provide "reasonable accommodation" could be a violation of federal law. In light of the aging of the American population, the code should also provide areas where congregate care, nursing home, and assisted living facilities may be constructed.

Allowance for accessory dwelling units. The code should allow accessory dwelling units in at least one zone district – either as an additional unit within an existing home structure or in an accessory building on the same lot. While some communities require a special permit for these uses, others find that they can be allowed by right provided that they comply with standards limiting scale, character, and parking.

Permit mixed use development. In order to promote affordability, housing should be allowed near businesses that employ workers, particularly moderate and lower income employees. To do that

the code should permit residential units in at least one commercial zone district or should map some lands for multi-family development in close proximity to commercial districts.

Lower parking standards. Although the traditional standard of two parking spaces per dwelling unit may be reasonable for many areas of a county, a lower standard can and generally should be used for affordable housing, multi-family housing, group housing, and special needs housing.

Flexibility on nonconforming structures. Although zoning codes generally require that nonconforming structures damaged or destroyed through fire or natural causes can only be rebuilt in compliance with the zoning code, an increasing number of codes are exempting affordable housing from this requirement. Often the most affordable housing in a community is located on lots that are too small or narrow for the district where they are located, or in multi-family buildings that have too many units for the district where they are located. If forced to replat with larger lots or to reduce density following a disaster, those affordable units may be lost, and allowing rebuilding with the same number of units as before may be the most efficient way to preserve these units in the housing stock.

Development incentives. In order to encourage the development of affordable housing, the code should recognize the difficult economics involved and should offer incentives. Common incentives include smaller lots, increased density in multi-family areas, reduced parking requirements, or waivers or reductions of application fees or development impact fees. Some communities provide additional incentives for housing that is restricted for occupancy at lower percentages of the Area Median Income (AMI). For example, developments restricted for households earning less than 50 percent of AMI could receive more generous incentives than those for households earning less than 80 percent of AMI. While zoning and subdivision incentives alone are often not enough to make development for lower levels of AMI economically feasible, they can be part of a broader package of incentives (for example, including financial incentives or land contributions) that make those project feasible. Any incentives offered should be updated as new housing studies are completed and new information about specific affordable housing needs is obtained.

Growth management exemptions. Most communities that operate a growth management system exempt affordable housing or allow it to compete for a separate pool of development rights in order to encourage this type of housing.

Figure 4.20
Vacant Parcels Available for Medium and High Density Residential Development in Douglas County, by Community Plan Area and Zoning District

Community Plan Area	Multi-Family Residential Zoning (MFR)	Mixed Use Commercial Zoning (MUC)	SFR-8000 Zoning (SFR-8,000)	< SFR-8000
Carson Valley Region				
Airport	-	-	-	-
Agriculture	-	-	49.14	-
East Valley	-	-	-	-
Fish Springs	-	-	-	-
Foothills	-	-	-	-
Gardnerville Ranchos	7.18		93.66	
Genoa	-	-	-	-
Johnson Lane	-	-	-	-
Indian Hills/Jacks Valley	2.18	-	229.81	-
Minden/Gardnerville	99.97	18.14	307.13	-
Ruhentroth				
Pinenut Region	-	-	-	-
Sierra Region	4.66	-	-	-
Topaz Region				
Topaz Lake	-	-	-	-
TRE/Holbrook	12.22	-	-	-
Total	126.21	18.14	679.14	-

Housing Demand by Income and Tenure

Projected demand for housing is shown in Figures 4.21 and 4.22. The tables show the number of units broken down by income and tenure for population growth rate under the State Demographer’s forecast and a population forecast based upon the historic growth rate of 1.39 percent between 2000 and 2010.

Figure 4.21
Housing Demand Forecast
State Demographer’s Population Growth: 2011-2030

Year	Owner Households			Renter Households		
	Very low Income	Low Income	Moderate or higher	Very low Income	Low Income	Moderate or higher
2011	-7	(8)	(39.15)	(7)	(5)	(10)
2012	(1)	(1)	(7)	(1)	(1)	(1)
2013	2	3	13	2	1	2
2014	6	6	32	4	3	6
2015	8	8	42	5	4	7
2016	10	10	52	6	5	9
2017	11	12	61	7	6	11
2018	13	14	69	8	7	12
2019	13	14	68	8	7	12
2020	13	14	68	8	7	12
2021	14	15	74	9	7	13
2022	14	15	73	9	7	13
2023	13	14	71	9	7	12
2024	13	14	68	8	6	12
2025	12	13	65	8	6	11
2026	11	12	61	7	6	11
2027	11	12	57	7	5	10
2028	10	11	53	6	5	9
2029	9	10	49	6	5	9
2030	8	9	45	5	4	8
Total	181	196	975	115	92	168

**Figure 4.22
Housing Demand Forecast
Historic Population Growth: 2011-2030**

Year	Owner Households			Renter Households		
	Very low Income	Low Income	Moderate or higher	Very low Income	Low Income	Moderate or higher
2011	118	128	637	77	61	112
2012	28	30	151	18	14	27
2013	28	31	153	18	15	27
2014	29	31	155	19	15	27
2015	29	32	157	19	15	28
2016	30	32	160	19	15	28
2017	30	33	162	19	15	28
2018	30	33	164	20	16	29
2019	31	33	166	20	16	29
2020	31	34	169	20	16	30
2021	32	34	171	21	16	30
2022	32	35	173	21	17	30
2023	33	35	176	21	17	31
2024	33	36	178	21	17	31
2025	34	36	181	22	17	32
2026	34	37	183	22	17	32
2027	35	37	186	22	18	33
2028	35	38	188	23	18	33
2029	35	38	191	23	18	34
2030	36	39	194	23	18	34
Total	724	783	3,894	468	372	684

Future housing demand estimates are based upon two different population forecasts. A lower growth forecast prepared by the Nevada State Demographer requires the development of 1,352 new housing units for ownership and 375 units for rental. A projected 377 new housing units will be needed to meet the demands of low and very-low income households. Just over 200 rental housing units will be needed for low and very low-income households over the next 20 years under the Demographer’s population forecast.

A population forecast which is based upon historic Douglas County growth levels from 2000 to 2010 (1.39 percent average annual growth) requires a substantial increase in new housing units as compared to the Demographer’s forecast. Total new units for owners in Douglas County are projected to be as high as 5,401, with 1,507 units for low and very low income households, over the next 20 years. Under the historic population growth scenario, an estimated 1,524 rental units will be needed with 840 units being available for low and very low income households.

Chapter 5 Transportation

Streets and Highways

There are 796.74 miles of road in Douglas County. The County maintains 231.67 miles of road, or 29.08 percent of the total. The remaining roads are maintained by the Towns of Gardnerville, Genoa, and Minden, as well as 16 different General Improvement Districts and two homeowner associations. In addition, there are 98.22 miles of private roads in Douglas County. Map 5.1 is an index showing the seven maintenance zones within the County. Maintenance Maps for each zone start on page 3 of the Transportation Chapter.

**Map 5.1
Douglas County Maintenance Zone Index**

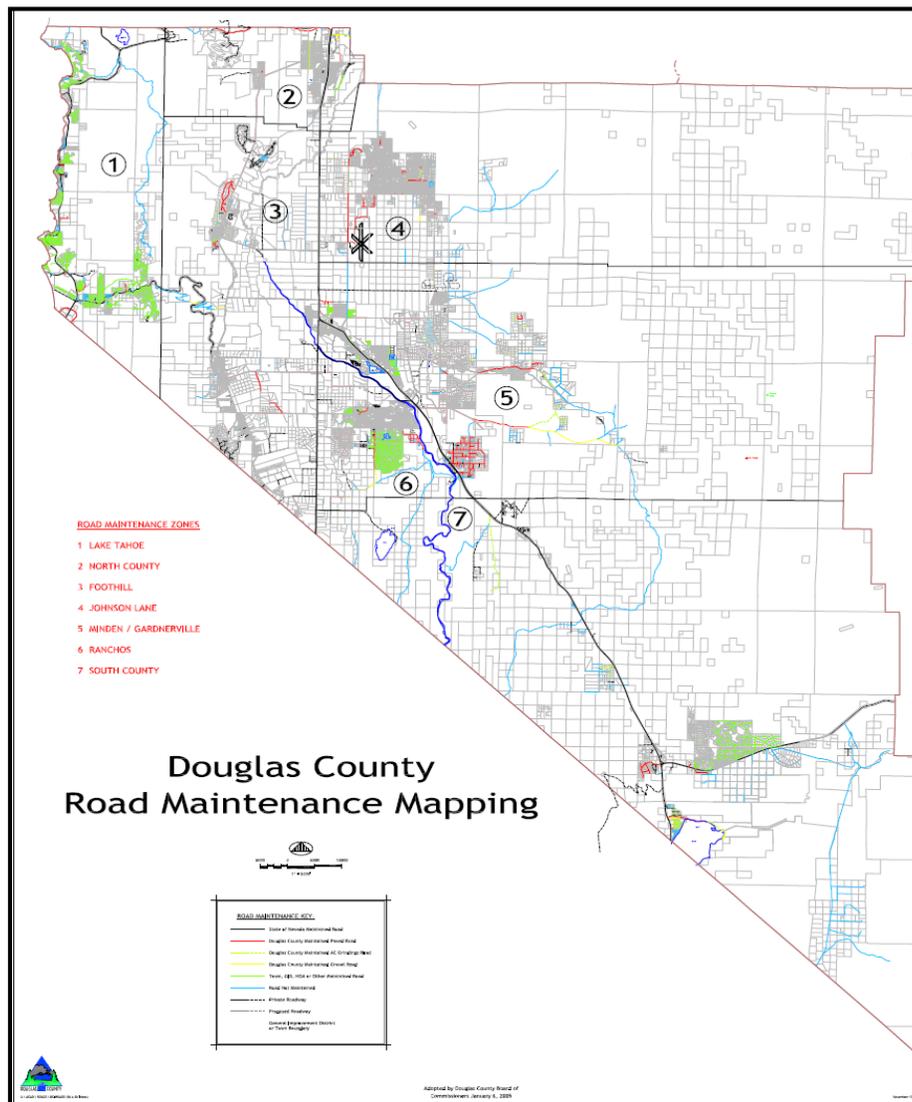
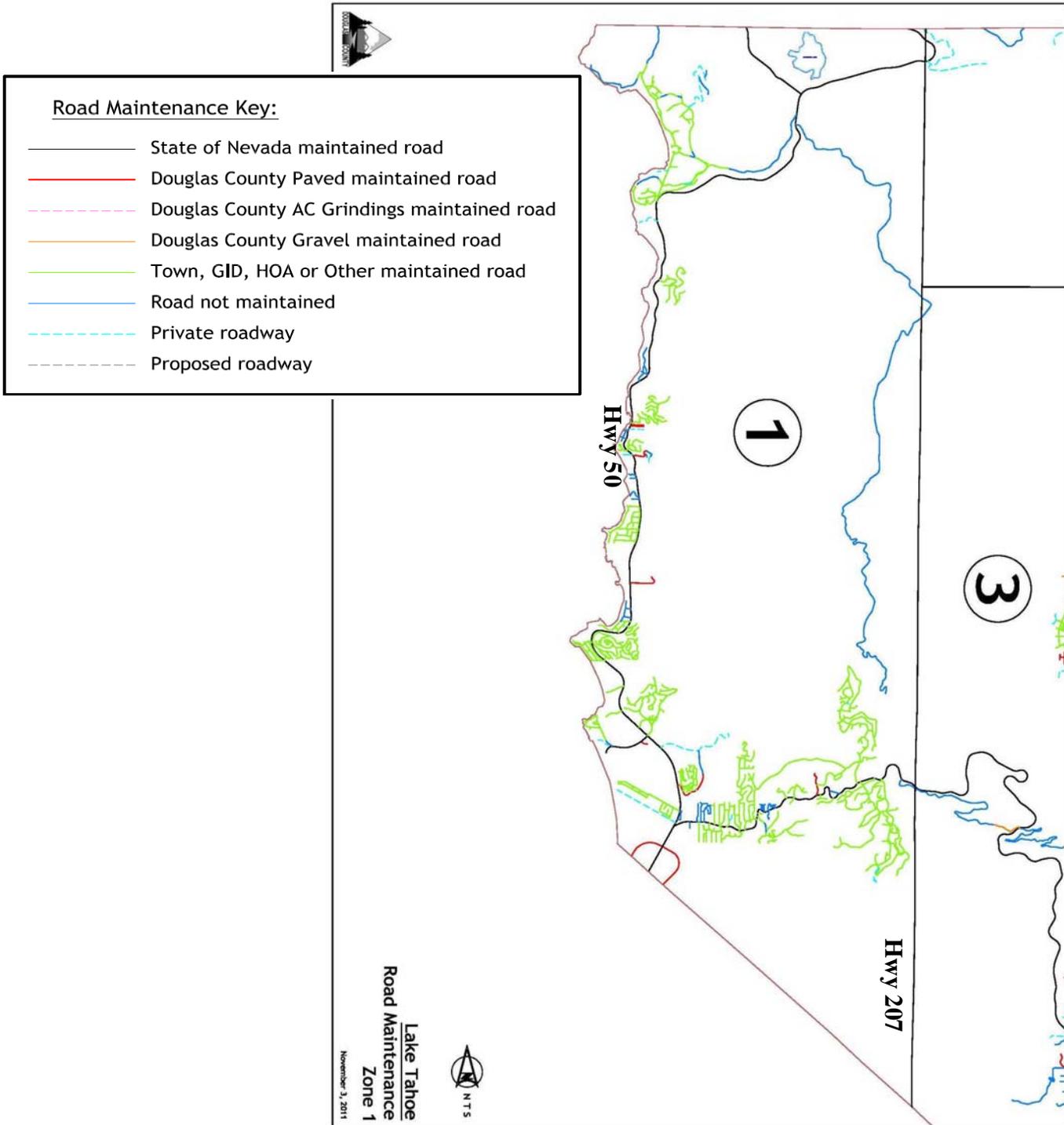


Figure 5.1 provides information on road maintenance responsibilities in Douglas County. Of the 796.74 total miles of road in the County, Douglas County maintains a total of 231.67 miles of road including 17.19 miles of gravel roads, 43.12 miles of grindings roads, and 171.36 miles of paved roads.

**Figure 5.1
 Lineal Miles of Roads Maintained and Entities Responsible for Maintenance**

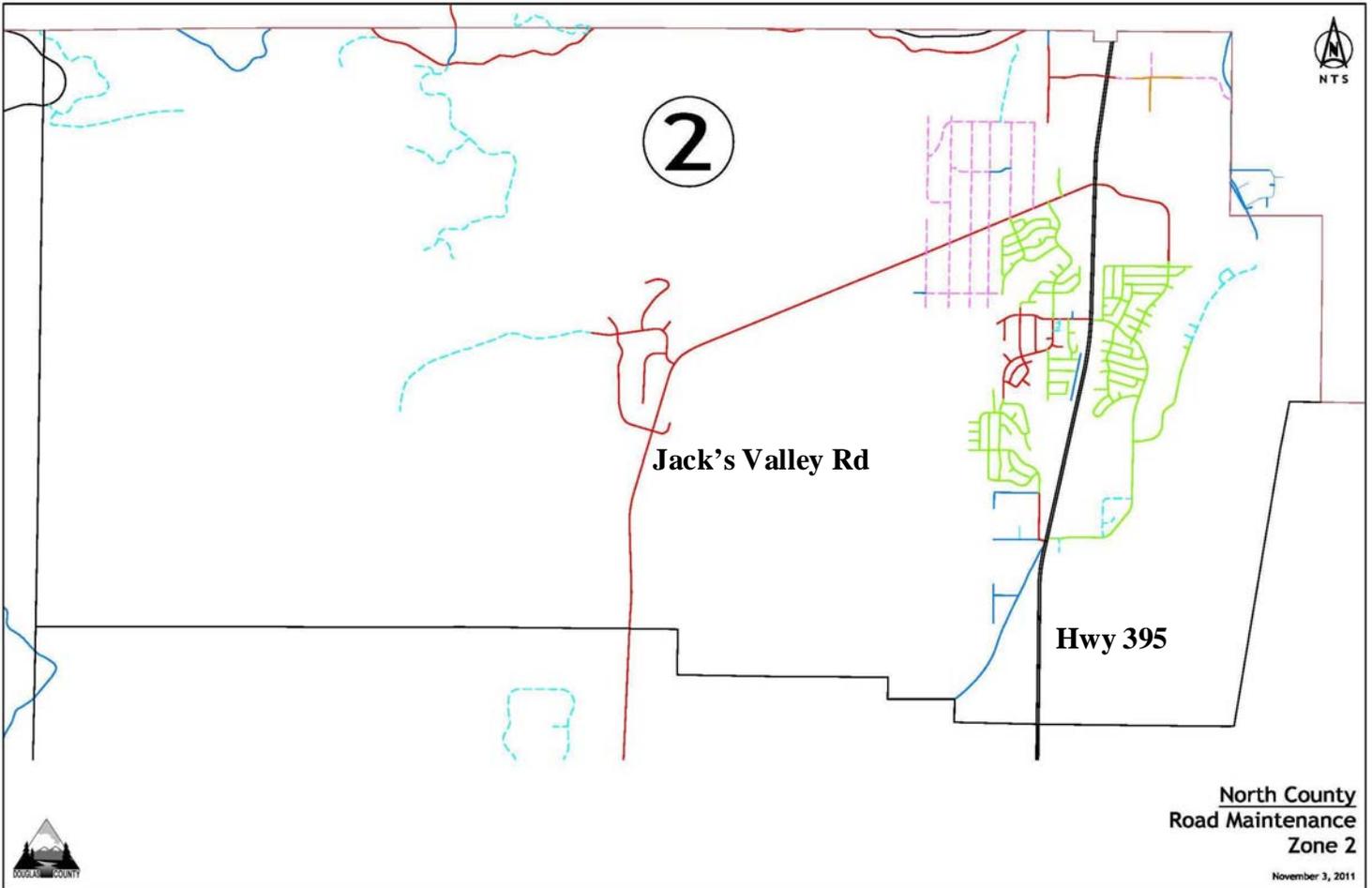
<u>Abbreviation</u>	<u>Jurisdiction Responsible for Maintenance</u>	<u>2008</u>	<u>2011</u>
CREGID	Cave Rock Estates GID	2.21	2.21
DC-G	Douglas County - Gravel	18.24	17.19
DC-GR	Douglas County - Grindings	42.93	43.12
DC-P	Douglas County - Paved	167.27	171.36
EPGID	Elk Point GID	0.93	0.93
Gardnerville	Town of Gardnerville	20.76	23.37
Genoa	Town of Genoa	2.46	2.05
GHOA	Glenbrook HOA	6.95	7.09
GRGID	Gardnerville Ranchos GID	43.30	42.87
IHGID	Indian Hills GID	16.42	15.82
KGID	Kingsbury GID	28.37	28.59
LCEGID	Logan Creek Estates GID	1.75	1.75
LRGID	Lake Ridge GID	0.98	0.98
LVGID	Lake Village GID	2.13	2.16
MBGID	Marla Bay GID	1.43	1.43
Minden	Town of Minden	14.56	16.12
NA	Public, Not Accepted for Maintenance	173.22	177.04
NDOT	Nevada Department of Transportation	101.85	101.85
OPGID	Oliver Park GID	1.98	1.98
Private	Private	93.78	98.22
RHGID	Round Hill GID	4.38	4.38
SGID	Skyland GID	2.87	2.87
TREGID	Topaz Ranch Estates GID	26.77	26.77
UHOA	Uppaway HOA	1.14	1.14
ZCGID	Zephyr Cove GID	0.73	0.73
ZHGID	Zephyr Heights GID	3.71	3.71
ZKGID	Zephyr Knolls GID	1.01	1.01
	Totals	782.13	796.74

Map 5.2 Douglas County Maintenance Zone 1



Source: Douglas County Community Development Department

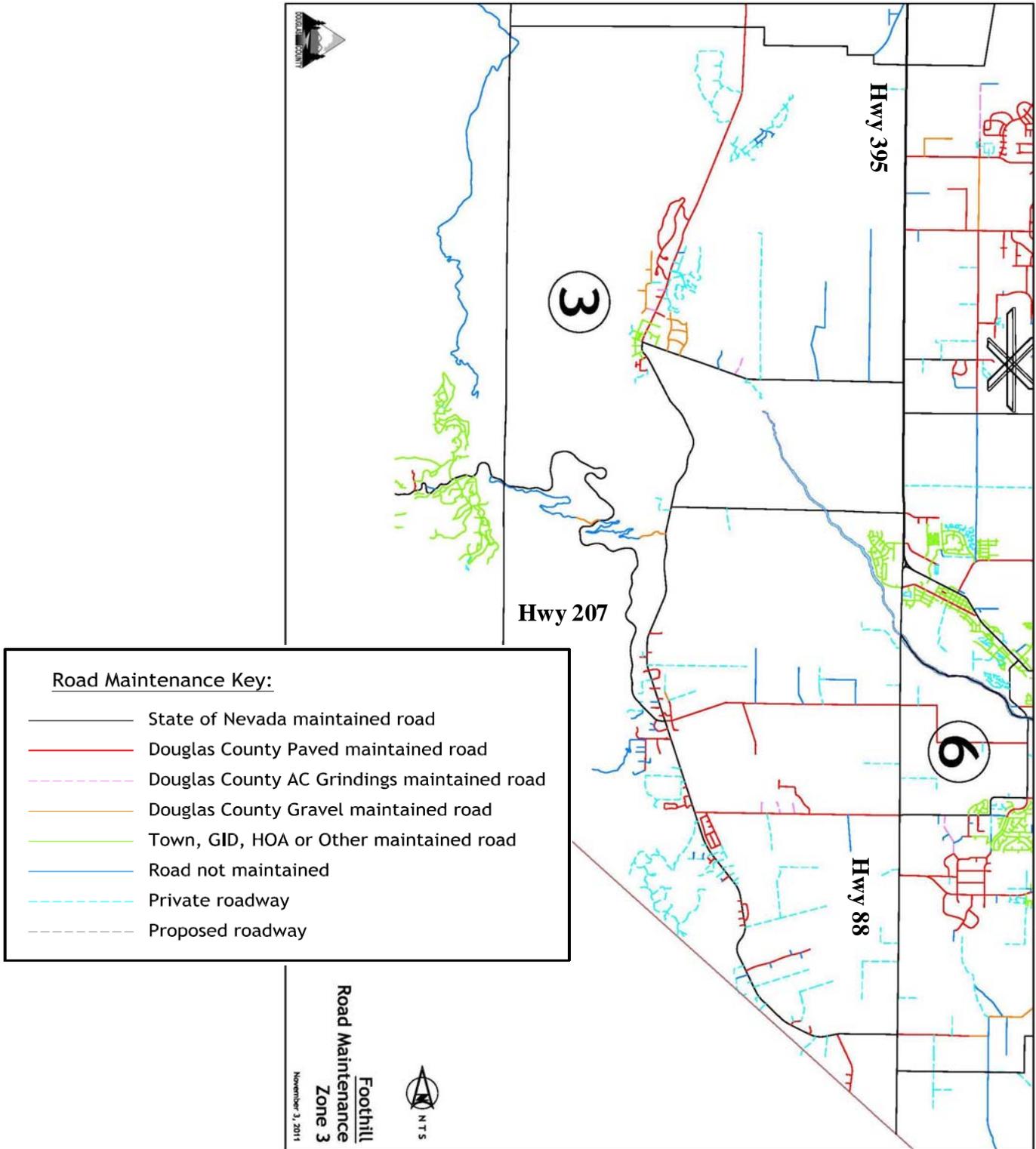
Map 5.3
Douglas County Maintenance Zone 2



Source: Douglas County Community Development Department

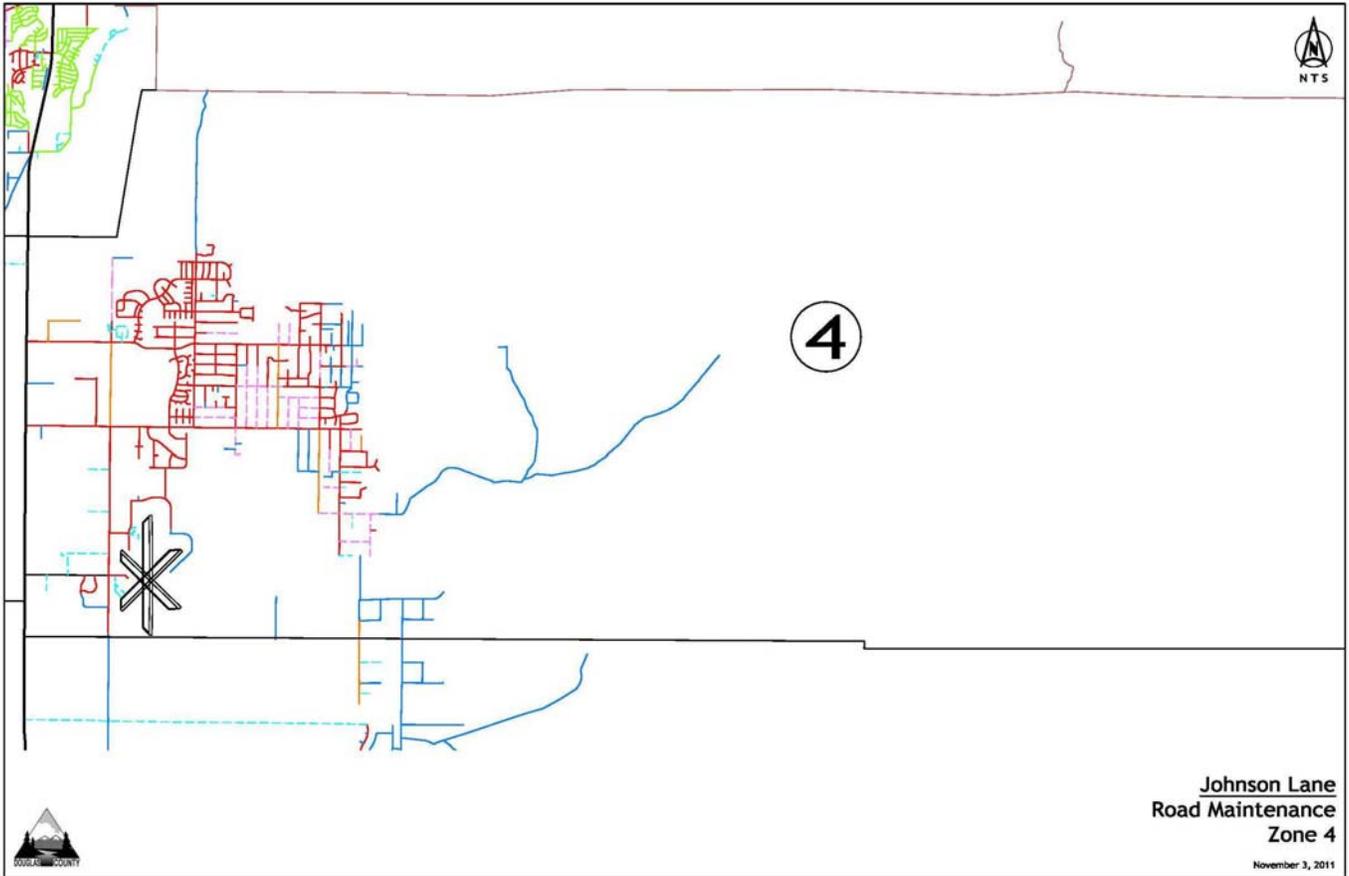
Road Maintenance Key:	
—	State of Nevada maintained road
—	Douglas County Paved maintained road
- - -	Douglas County AC Grindings maintained road
- - -	Douglas County Gravel maintained road
—	Town, GID, HOA or Other maintained road
—	Road not maintained
- - -	Private roadway
- - -	Proposed roadway

**Map 5.4
 Douglas County Maintenance Zone 3**



Source: Douglas County Community Development Department

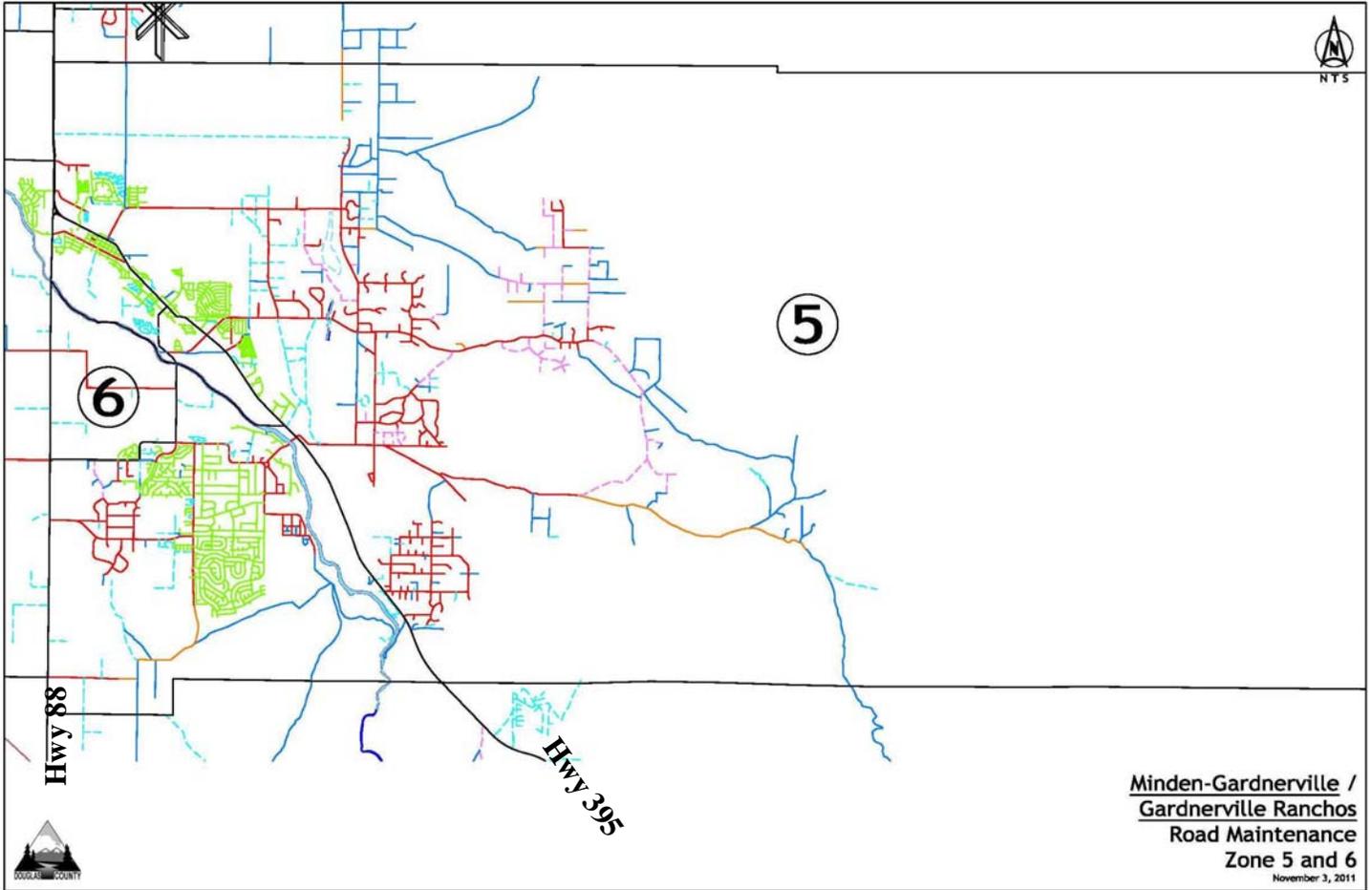
**Map 5.5
Douglas County Maintenance Zone 4**



Source: Douglas County Community Development Department

Road Maintenance Key:	
—————	State of Nevada maintained road
—————	Douglas County Paved maintained road
-----	Douglas County AC Grindings maintained road
—————	Douglas County Gravel maintained road
—————	Town, GID, HOA or Other maintained road
—————	Road not maintained
-----	Private roadway
-----	Proposed roadway

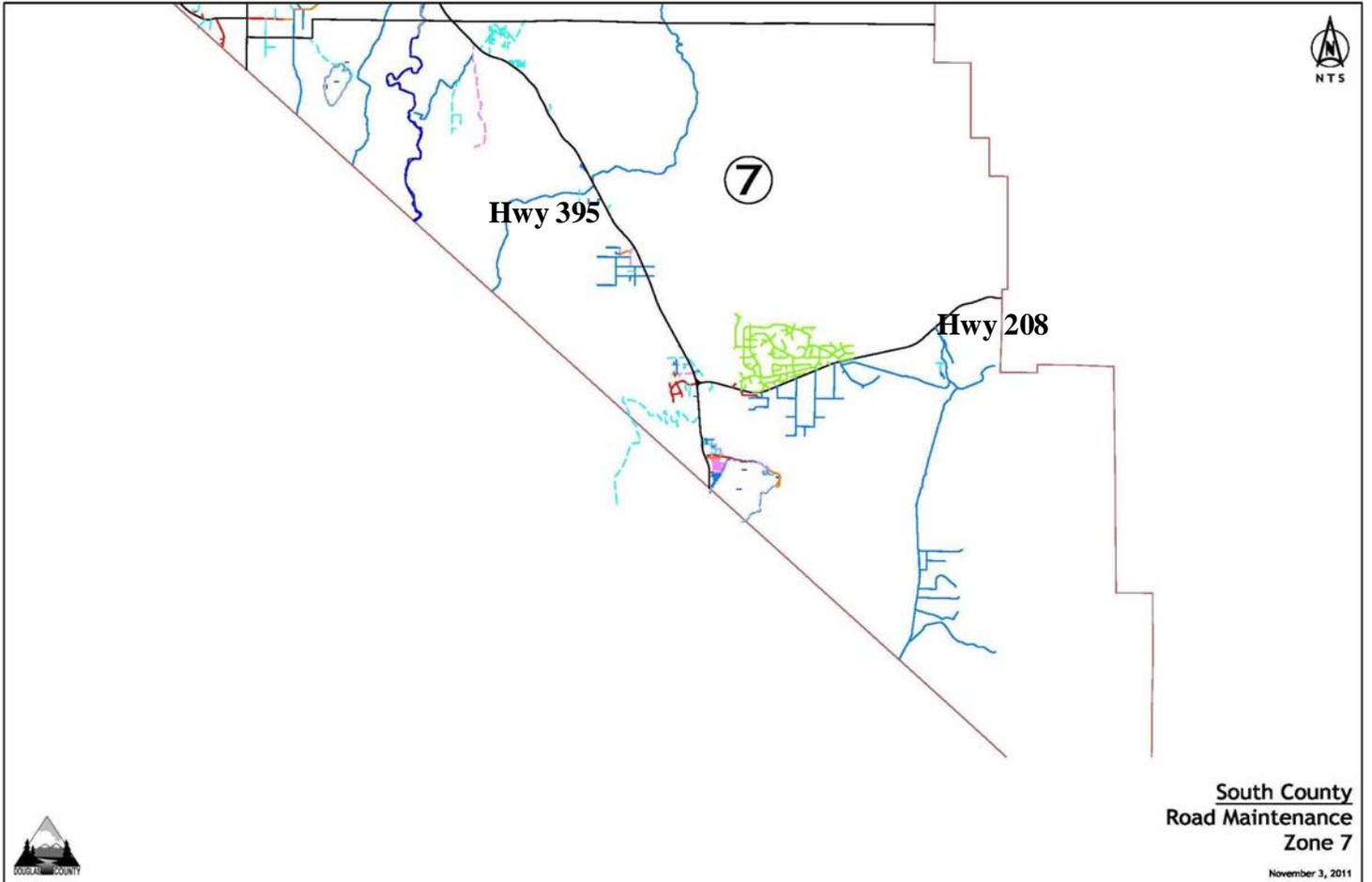
Map 5.6
Douglas County Maintenance Zones 5 & 6



Source: Douglas County Community Development Department

Road Maintenance Key:	
	State of Nevada maintained road
	Douglas County Paved maintained road
	Douglas County AC Grindings maintained road
	Douglas County Gravel maintained road
	Town, GID, HOA or Other maintained road
	Road not maintained
	Private roadway
	Proposed roadway

Map 5.7
Douglas County Maintenance Zone 7



Source: Douglas County Community Development Department

Road Maintenance Key:	
	State of Nevada maintained road
	Douglas County Paved maintained road
	Douglas County AC Grindings maintained road
	Douglas County Gravel maintained road
	Town, GID, HOA or Other maintained road
	Road not maintained
	Private roadway
	Proposed roadway

Figure 5.2 shows historic average daily trips counts at 23 different stations operated by the NDOT.

Figure 5.2
Average Daily Trip Counts, 2000-2010

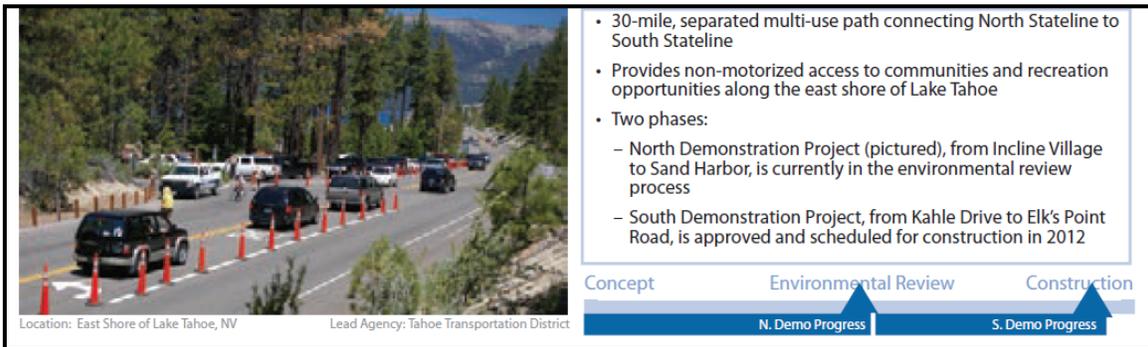
NDOT Station	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
50029	US 395, .2 mi. S of Muller Ln.	26,600	26,600	29,200	30,500	30,500	32,500	32,000	29,000	28,000	28,000	27,000
50045	US 395, .4 mi. N/of Jacks ValleyRd	37,600	37,600	39,600	36,500	44,000	45,500	46,000	4,000	41,000	40,000	38,000
50011	US 395, 650' S of SR-88	24,300	24,300	24,900	26,200	26,200	27,700	25,900	26,000	24,000	24,000	24,000
50069	US 395 .5 mi. S of Pinenut Rd	10,000	11,000	10,800	11,500	11,800	12,300	11,900	12,000	11,000	11,000	12,000
50001	US 395 at NV/CA State line(Topaz)	3,900	3,98	4,100	4,300	4,600	4,600	4,450	4,700	3,100	4,100	4,600
50034	Jacks Valley Rd, .15 mi. W of 395	9,000	9,000	15,300*	11,000*	11,000*	11,000*	11,000*	10,000	9,400	8,600	8500*
50024	Kingsbury Grade .3 mi. w/of Foothill	4,850	5,300	5,200	5,550	5,400	5,700	5,700	5,700	5,700	5,100	5000*
50042	Kingsbury Grade 350' E of US-50	15,200	15,200	14,800	15,000	14,700	14,600	14,300	13,000	14,000	13,000	14,000
50041	US-50, 300' E of SR-207	23,000	25,000	24,100	22,100	22,300	27,700	23,700	20,000	20,000	21,000	22,000*
50003	SR-208, 1 mi. E of US 395	3,550	3,600	3,600	3,900	3,900	4,100	4,150	4,000	3,600	3,800	3,400
50032	Airport Rd., .1 mi. E of 395	2,300	2,300	2,200	2,450	2,450	2,700	2,550	3,000	2,500	2,600	2,300
50052	Johnson Ln, .2 mi. E of 395	4,800	4,900	6,000	6,350	6,450	7,250	7,250	6,600	5,700	5,900	5,100
50028	Genoa Ln, 200' W of 395	1,400	1,400	1,600	1,600	1,500	1,450	1,450	1,500	1,500	1,300	1,400
50026	Muller Ln, 200' W of 395	1,500	1,600	1,600	1,550	1,500	1,500	1,650	1,500	1,700	1,500	1,000
50013	Mottsville Ln, .3 mi. W of SR-88	4,300	3,700	3,700	4,100	3,700	4,050	4,050	4,100	4,600	4,300	4,000
50062	Centerville Ln, 150' E of Foothill Rd	2,200	2,400	2,400	2,500	2,500	2,450	1,900	2,500	2,400	2,300	2,200
50018	Centerville Ln, .1 mi. E of SR-88	3,850	3,800	4,100	4,450	4,500	4,300	4,250	4,200	3,900	3,800	4,000
53130	Centerville Ln.N of Dresslerville	9,000	8,610	8,580	8,620	9,297	8,800	8,850	8,700	8,500	N/A	N/A
50016	Gilman Ave (756), .3' W of 395	5,650	5,300	5,250	5,800	5,500	6,600	6,650	5,400	5,600	5,500	5,100
50015	Waterloo Ln, .2 mi. E of SR-88	1,700	1,800	1,900	2,050	2,000	2,200	2,250	2,100	2,100	2,000	1,900
50056	Waterloo Ln, .2 mi. E of 395	5,050	6,100	6,700	7,150	7,200	6,900	7,400	7,200	7,200	7,400	6,600
50058	Toler Ave, .3 mi. E of Elges Rd	3,450	3,800	4,100	4,400	3,800	3,900	4,050	4,200	4,000	4,000	3,700
50066	Kimmerling Rd, 75' E of Short Ct	6,650	6,900	6,900	7,350	7,250	7,300	6,900	6,600	6,200	6,200	5,700

*Estimates by NDOT

Tahoe Transportation District

Figure 5.3 provides a brief description of the Nevada Stateline-to-Stateline Bikeway being coordinated by the Tahoe Transportation District (TTD).

Figure 5.3
Description of Nevada Stateline-to-Stateline Bikeway



The alignment for the Nevada Stateline-to-Stateline Bikeway has been developed at a conceptual level. Figure 5.4 shows estimated cost estimates and phasing by the Tahoe Transportation District and are based on factors such as segment length, the need for complex engineering solutions, cut and fill quantities, tree removal, and support facilities, such as restrooms and parking. For purposes of conceptual estimates, the district assumed that no private property would need to be acquired.

Figure 5.4
Nevada Stateline-to-Stateline Bikeway Cost Estimates and Phasing

Trail Segment	Segment Length (ft)	Estimated Cost (\$)	Suggested Phasing Order	Reason
A	14,600	14,700,000	5	Extends system south from Sand Harbor to Secret Harbor trailhead.
B	14,500	16,100,000	6	Extends system south from Secret Harbor trailhead to Skunk Harbor access road.
C1	13,500	15,800,000	7	Connects north and south legs.
C2	15,200	12,400,000	4	Extends system north to Spooner Junction and regional parking hub.
D	17,600	15,000,000	3	Extends system north to Glenbrook. Commuter options.
E	13,700	11,000,000	2	Extends system north to Cave Rock. Commuter options. Second cheapest segment.
F	8,500	6,000,000	1	Extends system north to Zephyr Cove from South Demo Project. Commuter options. Cheapest Segment.
TOTALS	97,600	91,000,000		

Note: Segment C is divided into two construction segments. Segment C1 extends from the Skunk Harbor access road to Spooner Junction and Segment C2 extends from Spooner Junction to the Glenbrook entrance gate.

Figure 5.5 and Map 5.8 provide information on the U.S. 50 South Shore Revitalization Project being coordinated by the Tahoe Transportation District.

Figure 5.5
Description of the U.S. 50 South Shore Revitalization Project

The US 50 Stateline corridor project will realign US 50 from South Lake Tahoe, CA to Stateline, NV. Lake Parkway would be re-designated as US 50, providing two lanes of travel in each direction. The existing US 50 corridor will be converted to two eastbound travel lanes, plus one two-way transit lane, with expanded bicycle and pedestrian facilities.

- Provides more efficient vehicle travel through South Lake Tahoe
- Allows the existing US 50 through Stateline to serve as a more community-oriented 'main street'
- Existing US 50 will have increased sidewalk capacity, landscaping and street furnishings, as well as expanded bicycle facilities

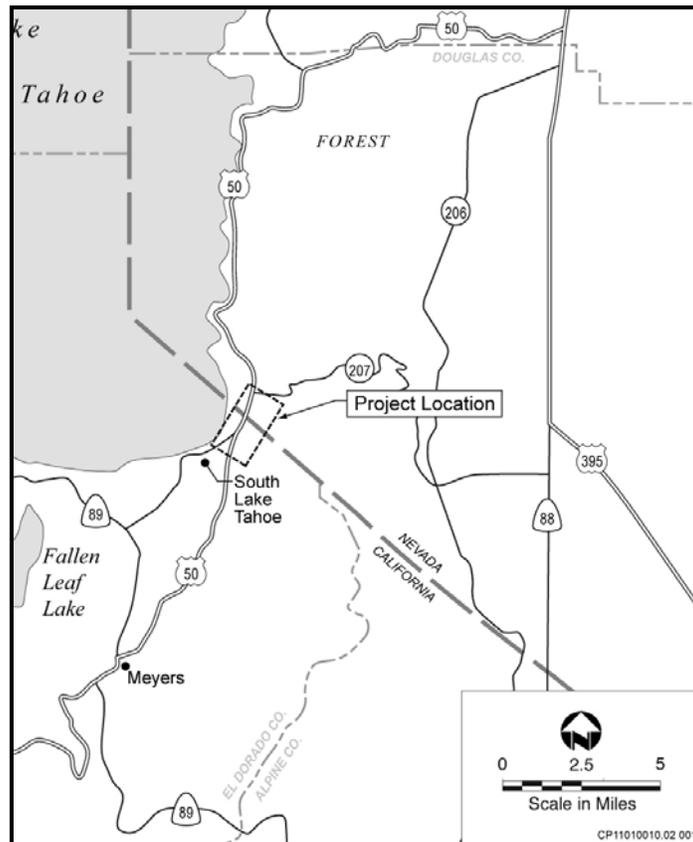
Concept Environmental Review Construction

Project Progress

Location: Stateline, NV and South Lake Tahoe, CA Lead Agency: Tahoe Transportation District

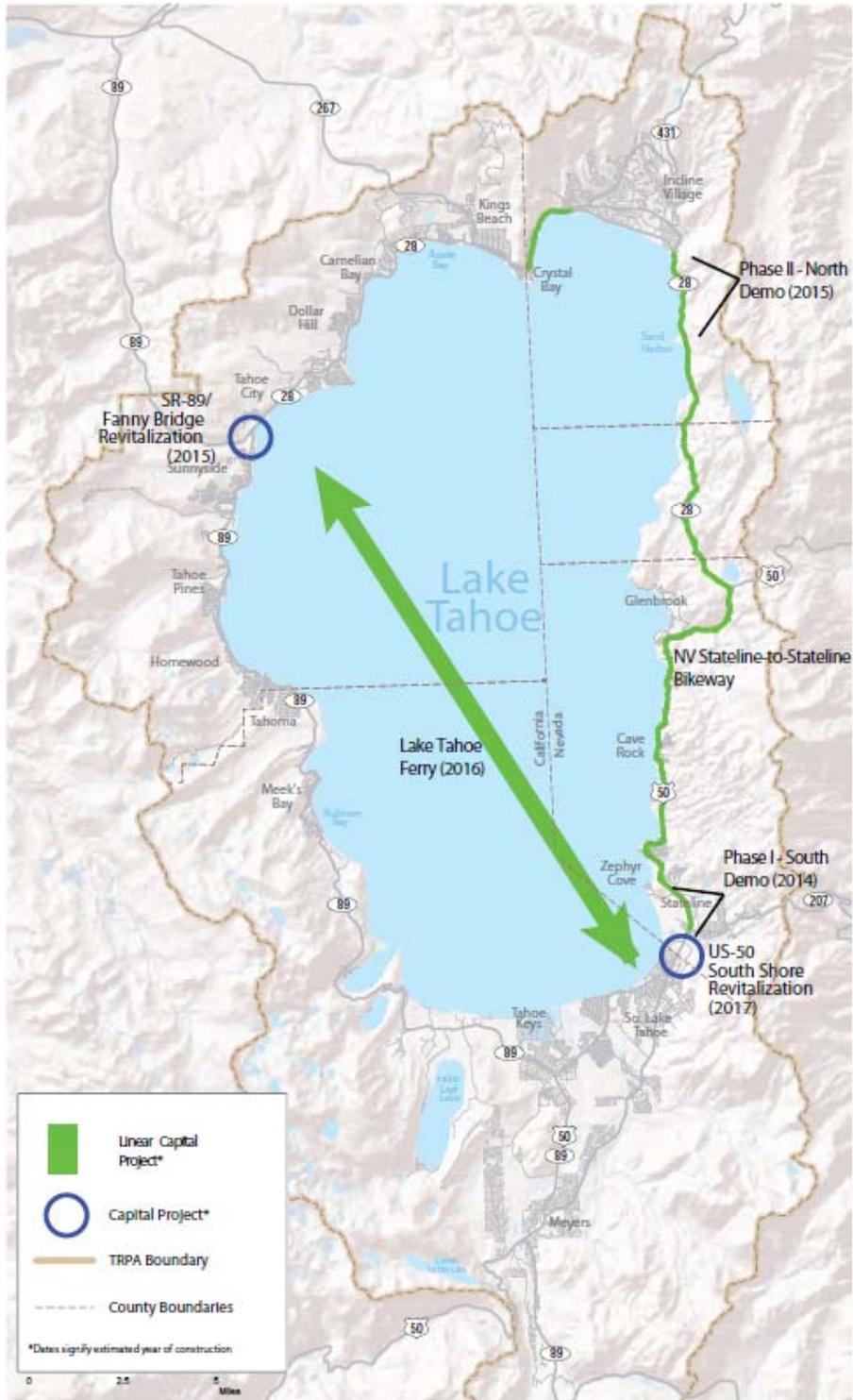
Source: Tahoe Transportation District

Map 5.8
Location of the U.S. 50 South Shore Revitalization Project



Map 5.9 shows the location of the two capital improvement projects located in Douglas County.

Map 5.9
Tahoe Transportation District's Capital Projects



Transportation Revenues

Figure 5.6 provides information on the different transportation revenue sources in Douglas County. The revenue sources include the residential and non-residential construction tax, the 1 percent room tax, as well as local and regional gas taxes. Since the year 2005, all three revenue streams have been steadily declining.

Figure 5.6
Douglas County Transportation Revenues

	ROAD FUND REVENUES										
	FY00/01	FY01/02	FY02/03	FY03/04	FY04/05	FY05/06	FY06/07	FY07/08	FY08/09	FY09/10	FY 10/11
CONSTRUCTION TAXES											
Road construction tax - residential (\$500 per Unit)	304,500	321,500	362,000	293,000	330,262	286,500	91,500	64,957	31,500	27,500	12,500
Road construction tax - commercial (.50 cent per sq ft)	-	-	-	30,834	248,508	193,843	158,831	103,839	72,547	44,411	38,627
Total of Construction taxes	304,500	321,500	362,000	323,834	578,770	480,343	250,331	168,796	104,047	71,911	51,127
		5%	11%	-12%	44%	-20%	-92%	-48%	-62%	-45%	-41%
ROOM TAXES (1% Valley and 1% Lake)											
Room tax (1%) - Valley	65,978	68,454	77,921	81,124	83,035	82,065	85,446	80,117	73,452	67,455	68,855
Room tax (1%) - Tahoe (TDTD)	661,085	636,352	599,437	588,324	580,817	599,576	590,928	577,037	493,920	447,869	449,136
Total Room Taxes	727,063	704,806	677,358	669,448	663,852	681,641	676,374	657,154	567,372	515,325	517,991
		-3%	-4%	-1%	-1%	3%	-1%	-3%	-16%	-10%	1%
ROAD OPERATING FUND (6.35-cent)											
Gas tax (\$.01) - County option	222,522	232,215	251,225	252,976	242,158	230,164	212,471	209,223	235,073	212,540	196,247
Adjustments per State	-	-	-	-	-	-	-	-	-	(63,924)	0
Adjusted 1-cent gas tax revenue	222,522	232,215	251,225	252,976	242,158	230,164	212,471	209,223	235,073	148,616	196,247
Gas tax (2.35 cents)	321,605	342,806	363,524	384,405	388,682	402,029	408,696	408,204	388,710	379,532	380,271
Gas tax (1.75 cents)	382,180	398,220	433,352	435,183	417,738	388,709	366,519	360,366	405,850	365,746	338,131
Adjustment per State	-	-	-	-	-	-	-	-	-	(109,263)	0
Gas tax (1.25 cents)	171,067	181,361	193,372	204,472	214,098	213,846	217,392	217,130	206,506	200,946	201,838
Total Adjusted 6.35-cent revenue	1,097,374	1,154,602	1,241,473	1,277,036	1,262,676	1,234,748	1,205,078	1,194,923	1,236,139	985,577	1,116,486
		5%	7%	3%	-1%	-2%	-2%	-1%	3%	-25%	12%
REGIONAL TRANSPORTATION (4-cent)											
Gas tax (4 cents)	884,468	924,200	999,833	1,008,476	965,284	917,009	845,583	832,664	935,548	845,880	781,029
Adjustments per State	-	-	-	-	-	-	-	-	-	(254,417)	-
Adjusted 4-cent revenue	884,468	924,200	999,833	1,008,476	965,284	917,009	845,583	832,664	935,548	591,463	781,029
		4%	8%	1%	-4%	-5%	-8%	-2%	11%	-58%	24%

Note: The adjusted 6.35-cent and 4-cent revenues for FY 09/10 reflect corrections associated with overpayment in FY 08/09. (Costco gas taxes were erroneously credited to Douglas County in FY 08/09 and FY 09/10 and the State withheld funds in FY 09/10 from Douglas County to correct the overpayment.)

* Revenues for FY 09/10 reflect corrections associated with a State overpayment in FY 08/09, the State withheld funds (Costco gas taxes were erroneously credited to Douglas County in FY 08/09).

Minden-Tahoe Airport

Local and Itinerant Operations Forecast

Forecasts of operations have been categorized into local and itinerant operations. Local means an operation that stays within the traffic pattern airspace (non-itinerant). Itinerant means an operation is arriving from outside the traffic pattern or departs the airport traffic pattern. The number of local operations will likely continue to be the dominant aircraft activity at the Minden-Tahoe Airport. Local operations currently account for 80 percent of all airport operations and this rate is projected to remain constant throughout the planning period.

Figure 5.7
Summary of Local and Itinerant Operations
2005-2026

Year	Local	Itinerant	Total
2005 ⁽¹⁾	63,623	15,906	79,529
2011	66,296	16,574	82,870
2016	67,648	16,912	84,560
2021	69,481	17,370	86,851
2026	71,313	17,828	89,141

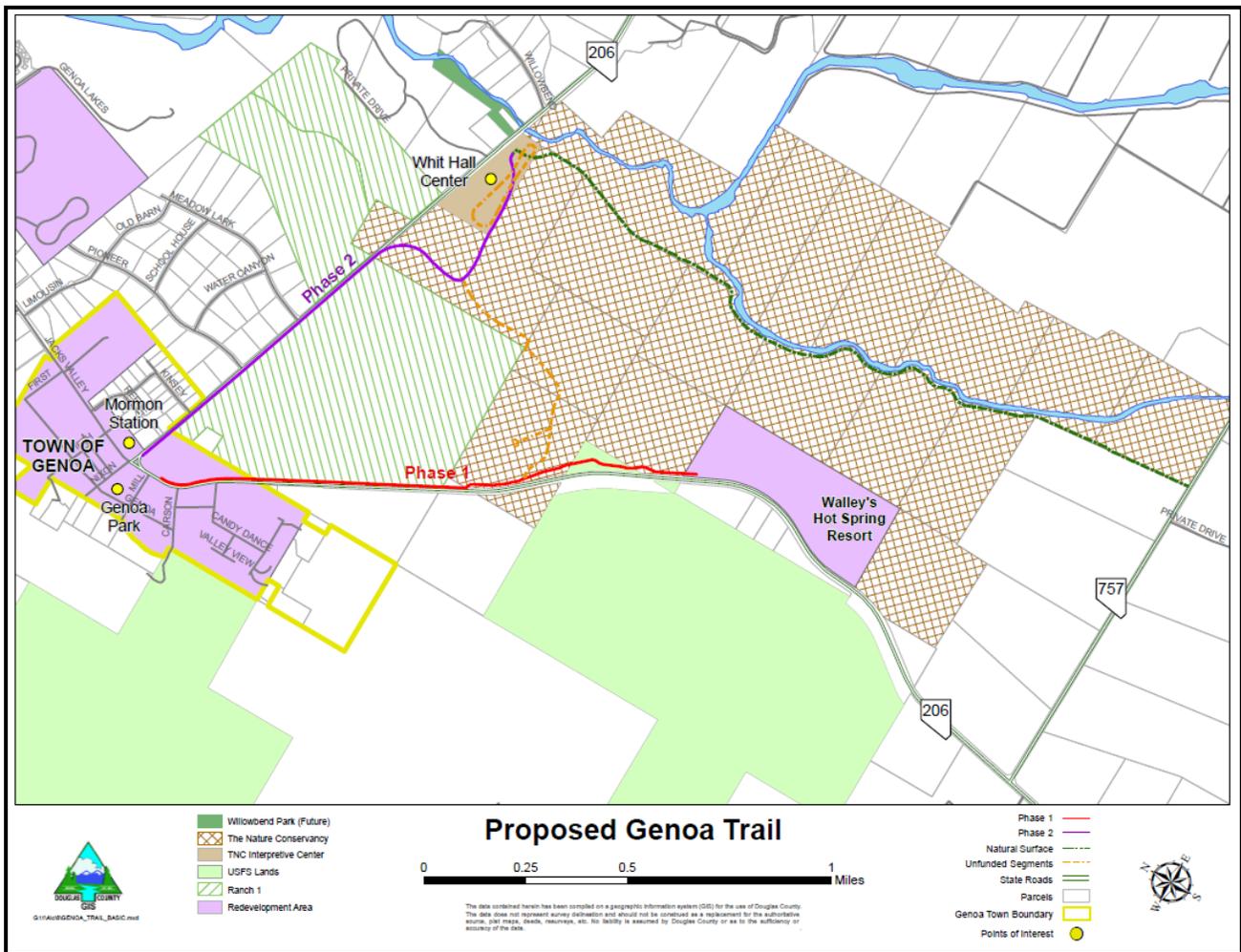
Source: Minden-Tahoe Airport Master Plan

⁽¹⁾ Actual

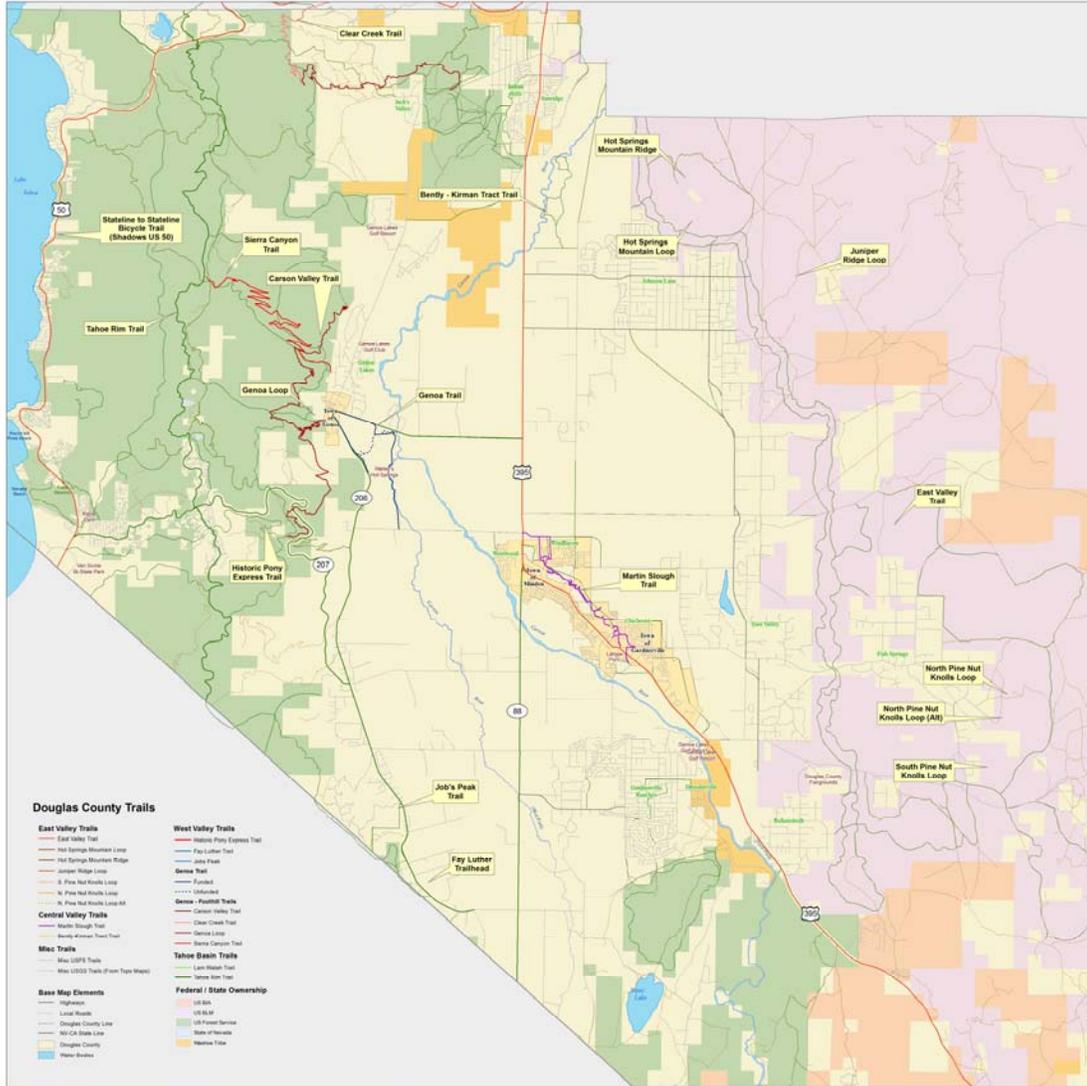
Douglas County Trails

Map 5.10 is a conceptual plan for the Genoa Trail. The first phase will connect the Town of Genoa to Walley’s Hot Springs Resort and the second phase of the plan will connect the Town of Genoa to the River Fork Ranch nature trails. Map 5.11 displays the network of existing and proposed trails throughout Douglas County.

**Map 5.10
 Proposed Genoa Trail**



**Map 5.11
 Douglas County Trails**



- Douglas County GIS -
 Flag Ship Trails Overview

The data contained herein has been collected or prepared by Douglas County GIS. The use of Douglas County GIS data and the information contained herein is provided as a public service to the citizens of Douglas County, Nevada. All rights are reserved by Douglas County or its authorized agents.



Chapter 6 Growth Management

Introduction

Due to a number of questions regarding the status of projects in Receiving Areas and the Transfer Development Rights (TDR) Program that were raised during the 2011 Master Plan Update, the following analysis of Receiving Area and Sending Area potential has been developed. Refer to Volume I, Chapter 6, Growth Management Element, for additional information on Receiving Areas and the TDR Program.

Receiving Areas

Figure 6.1, Receiving Area Status (2011), shows that there are approximately 4,972 acres in a Receiving Area in the Carson Valley and 1,286 acres in a Receiving Area in Topaz. There are approximately 2,499 acres that have been developed, are partially developed, or have tentative approval for a project and 2,473 acres that are vacant or have not been developed to full potential in the Carson Valley. It also shows that there are 1,286 acres in a Receiving Area that have not been developed to full potential in Topaz. Receiving Area can be developed for both residential and commercial purposes. Receiving Area, with the exception of lands east of the Airport and west of Rubio Way, can be developed to 16 dwelling units (du)/acre or 20 du/acre with the approval of an affordable housing and density bonus agreement. Historically, Receiving Area has developed between 5 to 7 du/acre.

**Figure 6.1
 Receiving Area Status (2011)**

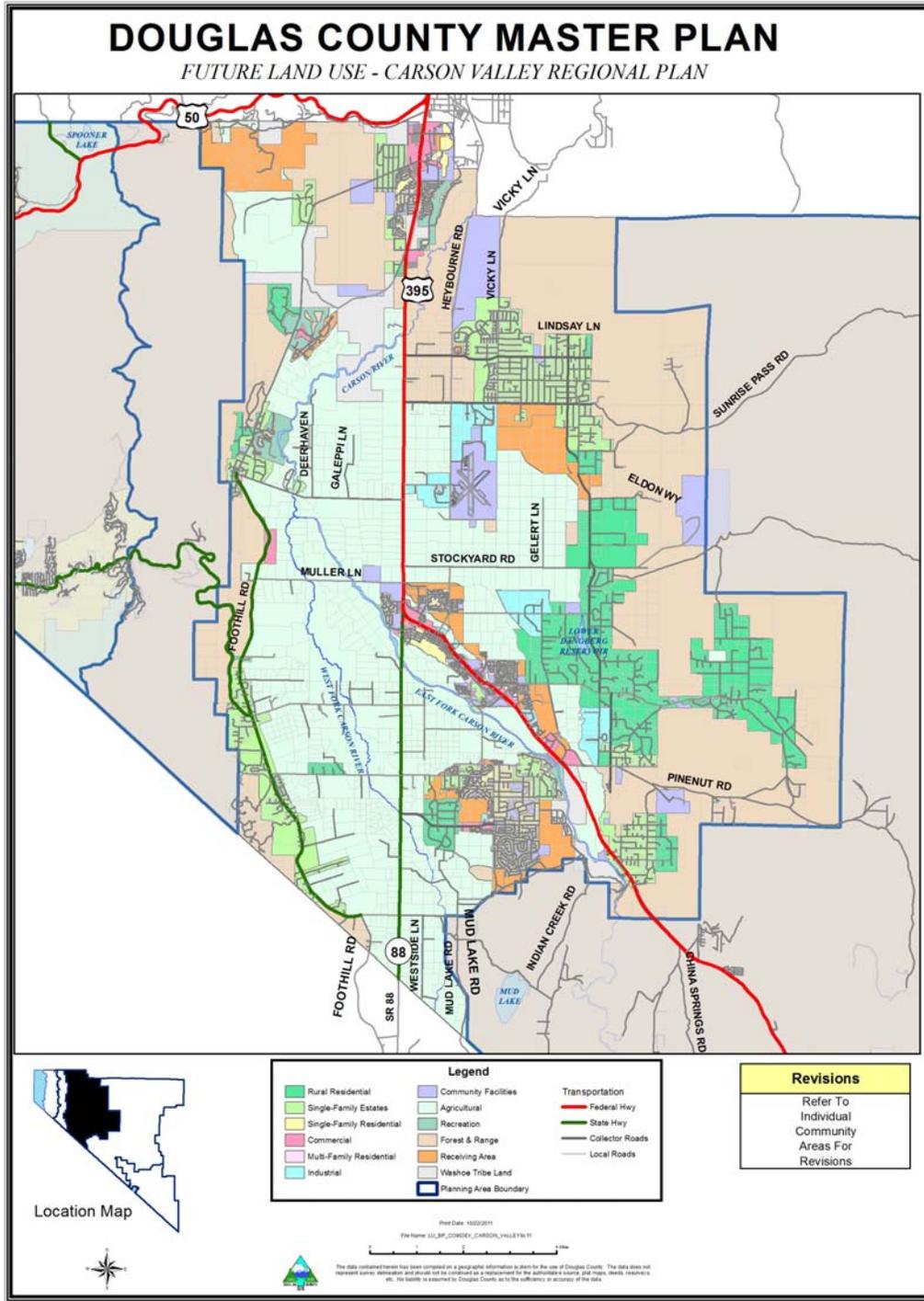
Carson Valley	Acreage
Developed or Tentatively Approved	2,499
Vacant or Not Developed to Full Potential	2,473
Total:	4,972
Topaz	
Developed or Tentatively Approved	0
Vacant or Not Developed to Full Potential	1,286
Total:	1,286

Source: Douglas County Community Development Department

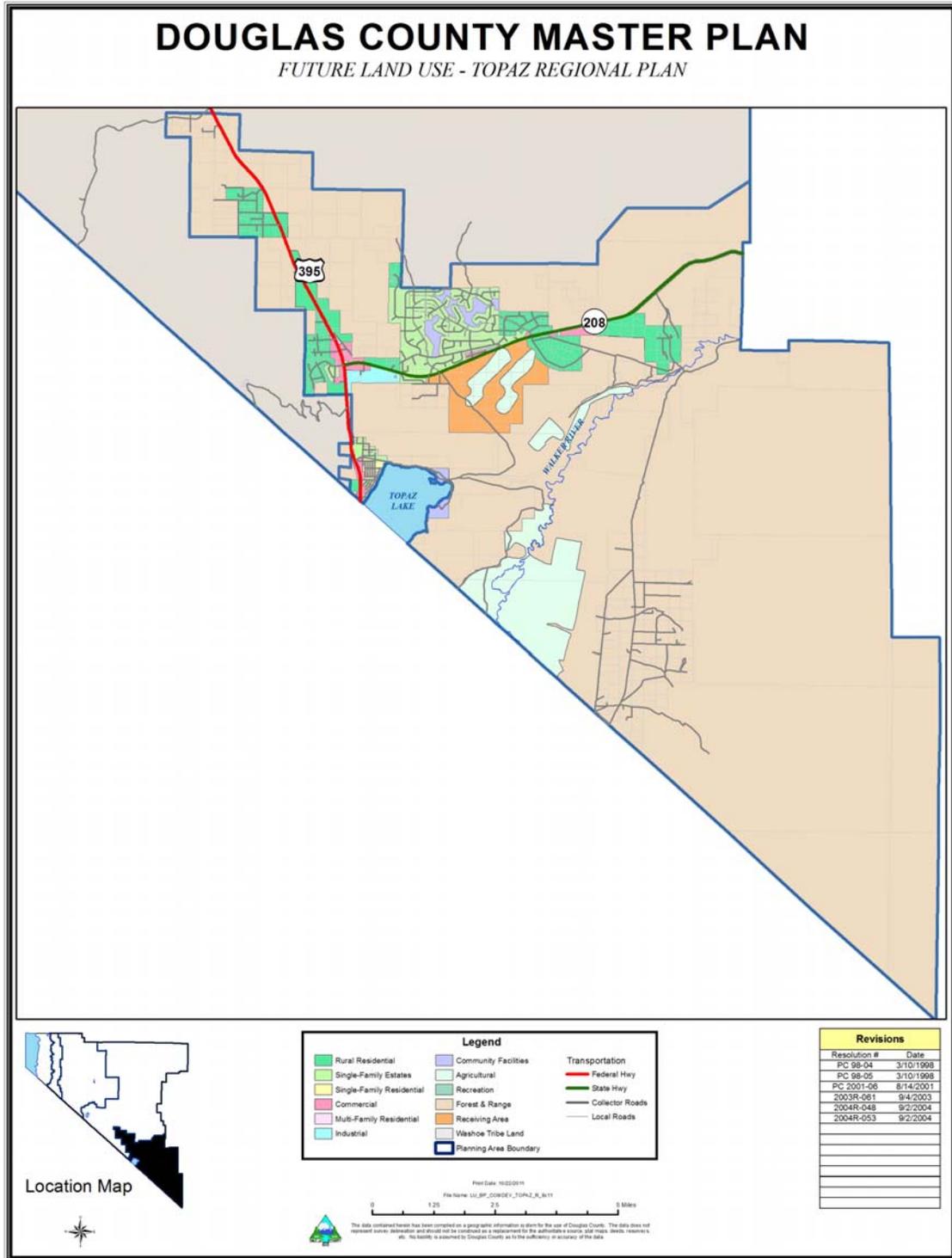
Note: Properties that contain a structure, such as a single-family home, but that could contain more units with TDRs have been classified under Vacant or Not Developed to Full Potential.

As one can see, approximately half of the Receiving Area in the Carson Valley has been developed or tentatively approved for development and none of the Receiving Area in Topaz has been developed or tentatively approved for development.

Map 6.1
Receiving Areas in the Carson Valley Regional Plan



Map 6.2
Receiving Areas in the Topaz Regional Plan



Sending Areas

The Douglas County Development Code (Chapter 20.500) allows the transfer of development rights (TDRs) from property zoned A-19 or FR-19 (Sending Areas) to property designated as Receiving Area on the Carson Valley and Topaz Regional Plan Future Land Use Maps. Each right is equivalent to a dwelling unit. The minimum parcel size for participation in the TDR program is 40 contiguous acres. Under the Master Plan, transfers of development rights are only permitted within the Carson Valley watershed or the Topaz watershed, and not from one watershed to another. This provision has not been codified in code.

Pursuant to current regulations, the Community Development Department developed Figure 6.2 for aiding in the calculation of TDRs for Sending Areas:

**Figure 6.2
 TDR Calculator**

A-19

	40 Acres	100 Acres	1,000 Acres
Base Dev. Rights	2 (40 divided by 19)	5 (100 divided by 19)	52 (1,000 divided by 19)
Base Bonus	18 (9 x base of 2)	45 (9 x base of 5)	468 (9 x base of 52)
Water Rights	14 (7 x base of 2)	35 (7 x base of 5)	364 (7 x base of 52)
Floodplain	14 (7 x base of 2)	35 (7 x base of 5)	364 (7 x base of 52)
Large Parcel	0	20 (bonus per 100 acres)	200 (bonus per 100 acres)
Total Dev. Rights	48	140	1,448
Per 19-acre parcel	24	28	27.8

FR-19

	40 Acres	100 Acres	1,000 Acres
Base Dev. Rights	2 (40 divided by 19)	5 (100 divided by 19)	52 (1,000 divided by 19)
Floodplain	2 (40 divided by 19)	5 (100 divided by 19)	52 (1,000 divided by 19)
Large Parcel	0	1 (bonus per 100 acres)	10 (bonus per each 100 acres)
Total Dev. Rights	4	11	114
Per 19-acre Parcel	2	2.2	2.19

Note: The Board may grant an additional bonus, not to exceed 1 unit per 19 acres for dedication of public access easements on A-19 or FR-19 zoned parcels. This is discretionary by the Board.

For the purpose of analysis, Figure 6.3, Carson Valley Sending Areas, and Figure 6.4 Topaz Sending Areas, provide the total amount of A-19 or FR-19 zoning that is privately held (not held by the government), not within a Receiving Area, and not within an existing open space conservation easement. The TDR potential is based off of the total acreage and is an estimate only. It also needs to be taken into account that not all property owners will be willing to participate in the TDR program and not all properties will qualify for bonus TDRs based on floodplain and water rights. Therefore, the TDR potential is likely much lower than the numbers provided.

**Figure 6.3
 Carson Valley Sending Areas**

Carson Valley A-19 Zoning*	Acreage	Percent	TDR Calculation	TDR Potential***
Total	31,480	100%	31,480/19 =	1,657
Parcels over 100 acres**	24,545	40%	24,545/100*20 =	4,909
Primary Flood Zone	13,501	43%	13,501/19*7 =	4,974
Bonus for Participating in Program			1,657*9 =	14,911
Water Rights			1,657*7=	11,598
			Total =	38,049

Note: The assumption was made that all parcels in the A-19 zoning district have Alpine Decree Water Rights.

Carson Valley FR-19 Zoning*	Acreage	Percent	TDR Calculation	TDR Potential***
Total	6,873	100%	6,873/19 =	362
Parcels over 100 acres**	2,608	38%	2,608/100=	26
Primary Flood Zone	614	9%	614/19=	32
			Total =	420

Carson Valley Total				38,469
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Source: GIS and Community Development Departments

*This is the total amount of A-19 or FR-19 zoning that is privately held (not held by the government), not within a Receiving Area, and not within an existing open space conservation easement.

** Includes contiguous parcels under same ownership that total 100 acres or more.

*** TDR Potential totals do not include the possible one bonus right per 19 acres for dedication of public access easements.

**Figure 6.4
 Topaz Sending Areas**

Topaz A-19 Zoning*	Acreage	Percent	TDR Calculation	TDR Potential***
Total	2,735	100%	2,735/19=	144
Parcels over 100 acres**	2,735	100%	2,735/100*20=	547
Primary Flood Zone	1,135	41%	1,135/19*7=	418
Bonus for Participating in Program			144*9=	1,296
Water Rights	145		145/19*7=	53
			Total =	2,458

Note: All A-19 zoning in Topaz is within APNs: 0922-000-02-005 & -006, owned by David Wallace Park and Diamond X Ranch, LLC, respectively. According to the NV Division of Water Resources, the owner of the Park parcel has two water right certificates and is currently irrigating 144.8 acres.

Topaz FR-19 Zoning*	Acreage	Percent	TDR Calculation	TDR Potential***
Total	19,309	100%	19,309/19=	1,016
Parcels over 100 acres**	14,651	76%	14,651/100=	147
Primary Flood Zone	2,261	12%	2,261/19=	119
			Total =	1,282

Topaz Total				3,740
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Source: GIS and Community Development Departments

*This is the total amount of A-19 or FR-19 zoning that is privately held (not held by the government), not within a Receiving Area, and not within an existing open space conservation easement.

** Includes contiguous parcels under same ownership that total 100 acres or more.

*** TDR Potential totals do not include the possible one bonus right per 19 acres for dedication of public access easements.

Carson Valley

A detailed breakdown of TDR activity in the Carson Valley since 2002 is provided in Figure 6.5. As one can see, 3,921 TDRs have been certified and 4,003 acres have been set aside in conservation easements as a result of the program.

Figure 6.5
Transfer Development Rights Activity
2002 to 2009

Year	# of TDRs Certified	# of TDRs Transferred to Another Owner	# of TDRs Remaining for Sale	Acreage Deed Restricted
2002	1,262	1,185	77	2,177.00
2003	663	663	0	461.64
2004	0	0	0	0.00
2005	1,447	1,445	2	989.26
2006	0	0	0	0.00
2007	146	146	0	100.00
2008	205	138	67	140.72
2009	198	138	60	135.05
Total	3,921	3,715	206	4,003.67

As provided in Figure 6.6 below, approximately 2,857 TDRs are required to support tentatively approved residential projects in the Carson Valley.

Figure 6.6
Carson Valley TDRs Needed to Support Approved Projects

Project/Owner Name	APNs	GIS Acres (Not Surveyed Acreage)	TDRs Needed to Complete Project (Estimate)
Clear Creek, LLC (PD 03-004)	Multiple	1,576	301
Wal-Mart	Multiple	15	0
Ashland Park (PD 05-013)	1320-34-002-001	33	291
Kit Carson PD (PD 05-003)	Multiple	18	0
Rocky Terrace	Multiple	37	0
A Eleven, LLC (Sunshine and Rainbows Daycare)	1220-09-302-004	1	0
Aloha/Rain Shadow Ranch (PD 05-012)	Multiple	36	26
Cedar Creek	Multiple	16	0
Montana/Summit Ridge (PD 05-012)	Multiple	144	71
North Fork Trails Subdivision	Multiple	33	0
Gardnerville Town Water Co.	1220-10-501-005	6	0
Stodick Estates	Multiple	29	0
Nevada Northwest Specific Plan (includes La Costa PD 02-004)	Multiple	54	407
Monterra (Park Place) PD 05-005	Multiple	92	152
The Ranch at Gardnerville (PD 04-008)	Multiple	164	600
Oakwood Companies Specific Plan (includes Arbor Gardens and Crestmore Village Apartments)	Multiple	33	0
Virginia Ranch (Sierra Nevada SW Ent.)	1220-03-000-039 & -034	212	1,009
Total		2,499	2,857

Note: In some instances, TDRs have been purchased, but have not been transferred to a project.

As provided in Figure 6.7 below, approximately 12,235 TDRs will be required if the 2,473 acres in the Carson Valley Receiving Areas identified as Vacant or Not Developed to Full Potential in Figure 6.1 are developed at a density of 5 du/acre, approximately 17,181 TDRs will be required if developed at 7 du/acre.

**Figure 6.7
 Carson Valley TDR Requirements (2)**

Carson Valley Receiving Area	Acreage	Calculation	TDRs Required
Vacant or Not Developed to Full Potential Total	2,473		
Density of 5 du/acre		$2,473 * 5 =$	12,365
Base Dev. Rights		$2,473 / 19 =$	130
Total (Density - Base Dev. Rights).			12,235
Density of 7 du/acre		$2,473 * 7 =$	17,311
Base Dev. Rights		$2,473 / 19 =$	130
Total (Density - Base Dev. Rights)			17,181

Note: For the purpose of developing this chart, the assumption was made that all Receiving Area will be developed for residential purposes. It is likely some of it will be developed for commercial purposes, which requires 10 TDRs per acre.

As estimated in Figure 6.3, there is a potential of 38,049 TDRs available. Thus, it appears that there is more than sufficient TDR potential to support the existing Receiving Area in the Carson Valley. However, it needs to be taken into consideration that between 32 to 45 percent of available TDRs would be required to support the existing Receiving Areas. There may not be enough property owners in Sending Areas willing to participate in the TDR Program.

Topaz

The TRE/Holbrook Junction Community Plan anticipates 1,000 to 2,000 dwelling units being developed on the approximately 1,286-acre Receiving Area site. With the existing residential zoning provided in Figure 6.8, the site could be developed with 480 residential units before transferring in any TDRs.

**Figure 6.8
 Topaz Receiving Area Zoning**

Zoning	Acreage	Calculation	Permitted Residential Density (without TDRs)
SFR-2	345.5	$345.5/2 =$	173
MFR	8.8	$8.8*16 =$	141
RA-5	814.8	$814.8/5 =$	163
FR-19	59.9	$59.9/19 =$	3
TC	30.2		n/a
GC	26.7		n/a
Total	1,286		480

Source: Douglas County Community Development Department

Therefore, in order to develop the site with 2,000 dwelling units, 1,520 TDRs would need to be transferred to the site. The owner of the Receiving Area would need to find property owners in Sending Areas within Topaz willing to transfer development rights from their property.

Issues

As discussed in Volume I, Chapter 6, Growth Management Element, the Board may want to 1) direct staff to consider modifications to the TDR program to help create additional incentives for preserving agricultural lands and 2) either direct staff to codify the provision in code that TDRs cannot be transferred between the Carson Valley and Topaz watersheds or remove the language from the Master Plan that prevents the transfer of development rights between watersheds. As presented, it appears that there is sufficient availability of TDRs in the Carson Valley to support the existing Receiving Areas, however, TDR availability is somewhat limited in Topaz.

Chapter 7

Environmental Resources and Conservation

Volume II of the Environmental Resources and Conservation Element provides information on existing conditions for natural resources in Douglas County, including air quality, energy, floodplains, soils and steep slopes, and water.

Air Quality

Douglas County would like to ensure, as much as possible, the preservation of clean, pure air. Close monitoring of the air quality is essential to its preservation. Pollutants which are of particular concern when monitoring air quality are: Particulates (PM₁₀), Fine Particulates (PM_{2.5}), Carbon Monoxide (CO), and Ozone (O₃).

- Particulates are breathable particulate matter that are generated primarily from residential wood burning, industry, construction activities, motor vehicles, open burning, and windblown dust. PM₁₀ particulates are those with a diameter of 10 micrometers or less and PM_{2.5} particulates are those with a diameter of 2.5 micrometers or less.
- Carbon Monoxide (CO) is an “odorless, invisible gas” which is emitted primarily from combustion sources such as motor vehicle engines, wood burning, and aircraft operations.
- Ozone (O₃) is the result of interaction with chemical hydrocarbons, nitrogen oxides, and sunlight.

The primary source of pollutants in the county are from auto emissions, dirt roads, fuel burning (including wood burning stoves), wildfires, paving materials, agricultural burning, and agricultural dust.

The Nevada Division of Environmental Protection, Bureau of Air Quality Planning, Nevada Air Quality Trend Report 1998-2009 dated January 2011 provides the most recent data on air quality trends in Douglas County.

Geology/Seismic

The dominant topographic features of Douglas County (Lake Tahoe, Carson Range, Carson Valley, and the Pinenut Mountains) are expressions of the horst and graben structure of the region. This type of structure is typified by alternating uplifted and downdropped fault blocks bounded by parallel faults. The Carson Range of the Sierra Nevada Mountains and the Pinenut Mountains are surface expressions of large uplifted fault blocks or horsts, while Lake Tahoe and the Carson Valley are grabens, or fault blocks which have dropped relative to adjoining fault blocks.

The major fault lines in Douglas County largely align with the Carson Valley. The western fault line, named the Genoa Fault, lies at the base of the Carson Range, running along the developed areas of Foothill and Genoa. It is this fault zone which forms the steep eastern slope of these mountains. Indeed, the majority of this slope is a 4,000 foot fault scarp at the base of which is a younger scarp of approximately 44 feet, which extends for ten (10) miles. This younger scarp, which was in existence when the first settlers arrived in 1854, was formed by 44 feet of vertical ground displacement during earthquakes some time within the past several hundred years. Another major fault line lies at the east side of the valley where the Pinenut Mountain Range begins. This fault system reaches as much as six miles in width (USGS 1985). The topography formed by this zone of faults is reflected in the eastside river terraces and foothills of the Pinenut Mountains. In the foothills, Tertiary and Quaternary sediments have been displaced from a few feet to 20 feet, producing many small fault scarps. Other portions of the eastside fault zone underlie the Gardnerville Ranchos, Fish Springs, and Johnson Lane areas. Many other smaller faults lie within the Carson Valley and underlie or are adjacent to several of the towns and communities in Douglas County, including Minden, Gardnerville, Indian Hills, and Jacks Valley. The Carson Valley itself has been filled with well-bedded fine-grained Tertiary lake sediments overlain by recent alluvial deposits. The depth of the sediments is greater than 1,000 feet. Much of the valley is poorly drained and has a high water table. The third major fault line generally follows the eastern boundary of Douglas County.

Douglas County faults have experienced significant movements. The Genoa fault and its related systems and Antelope Valley fault to the southeast of the Carson Valley may be capable of magnitude (M) 7.5 earthquakes. Since 1852, several moderate to strong earthquakes have been reported. The largest recorded earthquake in the region occurred in 1887 on the Genoa fault which was a M6.3 quake. A M6.1 quake occurred south of Gardnerville in 1994.

Predicting when an earthquake will occur is difficult; however, predicting the response of the ground surface to seismic vibration can be much more plausible. Site geology, therefore, is essential in predicting the results of future earthquakes. Recording earthquakes at various locations can indicate how sites will respond to varying levels of seismic energy. The geology of the Carson Valley suggests that conditions exist in this area for significant amplification of ground motion due to the presence of saturated, poorly consolidated sediments. The western section of the Carson Valley, traversed by the Carson River, is an area which is prone to liquefaction due to the saturated conditions. Maps 7.1 thru 7.4 at the end of this section depict the geologic features of each region.

Additionally, the presence of steep slopes exacerbates the geologic hazards of an area. In the Carson Valley, slopes of 0-15 percent, 15-30 percent, and 30 percent or greater have been mapped. The entire western side of the valley is composed of slopes of 30 percent

or greater. Interestingly, the break between the steep slopes, 30 percent, and more gentle gradients coincide almost precisely with the Genoa Fault. It is the steep slopes above this fault which are most hazardous. Refer to Slopes, Maps 7.9 thru 7.12.

The following figure shows the geologic makeup and the major faults of each community of Douglas County:

**Figure 7.1
Geologic Conditions of Douglas County Communities**

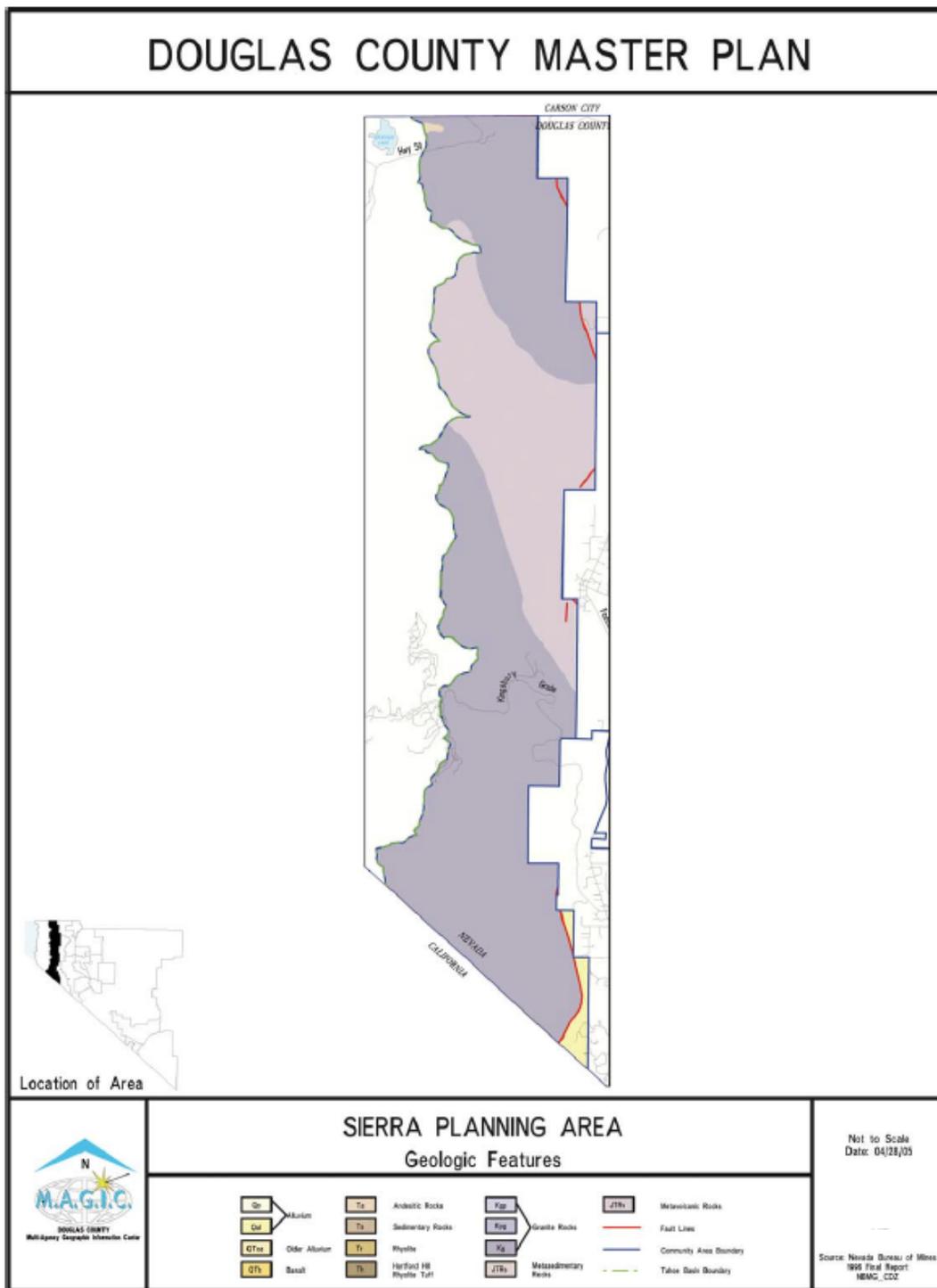
Community	Geologic Makeup	Location of Geologic Makeup	Major Faults
Agriculture	Alluvium Deposits Granitic Rock	Majority N.W. Corner	Within One Mile of Genoa Fault
Airport	Alluvium Deposits	Majority	6 Miles from Genoa Fault
East Valley	Older Alluvium Deposits Recent Alluvium Deposits	Eastern Half Western Half	7 Miles from Genoa Fault
Fish Springs	Alluvium Deposits Older Alluvium Deposits Metasedimentary Rocks Sedimentary	West Cntrl & East S.W. Corner East Majority	8 Miles from Genoa Fault
Foothill	Alluvial Fans Alluvium Deposits Granite Rocks	Majority Majority West	Close Proximity to Genoa Fault
Genoa	Alluvial Fans Alluvium Deposits Metavolcanic Rock Granitic Rocks	Majority Majority West West	Close Proximity to Genoa Fault
Indian Hills/ Jacks Valley	Granitic Rocks Alluvium Deposits	Majority	Close Proximity to Genoa Fault Several Holocene Faults
Johnson Lane	Alluvial Fans and Alluvium Deposits Metavolcanic and Sedimentary Rock	Majority Northeast and East	7 Miles from Genoa Fault
Central Valley	Alluvium Deposits	Majority	6 Miles from Genoa Fault
Minden- Gardnerville	Alluvium Deposits	Majority	6 Miles from Genoa Fault

Pinenut	Older Alluvium, Andesitic, Sedimentary and Granite Rocks	Majority	An Active Fault in the Northern End of the Plan Area
Ranchos	Alluvium Deposits	Majority	6 Miles from Genoa Fault
	Older Alluvium	Eastern Half	
Ruhenstroth	Older Alluvium	South & Northern	8 Miles to Genoa Fault
	Alluvium Deposits	Majority	
	Sedimentary Rock	Southeast	
	Andesitic Rock	Small Portion	
Sierra	Metavolcanic and Granite Rock	Majority	Close Proximity to Genoa Fault
Topaz Area	Alluvium Deposits	Majority	Close Proximity to the Fault, Parallel to HWY 395
	Andesitic and Metavolcanic Rock	Small Portion	
Topaz Lake	Andesitic and Metavolcanic Rock	Small Portions	One Potential Fault West of and Parallel to HWY 395
	Alluvial Fans	Majority	

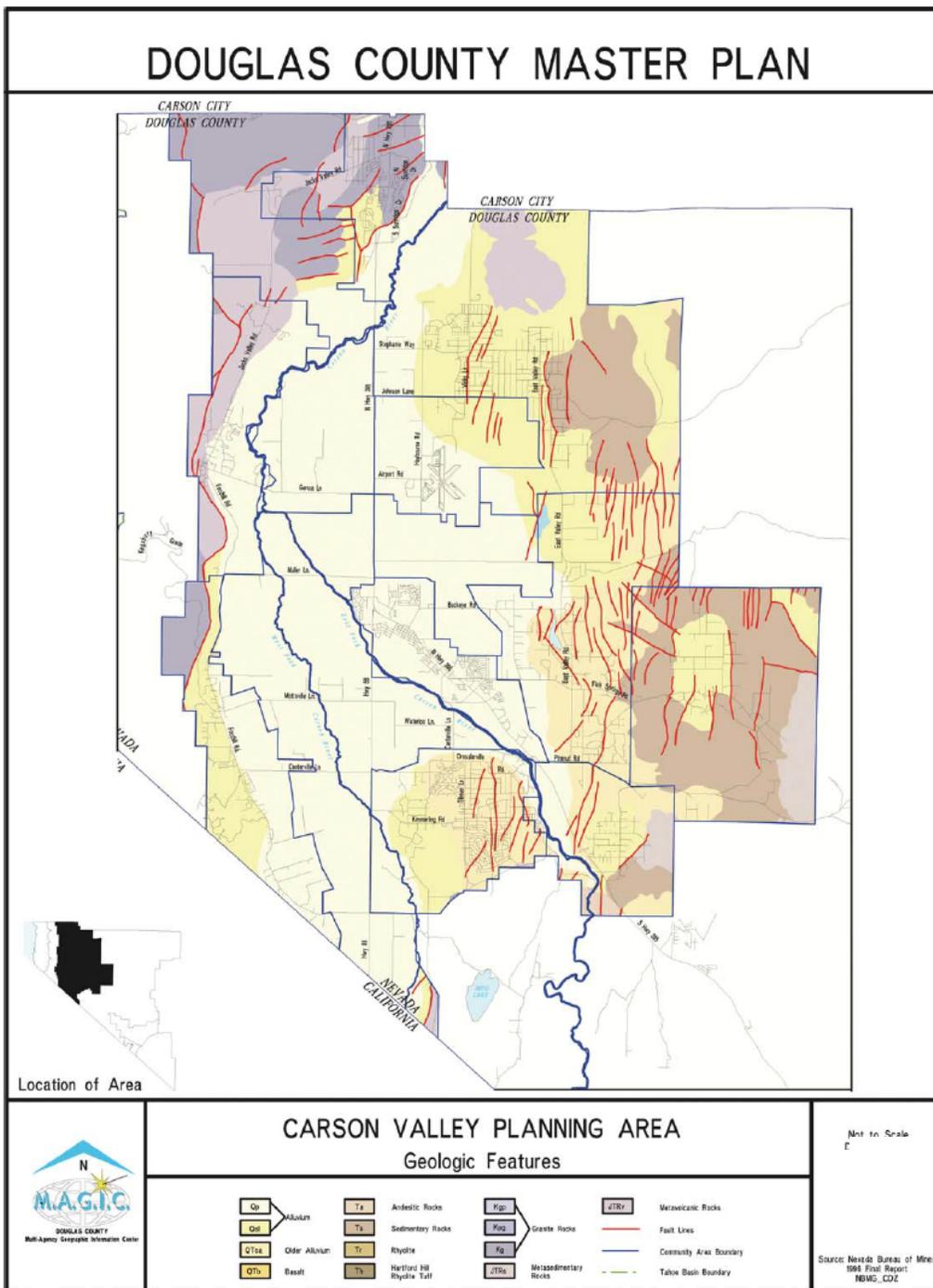
Source: Nevada Bureau of Mines Bulletin 75, 1969

In addition to earthquakes and dramatic mountains, geothermal activity and mineralization are often associated with faulting. In the case of the Carson Valley, a fairly large area with geothermal energy potential has been identified. At Walley's Hot Springs, Hobo Hot Springs, and Saratoga Hot Springs, geothermal water reaches the surface. The lands between and around these springs have been identified as having a non-electric geothermal energy potential.

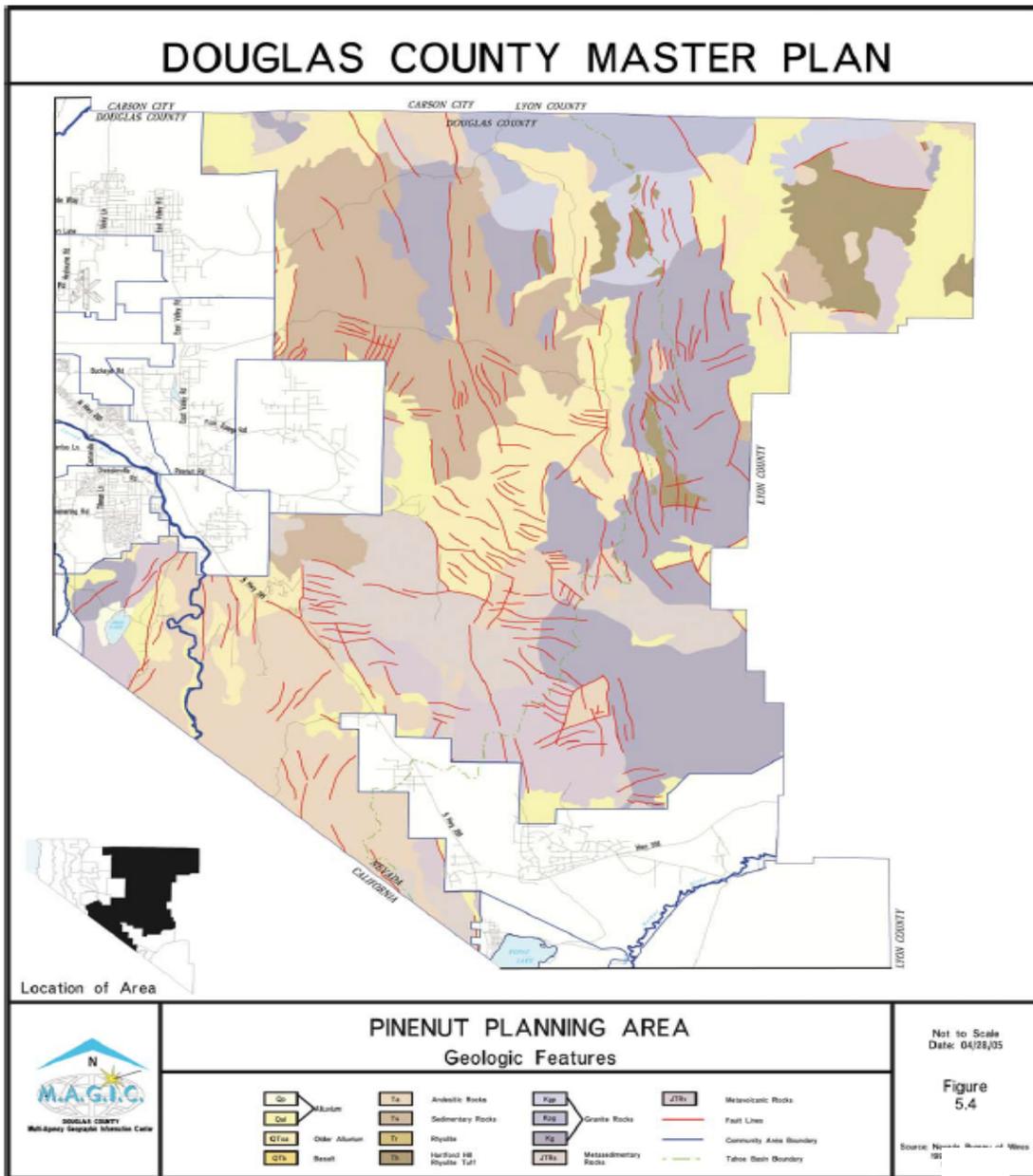
**Map 7.1
 Sierra Geologic Features**



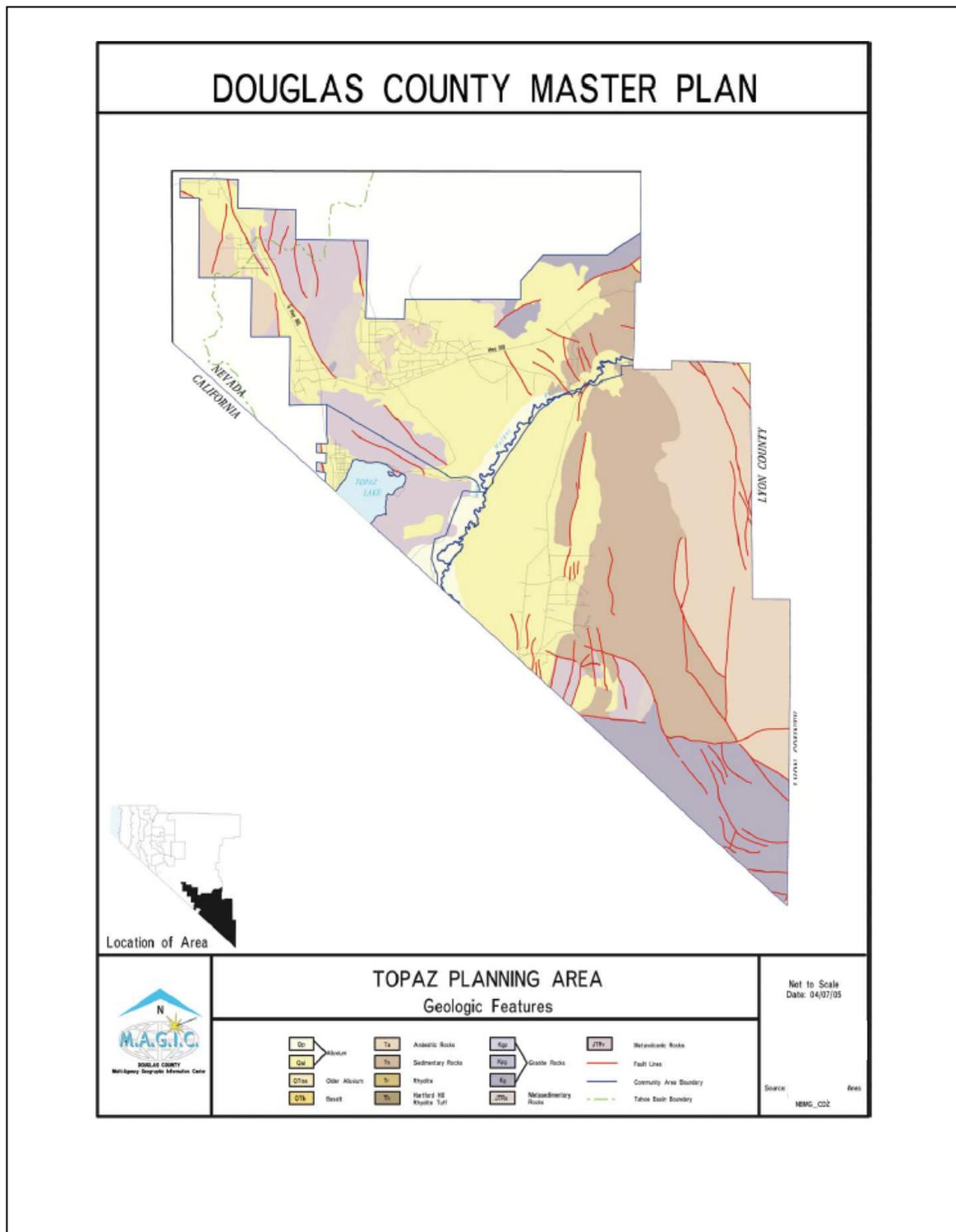
**Map 7.2
 Carson Valley Geologic Features**



**Map 7.3
 Pinenut Geologic Features**



**Map 7.4
 Topaz Geologic Features**



Soils

The general soils maps identify 16 major soil units within Douglas County. Each of these soil units has unique qualities and characteristics. The Natural Resource and Conservation Service has described these features, which have direct impact on the suitability of the soils for various land uses. The following information and tables are edited and excerpted from the 1984 Survey for each of the landscapes, they show the general soil characteristics of the county, providing additional information about an aspect of the natural environment that may affect planning for the county. More precise site-specific analysis would be necessary to determine the suitability of soils on a particular parcel for future development.

Soils lying on floodplains and low stream terraces are nearly level to moderately sloping. They typically range from moderate to deep to very deep. These soils have a high water table and are subject to flooding.

Figure 7.2
Areas dominated by Soils on Floodplains and Low Stream Terraces

General Soil Type	Urban Development Limitation	Sanitary Facility
Cradlebaugh-Voltaire	High water table, flooding, & wetness	Percolation slowly
Kimmerling-Ophir-Jubilee	High water table, flooding & wetness	Percolation slowly
Hussman-Dressler-Ormsby	Seasonal high water table, flooding & wetness	Percolation slowly- Poor filter
Gardnerville-Dangberg-Fettic	High water table, flooding & wetness	Percolation slowly

Soils lying on alluvial fans and terraces are primarily well drained. Of these soils, those that are located along the mountain fronts are sometimes coarse in texture, resulting in excessively drained soils. These are very deep soils that are nearly level to steep. They range in texture from fine to coarse. Some of these soils have high clay content, which are subject to high shrinkage and swelling.

Figure 7.3
Areas Dominated by Well Drained Soils on Alluvial Fans and Terraces

General Soil Type	Urban Development Limitation	Sanitary Facility
Haybourne-Turria-Springmeyer	Some areas steep slope Moderate shrink-swell Cutbanks cave	Poor filter Percolation slowly
Mottsville-Toll-Holbrook	Flooding Cutbanks cave	Poor filter Stones present
Indian Creek Phing-Reno	Cemented hard pan Shrink-swell	Percolation slowly

Soils located on foothills and high terraces are also well drained. They range from shallow to very deep. This soil grouping is known to have a well developed subsoil which is underlain by bedrock.

Figure 7.4
Areas Dominated by Well Drained Soils on Foothills and High Terraces

General Soil Type	Urban Development Limitation	Sanitary Facility
Pulcan-Puett-Chalco	Severe shrink-swell Shallow depth to rock	Percolation slowly Shallow depth to rock
Uhaldi-Pula-Nosrac	Steep slopes	Percolation slowly Shallow depth to rock
Stodick-Indiano-Loomer	Steep slopes Large stones Shallow depth to rock	Percolation slowly Shallow depth to rock

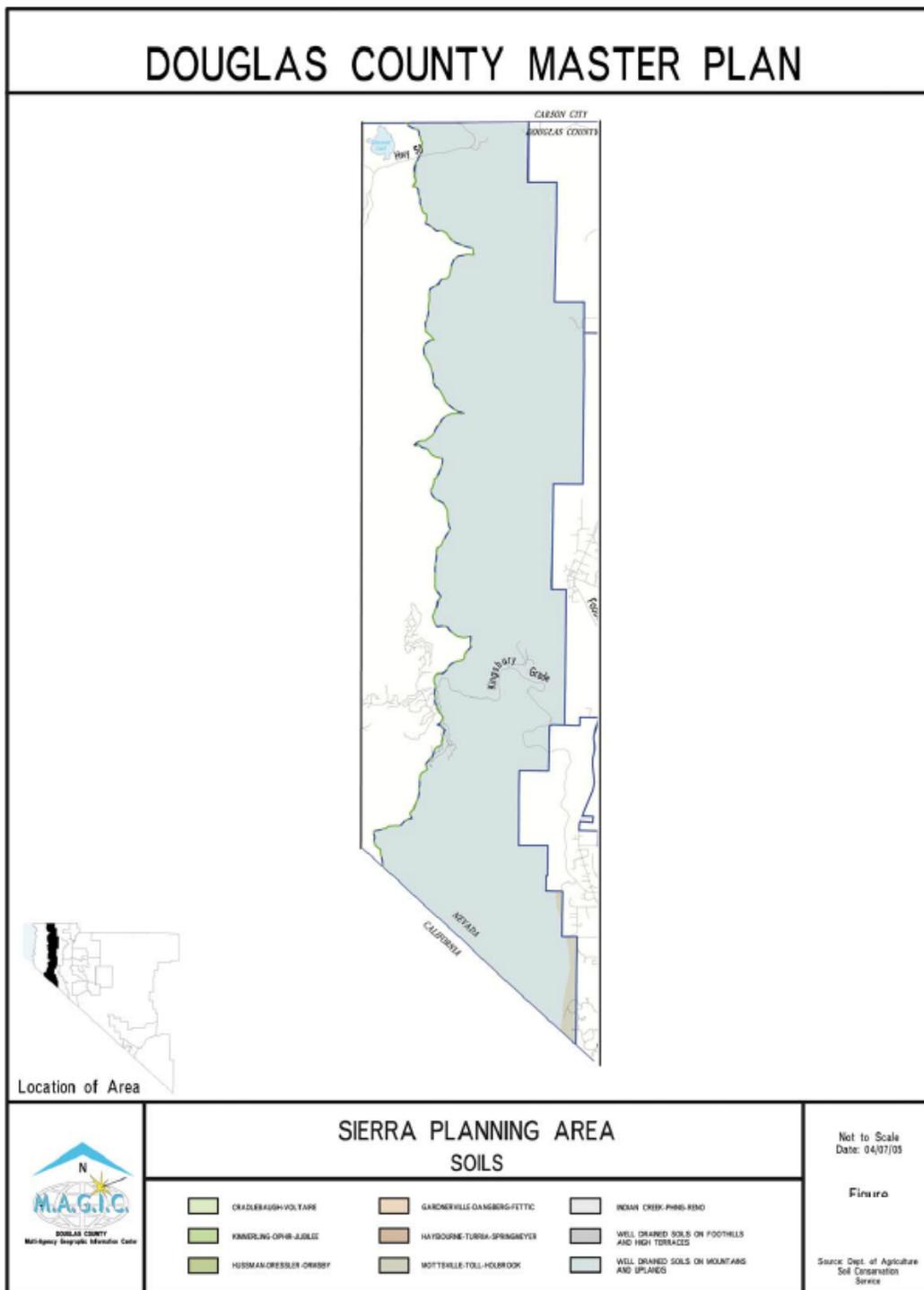
The soils located on the mountains and uplands are well drained. These are moderately steep to very steep and range from shallow to very deep. The soils in the Carson Range have a frost-free period between 30 to 80 days, while those in the Pinenuts, Wellington Hills and Topaz Lake areas have a frost free period from 60 to 120 days. These soils are shallow to very deep over bedrock.

Figure 7.5
Areas Dominated by Well Drained Soils on Mountains and Uplands

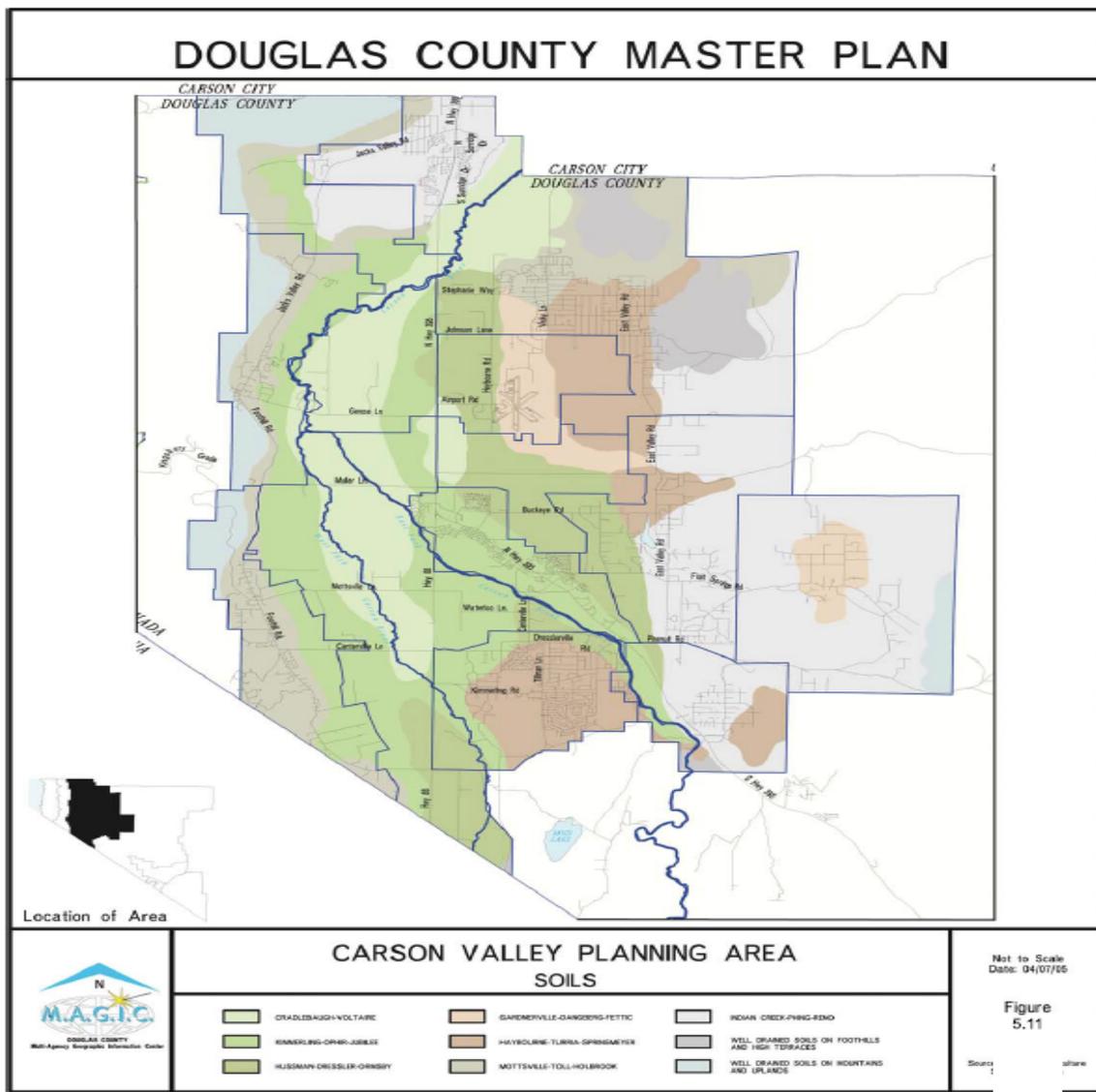
General Soil Type	Urban Development Limitation	Sanitary Facility
Cagle-Duco-Nosvac	Shallow depth to rock Steep slopes Severe shrink-swell Large Stones	Percolation slowly Shallow depth to rock
Trid-Drit-Roloc	Steep slopes Shallow depth to rock Moderate shrink-swell	Large stones Shallow depth to rock
Glean-Genoa-Sup	Shallow depth to rock Steep slopes Large stones	Large stones Shallow depth to rock
Corbett-Toiyabe	Steep slopes Shallow depth to rock Cutbacks cave	Shallow depth to rock
Vicee Franktown-Rock Outcrop	Steep slopes Rock outcrop	Large stones Shallow depth to rock
Witefels-Temo	Steep slopes Cutbanks cave Shallow depth to rock	Poor filter Shallow depth to rock

Maps 7.5 thru 7.8 depict the generalized soil types for each region.

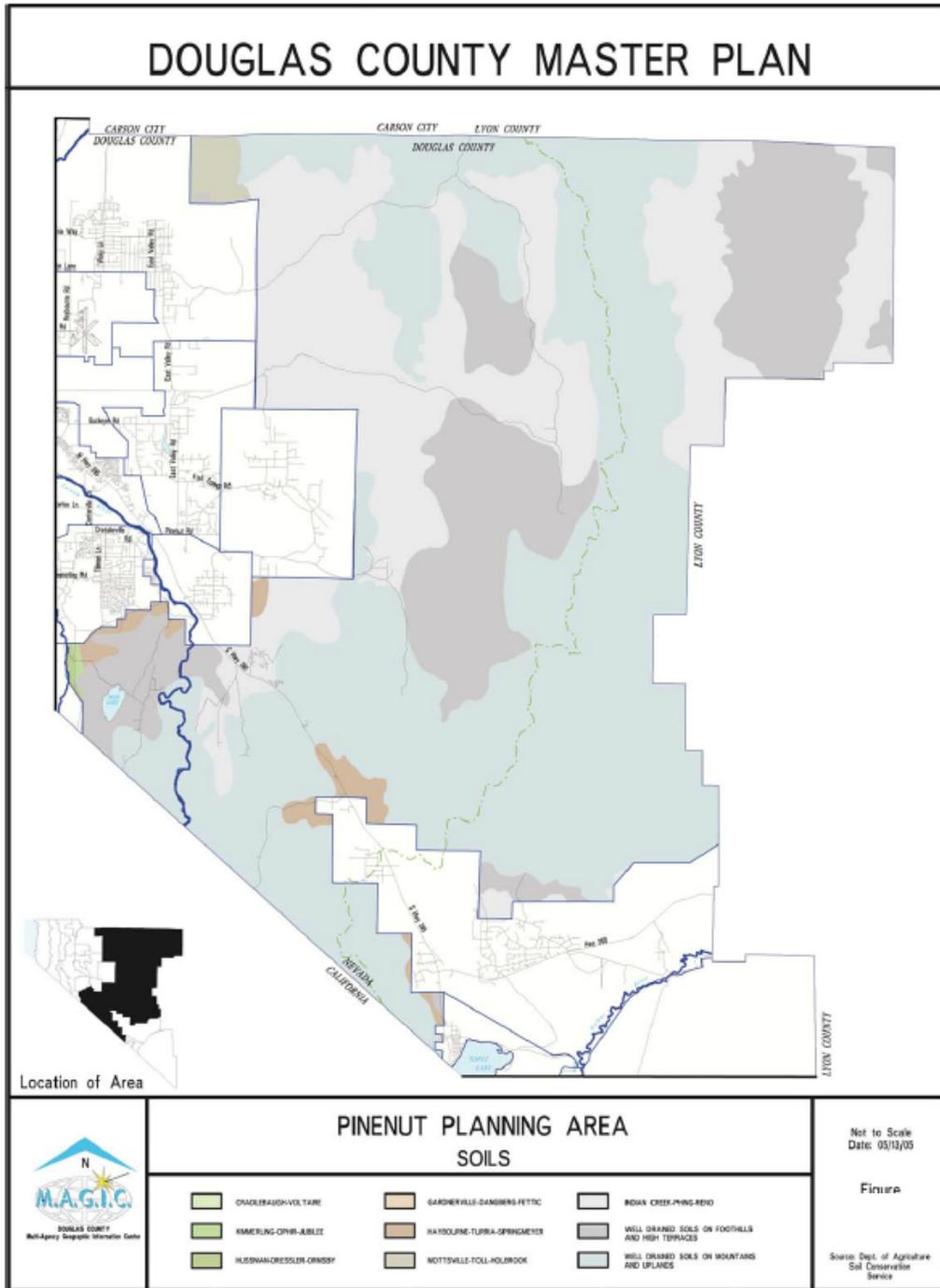
**Map 7.5
 Sierra Soils**



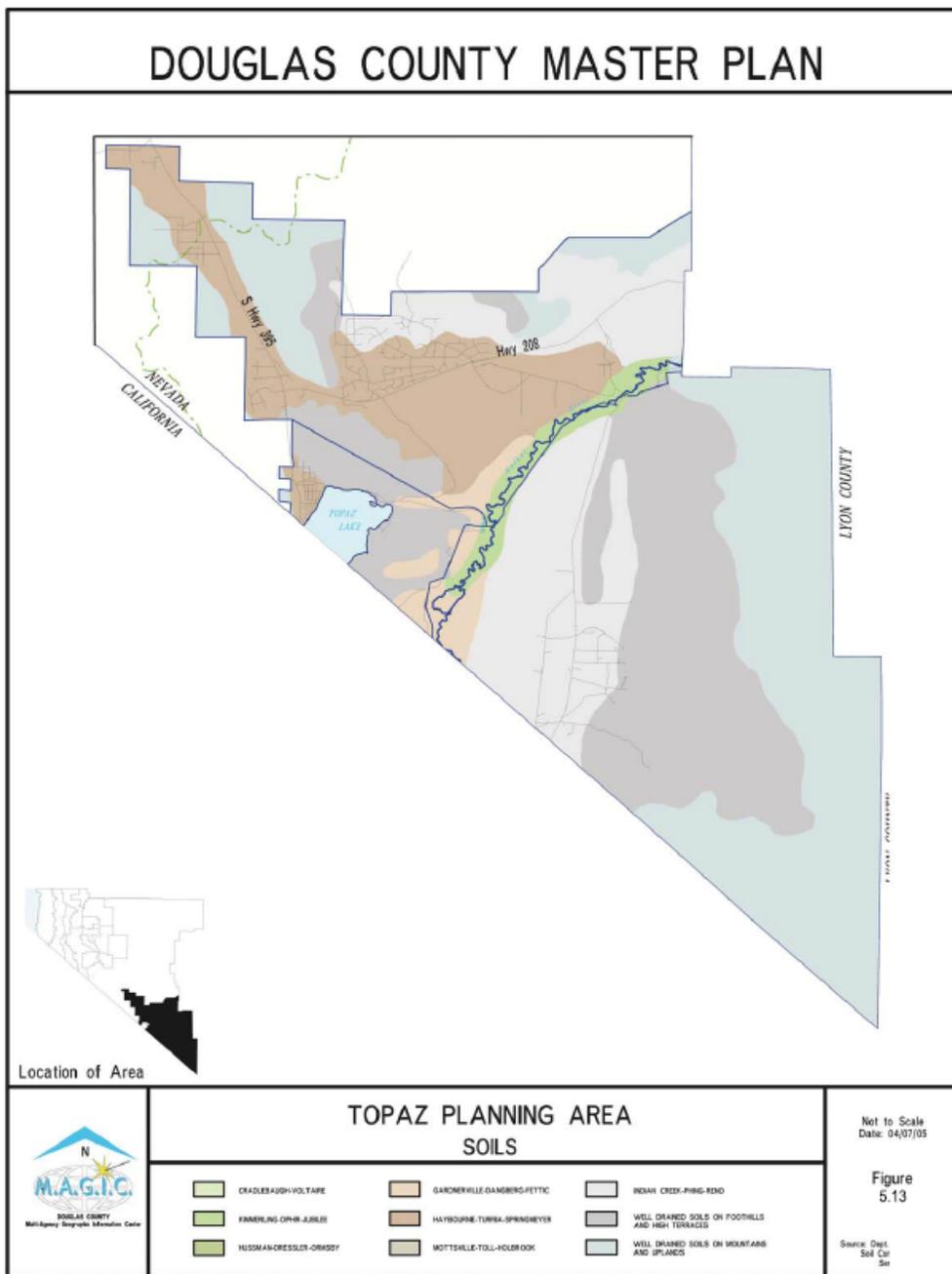
**Map 7.6
 Carson Valley Soils**



**Map 7.7
 Pinenut Soils**



**Map 7.8
 Topaz Soils**



Slopes - Hillsides – Ridgelines

Elevations of the Carson Range and Pinenut mountains reach to over 10,000 feet above sea level, while the Carson Valley floor dips to 4,625 feet above sea level. Approximately 35 percent of the county has slopes between 10 and 30 percent, and 25 percent has slopes greater than 30 percent. Thus, over half the county has slopes severe enough to affect development potential.

Slope of the land is an important consideration in planning for development. Slopes, in conjunction with soil types, geological and seismic hazards, and scenic vistas, are potential limitations to development. In terms of construction and service costs, land with 0 to 5 percent slope is generally most suitable for high density development. These slopes predominate throughout most of the Carson Valley floor. Typically, problems associated with development on slight slopes are minimal, although surface drainage may be difficult. Development on steep slopes, hillsides, and ridgelines can degrade the aesthetic value of the natural environment and can also represent hazards to the land itself.

Slopes between 10 percent and 30 percent typically have development limitations. Providing community services and infrastructure is often difficult and expensive and requires extensive grading for access. For this reason, development needs to be limited to low overall densities, and restricted to areas which would not be significantly impacted. Slopes above 30 percent have severe development limitations that would preclude most development except very low intensity uses.

Limitations to development on steeper slopes are often magnified by poor soil conditions. For this reason, even properties with moderate slopes may be unsuitable for development, depending on the predominant soil type. Other limitations to development in moderate to steep slope areas are geological hazards, such as landslides and seismic hazards. Landslides can be expected to occur in canyons, ravines, and other areas with steep slopes. Seismic hazards and flash floods are also a concern in the county in areas with steep slopes.

Fire hazards are of special concern to Douglas County, given the nature of the terrain and the growing population. Areas of the county with narrow canyons and saddles are conducive to the rapid spread of fire. The steeper the slope, the more rapid the rate at which the fire spreads; locations where slopes of 10 percent or greater have been identified as areas of concern. Also, vegetation plays a major role in the spread of wildfires, primarily vegetation that grows in areas of little moisture content or vegetation that is known to ignite quickly. Limited access to sites is another major factor in the identification of fire hazard zones.

The slope information illustrated on the Sierra, Carson Valley, Pinenut, and Topaz Regional Plan Maps (Maps 7.9 thru 7.12) for Moderate to Steep Slopes, is based on topographic information available from United States Geographical Survey (USGS) Quadrangle Mapping.

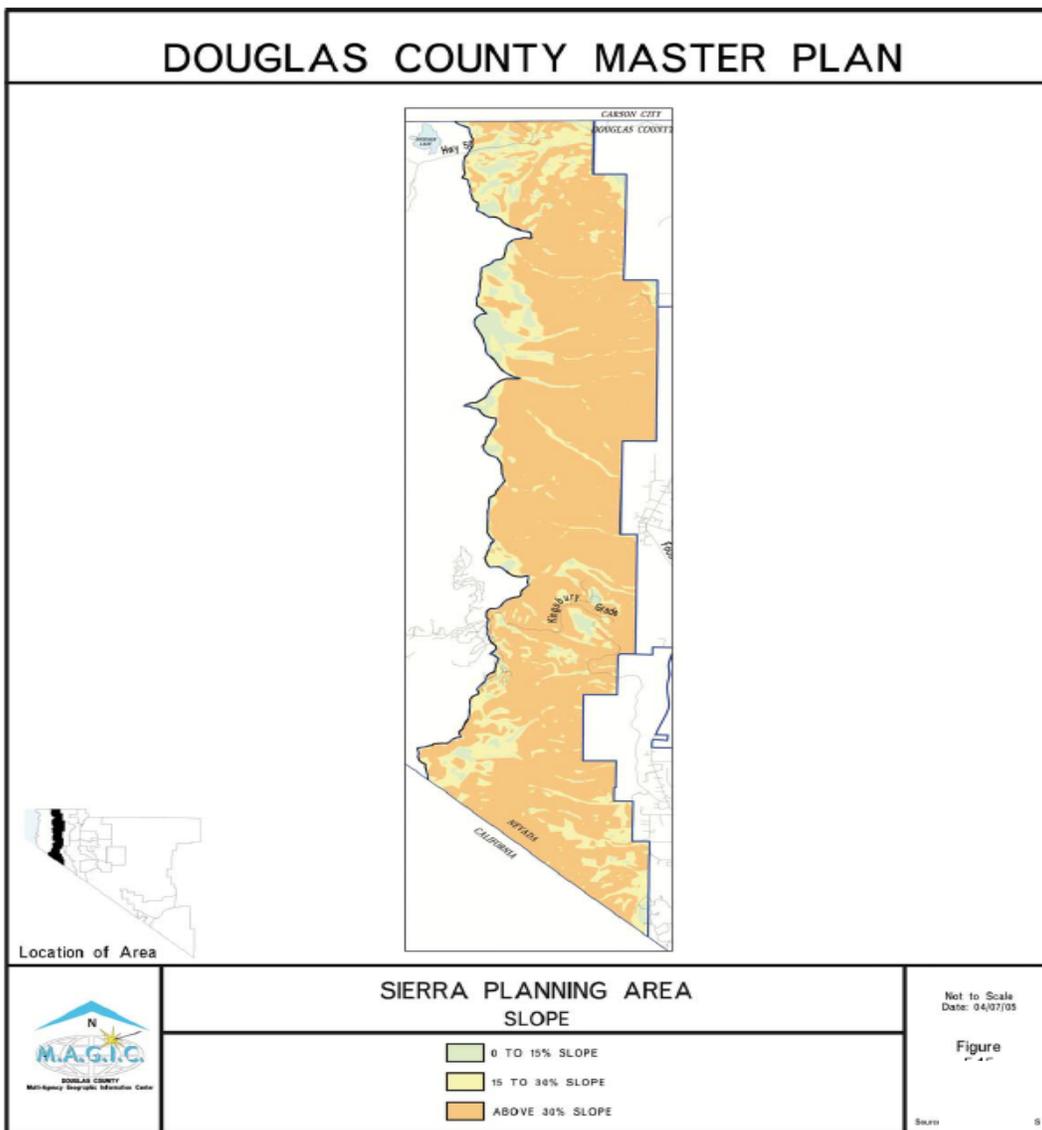
Steep slopes and ridgelines are important land forms in Douglas County, which contribute to its character and aesthetics; the steep slopes and ridgelines merit strong consideration within the Master Plan to ensure their preservation. The steep slopes are important from an aesthetic, ecological, and public safety perspective. Development on these slopes can be hazardous due to soil instability and potential for land failure due to inappropriate grading or construction techniques.

The following figure describes the slope characteristics of each community:

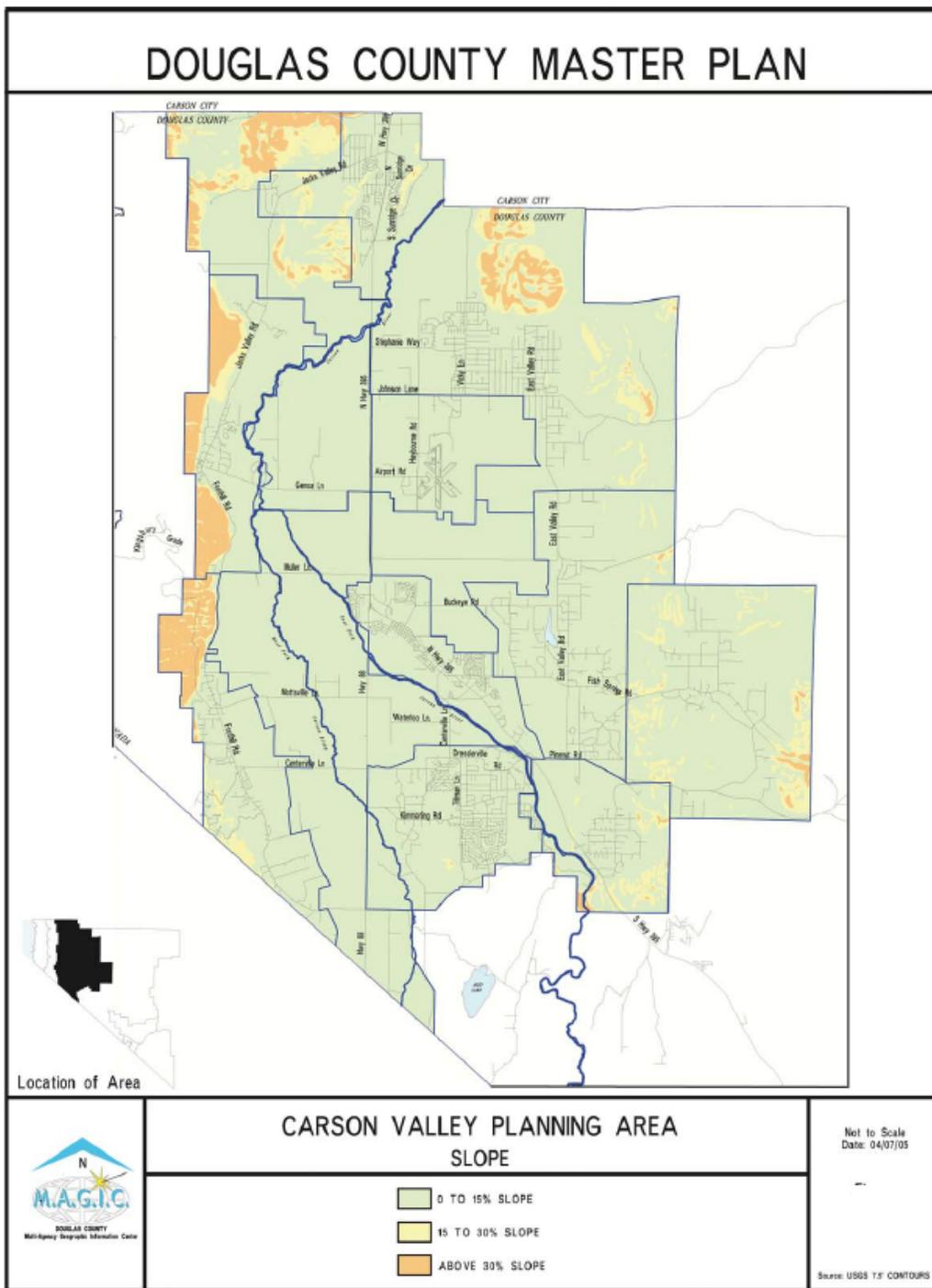
Figure 7.6
Generalized Slope Characteristics

Community	Slope Characteristics
Agriculture	Generally 0 - 5 percent slope; northwest portion exceeds 15 percent.
Airport	Relatively flat and gently slopes to the northwest.
East Valley	Relatively flat with some areas of moderate (15 - 30%) to steep (30%) slopes at the higher elevations.
Foothill	Gentle slopes to the east; northwestern edge exceeds 30 percent.
Genoa	Central portion slopes to the east; western edge exceeds 30 percent
Indian Hills/Jacks Valley	Majority of community is on rolling hills with some slopes exceeding 15 percent.
Johnson Lane	Western portion is relatively flat; steep slopes in east and northwest; east 1/3 has moderate slopes (15 - 30%).
Central Valley	Relatively flat.
Ranchos	Gentle slopes to the northwest; relatively flat, small portions experience (5 - 15%); Dressler Butte only slope exceeding 15 percent.
Ruhenstroth	Relatively flat; steep slopes to the east.
Minden-Gardnerville	Relatively flat.
Topaz Lake	Gentle sloping alluvial fan (5 -10%); steep (+30%) at extreme north end.
Topaz Areas	Steep slopes at western end, northern section of TRE, and areas near Wild Oat Mountain.
Pinenuts	Eastern portion contains steep slopes, gradually decreasing to (0 - 15%) to the western edge.
Sierra	Majority of community contains steep slopes.

Map 7.9 Sierra Moderate to Steep Slopes

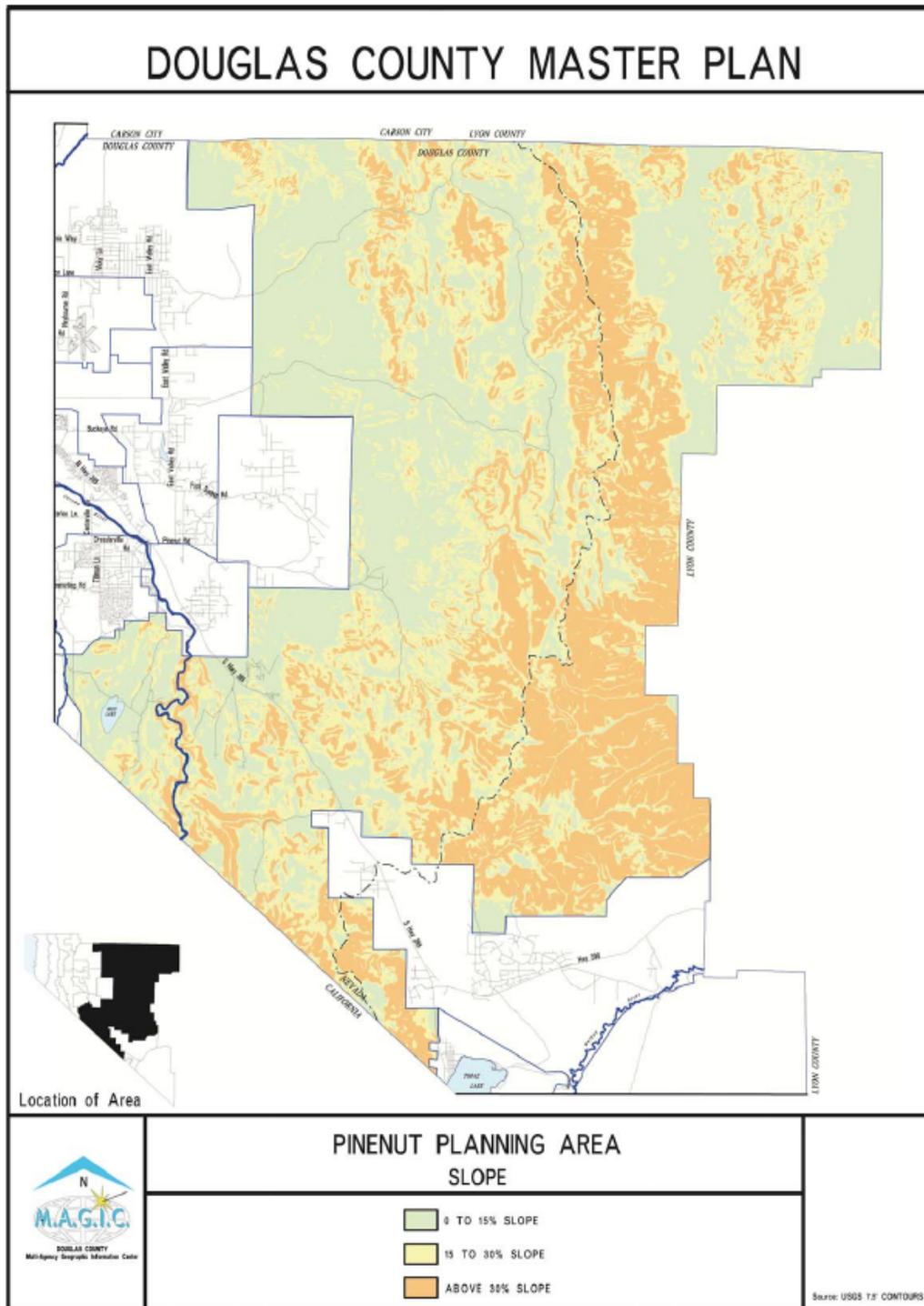


Map 7.10
Carson Valley Moderate to Steep Slopes

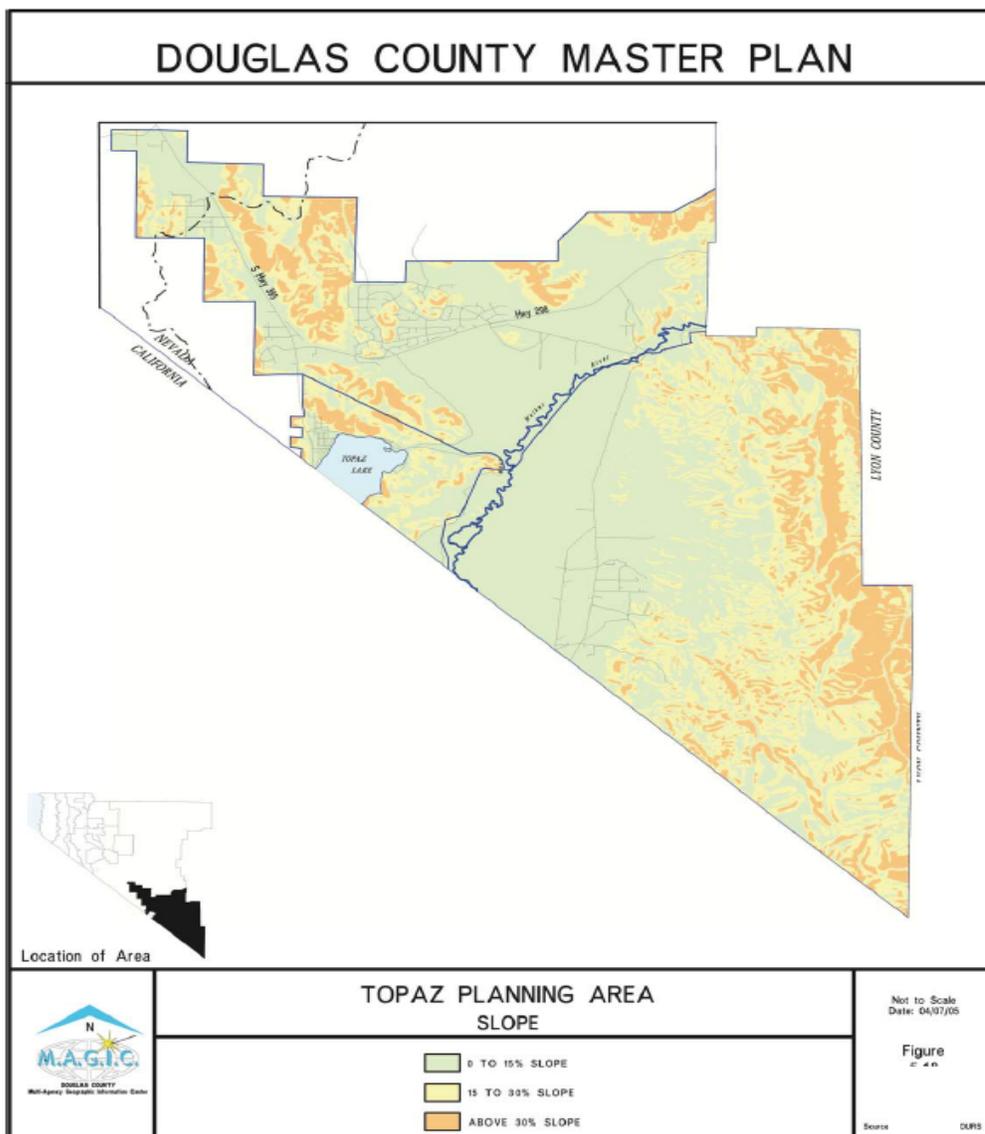


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Map 7.11
Pinenut Moderate to Steep Slopes



Map 7.12
Topaz Moderate to Steep Slopes



Climate

Douglas County lies between two mountain ranges that have a marked influence on the climate. The two ranges are the Carson Range to the west, which affects the climate mainly in the winter, and the Pinenut Mountains to the east, which affects the climate mainly in the summer. The Carson Range is part of the Sierra Nevada. It rises from the valley floor to an elevation of about 10,000 feet within a distance of 10 miles. The Pinenut Mountains generally rise to elevations of 7,000 to 9,500 feet. On the valley floor, the highest elevation is approximately 5,400 feet (near Woodfords, California) and the lowest is approximately 4,625 feet (in the northern part of Douglas County).

The climate of Douglas County is continental. The summers are short and often hot, and the winters are moderately cold. The percentage of possible sunshine averages 78 percent for the year; 90 percent for the summer, 66 percent for the winter, but the abundant sunshine is somewhat offset by the shortness of the growing season. The average daily maximum temperature in July is 90° F, and average daily minimum temperature in January is 18° F.

The Sierra Nevada effectively reduces the moisture content of storms that sweep in from the Pacific Ocean. Winter is by far the wettest part of the year; more than half the annual precipitation is received during the period November through February.

Total precipitation averages 9.37 inches a year at Minden, but variations of about 25 percent are common from year to year. The annual precipitation is greater than these amounts by about 58 percent of the time.

In winter, because the Sierra Nevada is a barrier to the flow of air toward the east, there is considerable difference between the amount of precipitation received at the higher elevations and the amount received at the lower elevations.

The summer showers are a product of the moist air from the Gulf of Mexico. The blocking effect of the Pinenut Mountains to the flow of air toward the northwest is strong, but not nearly so pronounced as that of the Carson Range to the flow of air toward the east in winter. An average of only 12 thunderstorms a year has been recorded.

Flooding and Drainage

Major Drainage Basins

Precipitation in Douglas County falls onto three major drainage basins or watersheds. These watersheds are: Carson River, Walker River and Lake Tahoe basins. The Carson River is the largest drainage basin within Douglas County. All precipitation within this basin drains to the Carson River. The river flows from south to north towards Carson City in two forks, East and West, which join in the middle of the Carson Valley. The Walker River Basin drains portions of the south and east ends of the county and flows primarily from southwest to northeast. The Lake Tahoe basin drains to Lake Tahoe then to the Truckee River in California. Stormwater Management for the Tahoe Basin is under the direction of the TRPA. Maps 7.13 thru 7.16 depict the FEMA floodplains.

Floods are natural and recurrent events. The problems associated with flooding are compounded when man competes with rivers, streams, and lakes for the use of the floodplain.

Floodplains are valuable areas requiring protection. They provide a water storage function, affecting downstream flow, water quality and quantity, and land suitable for human activities. In Douglas County, floodplains provide opportunities for agricultural activity, open space, and recreation. The nature and extent of use within the floodplain should be compatible with the risk involved and the degree of protection that can be provided.

Flooding

A number of damaging floods have occurred in the Carson Valley, Topaz Lake, and Topaz Ranch Estates as a result of heavy rainfall on accumulated snow pack, long duration rains, or by summer cloudbursts.

Floods from snow melt caused by heavy, long duration rainfall can occur anytime between October and March. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions, when the ground is frozen and infiltration is minimal, or when warm rain on the snow in higher elevations of the tributary areas adds snow melt to rain flood run-off. These storms are also known as wet-mantle storms.

Severe but localized flooding may also result from cloud burst storms centered over the Carson River tributary basins. These storms may occur from late spring to early fall, but generally occur in June, July, and August. Run-off from cloud bursts is characterized by high peak flows with a short duration falling on dry soils with a thin depleted vegetal cover, where the soil mantle is only superficially moistened by rain. These storms are also known as dry-mantle storms.

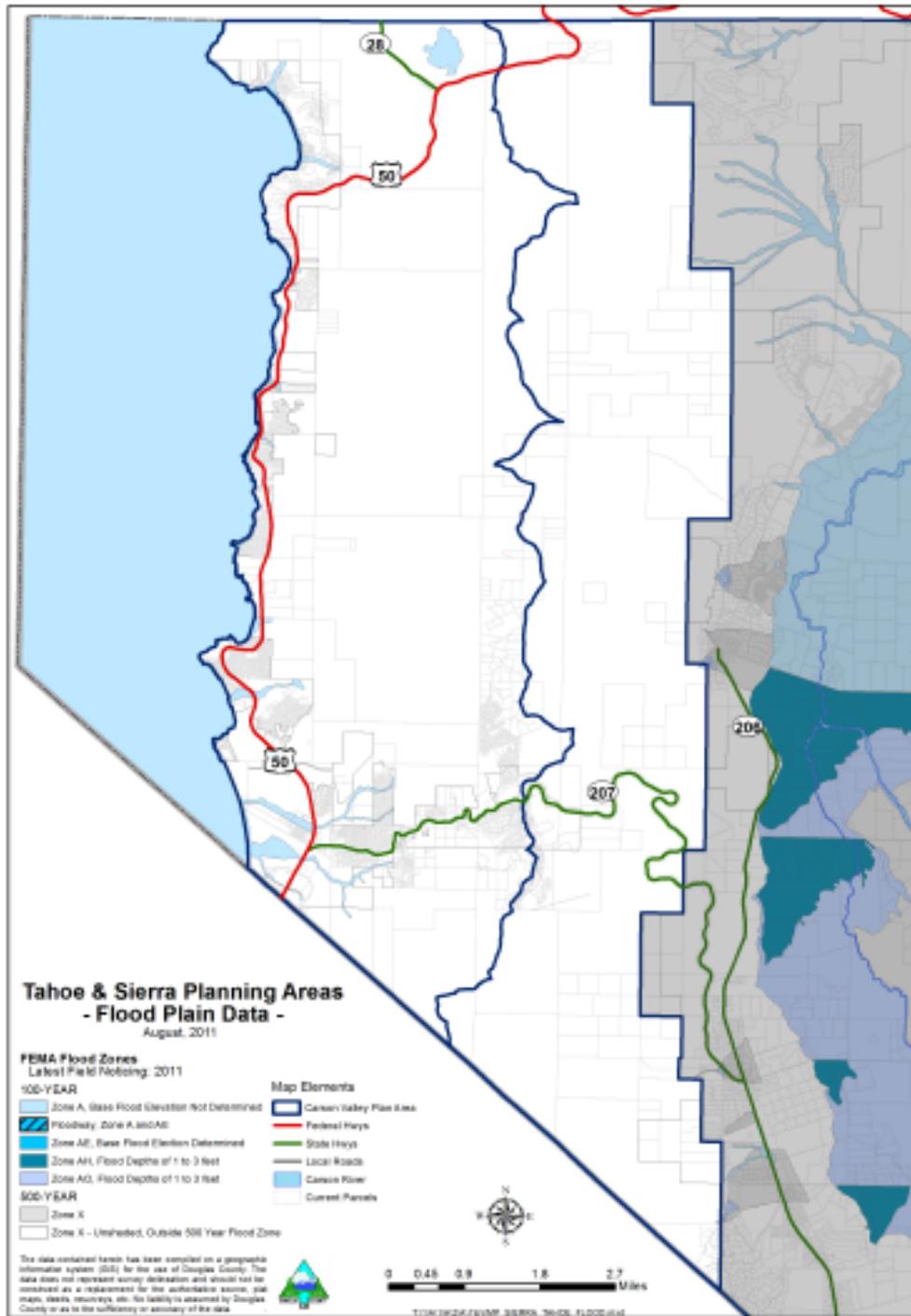
Although higher peak flows per square mile of drainage may result from cloud bursts, the winter rain flood is more damaging because of the greater volume of flow, longer periods of sustained flow, wider area of inundation, and larger areas of population.

Carson River Flooding

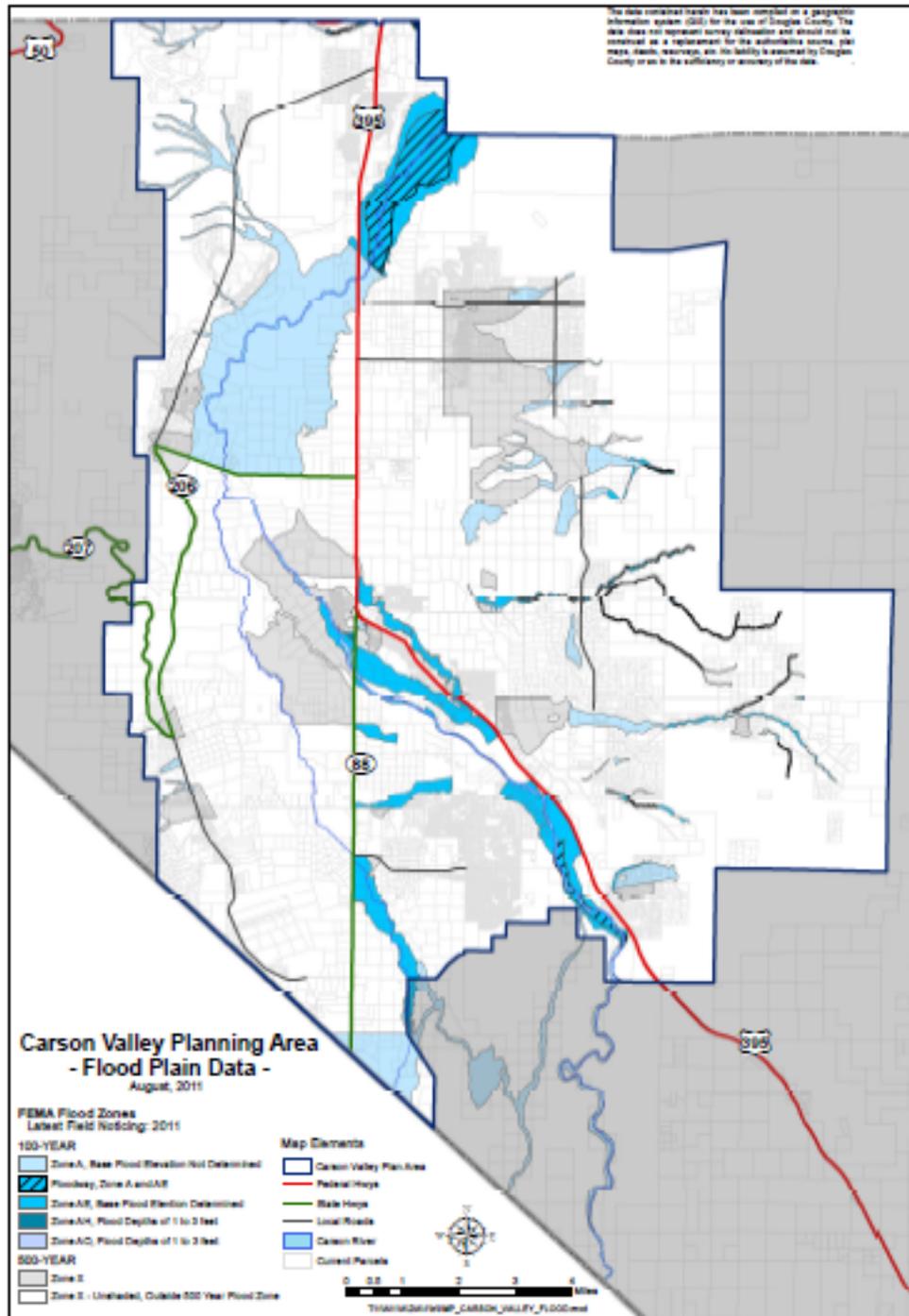
A number of damaging floods in the Carson River Basin have occurred as a result of spring run-off and wet mantle storms. All major floods of the East and West Forks of the Carson River, with the exception of the flood occurring in the spring of 1890, have been caused by wet mantle storms.

Of the significant flood events that have been recorded, more than 25 have occurred in the Carson Valley. The major floods of record occurred in 1852, 1861-62, 1867-68, 1906, 1907, 1937, 1955, 1963, 1964, and 1997. The flood of 1890 is regarded as the most severe early flood, although there are no accurate records of floods prior to 1937. The flooding that occurred during the March 1 to June 15, 1890, time period resulted from the harsh winter of 1889-1890.

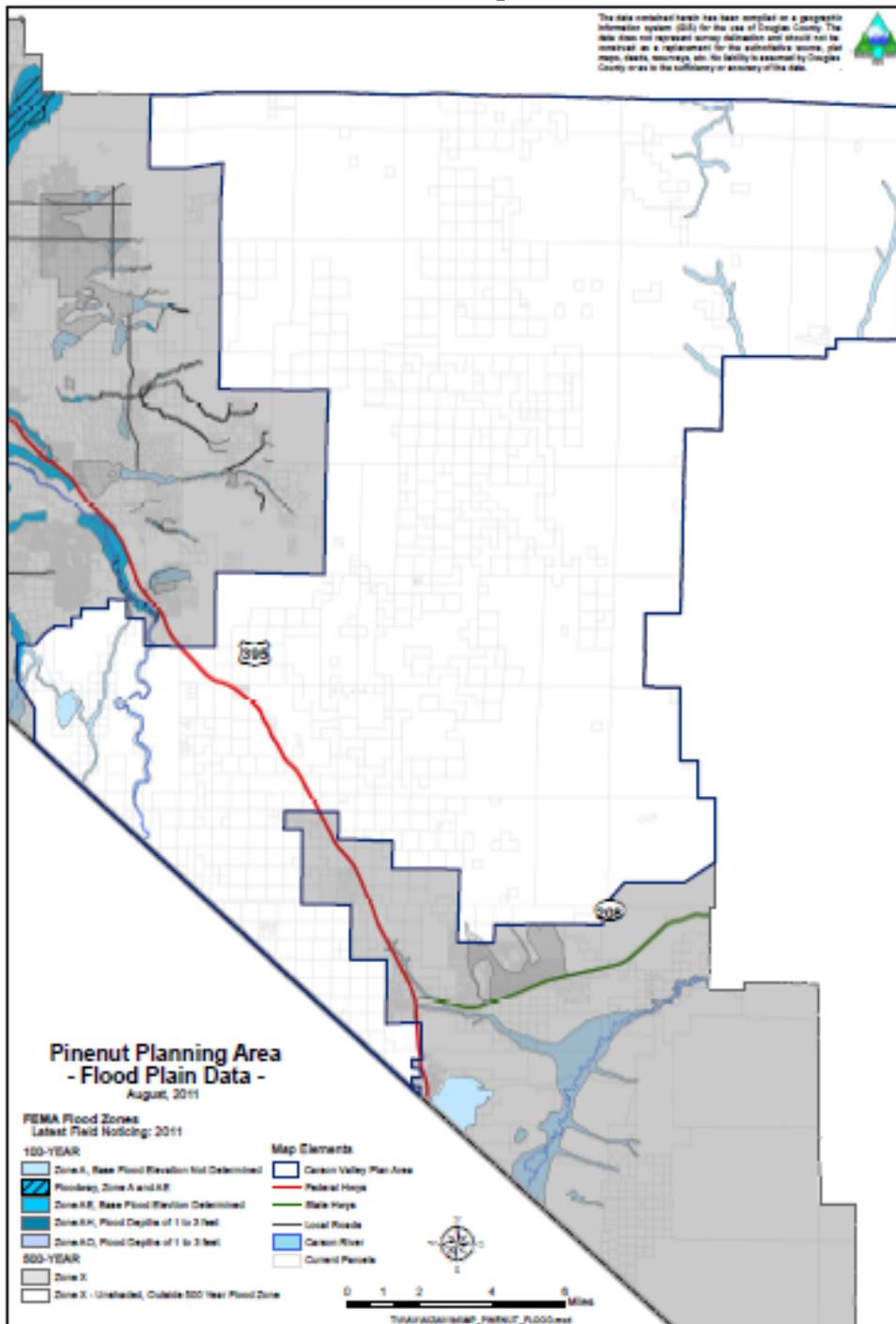
**Map 7.13
 Tahoe and Sierra Floodplain**



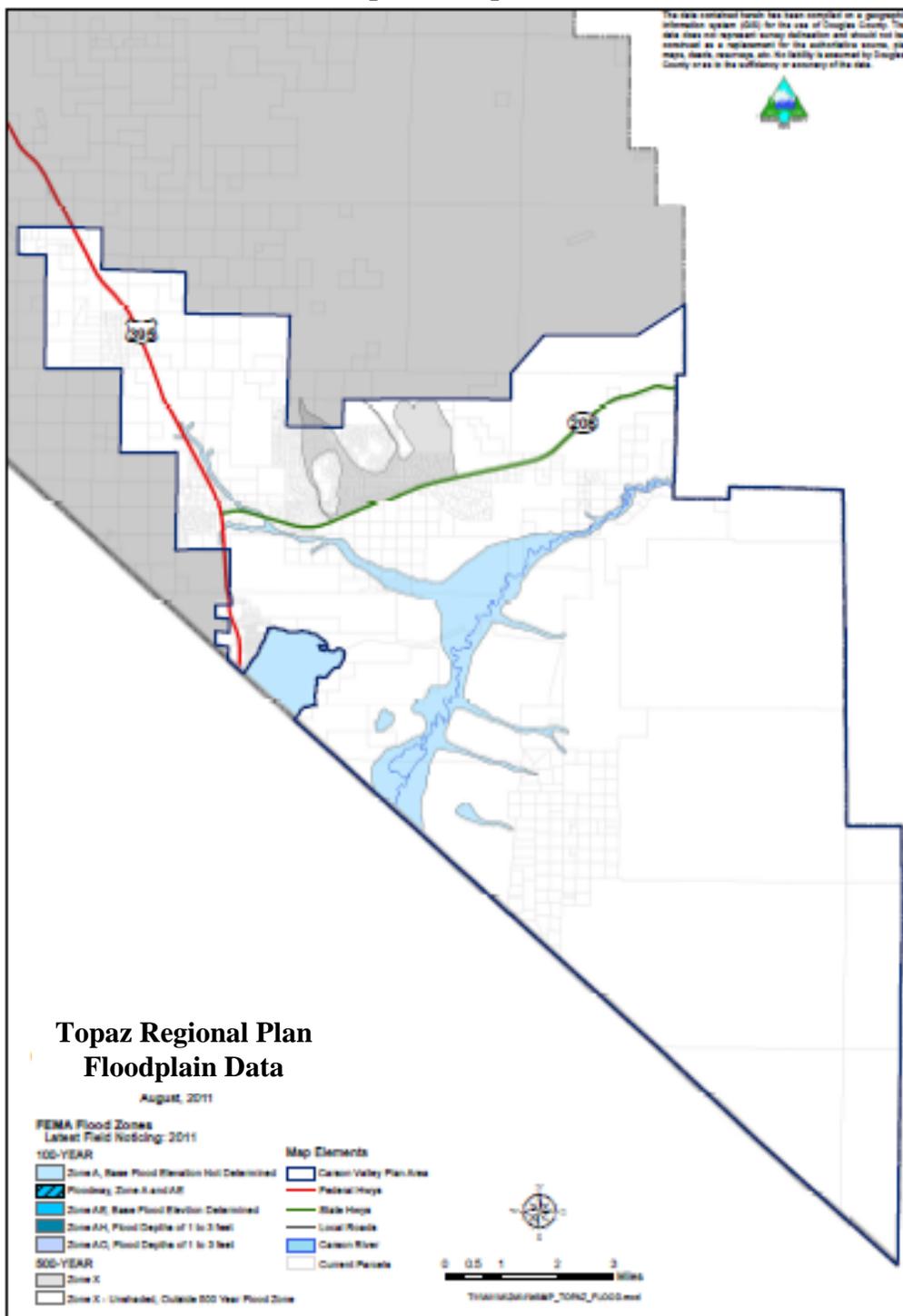
**Map 7.14
 Carson Valley Floodplain**



**Map 7.15
 Pinenut Floodplain**



**Map 7.16
 Topaz Floodplain**



The most damaging and apparently the largest flood events have occurred since 1950. Flood damages have increased as development within the floodplain has increased, but the extent and severity of flooding in the Carson Valley has probably been influenced more by the construction of elevated roadways across the floodplain than by any other activity of man.

In 1950, floods in November and December reached 25- and 15-year frequencies, respectively. They were both caused by rain falling on snow and saturated ground. Damages for this 2-month period were estimated at \$825,000.

The flood event of December 1955 was caused by heavy rainfall on snow, in what was probably the heaviest sustained downpour in the history of western Nevada. This storm period was characterized by approximately 60 hours of continuous precipitation that dropped in excess of 10 inches of moisture in the upper watershed areas. This precipitation was mostly in the form of rain below the 9,000 foot elevation, with 10.37 inches recorded at Woodfords, California. The flood crest that resulted from the storm, estimated to be an 86-year event on the East Fork, is the largest flood recorded in the valley. The damages were established at \$1.5 million.

The most damaging flood on record was the New Year's flood of 1997. In December 1996, several moderate to heavy snowstorms built up a large snowpack (more than 180 percent of normal) in the higher altitudes of the Sierras with two to three feet on the valley floors. A series of three subtropical storms originating in the central Pacific Ocean brought heavy rainstorms to the region. The last of these storms moved through the region from late December 30, 1996, to early January 2, 1997. These storms brought heavy, unseasonably warm rain to the Sierras and melted almost 80 percent of the snowpack in the Sierra Nevada below about 7,000 feet. Recorded precipitation was 16.4 inches at Ebbetts Pass (8,700 ft) and 3.5 inches at Minden.

About 53.2 square miles of the Carson River Basin were flooded. The combined floodwater formed a lake across the valley floor 2 to 3 feet deep, overflowing Muller Lane and closing State Route 88 for two days. About one foot of water covered Highway 395 near Cradlebaugh Bridge, which has been damaged numerous times in the past during floods. On January 2, 1997, the flow at the East Fork of the Carson River near Gardnerville peaked at 20,300 cubic feet per second (cfs). This is the highest figure ever recorded.

Three factors generally cause flooding along the East and West Forks of the Carson River: insufficient capacity, obstruction to flow along waterways, and the natural slope of the channel.

Available recorded data on channel capacities are vague. Channel capacities along the Carson River forks fluctuate annually as reaches of the channel deteriorate or improve. It is a general rule of thumb that a flood hazard exists on the East Fork of the Carson River if flow exceeds 5,500 cubic feet per second and if flow within the West Fork of the Carson River exceeds 1,000 cubic feet per second.

The East and West Forks of the Carson River have both natural and man-made obstructions, which impede the channel capacities.

Natural Obstructions

Natural obstructions to flood flow include brush and other vegetation growing along the stream banks in floodway areas and ice. During floods, brush growing in floodways impedes flood flows and results in backwater and increased flood heights. Brush washed out during floods and carried downstream may collect on bridges or plug culverts, thus creating a damming effect resulting in overbank flow. As flood flow increases, masses of debris may break loose allowing a wall of water and debris to surge downstream until another obstruction is encountered. Such was the case during the March 1986 flood event when a large tree and debris were caught at the Rocky Slough-Virginia Ditch Diversion structure located on the East Fork of the Carson River. Although the river flow was not as large as previous historic flows, the obstruction caused a damming effect at that location and major erosion of the stream bank took place until the debris could be removed.

Due to the Carson River Basin's high elevation and low winter temperatures, ice on the river can also become a problem. Ice formed in and along the river during the low freezing temperatures can be broken up and set in motion by a few successive warm days or by rains. The ice then becomes floating debris and hence eventually creates hazards. As night temperatures fall, the ice solidifies into larger structures enabling greater amounts of ice and debris to pile up behind. As temperatures warm and rain melts more snow, the damming problem intensifies.

Man-Made Obstructions

Man-made obstructions to flood flow in the region consist of a number of bridges, culverts, and irrigation diversion structures. Debris collecting on these obstructions may increase to the point where structural capability is exceeded and the structure is destroyed. This type of flood event occurred in January 1980 on the East Fork of the Carson River when debris accumulated along the piles supporting the Riverview Bridge. As the debris and flow increased, the substructure and superstructure were damaged and had to be replaced by the present structure.

During high flows, the man-made obstructions can raise water levels to the extent that local flooding and erosion occur. Irrigation structures, which naturally restrict channel

flow, and public roadways, which are elevated above the local terrain, also act as dikes, which block and divert the water causing additional flooding.

The Carson River and adjoining lands that can become inundated during flooding have a natural slope toward the northwest. Most of the channels and irrigation canals are oriented toward the north. Because of the orientation of the existing irrigation canals, floodwater during flood events tends to travel down the natural slope to the northwest causing overflows from each canal to the next down-slope canal. This occurrence intensifies as the storm frequency increases causing eventual inundation of large areas of the valley between the irrigation canals. Siltation deposits can also be a problem with the north orientation of the existing irrigation canals because of the natural northwest slope of the valley.

If irrigation canals were opened, designed for flood drainage, designed to handle siltation, and regularly maintained, they would aid in alleviating a portion of the floodwaters from the Carson River.

Carson River Tributary Basin Flooding

The Carson River Basin is narrow for the most part. Its sides are composed of various mountain ranges, each with associated drainage networks. The drainage basins on the eastern side of the Sierra Nevada Mountains and the basins within the Pinenut Mountains can generate two different types of flood events consisting of wet-mantle storms or dry-mantle storms.

Wet-Mantle Flooding

The earliest recorded flood damage in Genoa occurred on January 20-26, 1886, during a flood event in the Carson Valley. The resulting flood from rain on snow on the small drainage areas west of Genoa caused damage to most buildings and streets. In March 1890, snowmelt caused the failure of a small dam in Genoa Canyon and several buildings were damaged.

Dry-Mantle Flooding

Damages from this type of flood are localized, but often severe, in the form of range and watershed erosion in the upper reaches of the watershed, and flooding and sediment deposition on agricultural lands and rural and urban developments within the flood area. These floods are also referred to as cloudbursts and flash floods.

Dry-mantle flooding has occurred in Genoa, the Johnson Lane area, Topaz Ranch Estates, the Fish Springs area, the Ruhenstroth area, and other basins located on the east side of the Carson Valley.

Genoa is also vulnerable to damage from severe thunderstorms. On August 5, 1971, several occurred in the vicinity. A flash flood (dry-mantle) came down Sierra Canyon 0.8 miles north of Genoa and spewed mud, rocks, and debris throughout the community and across Foothill Road, which parallels the Sierra front through the Carson Valley. The drainage area encompassed 3.1 square miles and discharged an estimated 344 cubic feet of water per second.

The Johnson Lane area lies above the Carson River floodplain, but has several alluvial fan washes, including the Johnson Lane Wash, the Buckbrush Wash, and the Airport Wash that have produced large dry-mantle cloud burst flows. The Johnson Lane area around these washes has continued to grow in population over the past few years. Large population growth in this area will dictate that flood plain management and possibly flood protection measures be taken. Protection and management in this area has become increasingly important in light of the frequent flood occurrence with cloud bursts occurring in this area.

The East Valley, Fish Springs, Pinenut, and Ruhestroth areas have also experienced several large cloudbursts in recent years causing short duration, high-flow events to occur. These areas have a multitude of alluvial fans with encroachment by development near the high flood-prone areas. Floodplain management and flood protection measures should also be considered in these regions of the Carson Valley.

Topaz Ranch Estates has several alluvial fan dry-stream basins, such as Minnehaha Canyon, that have experienced both wet- and dry-mantle storms in recent years. These storms have been particularly damaging to property, roads, and road structures due to encroachment and development near the stream basins.

In addition to water, flooding can carry significant amounts of silt, sand, and debris. Debris may consist of sediment, boulders, rocks, and trees. This flow is often called a debris flow and can cause significant damage to structures and roadways. Debris flows have the highest potential of occurring in smaller, steeper watersheds along the eastern slopes of the Carson Range or after the vegetation has been destroyed by fire which leads to increased erosion.

Watersheds that may impact areas of current or proposed development and are tributaries of the Carson River and the Walker River are listed on Map 7.17.

Federal Emergency Management Agency Floodplains

Douglas County entered the National Flood Insurance Program (NFIP) in January 1974. A flood insurance study was completed on the East and West Forks of the Carson River, the Genoa area, and Topaz Ranch Estates area of Douglas County. A subsequent updated

study was completed on several stream basins along the east and west sides of the Carson Valley between 1986 and 1990.

In 2008, FEMA updated the Flood Insurance Rate Maps (FIRM) used by the County in determining flood zone information for several eastern Carson Valley Basins (Buckbrush Wash, Johnson Lane Wash, Buckeye Creek, etc.), which changed the flood zone for approximately 5,000 parcels in the valley. The maps went into effect on January 20, 2010.

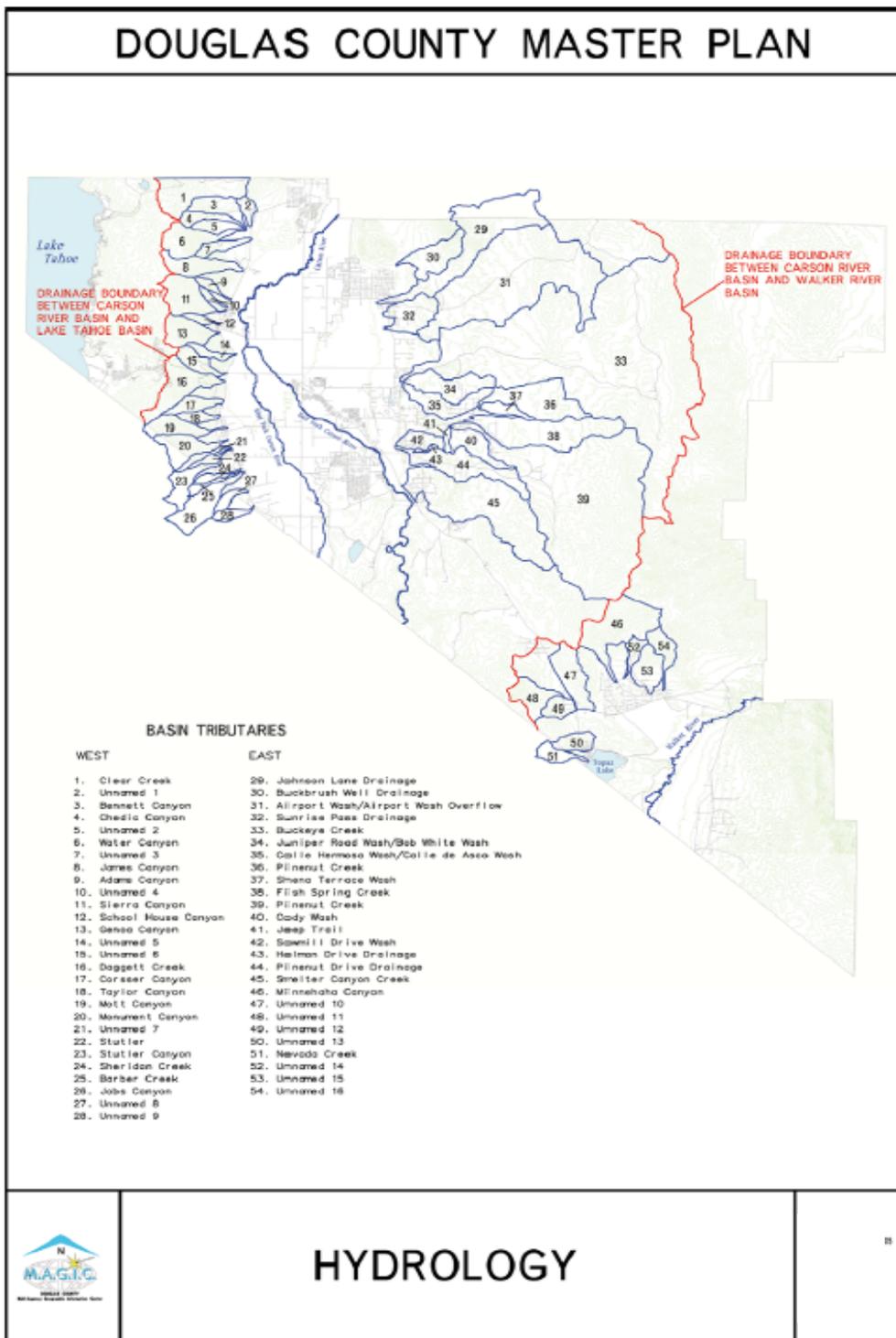
Revisions to the floodplain mapping are on-going and the limits to further areas of flood studies are dependent on limited FEMA funding. Not all of the county has been analyzed. Future analysis may result in change to the current floodplain mapping and designations.

In August 2008, Douglas County adopted the Carson River Watershed Regional Floodplain Management Plan. The Plan was also adopted by other jurisdictions along the Carson River, including Carson City, Lyon County, Churchill County, and Alpine County, California. The Plan's objectives relate to floodplain management strategies that will reduce flood damage.

Douglas County's participation in the NFIP provides a basis for flood planning in areas mapped and designated flood-prone. According to the Program's regulations, a community can adopt floodway ordinances which prohibit encroachment (including fill, new construction, and other development) that would result in any increase in flood levels. The County's floodplain management ordinance (refer to Douglas County Code, Chapter 20.50) was updated in October 2008 to meet NFIP and FEMA requirements.

The floodway is based on the principle that the regulated area must be designed to carry the water of the base flood without increasing the water surface elevation of the flood more than one foot at any point. Development within a designated floodway is prohibited.

**Map 7.17
 Hydrology**



The principal Carson Valley floodplain areas are along the west side of Highway 395 with smaller portions to the east, along the East Fork of the Carson River. The Master Plan recognizes that the entire length of the Carson River should be used for open space, and agricultural maintenance. Thus, the flood-prone areas of the Carson River need to remain principally undeveloped.

Flooding Frequency

Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for floodplain insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent, and for any 90-year period the risk increases to approximately 60 percent. The analyses reported here reflect flooding potentials based on conditions existing in the county at the time of completion of the flood study. Maps and flood elevations are amended periodically to reflect changes.

Flood Insurance Rate Map Description

The FIRM for Douglas County, Nevada, is for insurance purposes, the principal result of the Flood Insurance Study (FIS). This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water surface elevations of the base (100-year) flood. The map was developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration. Not all of the county has been analyzed and continued work by FEMA may result in additional designations.

Flood Insurance Zones

The entire area of Douglas County was divided into zones, each having a specific flood potential hazard. Each zone was assigned one of the following flood insurance zone designations listed below:

- Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations or Flood Hazard Factors determined.
- Zone AE: Special Flood Hazard Areas and areas where base flood elevations determined.
- Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- Zone AO: Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1 and 3 feet; depths are shown, but no Flood Hazard Factors are determined.
- Zone X (shaded): Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
- Zone X (unshaded): Areas determined to be outside the 500-year floodplain.

Carson River Flood Management

Several options exist for minimizing the impacts of flooding of the Carson River. One option involves the possible use of existing irrigation facilities to provide additional conveyance capacity around the populated areas of the county. Another option that should be investigated is using the existing irrigation ditches to convey a portion of the peak flows to wetlands for detention. The irrigation ditches or canals that could be used to convey Carson River flood waters are shown on Map 7.18. These ditches were identified by the Water Conveyance Advisory Committee, which is made up of the County's major ditch users.

Since the Carson River typically floods while the irrigation system is not being used, the system could help to relieve some flooding by adding additional flow capacity for Carson River flood flows. This type of solution would require the County and the ditch owners to come to an agreement on how this system would be operated and maintained. The issues which should be considered are: 1) the improvements required to utilize the ditches for flood control, 2) the additional maintenance the County or other entities should provide for using the irrigation systems, and 3) whether the capacity of the ditches can be improved for additional flood control while maintaining the operational integrity of the system.

In addition to the possibility of conveying a portion of the Carson River flows using the existing irrigation canals and ditches, flows could also be conveyed to wetlands such as those near the Douglas County Airport. This could be accomplished by using portions of the Allerman Canal and its associated reservoirs and would require agreements with ditch and land owners for use and joint maintenance of the ditches.

Tributary Basin Floodplain Management

Watershed Prioritization

Non-structural flood control measures should be used as much as possible within tributary basins.

Each urban and rural watershed within the county that feeds into a major drainageway should be prioritized according to severity of historical flooding. Priority should be given to watersheds that traverse through existing urbanized areas with high risk to life and property. Additional information and data compiled by the Douglas County Community Development Department on past storm events and damage should also be used in prioritization of watersheds.

Figures 7.7 thru 7.9 provide suggested initial listings for high, medium, and lower priority of the Carson River and East Walker River tributaries. The priorities are based on flooding problems and flood damage and should be reviewed and addressed to resolve flood issues.

**Map 7.18
 Carson Valley Drainage**

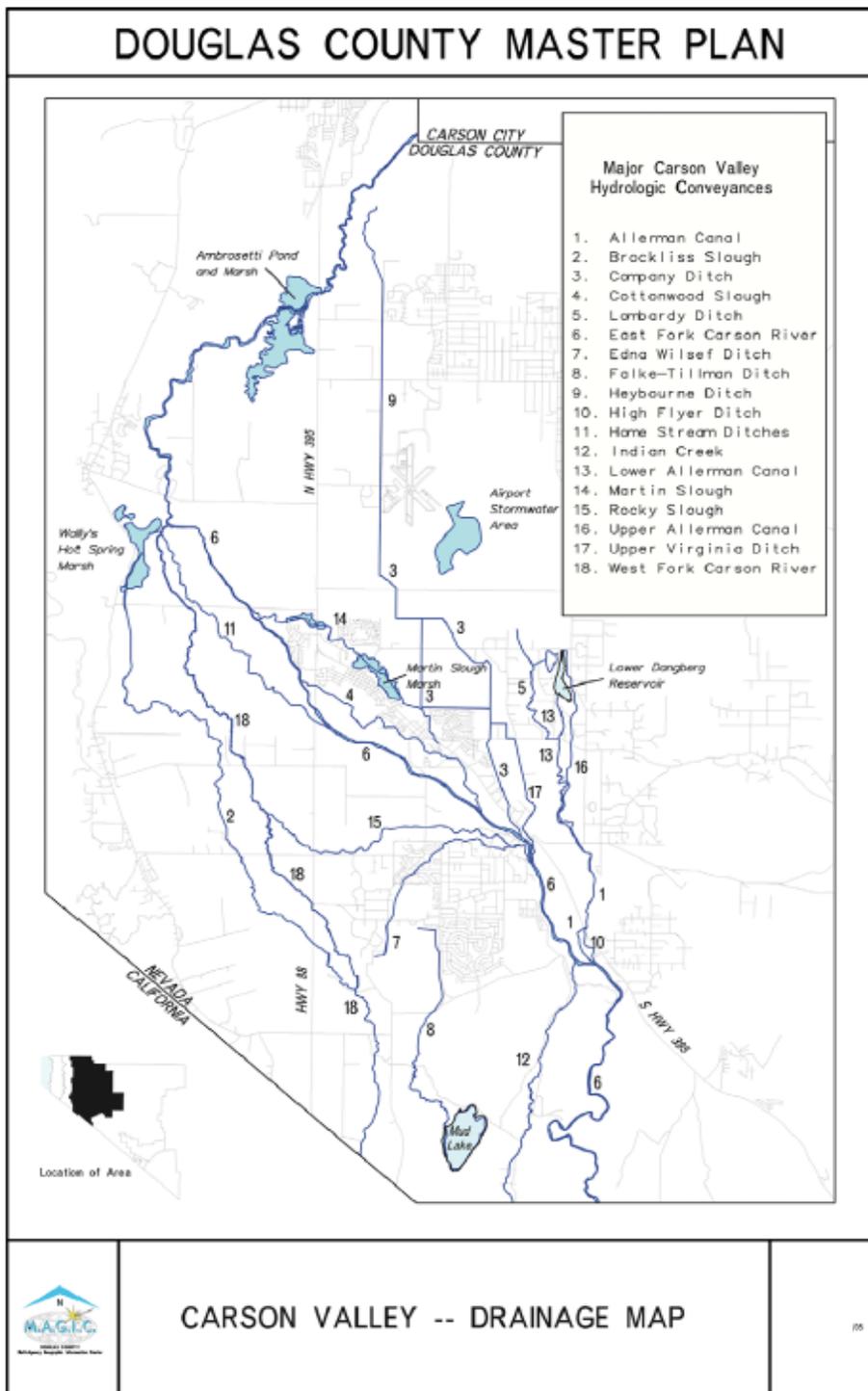


Figure 7.7
High Priority

BASIN TRIBUTARY	LOCATION
Johnson Lane Wash	Johnson Lane
Minnehaha Canyon Wash	Topaz Ranch Estates
Buckbrush Wash	Johnson Lane
Smelter Creek	Ruhenstroth
Pinenut Creek	Fish Springs
School House Canyon	Genoa
Genoa Canyon	Genoa
Bennet Canyon	Jacks Valley
Chedic Canyon	Jacks Valley
Water Canyon	Jacks Valley
James Canyon	Genoa
Sierra Canyon	Genoa
Daggett Creek	Mottsville
Taylor Canyon	Mottsville
Mott Canyon	Mottsville
Monument Canyon	Sheridan
Stutler Canyon	Sheridan
Sheridan Creek	Sheridan
Barber Creek	Sheridan
Jobs Canyon	Sheridan

Figure 7.8
Medium Priority

BASIN TRIBUTARY	LOCATION
Airport Wash	Johnson Lane
Buckeye Creek	East Valley
Juniper Road Wash	Fish Springs
Calle Hermosa Wash	Fish Springs
Sheena Terrace Wash	Fish Springs
Fish Springs Creek	Fish Springs
Pinenut Drive Drain	Pinenut
Unnamed 14	Topaz Ranch Estates
Unnamed 10	Topaz Ranch Estates
Unnamed 11	Topaz Ranch Estates
Unnamed 12	Topaz Ranch Estates

Figure 7.9
Low Priority

BASIN TRIBUTARY	LOCATION
Sunrise Pass Drainage	Johnson Lane
Sawmill Road Wash	Pinenut
Jeep Trail Tributary	Pinenut
Cody Wash Tributary	Pinenut
Helman Drive Drain	Pinenut
Unnamed 16	Topaz Ranch Estates
Unnamed 15	Topaz Ranch Estates
Unnamed 13	Topaz Lake
Nevada Creek	Topaz Lake
Clear Creek	Jacks Valley
Unnamed 1	Jacks Valley
Unnamed 2	Jacks Valley
Unnamed 3	Jacks Valley
Adams Canyon	Genoa
Unnamed 4	Genoa
Unnamed 5	Mottsville
Unnamed 6	Mottsville
Corsser Canyon	Mottsville
Unnamed 7	Mottsville
Stutler Canyon Tributary	Sheridan
Unnamed 8	Sheridan
Unnamed 9	Sheridan

Alluvial Fan Flood Management

Identifying and providing solutions to alluvial fan and flash flooding in Douglas County requires a comprehensive approach. A combination of watershed evaluation and development planning is necessary to provide the proper safety in the community.

Areas that are already developed and experiencing flooding problems will need evaluation and implementation of structural and non-structural solutions to alleviate flooding to an acceptable level. This involves prioritization of the watersheds that need evaluation, a clear sense of what information is needed to accomplish evaluation, and the use of evaluation results to plan development and flood control improvements.

The following areas have had flooding-related problems:

- Johnson Lane Community (Buckbrush Wash and Johnson Lane Drainage)
- Topaz Ranch Estates (Minnehaha Canyon)
- Pine Nut Creek
- Smelter Canyon Creek
- Buckeye Creek
- Pine Nut Drive Drain
- Airport Wash
- Genoa Canyon
- School House Canyon
- Stutler Canyon

Areas yet to be developed should be evaluated for flooding potential, and a watershed planning approach should be used to guide proper future development in these areas. An example of good planning in alluvial fan flooding areas is zoning and dedication of portions of developments to open space for watershed-wide flood control. This benefits the community by providing a higher level of protection and lower flood insurance rates.

The following is a list of structural and non-structural tools that may be used for flood management:

- Upper Watershed Management
- Zoning Limitations
- Open Space for Flood Control
- Local Levies and Street Conveyance
- Armored Fills
- Debris Basins and Channels
- Regional or Localized Basins
- Storm Drains

One of the major problems with the majority of the tributary basins is their damage course in route to the Carson River. The route to the major drainage for these basins is often through populated areas that have encroached into the alluvial fan floodplain or are close to the flood channel. This makes it difficult to make structural flood-proofing improvements.

Existing irrigation canals that run in a northerly direction can be improved to accommodate drainage and flood flows as noted previously. In addition to the main northerly conveyance structures, a number of irrigation canals run in an east to west direction toward the Carson River. These ditches, which traverse through private agricultural property, could be improved to take flood flows from tributary basins and

direct the storm water to the Carson River. Solutions to limited channel and structural capacity under Highway 395 would need to be resolved for this alternative.

Development Considerations

Development regulations relating to stormwater management should protect the public from flooding and pollution hazards and provide cost-effective storm drainage. These regulations should consider peak flows, sedimentation, and water quality in proposals for new development. Development regulations should also address protection of developments from existing flood hazards and guard against flood hazards that the development could create. Development policies must continue to meet or exceed FEMA requirements in order to maintain the County's eligibility for the NFIP.

Design criteria should be carefully considered to evaluate drainage facility requirements. Generally, storm run-off from a development or project site should be detained or retained on-site to the extent that the post-development peak run-off leaving the site will not exceed the predevelopment peak run-off leaving the site. Other development considerations to be considered include treatment of stormwater to mitigate adverse water quality impacts before disposal into the river system in the county. This can be done on-site, but basin or regional treatment is preferred. The Towns have indicated a preference for utilizing regional basins as opposed to multiple smaller detention basins.

Point and Non-Point Pollution

The need to protect surface waters from the impact of human activities in Douglas County is a growing concern as urbanization continues. Increased urban growth brings with it water quality impacts as the result of additional pollution. The quality of surface water is dependent upon activities within the watershed area. Sedimentation can be caused by natural processes, development, and agricultural activities. Pollution of surface waters can be caused by a variety of sources, some traceable and some not.

Urbanization impacts the quality of surface water by introducing pollutants directly into the water. These pollutants are generated from sources such as chemical fertilizers, pesticides, refuse, raw sewage, industrial activity, and automobile-related facilities and reach water by natural run-off, storm drains, and illegal dumping. Grease traps, detention ponds, hazardous waste collection, sand/oil separators, low impact development (LID) techniques, and other measures can reduce undesirable impacts of urbanization on water quality.

Potential Wetlands

Wetlands are natural areas which are either permanently or intermittently inundated or saturated by water because the water table is close to the surface of the ground, and the area can support life that is capable of adapting to the saturated conditions. The most common types of wetlands in the county are freshwater marshes and wet meadows, although small potholes and riparian environments are also found in some areas. Additionally, the Carson Valley contains areas of wetlands, which are irrigation induced.

These areas serve as key locations for groundwater recharge, provide natural flood protection and control, act as sediment traps and water pollution filtration systems, and offer unique habitat for many plant, fish, and wildlife species. These factors contribute to make wetlands important resources. In addition, many wetlands have scenic and recreational appeal which makes them valuable from an economic and recreational standpoint when protected as open space. Their protection as important county resources is a component of this Plan.

The areas of potential wetlands for the Carson Valley generally coincide with the east and west forks of the Carson River. The areas of potential wetlands within the Pinenut region are in the Mud Lake area in the far west edge of the plan area. Limited areas of potential wetlands of Topaz Lake are near the shoreline, in the northwest corner, and a narrow band along Nevada Creek and along the East Fork of the Walker River. The areas of potential wetlands for the Topaz Ranch/Holbrook community are along the intermittent stream to the east of Highway 395. These potential wetlands are only generally classified and further study is necessary to delineate any wetlands.

Douglas County may want to examine the potential for wetland mitigation banking. Wetland mitigation banking is the process of creating, restoring, enhancing, or preserving wetland areas in an effort to mitigate the destruction of existing wetlands. The objective is in replacing the functions, both biological and aesthetic, that are lost because of development. The Towns of Minden and Gardnerville have been successful in implementing programs to protect wetland in areas along the Martin Slough.

Water Resources

Douglas County has three major valleys: the Lake Tahoe Basin along the western border (about 70 square miles), Carson Valley in the central part (about 420 square miles), and Antelope Valley in the southeastern corner of the county (about 110 square miles). Two major river systems flow in a northerly direction through the county: the Carson River through Carson Valley and the West Walker River through Antelope Valley.

Groundwater is the principal source of drinking water for most of Douglas County except in the Lake Tahoe Basin where the lake is the primary source. Groundwater is also used for irrigation in Carson and Antelope Valleys.

There are terms used in these reports that are important to understand when discussing water resources. These include:

- Carson River Basin: The hydrological-geological area of the entire Carson River watershed from the Carson-Iceberg Wilderness in California to the Carson Sink in Churchill County, NV.
- Carson Valley Basin: The hydrographic area defined by the Nevada State Engineer on June 14, 1977 with Order 684. A small portion is in Carson City and the remainder is in Douglas County.
- Carson Valley: The area of the Carson Valley Basin that is in Douglas County.

The first two terms are defined in both the 1975 Glancy-Katzer report and the 1986 Maurer report. The third is a term defined by Vasey in his 1994 report to indicate the Douglas County portion of the Carson River watershed, and it is the portion he is referring to when he assumes the annual groundwater recharge within the Carson Valley to be 35,000 acre-feet and the population number to be 47,000.

In addition, the document entitled Carson Valley Comprehensive Water Plan 1994, prepared by Vasey Engineering, summarizes data from many of these documents and has provided the basis for the conclusions and recommendations contained with this Plan. The 1994 Water Plan is incorporated by reference as a part of the Douglas County Master Plan, as well as testimony from the State Water Engineer related to local water resource availability.

Water Quality

Land use has a direct relation to the potential for contamination of ground and surface waters. There are two types of contamination sources associated with land use: 1) point sources, which have the potential for discharging directly into the surface water or have the potential for injecting contaminants directly into the soil which potentially could reach groundwater; and 2) non-point sources, which are generally land management activities, and have the potential for impacting surface waters and groundwater by distributing potential contaminants over the land's surface. Ironically, it is the non-point sources which pose the greatest threat to groundwater resources. The contamination from these sources generally builds up gradually over the long term.

The quality of a river can best be assessed by the beneficial uses established for each reach and the associated water quality standards which are established at a level to protect the most sensitive use designated. Additionally, Nevada has legislated that any surface waters of the state whose quality is higher than the applicable standards of water quality

as of the date when those standards become effective, must be maintained in their higher quality.

Carson Valley (Carson River Basin)

Groundwater

In general, the quality of groundwater in much of the county meets drinking water standards and criteria and is, therefore, suitable for most purposes. In Carson Valley, concentrations of most constituents generally increase in a northerly and easterly direction, corresponding to the direction of groundwater flow (Garcia, 1989).

Garcia and Thodal found, however, that there were instances where primary and secondary drinking water standards were exceeded at specific locations. Standards for fluoride, nitrate, arsenic, iron, and manganese were exceeded in the Jacks Valley/Indian Hills area with the potential source of contamination being septic tanks. Standards for sulfate, fluoride, dissolved solids, nitrate, arsenic, iron and manganese were exceeded in the Johnson Lane area with the potential source of contamination again being septic tanks. Standards for iron were exceeded in the Genoa, Minden-Gardnerville, and Gardnerville Ranchos area with the potential source of contamination being agricultural and urban runoff and septic tanks. Manganese levels exceeding standards were found in the Airport area and in the Ruhenstroth area; nitrate, iron, and manganese were found at levels exceeding standards. Additionally, groundwater in the west, central, and northeastern parts of Carson Valley is influenced by mixing with geothermal water. No overall trends of groundwater contamination were indicated.

Surface Water (Carson River)

A report prepared by the Bureau of Water Quality Planning of the Division of Environmental Protection in 1994 described the beneficial uses of the Carson River, associated standards, and results of periods of monitoring. The report recommended that all previously adopted beneficial uses be retained and that, with few exceptions, the required standards to maintain existing quality (RMHQ) not be modified. The change in RMHQ values for several of the parameters was associated with the removal of municipal wastewater from the river.

The Carson River has the following beneficial uses from the state line to the Lahontan Reservoir:

1. Irrigation;
2. Watering of livestock;
3. Recreation involving contact with water;
4. Recreation not involving contact with water;
5. Industrial supply;

6. Municipal or domestic supply, or both;
7. Propagation of wildlife;
8. Propagation of aquatic life, more specifically, the species of concern are rainbow trout, brown trout, catfish, smallmouth bass, walleye, channel catfish, and white bass.

The parameters evaluated in the 1994 report include temperature, pH, total phosphates, total nitrogen, nitrate, nitrite, ammonia (un-ionized), dissolved oxygen, suspended solids, turbidity, color, total dissolved solids, chlorides, sulfate, sodium absorption rate, alkalinity, and fecal coliform.

Antelope Valley (Topaz Lake and West Walker River Basin)

The Topaz Lake Area Water & Wastewater Master Plan, prepared by Consulting Engineering Services (CES) in 1991 for Douglas County, summarized numerous reports relating to water quality in the Topaz Lake area.

Groundwater

In the Topaz Lake area, standards were exceeded for nitrate, arsenic, iron, and manganese. Nitrate concentrations in water appeared to be increasing in two areas with the source appearing to be septic tank effluent. The CES Master Plan identifies the areas and the investigations that have taken place.

Surface Water

Data summarizing the surface water quality of the West Walker River was not developed for this Master Plan due to the limited urban development potential adjacent to the river. Extensive studies, however, have been performed on Topaz Lake water quality. The most significant concern appears to be increasing nitrogen loading to the lake from septic tank effluent.

The Walker River and Topaz Lake have the following beneficial uses from the state line to the Walker Lake:

1. Irrigation;
2. Watering of livestock;
3. Recreation involving contact with water;
4. Recreation not involving contact with water;
5. Industrial supply;
6. Municipal or domestic supply, or both;
7. Propagation of aquatic life, more specifically, the species of concern are rainbow trout, brown trout, cutthroat trout, Lahontan cutthroat trout, brook trout, kokanee salmon, silver salmon, mountain white fish, catfish, channel catfish, and largemouth bass.

Water Quantity

General

The general policy of the State Engineer is to limit groundwater withdrawals from a basin to the annual average recharge to the basin. The State Engineer will make a final determination on what the groundwater withdrawal limit is when the actual pumpage approaches the annual recharge or if the groundwater basin begins to show adverse effects from pumpage.

Additionally, groundwater basins may be “Designated” by the State Engineer. In Designated Basins, the State Engineer may establish preferred uses of water within such basins as well as limit withdrawals. No wells can be drilled in a designated basin until a permit is issued by the State Engineer, unless it is a well for domestic purposes limited to 1,800 gallons per day for one household, family, lawn, garden, and domestic animals. The State Engineer may prohibit the drilling of wells for domestic use in areas within designated basins where water can be supplied by a community water system.

Carson Valley (Carson River Basin)

Groundwater

The estimated quantity of groundwater stored in the upper 100 feet of saturated valley fill is approximately 700,000 acre-feet. Water Reconnaissance Report 59 (Glancy and Katzer, 1975) and Water Resources Investigations Report 86-4328 (Maurer, 1986), both prepared by the U.S. Geological Survey, contain estimates of potential annual groundwater recharge to the Carson Valley Basin. These reports estimate 41,000 (Glancy and Katzer) and 49,000 acre-feet per year in the (Maurer).

Annual groundwater recharge within the Carson Valley was assumed to be 35,000 acre-feet in the Carson Valley Comprehensive Water Plan (Vasey, 1994). According to this report, pumpage “will begin to exceed the potential annual recharge of 35,000 acre-feet as the population approaches 47,000 people” in the Carson Valley. Water conservation and the use of treated effluent to replace both supplemental and non-supplemental groundwater being pumped for irrigation purposes could reduce the groundwater pumpage below 35,000 acre-feet per year by the year 2015. The use of surface water to recharge the groundwater basin and/or the use of surface water through storage and treatment for municipal purposes would be required to meet population demands beyond the anticipated population of this Master Plan.

The Carson Valley Groundwater Basin was designated by the State Engineer on June 14, 1977, with Order 684.

Surface Water

The water budget for the Carson Valley is dominated by the Carson River flows. The majority of the stream flow enters the valley via the West and East Forks of the Carson River, with additional flows from streams and springs, originating on slopes on the east and west sides of the valley. Stream flows entering Carson Valley average 280,000 acre-feet per year for the East Fork and 80,000 acre-feet per year for the West Fork.

The Carson River Decree states that the waters of the Carson River and its tributaries are fully appropriated. Any new uses of the Carson River or its tributaries will require changes in existing rights.

Secondary Treated Sewage Effluent

An additional water resource available in the Carson Valley is secondary treated effluent. To date, secondary treated effluent has been used primarily for irrigation purposes during the summer months.

Secondary treated effluent is imported into the valley by Incline Village General Improvement District (IVGID) and Douglas County Sewer Improvement District No. 1. (DCSID No. 1). Both IVGID and DCSID No.1 store treated effluent in the valley for agricultural reuse during the irrigation season.

Minden-Gardnerville Sanitation District (MGSD) stores treated effluent in a reservoir along Muller Lane and then pumps a portion of the treated effluent to a second reservoir in the Buckeye Creek area east of East Valley Road. During the summer, effluent is utilized by downstream users for irrigation purposes.

The County's North Valley Wastewater Treatment Facility currently contains an on-site storage reservoir and discharges its treated effluent to a Rapid Infiltration Basin and the IVGID wetlands. The County is currently developing an irrigation reuse program.

IHGID operates a secondary sewer treatment facility servicing Indian Hills, Ridgeview as well as the Jacks Valley School. Currently, treated effluent is stored and used for golf course irrigation.

Figure 7.10
Treated Effluent – Carson Valley

Treatment Facility	Present Place of Use/Storage
IVGID	Schneider Ranch, Bentley Kirman Tract and Wetlands
DCSID No. 1	Settelmeyer Ranch and Bentley Ranches
MGSD	Danberg Holding, Gallepi Ranch, and Bentley Ranches
NVWWTP	<i>On-site storage reservoir, Rapid Infiltration Basin, Kirman Tract, and IVGID Wetlands</i>
IHGID	Sunridge Golf Course

A portion of the imported treated effluent, which totals over 5,000 acre-feet annually could be considered additional groundwater recharge in the basin.

Future treated effluent flows could increase the water resources available for development in the valley. Alternative uses of the effluent, which may be beneficial to the development of additional water supplies include:

- Use of treated effluent to supplement existing surface water rights rather than supplemental wells, thereby reducing the pumpage of the groundwater resource.
- Use of treated effluent to replace the use of existing surface water rights for irrigation and use the surface water rights to recharge the Groundwater Basin.

Antelope Valley (Topaz Lake and West Walker River Basin)

Groundwater

The estimated quantity of groundwater stored in the upper 100 feet of saturated valley fill in the Nevada part of the Antelope Valley is approximately 200,000 acre-feet (Glancy, 1971). Water Reconnaissance Report 53, by the U.S. Geological Survey, contains an estimate of 5,000 acre-feet per year potential groundwater recharge to the Nevada part of the Antelope Valley.

Surface Water

The water budget for the Antelope Valley is dominated by river flows. The majority of the stream flow enters the valley via the West Walker River. Stream flows entering Antelope Valley average 165,000 acre-feet per year.

Water Rights and Ground Water Pumping

Carson Valley

The Carson Valley Groundwater Pumpage Inventory report, which is published annually by the State of Nevada Department of Conservation and Natural Resources Division of Water Resources, provides current and historical data related to water resources.

Future Water Resource Demand

Forecasts have been made of water demands for the various communities both on community water systems and individual wells, as well as other uses to determine the overall demand on the groundwater resources in the county. The forecasts are based on land uses projected in the land use element and the methodology contained in the Carson Valley Comprehensive Water Plan, 1994.

In summary, the water plan states that overall water demand in 2015 is estimated to be approximately 40,700 acre-feet in the Carson Valley and 6,100 acre-feet in the Antelope Valley. The longer-term demand based on the proposed land uses is 66,000 acre-feet in the Carson Valley and 10,500 acre-feet in the Antelope Valley.

Annual groundwater recharge within the Carson Valley was assumed to be 35,000 acre-feet in the Carson Valley Comprehensive Water Plan (Vasey, 1994). According to this report, pumpage “will begin to exceed the potential annual recharge of 35,000 acre-feet as the population approaches 47,000 people” in the Carson Valley. Water conservation and the use of treated effluent to replace both supplemental and non-supplemental groundwater being pumped for irrigation purposes could reduce the groundwater pumpage below 35,000 acre-feet per year by the year 2015. The use of surface water to recharge the groundwater basin and/or the use of surface water through storage and treatment for municipal purposes would be required to meet population demands beyond the anticipated population of this Master Plan.

As previously discussed, when actual pumpage in Carson Valley approaches 35,000 acre-feet annually, the State Engineer may begin to regulate withdrawals. If some adverse effect of pumping is detected before the withdrawal of 35,000 acre-feet, the State Engineer may also regulate pumpage.

Municipal water use is based on 1.12 acre-feet per household per year based on the State Engineer’s water right requirements for use on Municipal systems and Douglas County’s Water Ordinance. Actual water usage reported by the water purveyors in the Valley varies from as low as 0.41 acre-feet per year per EDU at Indian Hills to as high as 1.33 acre-feet per connection in Minden. Water conservation could reduce the municipal requirements in areas where the household use is high. It is estimated that reductions in municipal requirements could be realized through water conservation in certain areas

which could result in reducing the municipal demands by as much as 2,000 acre-feet in the year 2015 and 4,000 acre-feet for longer-term development.

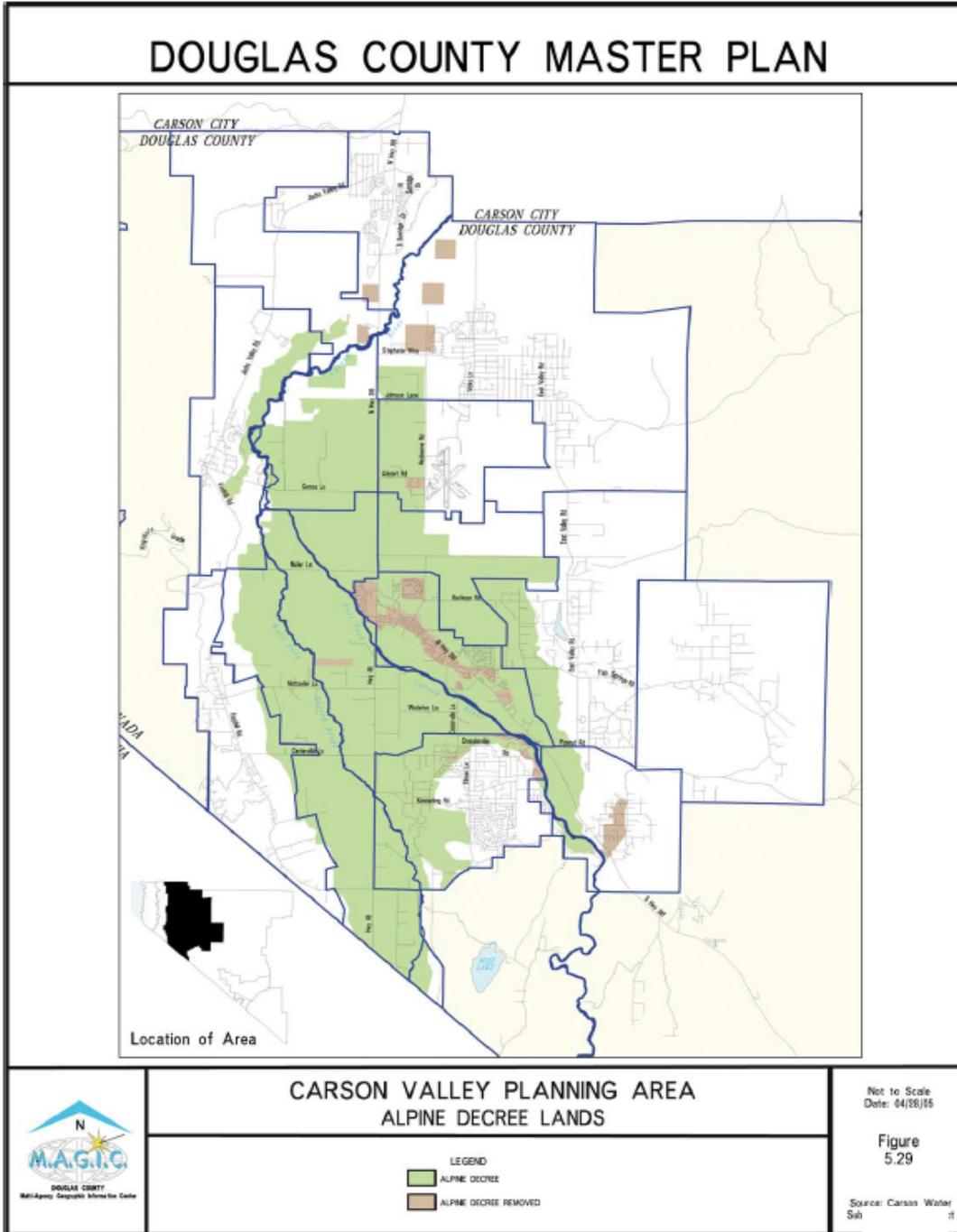
Additional treated sewage effluent will be available from MGSD, the IHGID, and the North Valley facility in the future, which could be used to irrigate the crops presently being irrigated with both supplemental and non-supplemental groundwater. By 2015, treated effluent flows from these three plants may be approximately 6,700 acre-feet per year and about 11,500 acre-feet per year for longer-term development. A portion of this water could be used to reduce the amount of water pumped for irrigation purposes.

Other programs, such as the use of surface water to recharge the groundwater basin either through injection wells or infiltration basins, could be used to increase the amount of groundwater available to meet future demands. The amount of surface water that could be recharged to the basin is unknown at the present time.

It also appears that the use of surface water to recharge the groundwater basin and/or through storage and treatment for a drinking water supply, will be required to avoid exceeding the estimated potential groundwater recharge for longer-term development in Carson Valley.

Adequate resources exist for the Antelope Valley area for the projected population in 2015 with conversion of some groundwater agricultural rights. Further development will require utilization of surface supplies and conversion of most of the groundwater agricultural rights.

Map 7.19
Carson Valley Alpine Decree Lands



Wildlife/Vegetation

The Natural Resource and Conservation Service has identified five general wildlife areas within Douglas County (SCS, 1984). These wildlife areas are based on soil type, plant species, and general land uses; they define particular habitats available within the county. In addition, vegetation also provides fuel for wildland fires which is of significant concern in Douglas County.

Wildlife Area 1 is identified as open land and wetland wildlife habitat. It is generally associated with soil units 1, 2, 3, and 4 and is commonly found in the floodplains, low terraces, and alluvial fans in the Carson and Antelope Valleys.

Wildlife Area 2 is defined in areas of soil units 5, 6, and 7. These are gradually sloping lands on alluvial fans and terraces. This is one of two wildlife areas which provides habitat for rangeland wildlife.

Wildlife Area 3 is also considered part of the county's rangeland habitat. However, it includes lands which are steeper, at higher elevations, and, as a result, drier than the habitat in Wildlife Area 2. Soil units 8 and 10 are found in this area.

Wildlife Area 4 is the drier part of the woodland wildlife habitat. It is associated with soil units 9, 11, 12, and 13, and is found in the Pinenuts and Wellington Hills.

Wildlife Area 5 is the wetter woodland habitat. This habitat is found in the Carson Range in areas with soil units 14, 15, and 16.

There are a variety of species of wildlife and vegetation found in Douglas County that are distinctive to particular land resources. The West Walker River supports trout; the east and west forks of the Carson River support trout and catfish. Pheasant, valley quail, cottontail rabbit, meadowlark and killdeer are found in open grasslands and cultivated areas. Wetland wildlife include ducks, geese, heron, muskrat, and beaver. Common rangeland wildlife include jack rabbits, coyote, chukar, partridge, and a variety of non-game birds and rodents. Woodland wildlife includes such species as the mule deer, black bear, mountain lion, some wild turkeys, and cottontail and pygmy rabbits. The upland areas include game birds such as the valley land mountain quail and blue grouse.

In addition to these habitat areas, eagle nesting grounds are located in the mountains at the southern end of the Carson Valley in California. While the nests are outside Douglas County, development of Carson Valley could impact the eagle's hunting grounds.

The Nevada Natural Heritage Program (NNHP) has identified sightings of sensitive flora and fauna in Douglas County; it does not, however, identify habitat areas for individual species. The term “sensitive”, by NNHP’s definition, includes all species of concern; this includes candidates for Federal protection and species that are identified as “critically endangered” by the State, which in turn receive State protection. The plant species candidates for Federal protection are the Lavin’s Egg Milk-Vetch (found in the Wellington Hills and the upper reaches of the Buckeye Creek basin) and the Tahoe Yellow-Cress (found along the east side of Lake Tahoe). The Lake Tahoe Benthic Stonefly is the one animal species that is a candidate for Federal protection and that the NNHP reports as being last spotted in 1962 just east of Lake Tahoe.

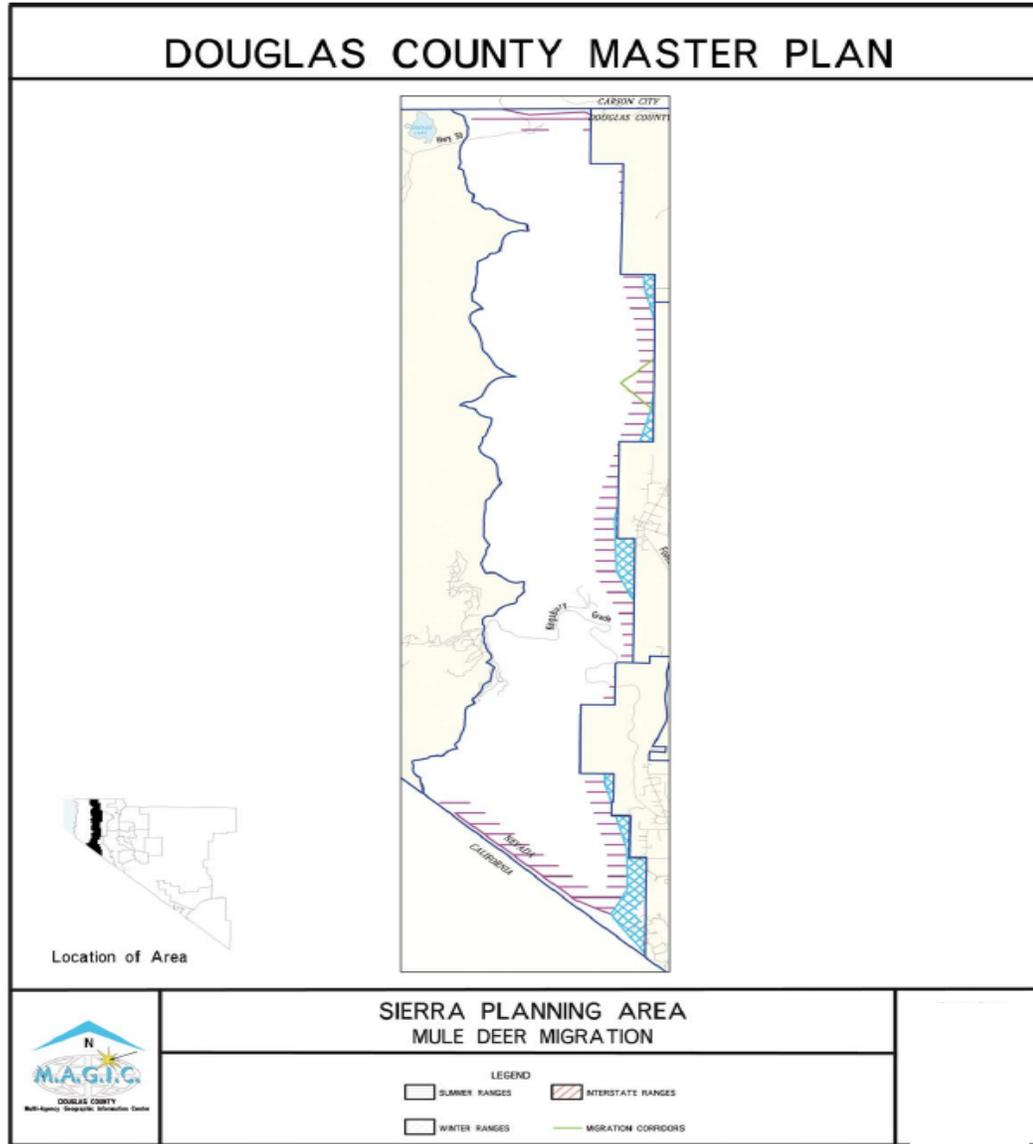
Habitat areas and migration routes have been identified for the mule deer. Maps 7.20 thru 7.22 depict the summer ranges, interstate regions, and migration corridors of the mule deer population of Douglas County. Identifying these critical habitat areas is necessary due to the impact of urban development on deer summer and winter ranges and on the migration routes between the two ranges. As urban development encroaches, these habitat areas are destroyed or become isolated; winter feeding areas and migration routes are also severely constricted.

The State of Nevada Park and Wildlife Bond Bill was passed to provide public support for programs dedicated to the preservation and protection of fish and wildlife resources and their habitats and also provides some \$13 million to assist in accomplishing these objectives.

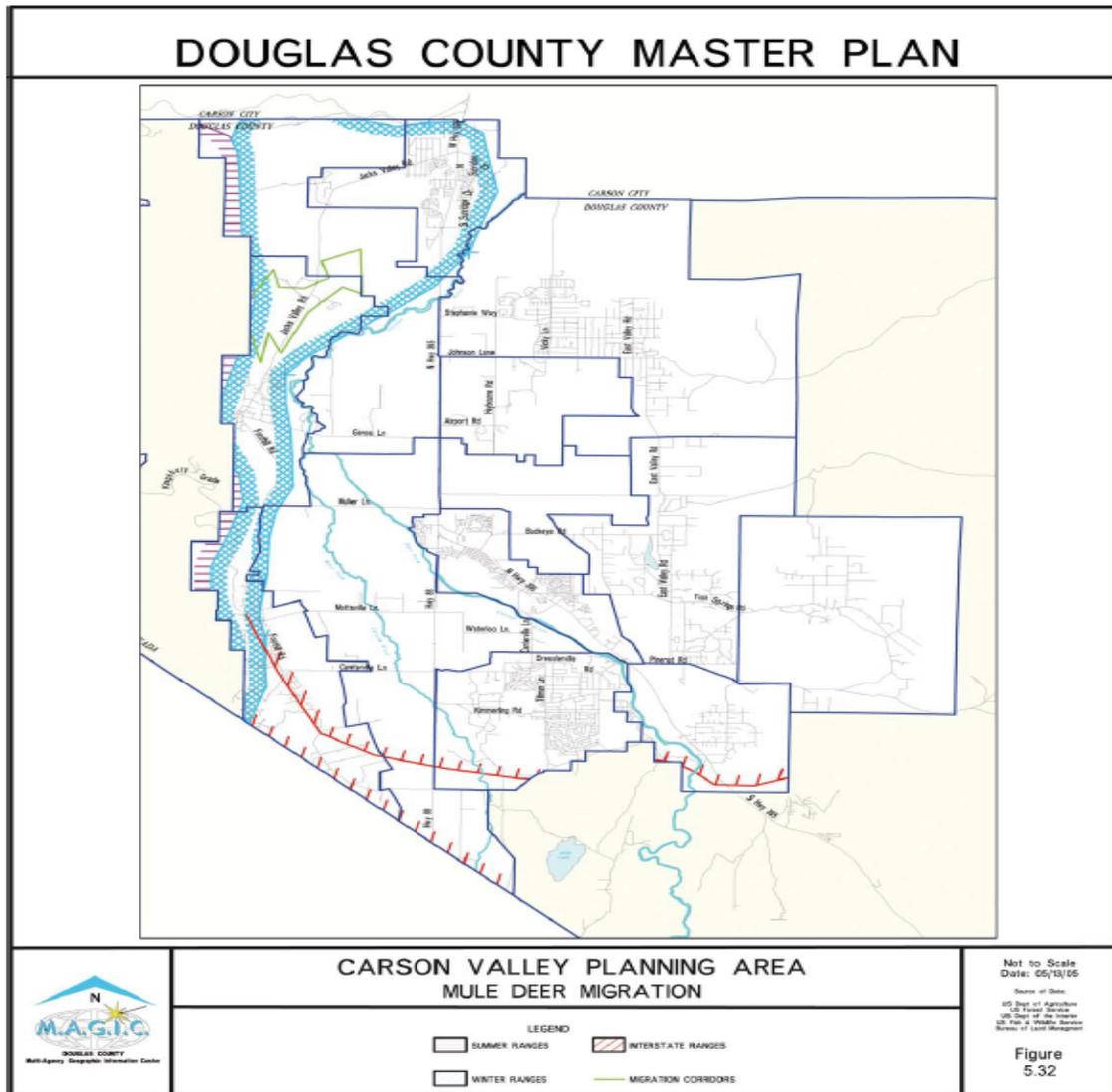
Douglas County is home to several sensitive plant and animal species. It is also part of the mule deer’s critical habitat. Other wildlife species, while not endangered, contribute to the county’s recreational opportunities and quality of life. Habitat of sensitive species, deer migration routes, and riparian habitats must all be considered as the County seeks to identify appropriate policies for future urban growth and for the management of those resources, which define or enhance the county’s desired character.

Douglas County has many areas with thick vegetation generally associated with the riparian areas and areas of timber with heavy ground fuels. The fire fuel lands are areas that are very susceptible to fire dangers and provide significant habitat. Following the Angora Fire in Lake Tahoe, Douglas County adopted code provisions which require non flammable roofing materials be used throughout Douglas County.

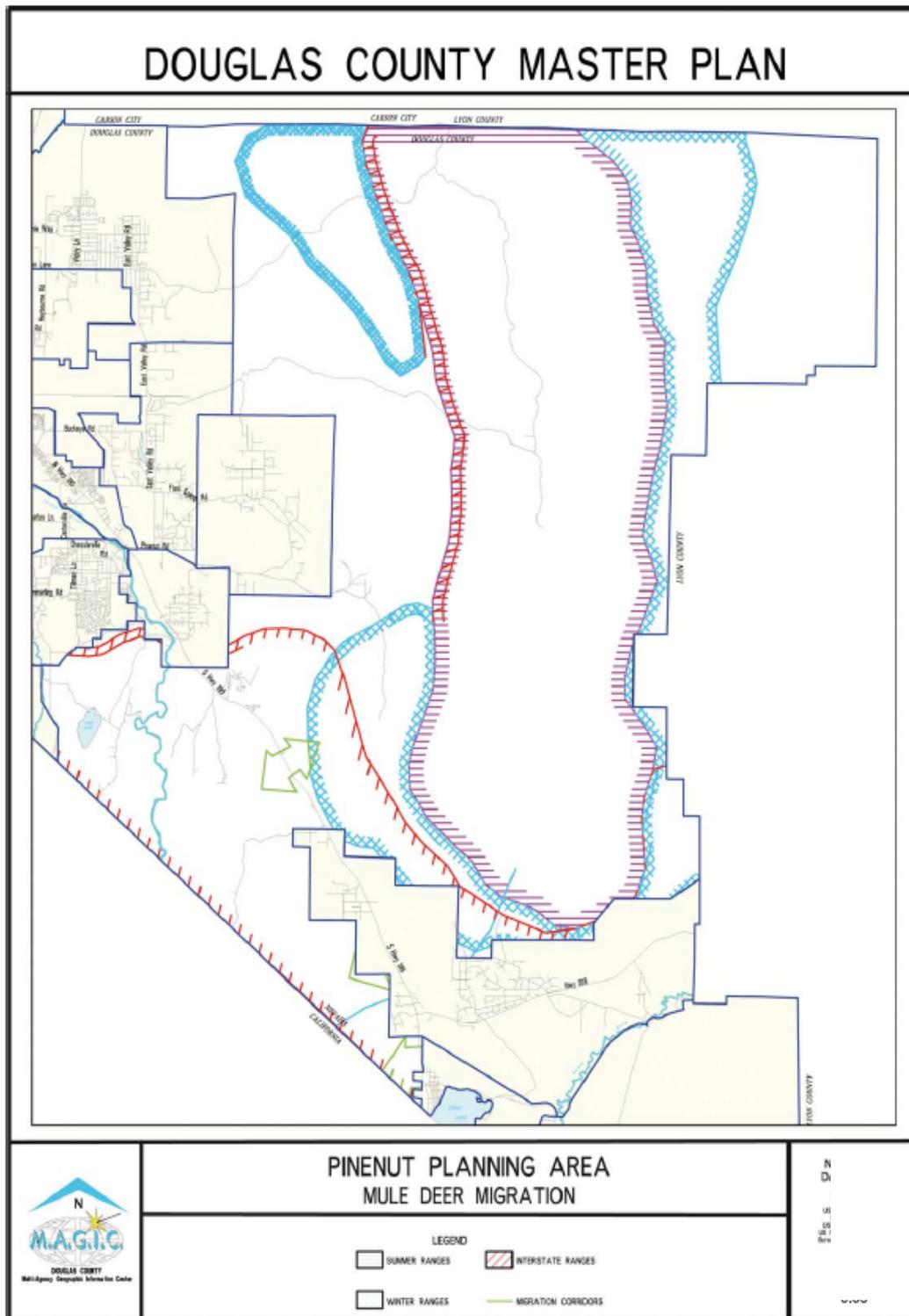
Map 7.20
Sierra Mule Deer Migration



**Map 7.21
 Carson Valley Mule Deer Migration**



Map 7.22
Pinenut Mule Deer Migration



Energy

Sources

Many potential renewable energy resources exist in Douglas County that could be more fully utilized to minimize the use of conventional energy resources. These include “clean” energy sources such as solar, wind, and geothermal energy.

Given the financial and environmental costs associated with inefficient use of conventional energy and the increasing need for the United States to become energy-independent, the development of these “clean” energy resources and conservation methods should be of high priority.

The climate of Douglas County has been characterized as Continental, with moderately hot summers and moderately cold winters.

The most readily available form of “clean” energy in Douglas County is solar. “The sun shines 90 percent of the time possible in the summer and 66 percent in winter” (*Soil Survey of Douglas County Area Nevada*, U.S. Department of Agriculture Soil Conservation Service, 1984). This abundance of sunshine offers opportunities for utilizing both passive and active solar energy for water and space heating.

Passive solar energy generation involves the use of direct solar gain to convert natural sunlight into usable heat, to cause air-movement for ventilation or cooling, or to store the heat for future use. Passive solar technology can heat houses, non-residential buildings, and water, among other things. Passive solar buildings are easier to keep cool in the summer, as well. Design and orientation of structures is the key – passive solar does not require any additional or specialized electrical or mechanical equipment to make heating and cooling a structure more efficient.

For new construction projects and existing buildings that can be cost-effectively retrofitted to take advantage of direct solar gain, passive solar is the simplest way to achieve greater energy efficiency. Passive solar buildings require no additional energy to operate, have zero additional operating costs, are cheaper to maintain, and emit almost no greenhouse gases in operation. All new construction in Douglas County should be designed and built in a way to take advantage of passive solar technology.

Active solar energy generation involves the conversion of the sun’s energy into electricity or heat. This is most commonly accomplished with photovoltaic (PV) cells, also known as solar collectors, which create electricity. Systems that use pumps or fans are also classified as active solar technologies. The cost of purchasing and installing active solar is decreasing, and as more people begin to use this technology, its effectiveness and efficiency will continue increasing. In addition, there are incentive programs offered from time to time by power utilities and government agencies designed to spur growth in the active solar industry.

There are approximately 300 sunny days per year in Douglas County. Active solar can be fitted to new construction or retrofitted to existing structures to take advantage of this and decrease dependence on conventional energy resources. It may be a particularly attractive option for property owners who want to be more energy-independent but whose buildings cannot be cost-effectively retrofitted and/or reoriented to take advantage of passive solar technology.

Windmills used to be a very important part of life in Nevada. They were used to run well pumps and bring groundwater to the surface. Now, wind power may become popular again. Every year, the amount of wind energy generated state- and nation-wide increases. Turbines come in all shapes and sizes and can be used by all types of users, from large power utilities to the individual homeowner.

Wind power can be used to supplement conventional power generation, protect the environment, lower electricity costs, and foster greater energy independence. It should be noted, however, that wind power has its detractors: many people feel that wind generation creates excessive noise, presents dangers to people and property on the ground as well as birds in flight, and decreases the aesthetic appeal of the natural landscape.

Geothermal energy potential is the heat energy in the earth's crust which is created within the earth's molten interior. It can be tapped as steam or by injection of water to form steam.

Figure 7.11
Characteristics of Carson Valley Geothermal Waters

Name of Geothermal Feature	Temperature Range (°C)	Dominant Dissolved Chemicals
Walley's Hot Springs	58 - 71	NaSo4 (500 - 1000 ppm)
Hobo Hot Springs	46	NaSo4 (0 - 500 ppm)
Unnamed Indian Hill Spring	24 - 32	Na-HCO3 (0 - 500 ppm)
Saratoga Hot Springs	50	Ca-So4 (0 - 500 ppm)

Geothermal energy potential is present in the Carson Valley, primarily along the western fault line, incorporating the Genoa area and in the northern portion of the Valley, including Johnson Lane to the east. This geothermal energy has been identified as non-electricity producing, but it does have some potential for space and district heating (heating of several buildings connected through steam lines).

Geothermal water reaches the earth's surface in the areas of Walley's Hot Springs, Hobo Hot Springs, Saratoga Hot Springs, and Indian Hills Springs. Walley's Hot Springs, Hobo Hot Springs, and Saratoga Hot Springs have all been tapped for commercial purposes in the past, but Walley's Hot Springs is the only commercial hot spring at present.

The abundance of cool weather and the increasing population in Douglas County increase the importance of using solar and geothermal energy for heating. The sun provides a renewable non-polluting energy source for Douglas County. Techniques for supporting the use of solar energy include regulations and guidelines that promote passive solar design and protect solar access.

Besides solar, wind, and geothermal energy sources, another good energy “source” is conservation. Proper insulation of houses and non-residential structures reduces the need for heating and cooling on a continuing basis. Construction that uses environmentally-friendly materials such as straw bales, natural stone, rammed earth, and recycled/recyclable goods reduces resource use when structures are built and demolished.

Conservation can be accomplished on a larger scale through community design. An efficient house reduces energy use for the inhabitants of that house. An efficient community – one which is designed to minimize resource consumption – reduces energy use for the inhabitants of many houses. Efficient community design can involve location of the community near to services (which reduces the need to travel), compact development (which reduces infrastructure costs), provision of bicycle and pedestrian paths (which encourages walking and biking over the use of the automobile for visits and errands), reduction in roads and other impermeable surface (which provides better drainage and reduces the risk of flooding), efficient design of structures (which reduces resource consumption), and landscape design that requires little irrigation and uses local flora (which reduces water use, highlights indigenous plant species that look and are appropriate to the environment, and requires less-frequent replacement of landscape features).

Most sources of energy used in Douglas County are non-renewable. The efficient use of these resources must be maximized. Energy suppliers need to plan for the long-range development of the county in accordance with the Master Plan Goals and Policies to assure that ample and reliable energy will be available to consumers when needed. Because of the importance of energy to the quality of life and economic health of the county, energy consumption should be managed in an imaginative, innovative, and prudent fashion.

Noise

Noise pollution originates from a variety of sources in Douglas County. Major highways, the Douglas County Airport, and industrial areas can be primary sources. Mining and gravel operations are other sources of noise pollution.

Noise levels directly affect the suitability of land for various uses. Noise is an environmental factor generally paid little attention by the public. However, studies show that noise levels can have a significant impact on people’s health and enjoyment of their surroundings.

Human response to noise varies according to the type of activity in which a person is involved. Noise levels are measured in dBA, the standard expression for “decibels” with a weighting to account for the sensitivity of the human ear. Seventy dBA¹ might be acceptable at a social gathering or a sporting event. However, it would be undesirable to relax or to carry on an important discussion at that level. Since high noise levels restrict certain types of human activity, each land use category has a naturally determined, fixed limit which cannot be exceeded if the land use is to maintain its proper function. This knowledge can be used to establish noise standards to protect the public.

LDN stands for Day/Night noise level, which weighs noise at night higher than daytime noise and uses within a numeric formula for average sound levels. An LDN of 70 dBA is equivalent to a person sitting 10 feet from a continuously operating vacuum cleaner all day and sleeping 30 feet away from it all night. A continuous sound level of 70 dBA will not permit normal conversation at a distance of 3 feet. Studies have shown that, at this level, the pupils of the eyes dilate and blood vessels constrict, causing increased arterial pressure, nervousness, fatigue, and hearing loss. Further, the body does not adapt to these physiological phenomena, even though a person may become “accustomed” to the noise.

Commercial and office use requires a fairly constant exchange of information and ideas, necessitating noise levels that will permit conversation (65 dBA maximum). Sixty-five dBA represents a noticeable reduction from the clearly unacceptable effects experienced at 70 dBA. Hearing loss is not a problem, although annoyance and activity interference occur regularly at this level.

Residential use is the most sensitive to sound because of interference with sleep and relaxation. Fifty-five dBA has been found to be an acceptable exterior residential noise level. Normal conversation is unimpaired, physiological and psychological reactions do not generally occur, task performance is nearly optimum, and annoyance is slight. However, noises at this level will awaken most people from sleep.

An exterior level of 60 dBA can be reduced to 50 dBA inside with windows open, or 45 dBA inside with windows closed. Forty-five dBA is considered an acceptable interior level and will not cause sleep interference for most people.

Separation of Noise-Sensitive Uses and Noise Generators

Careful coordination of land uses is a primary tool for minimizing the impacts of noise. Zoning and related setback requirements can be used to separate land uses that are sensitive to noise generators. Land uses sensitive to noises include residences, religious institutions, schools, hospitals, and some recreational uses. Noise generators include traffic, airports, and industrial activities.

The Minden-Tahoe Airport Master Plan, 2008, contains projections of noise contours, which should be reviewed when projects are proposed in the vicinity of the airport to mitigate noise concerns.

Mitigation of Off-Site Noise Impacts

In addition to separating noise generators from noise sensitive land uses, the impacts of noises can be reduced through a variety of structural techniques. Roadway noise can be mitigated by the use of sound walls, vegetative or structural buffers, building orientation, localized barriers, and insulation measures applied to affected buildings. The location of new roadways can dramatically affect noise levels. In general, industrial noise can be mitigated at the source through the use of sound walls, noise source muffling, buffering techniques, limits on hours of operation, and good site design. Construction is a temporary source of noise.

² Leg (24) represents an all day, 24-hour average noise level.

Chapter 8

Public Services and Facilities Element (2007)

Introduction

Public services and facilities are both conveniences and services that ensure the health and safety of the county's residents. Strategies for public services can have crucial impacts on environmental systems, public safety, education, recreation, and welfare. Phasing of essential public services has a large influence on the shape of the country and its communities. The purpose of the Public Services and Facilities Element is to ensure that services provided by both public and private purveyors will be supportive of the comprehensive plan and be available to support the growth and development as it occurs during the planning period.

The Public Services and Facilities Element has been developed to be consistent with the other elements of the Master Plan. The Land Use and Growth Management Elements establish the overall growth strategy for Douglas County. The system design and timing for extensions of services should promote the land use pattern and policies proposed in the Land Use and Growth Management Elements. The level of service standards established for public services determines the capital facilities cost and revenue analysis in the Capital Facilities Plan Element and provides a critical perspective on land use patterns in the Land Use Element. The Conservation Plan Element describes the County's environmental stewardship approach to promote health, safety, and welfare of residents and to protect sensitive environmental systems such as wetlands, steep slopes, and surface water systems. These policies guide location and mitigation techniques for placement of utilities infrastructure.

Purpose of Public Services and Facilities Plan and Capital Improvement Program

The Public Services and Facilities Plan is a plan for capital improvements that support the county's current and future population and economy. One of the principal criteria for identifying needed capital improvements are standards for levels of service (LOS). The Public Services and Facilities Plan contains a method for developing LOS standards for each public facility, and requires that new development be served by adequate facilities (i.e., the "concurrency" requirement). The plan also contains broad goals and specific policies that guide and implement the provisions of adequate facilities. Taken together, these policies help insure that growth will not outstrip the ability of the County, the service providers, or the public to pay for adequate public facilities.

The Capital Improvement Program (CIP) is the program that implements the Public Service and Facilities Plan. The Public Services and Facilities Plan determines general financial feasibility as a part of setting levels of service and is reviewed annually. The CIP is an integral part of the annual budget process that specifically identifies projects and their component parts and allocates funding to accomplish the project. The CIP will

provide budget authority to begin design and construction of a public facility identified as needed in the Public Services and Facilities Plan. In general, the public services and facilities plan and the CIP assume that the County must find a reasonable way to finance its backlog of public improvements.

Planning for Public Services and Facilities

The Public Service and Facilities Element supports the Master Plan by:

1. Providing capital facilities for land development that is envisioned and authorized by the Land Use Element of the Master Plan.
2. Maintaining the quality of life for existing and future development by establishing and maintaining standards for the level of service of capital facilities.
3. Coordinating and providing consistency among the many plans for capital improvements, including:
 - other elements of the Master Plan (i.e., Transportation);
 - other plans of Douglas County, towns and improvement districts; and
 - the plans for capital facilities of state and/or regional significance.
4. Insuring the timely provision of adequate facilities.
5. Documenting all capital projects and their financing mechanisms.

The Public Services and Facilities Plan is the element that sets forth the infrastructure requirements and services to implement the Master Plan. By establishing levels of service as the basis for providing capital facilities and for achieving concurrency, the Public Services and Facilities Plan helps determine a number of elements of the quality of life in the county. The requirement to fully finance the Public Services and Facilities plan (or revise the land use element or population and growth rates) provides a reality check on the vision set forth in the Master Plan. The capacity of capital facilities that are provided through the Public Services and Facilities element also affects the size and configuration of the urban growth area.

Effective Management of Public Facilities and Services

Planning for major capital facilities and their costs enables Douglas County to:

1. Calculate the need for facilities and the need for revenues to pay for them;
2. Estimate future operation/maintenance costs of new facilities that will impact the annual budget;
3. Take advantage of sources of revenue that require a CIP in order to qualify for the revenue; and
4. Obtain better ratings on bond issues when the County borrows money for capital facilities.

Statutory Requirements for Public Services and Facility Planning (CIP)

The financial implications of new growth have led many communities to adopt impact fees and other taxing and regulatory financing systems. Impact fees are a regulatory, police power mechanism whereby the capital costs of facilities needed to support new development are funded on a pro rata basis by such development. Courts in many states have judicially approved the concept of impact fees so long as various legal and constitutional requirements are met. Those requirements include procedural due process, substantive due process, equal protection and “earmarking”. The latter requirement insures that money collected from payment of impact fees will be segregated from other County funds and used only for the purposes for which it has been collected. The constitutional standard for impact fees has generally been described as the “rational nexus” test. The test has two parts: 1) that the need for the public facility or public facility expansion is a direct result of the proposed new development; and 2) that the proposed new development will benefit from the provision of the new facility.

The amount of the impact fee is generally a measure of the demand imposed by the proposed development multiplied by the cost to meet a given unit of demand. The impact fee charge may not exceed the fair “pro rata” share reasonably assigned to the proposed development (NRS 278B.230). There is a vigorous debate nationally about how “fair share” must be calculated. In most states, there is no requirement that past taxes paid or future taxes to be paid on the property subject to the proposed development must be factored into the impact fee calculation.

While impact fees have the capacity to generate substantial funds for new or expanded capital improvements, there are important limitations on the use of impact fee funds. They cannot be used for operation and maintenance expenses nor for personnel expenses (NRS 278B.280). Impact fees may not be used to correct existing public facility deficiencies (NRS 278B.280). Thus, depending on the level of service standard, the correction of deficiencies will be a general County-wide funding obligation. A higher level of service standard will generate greater impact fees, but will also impose greater burdens on the County to address deficiencies. In most cases, LOS standards will be set at a level equal to or above the existing level of service standard.

Other forms of financing, such as utility connection fees or charges, stormwater (flood control) districts, user fees, dedication and fees in-lieu of mandatory dedication may also be employed to meet local infrastructure needs. Each of these techniques is designed to work in a slightly different fashion. For example, exactions (impact fees, dedication and money in-lieu of dedication) are imposed as a condition of development approval and authorize local government to require: dedication of sites for public or common facilities; construction and dedication of public or common facilities; payments to defray cost of land, facilities, vehicles and equipment in connection with the provision of public off-site facilities; or provision of other specifically agreed upon public amenities. In contrast,

user fees are charges imposed by a local government for the provision of a particular service to users; these fees are generally employed solely to generate revenues to fund facilities and services used by such development. User fees have been traditionally used in the areas of water and sewer, but many states have extended the use in financing roads and drainage projects. Utility connection fees or charges are an adjunct to the provision of utility service. These fees/charges are levied for the one-time connection to the service. Financing by special assessments or benefit districts is yet another potential financing method. Special assessment apportion the costs of a public improvement project on the basis of benefit received by the property. The key to special assessments is that the assessment accurately reflect benefit received.

Level of Service Method for Analyzing Capital Facilities

Explanation of Levels of Service

Levels of service are usually quantifiable measures of the amount of public facilities that are provided by the community. Levels of service may also measure the quality of some public facilities.

In order to make use of the level of service method, the County selects the way in which it will measure each facility (i.e., acres, gallons, etc.), and it identifies the amount of current and proposed (i.e., standard) level of service for each measurement.

Method for Using Levels of Service

The level of service method answers two questions in development of a financially feasible Public Services and Facility Plan. Generally, the plan should be based on standards for level of service that are measurable and financially feasible for the 5 years following the adoption of the plan. The two questions can be stated as:

1. What is the quantity of public facilities that will be required by the end of 2001 (assuming the plan is adopted in 1996)?
2. Is it financially feasible to provide the quantity of facilities that are required by the year 2001?

The answer to each question can be calculated by using objective data and formulas. Each type of public facility is examined separately (i.e., roads are examined separately from parks). The costs of all the types of facilities are then added together in order to determine the overall financial feasibility of the plan.

Question 1. What is the quantity of public facilities that will be required by the end of year 2001?

Formula 1.1:

Demand x Standard = Requirement

Where “Demand” is the estimated 2001 population or other appropriate measurement of need, and “Standard” is the amount of public facility per unit of demand.

The answer to this formula is the total amount of public facilities that are needed, regardless of the amount of facilities that are already in place and being used by the public.

Formula 1.2:

Requirement - Inventory = Surplus or Deficiency

Where “Requirement” is the result of Formula 1.1, and “Inventory” is the quantity of facilities available as of December 1996 (the beginning of the 5 years covered by the plan).

This formula uses the inventory of existing facilities, plus facilities that will be completed by December 1996 to offset the total requirement of Formula 1.1. The answer to Formula 1.2 is the net surplus of public facilities or the net deficiency that must be eliminated by additional facilities before December 2001. If a net deficiency exists, it represents the combined needs of existing development and anticipated new development. Detailed analysis will reveal the portion of the net deficiency that is attributable to current development compared to the portion needed for new development.

Question 2. Is it financially feasible to provide the quantity of facilities that are needed by the end of 2001?

A preliminary answer to Question 2 is prepared in order to test the financial feasibility of tentative or proposed standards of service. The preliminary answers use “average costs” of facilities, rather than specific project costs. This approach avoids the problem of developing detailed projects and costs that would be unusable if the standard proved to be financially unfeasible. If the standards are feasible at the preliminary level, detailed projects are prepared for the final answer to Question 2. If, however, the preliminary answer indicates that a standard of service is not financially feasible, six options are available to the County:

1. Reduce the standard of service, which will reduce the cost, but may also reduce the quality of life in the county; or
2. Increase revenues to pay for the proposed standard of service (higher rates for existing revenues, and/or new sources of revenue); or
3. Reduce the average cost of the public facility (i.e., alternative technology or alternative ownership or financing), thus reducing the total cost, and possibly the quality; or

4. Reduce the demand by restricting population (i.e., revise the land use element or number of building permits allowed); or
5. Reduce the demand by reducing the consumption (i.e., transportation demand techniques, recycling solid waste, water conservation, etc.) which may cost more initially, but may save money later; or
6. Any combination of options 1-5.

The preliminary answer to Question 2 is prepared using the following formulas:

Formula 2.1 (Preliminary)

$$\text{Deficiency} \times \text{Average Unit Cost} = \text{Deficiency Cost}$$

Where “Deficiency” is the result of Formula 1.2, and “Average Unit Cost” is the usual cost of one unit of the facility (i.e., mile of road, acre of park)

The answer to Formula 2.1 (Preliminary) is the approximate cost of eliminating all deficiencies of public facilities, based on the use of an “average” cost for each unit of public facility that is needed.

Formula 2.2 (Preliminary)

$$\text{Deficiency Cost} - \text{Revenue} = \text{Net Surplus or Deficiency}$$

Where “Deficiency Cost” is the result of Formula 2.1 (Preliminary), and “Revenue” is the money currently available for public facilities.

The result of Formula 2.2 (Preliminary) is the preliminary answer to the test of financial feasibility of the standards of service. A surplus of revenue means the standard of service is affordable with the money remaining, therefore the standard is financially feasible. A deficiency of revenue compared to cost means that not enough money is available to build the facilities, therefore the standard is not financially feasible. Any standard that is not financially feasible will need to be adjusted using the 6 options listed above.

The final demonstration of financial feasibility uses detailed costs of specific capital projects in lieu of the “average” costs of facilities used in the preliminary answer.

Formula 2.1 (Final)

$$\text{Capacity Projects} + \text{Non-Capacity Projects} = \text{Project Cost}$$

Where “Capacity Projects” is the cost of all projects to eliminate the deficiency for existing and future development (Formula 1.2), including upgrades and/or new expansion of existing facilities as well as new facilities, and “Non-Capacity Projects” is the cost of

remodeling, renovation or replacement needed to maintain the inventory of existing facilities.

Formula 2.2 (Final)

Project Cost - Revenue = Net Surplus or Deficiency

Where “Project Cost” is the result of Formula 2.1 (Final) and “Revenue” is the money available for public facilities from current/proposed source.

The “final” answer to Question 2 validates the financial feasibility of the standards for levels of service that are used for each public facility in the plan and in other elements of the master plan. The financially feasible standards for levels of service and the resulting capital improvements projects are used as the basis for policies and implementation programs in the final Public Services and Facilities Plan.

Setting the Standards for Levels of Service

Because the need for capital facilities is largely determined by the levels of service that are adopted, the key to influencing the Public Services and Facility Plan is to influence the selection of the level of service standards. Level of service standards are one measure of the quality of life of the county. The standards should be based on the County’s vision of its future and its values.

The Planning Commission and Board of County Commissioners enact the level of service standards that reflect the County’s vision. Their decision should be influenced by recommendations from providers of public facilities, advisory groups, and the general public through individual citizens and community civic and business organizations that make their views known or are sought through sampling techniques.

The scenario-driven approach to developing the level of service standards provides decision makers and anyone else who wishes to participate with a clear statement of the outcomes of various levels of service for each type of public facility. This approach reduces the tendency for decisions to be controlled by expert staff or consultants, and opens up the decision making process to the public and advisory groups, and places the decisions before the Planning Commission and the Board of County Commissioners.

The standards for levels of service are adopted as part of the Capital Improvements Program in the annual budget process. The adopted standards determine the need for capital improvements and are the benchmarks for testing the adequacy of public facilities for each proposed development pursuant to “concurrency” requirements.

Level of Service Goals and Policies

Goal 12.01 **To provide levels of services for its residents to maintain at a minimum, the current quality of life for the county's citizens.**

Policy 12.01.01 The County shall determine public facility level of service standards and select specific capital improvements needed to achieve and maintain the standards for existing and future population, and to repair or replace existing public facilities.

Policy 12.01.02 The County shall establish an approach to fund needed capital facilities improvements and associated operating and maintenance costs so as to achieve and maintain the adequacy of the County's public facilities. If the total cost of needed public facilities cannot reasonably be funded, then the County shall adjust levels of service, growth, rates, required facility quality, or other factors to create a financially feasible alternative.

Policy 12.01.03 Adequate public facilities shall be provided by constructing needed capital improvements which 1) repair or replace obsolete or worn out facilities, 2) eliminate existing deficiencies, and 3) meet the needs of future development and redevelopment caused by previously issued and new development permits. The County's ability to provide needed improvements will be demonstrated by maintaining a financially feasible schedule of capital improvements.

Policy 12.01.04 The County finds that the impacts of development on public facilities within the county occur at the same time as occupancy of development authorized by a final development permit. The County shall condition the issuance of development permits on a determination that there is sufficient capacity of public facilities to meet the standards for levels of service for existing development and the impacts of the proposed development concurrent with the proposed development.

Policy 12.01.05 The following programs shall be implemented to ensure that the goals and policies established in this plan will be achieved or exceeded and that the capital improvements will be constructed. Each implementation program will be adopted by ordinance, resolution or executive order, as appropriate for each implementation program.

Review of Applications for Development Permits

The County shall amend its development regulations to provide for a system of review of various applications for development permits which applications, if granted, would impact the levels of service of certain public facilities. Such a system shall assure that no

final development permit shall be issued which results in a reduction in levels of service below the standards adopted by the County.

The land development regulations shall also address the circumstances under which public facilities may be provided by applicants for development permits. Applicants may offer to provide public facilities at the applicant's own expense in order to insure sufficient capacity of certain public facilities. Development permits may be issued subject to the provision of public facilities by the applicant subject to the following requirements:

The County and the applicant enter into an enforceable development agreement which shall provide, at a minimum, a schedule for construction of public facilities and mechanisms for monitoring to insure that the public facilities are completed concurrent with the impacts of development or the development will not be allowed to proceed.

The public facilities to be provided by the applicant are contained in the schedule of capital improvements developed pursuant to this plan. The public facilities will achieve and maintain the adopted standard for levels of service concurrent with the impacts of development.

Impact Fee

Douglas County shall consider the adoption of impact fees to pay for infrastructure needed to serve new development. Impact fee ordinances shall require the same standard for level of service as is required in this Public Services and Facilities Plan.

Annual Budget

The annual budget shall include in its capital appropriations all projects in the schedule of capital improvements that are planned for expenditure during the subsequent fiscal year.

Update of Public Services and Facilities Plan

The Capital Improvements Program, which implements the Public Services and Facilities Plan, shall be reviewed and data updated annually. The Plan data shall be updated in conjunction with the budget process and the annual review of the Master Plan. The update shall include:

- Revisions of population projections
- Revision of growth rates allowed under the proposed residential building permit allocation system
- Update of the inventory of facilities
- Update of cost of facilities
- Update of public facilities requirements analysis (actual LOS versus adopted LOS)

- Update of revenue forecasts
- Revise and develop capital improvements projects for next 5 fiscal years
- Update analysis of financial capacity

Amendments to the Public Services and Facilities Plan, including amendments to levels of service standards, capital projects, and/or the financing plan sources of revenue.

Concurrency Implementation and Monitoring System

The County shall establish and maintain concurrency and monitoring systems. The systems shall consist of the following components.

1. Annual Report on the Capacity and Levels of Service of Public Facilities. The report shall summarize the actual capacity of public facilities compared to the standards for adopted levels of service and forecast the capacity of public facilities for each of the five succeeding fiscal years. The forecasts shall be based on the most recently updated schedule of capital improvements in the Public Services and Facilities Plan. The annual report shall provide the initial determination of the capacity and levels of service of public facilities for the purpose of issuing building permits during the 12 months following completion of the annual report. Each application will be analyzed separately for concurrency as described below.
2. Public Facility Capacity Review of Development Applications. The County shall use the procedures specified previously to enforce the requirements of Policy 12.1.3. Records shall be maintained during each fiscal year to indicate the cumulative impacts of all development permits approved during the fiscal year-to-date on the capacity of public facilities as set forth in the most recent annual report on capacity and levels of service.

The County will monitor the capacity to provide the required facilities; and if it is unable to provide the facilities, then adjustments to the building permit allocation system will be required to ensure balance is maintained.

3. Concurrency Implementation Strategies. The County shall annually review the concurrency implementation strategies that are developed to implement this plan. Such strategies may include, but are not limited to, the following:
 - Standards for levels of service may be phased to reflect the County's financial ability to increase public facility capacity, and resulting levels of service, from year to year. Standards for levels of service may be phased to provide clear, unambiguous standards for issuance of development permits.
 - Standards for levels of service may be applied according to the timing of the impacts of development on public facilities. Final development permits, which

impact public facilities in a matter of months (e.g., water and sewer facilities), are issued subject to the availability of public facilities prior to the issuance of the building permit (unless the public facility is of the category that must be available within four years, such as library facilities, law enforcement, etc.).

Preliminary development permits may be issued subject to public facility capacity, but the capacity determination expires unless the applicant provides financial assurance to the County and obtains subsequent development permits before the expiration of the initial development permit. As an alternative, the determination of public facility capacity for preliminary development permits can be waived with an agreement that a capacity determination must be made prior to issuance of any final development permit for the subject property. Such a waiver specifically precludes the acquisition of rights to a final development permit as a result of the issuance of the preliminary development permit.

- Public facility capital improvements are prioritized among competing applications for the same amount of facility capacity. If any applications have to be deferred to a future fiscal year because of insufficient capacity of public facilities during the current fiscal year, the applications to be deferred will be selected on the basis of rational criteria.

Capacity of Public Facilities for Development Permits Issued Prior to Adoption of the Plan

The County should “reserve” capacity of public facilities for vested development permits that were issued by the County prior to the adoption of this Master Plan.

The County should recognize approved development rights, existing lots or parcels obtained with some previous County action and implemented by recordation of a final map or a development agreement approval. The County should quantify properties which have approved rights pursuant to procedures to be adopted in the land development regulations.

The County should reserve capacity of public facilities to serve the needs of properties with approved development rights. In the event that there is not sufficient capacity to serve the approved properties, the County should create an allotment of the future capacity of public facilities in order to serve the approved property at the adopted level of service standard before allowing other property to use such existing public facility capacity.

The County intends to require approved properties to commence and to continue development as required and to make such payments as are required in order to maintain the “reservation” of capacity of public facilities which are provided by the County. The County also intends to evaluate the timing and estimated density/intensity of vested properties in order to phase the reservation of capacity to meet the probable needs of such

properties. Experience indicates that some vested development permits are not used to the maximum allowable uses, densities or intensities, or reach such development limits over extended periods of time.

The County finds that it is not necessary to automatically “reserve” capacity of public facilities for any other approval whether issued before or after the adoption of the plan. Such development should be subject to the concurrency requirement. The County finds that the population forecasts that are the basis for this plan are a reasonable prediction of the absorption rate for development, and that the capital facilities which are planned to serve the forecast development are available for that absorption rate. Reserving public facility capacity for non-approved development would deny new applicants access to public facilities, and would arbitrarily enhance the value of dormant development permits.

Evaluation Reports

Evaluation reports will address implementation of the goals and policies of the Public Services and Facilities Plan. The monitoring procedures necessary to enable the completion of evaluation include a review of annual reports of the concurrency implementation and monitoring system and a review of annual updates of this Public Services and Facilities Plan, including updated supporting documents.

Capital Improvements Program Goals and Policies

GOAL 12.02 **To provide for the organized planning, funding, construction, and maintenance of infrastructure at locations consistent with planned land uses and with capacities which are adequate to meet the needs of these planned land uses.**

Policy 12.02.01 Douglas County shall establish a process for developing a 5-year Capital Improvements Program (CIP) to plan and provide for the services necessary to implement this Master Plan.

Policy 12.02.02 Douglas County shall only include capital projects in the CIP when they are consistent or do not conflict with the Master Plan and all its elements.

Policy 12.02.03 Douglas County shall include in the 5-year CIP descriptions of each capital project, including its location, estimated construction cost and schedule, funding source, estimated life-cycle cost (including operation and maintenance costs over the life of the facility), and effect on the County’s ability to achieve the goals and policies of the Master Plan.

Policy 12.02.04 Douglas County shall evaluate potential capital projects according to an established set of criteria to determine their importance in

implementing the Master Plan's goals and policies. Priorities in the CIP shall be based on projects' importance to the Master Plan implementation.

- Policy 12.02.05 Douglas County shall update its CIP annually.
- Policy 12.02.06 Douglas County shall provide for public participation in the review of the proposed 5-year CIP and in its annual update.
- Policy 12.02.07 Douglas County shall use its CIP to provide facilities needed to correct existing deficiencies in public services and facilities provided by the County.
- Policy 12.02.08 Douglas County shall identify funding and establish programs to operate and maintain public facilities required for adequate levels of service, which are not otherwise provided, operated, and maintained by another public entity.
- Policy 12.02.09 Douglas County shall cooperate with other service providers to encourage the use of common improvement standards, to coordinate the timing of capital projects, and to ensure that requirements of adequacy and concurrency are met.

Fair Share Cost Distribution Goals and Policies

GOAL 12.03 To ensure that new development pays its equitable share of the costs for public services and facilities needed to serve it.

- Policy 12.03.01 Douglas County shall review and revise the Development Code as necessary to ensure that development projects provide all on-site and off-site facilities to meet the County's adequate public facilities requirements.
- Policy 12.03.02 Douglas County shall require that facilities constructed and/or operated by the private sector meet the same improvement and operation standards required for facilities provided by the public sector.
- Policy 12.03.03 Douglas County shall evaluate potential funding sources such as impact fees or assessment districts (to the extent permitted under Nevada law) to determine whether such programs should be instituted as means for new development to fund the facilities and services needed by that development.
- Policy 12.03.04 Douglas County shall seek changes in State legislation to provide additional means to ensure equitable payments of costs for services and facilities. Such measures could include changes in requirements for construction or excise taxes, expansion of impact fees to fund other services, or other changes in available public financing techniques.
- Policy 12.03.05 The County shall not permit nor initiate the construction of any facility where there is inadequate funding to properly maintain it.
- Policy 12.03.06 The County shall continue to refer development proposals to State agencies for review and comment.

Public Facilities and Services Standards

The following sections provide a general analysis of the current facilities for:

1. Law Enforcement
 - Central Administration
 - Jail Facilities
 - Substations
2. Emergency Medical Facilities
3. Fire Protection Facilities
4. Library
5. School Facilities
6. Solid Waste
7. Water & Wastewater Systems

Within each of the facilities and services sections and other elements noted, levels of service standards are suggested for incorporation into the Capital Improvements Program (CIP), which is a separate document from the Master Plan. The actual level of service standard is a function of the CIP and is adopted annually with the CIP.

In addition to the analysis of capital needs relating to the level of service standards, the County's ability to maintain operating levels of service should also be evaluated on an annual basis. The actual operating level of service standards will be included in the capital improvements program for each of the facilities listed above and are not adopted as a part of this plan.

As detailed in the Public Services and Facilities Element of the Master Plan, the highest priority ranking of expenditure of funds is to maintain the adopted level of service for existing and approved development. The ability to accommodate growth depends on the capability of the County to fund capital facilities and to fund operation and maintenance requirements.

Law Enforcement

Current Facilities

The current 1995 inventory of the County's law enforcement facilities totals 3,820 square feet of administrative space and 5,903 square feet for Patrol/Investigations for a total of 9,723 square feet (1990 Master Plan Departmental Space Requirements Study) and 120 beds in the jail. One Substation is currently in operation and is located in the Lake Tahoe area. Figure 12.1 "Current Facilities Inventory" lists the facilities, as well as its current capacity and location.

Level of Service (LOS)

Central Administrative Offices (Includes Administration and Patrol/Investigations)

The calculation LOS for Administrative Offices includes the county-wide population as the main administrative offices in Minden provides support services county-wide. The current LOS for Administrative Office space is 282 square feet per 1,000 population, which is based on the existing inventory divided by the 1995 county population of 34,493. The proposed LOS of 211 square feet per 1,000 population is 71 square feet lower (34 %) than the current LOS. The LOS capacity analysis is shown on Figure 12.2.

Jail Facilities

The current LOS for the jail is 3.48 beds per 1,000 population, which is based upon the current inventory of 120 beds divided by the county-wide population of 34,493. The current utilization rate is 54 percent. The proposed LOS of 1.93 beds per 1,000 population is 1.55 beds per 1,000 population lower (80%) than the current LOS. The proposed LOS does not require any additional beds through the year 2015. The LOS capacity analysis is shown on Figure 12.3.

Substations

A substation is currently being constructed in the Indian Hills Community Area. The current LOS is 398 square feet per 1,000 population, which is based upon the current inventory of 1,200 square feet divided by the 1995 population of the Indian Hills/Jacks Valley Community Area. The proposed LOS is 100 square feet per 1,000 population based upon two new substations; one in the Gardnerville Ranchos area and the other in the Topaz Planning Area. Each substation would contain a reception area, three administrative offices and a holding cell. The approximate size of the substation is 1,200 square feet. The public would be provided four spaces and staff of the Sheriff's Office would be provided four spaces. The LOS capacity analysis for Indian Hills/Jacks Valley is shown on Figure 12.4; for Gardnerville Ranchos Figure 12.5; and for the Topaz Area on Figure 12.6.

Capital Facility Projects and Financing

Central Administrative Offices

There are no capacity projects planned for the next five years. There is one non-capacity project for a total cost of \$75,000.

Jail

There are no capacity projects planned for the next five years. There is one non-capacity project for the Minden Jail totaling \$28,500.

Substations

One substation in the Indian Hills community area is completed. There are two capacity projects; one a substation in the Gardnerville Ranchos community area and the other in the Topaz planning area.

Operating Impact of LOS Capital Improvements

Administrative Offices

There are no net operating impacts due to capital improvement projects during the 1996-2001 period to maintain the proposed LOS.

Jail

There are no net operating impacts due to capital improvement projects during the 1996-2001 period to maintain the proposed LOS.

Substations

The net operating impact of the capital improvement projects required during 1996-2001 has not been determined.

Concurrency

In compliance with County CFP Policy, adequate Law Enforcement Facilities (Substations) must be available within three years of occupancy and use.

Figure 12.1
CURRENT FACILITIES INVENTORY

LAW ENFORCEMENT

The inventory of current Law Enforcement facilities include the following:

<u>Name</u>	<u>Current Capacity</u>	<u>Location</u>
A. Central Administrative Offices	9,723	Minden
B. Jail	120 beds	Minden
C. Tahoe Substation	1	Lake Tahoe

Figure 12.2
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LAW ENFORCEMENT - ADMINISTRATIVE OFFICES

COUNTY PROPOSED LOS = 211 SQUARE FEET PER 1,000 POPULATION

<u>Time Period</u>	<u>County-Wide Population</u>	<u>Square Feet @ 0.21 Per Capita</u>	<u>Current Square Feet Available</u>	<u>Net Reserve or Deficiency</u>
1995 ACTUAL	34,493	7,278	9,723	2,445
1996 TRANSITION	1,207	255	2,445	2,190
1997-2001 GROWTH	5,500	1,161	2,190	1,029
TOTAL AS OF 2001	41,200	8,694	9,723	1,029
CAPACITY PROJECTS: none			1,029	1,029

Figure 12.3
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LAW ENFORCEMENT - JAIL

COUNTY PROPOSED LOS =1.93 BEDS PER 1,000 POPULATION

<u>Time Period</u>	<u>County-Wide Population</u>	<u>Beds @ .00193 Per Capita</u>	<u>Beds Available</u>	<u>Net Reserve or Deficiency</u>
1995 ACTUAL	34,493	67	120	53
1996 TRANSITION	1,207	2	53	51
1997-2001 GROWTH	5,500	11	51	40
TOTAL AS OF 2001 CAPACITY PROJECTS:	41,200	80	120	40
none			40	40

Figure 12.4
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LAW ENFORCEMENT - SUBSTATION / INDIAN HILLS

COUNTY PROPOSED LOS =100 SQUARE FEET PER 1,000 POPULATION

<u>Time Period</u>	<u>Indian Hills/ Jacks Valley Population</u>	<u>Square Feet @ 0.100 Per Capita</u>	<u>Square Feet Available</u>	<u>Net Reserve or Deficiency</u>
1995 ACTUAL	3,217	322	1200	878
1996 TRANSITION	113	11	878	867
1997-2001 GROWTH	362	36	835	835
TOTAL AS OF 2001 CAPACITY PROJECTS:	3,692	369	1,200	831
none			831	831

Figure 12.5
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LAW ENFORCEMENT - SUBSTATION / GRID

COUNTY PROPOSED LOS =100 SQUARE FEET PER 1,000 POPULATION

<u>Time Period</u>	<u>GRID Population</u>	<u>Square Feet @ 0.100 Per Capita</u>	<u>Square Feet Available</u>	<u>Net Reserve or Deficiency</u>
1995 ACTUAL	9,654	965	0	[965]
1996 TRANSITION	338	34	0	[999]
1997-2001 GROWTH	633	63	0	[1,062]
TOTAL AS OF 2001 CAPACITY PROJECTS:	10,625	1,062	0	[1,062]
Substation			1200	138

Figure 12.6
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LAW ENFORCEMENT - SUBSTATION / TOPAZ

COUNTY PROPOSED LOS =100 SQUARE FEET PER 1,000 POPULATION

<u>Time Period</u>	<u>Topaz Population</u>	<u>Square Feet @ 0.100 Per Capita</u>	<u>Square Feet Available</u>	<u>Net Reserve or Deficiency</u>
1995 ACTUAL	1,636	164	0	[164]
1996 TRANSITION	57	6	0	[170]
1997-2001 GROWTH	914	91	0	[261]
TOTAL AS OF 2001 CAPACITY PROJECTS:	2,607	261	0	[261]
Substation			1200	939

Emergency Medical Facilities (East Fork Fire and Paramedic District)

Current Facilities

The current 2001 inventory of the County's emergency medical facilities for the East Fork Fire and Paramedic Districts consist of response units dispatched from 6 of the 13 fire stations within the district. Figure 12.7 "Current Facilities Inventory" lists the County facilities for emergency medical services.

Level of Service (LOS)

Emergency Medical Response Unit Locations/Response Time

The current LOS for emergency medical response is to be within a 5 mile radius of developed properties. The proposed LOS is that emergency response units be within a 5 mile radius of development. The East Fork Fire and Paramedic District has established that "Standard Driving Time" shall be an additional measure of response. The term "Standard Driving Time" is defined as the time it takes to drive from the station to a location using State and County roads while not exceeding the posted speed limits. The level of service standard for "Standard Driving Time" is defined for the following areas:

- Urban Service Areas: The current LOS for Standard Driving Time is 7 minutes. The proposed LOS is 7 minutes.
- Rural Areas: The current LOS for Standard Driving Time is 12 minutes. The proposed LOS is 12 minutes.

The LOS does not take into account the dispatch and mobilization time for volunteer forces. Further, the newly adopted NFPA 1720 established no response time for volunteer departments. As a combination fire and EMS department, the East Fork Fire and Paramedic District would fall under the requirements of NFPA 1720. In most cases where career staff are stationed, the LOS is achievable.

Capital Facility Projects and Financing

The districts are managed under one authority and administrative body. Under this arrangement, most capital projects are planned and financed jointly between both the Fire and the Paramedic districts. In the year 2002, the planned facilities include a District Office Facility, funded jointly with Douglas County and Fire Station No. 12 which will be funded jointly with NDF. There is a 5-Year Plan for the Fire Rescue Division that identifies and forecasts vehicle and equipment replacement needs.

Operating Impact of LOS Capital Improvements

As there are no capacity projects, there are no associated operating impacts; however, there will be operating impacts due to increased calls that are related to new development.

Concurrency

In compliance with County CFP Policy adequate Emergency Medical Facilities must be available within 3 years of occupancy and use.

Figure 12.7

CURRENT FACILITIES INVENTORY

EMERGENCY MEDICAL SERVICES

The inventory of current Emergency Medical Facilities include the following:

Name	Location
Station 4	Topaz Ranch Estates
Station 6	Johnson Lane
Station 7	Ranchos
Station 9	Fish Springs
Station 12	Jacks Valley
Station 14	Minden

Fire Protection (East Fork Fire and Paramedic District)

Current Facilities

The current 2001 inventory of the County’s fire protection facilities for the East Fork Township consists of 13 fire stations and 1 paramedic station. In addition, aid units operate out of several of the fire stations. Additionally, located at the airport is the Sierra Front Wildfire Cooperative Interagency Fire Center, which includes a fire air suppression base. Figure 12.8 “Current Facilities Inventory” lists the County facilities.

The Nevada Division of Forestry also provides service to areas within the East Fork Township and operate out of Stations 12 and 13 (NDF 121). The Tahoe-Douglas Fire Protection District, which is not part of the East Fork Fire and Paramedic District, serves the Lake Tahoe portion of the county.

Level of Service (LOS)

Station Location / Response Time

The current LOS for a fire station location is to be within a 5 mile radius of developed properties. The proposed LOS is that stations be within a 5 mile radius of developed properties also (Figure 12.9). As an additional measure, the East Fork Fire and Paramedic District has established that “Standard Driving Time” shall be an additional measure of response. The term “Standard Driving Time” is defined as the time it takes to drive from the fire station to a location using State and County roads while not exceeding the posted speed limits. The level of service standard for “Standard Driving Time” is defined for the following areas:

- Urban Service Areas: The current LOS for Standard Driving Time is 7 minutes. The proposed LOS is 7 minutes.
- Rural Areas: The current LOS for Standard Driving Time is 12 minutes. The proposed LOS is 12 minutes.

Fire Protection Equipment

The East Fork Fire and Paramedic District has defined “core” stations and adopted minimum equipment requirements to be located at these stations. The core stations are:

- Minden
- Gardnerville
- Ranchos

The equipment assigned to a “core” station consists of:

- 2 Type 1 Engines (Structure)

- 1 Type 3 Engine (Brush truck)
- 1 Type 2 Water Tender - if no water system available
- 1 Multipurpose Apparatus (Aerial/Squad)

Other Station Equipment

Equipment located at stations other than core stations consists:

- 1 Type 1 Engine (Structure)
- 1 Type 3 Engine (Brush Truck)
- 1 Type 2 Water Tender

Capital Facility Projects and Financing

The districts are managed under one authority and administrative body. Under this arrangement, most capital projects are planned and financed jointly between both the Fire and the Paramedic districts. In the year 2002, the planned facilities include a District Office Facility, funded jointly with Douglas County, and Fire Station No. 12 which will be funded jointly with NDF. There are several non-capacity projects identified in the East Fork Fire and Paramedic District 5-Year Plan for Fire Suppression dated 1995.

Operating Impact of LOS Capital Improvements

As there are no capacity projects, there are no operating impacts directly associated. The district will experience operating impacts due to increased service calls that are directly related to new development.

Concurrency

In compliance with County CFP Policy, adequate Fire Protection Facilities must be available within three years of occupancy and use.

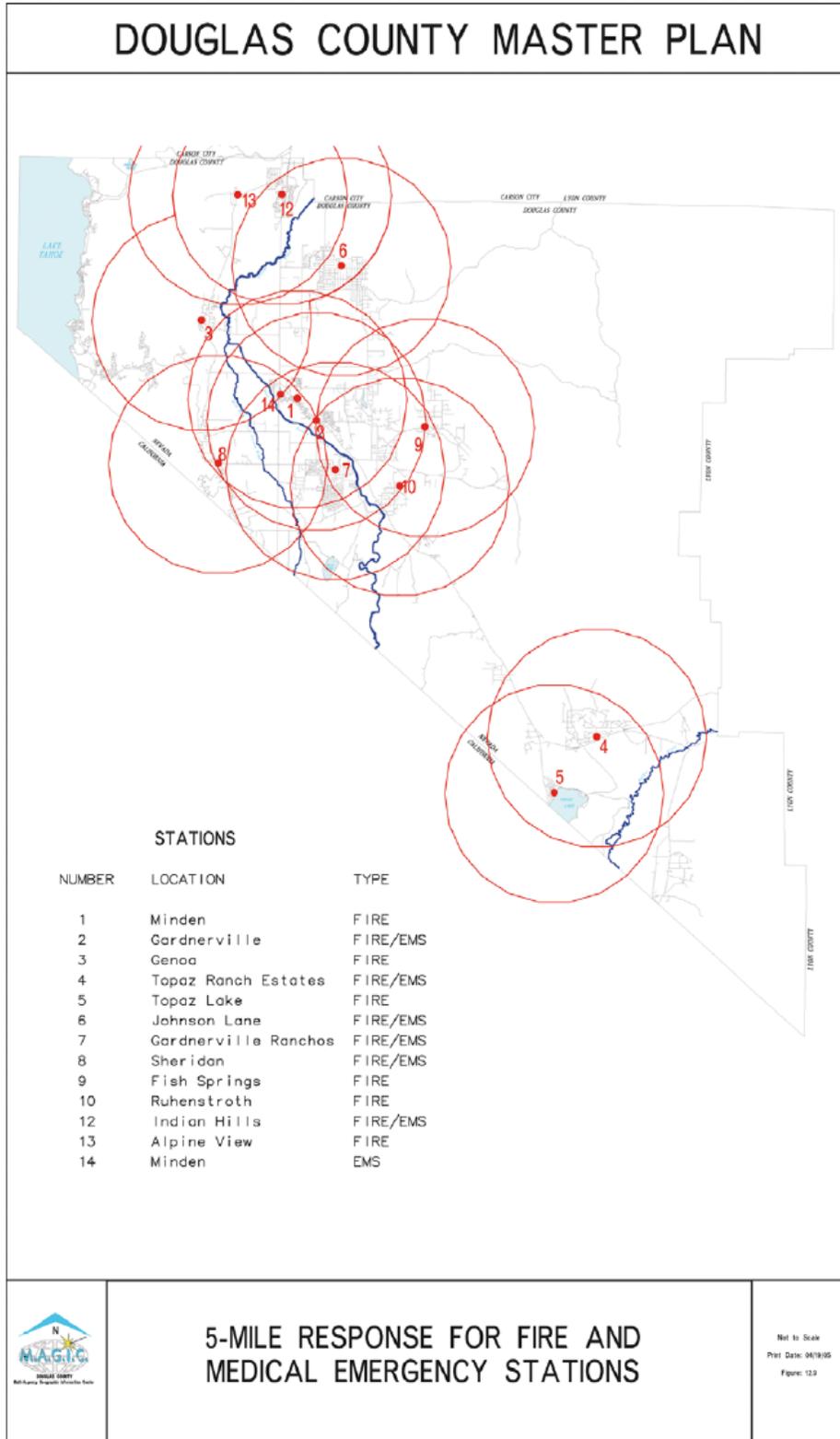
Figure 12.8	
CURRENT FACILITIES INVENTORY	
FIRE PROTECTION	
The inventory of current Fire Protection facilities include the following:	
<u>Name</u>	<u>Current Capacity</u>
Station 1 – Minden	
Station	1
Type 1 Engine	2
Type 3 Brush Unit	1

Tender	Type 2 Water	1
Rescue	Squad/Heavy	1
	Utility	1
Station 2 – Gardnerville		
	Station	1
	Type 1 Engine	2
	Type 3 Brush Unit	1
	Utility	1
Station 3 – Genoa		
	Station	1
	Type 1 Engine	1
	Type 3 Brush Unit	1
Tender	Type 2 Water	1
	Mini Pumper	1
Rescue	Squad/Light Duty	1
	<u>Name</u>	<u>Current Capacity</u>
Station 4 - Topaz Ranch Estates		
	Station	1
	Type 1 Engine	1
	Type 3 Brush Unit	1
Tender	Type 2 Water	1
	Utility Units	2
	Rescue	1
Station 5 - Topaz Lake		
	Station	1
	Type 1 Engine	1
	Type 3 Brush Unit	1
Tender	Type 2 Water	1
		1

Utility	
Station 6 – Johnson Lane	
Station	1
Type 1 Engine	2
Type 3 Brush Unit	1
Tender Type 2 Water	1
Utility	1
Rescue	1
Station 7 – Ranchos	
Station	1
Type 1 Engine	2
Type 3 Brush Unit	1
Tender Type 2 Water	1
Utility	1
Rescue	2
Station 8 - Sheridan Acres	
Station	1
Type 1 Engine	2
Type 3 Brush Unit	2
Tender Type 2 Water	1
Utility	1
Patrol (NDF)	1
Station 9 - Fish Springs	
Station	1
Type 1 Engine	1
Type 3 Brush Unit	1
Tender Type 2 Water	1
HazMat Unit & trailer	1
Station 10 – Ruhestroth	
Station	1
Type 1 Engine	1

Type 3 Brush Unit	2
Type 2 Water Tender	1
Utility	1
Station 11- Ridgeview	1
Station	1
Type 1 Engine	1
Type 3 Brush Unit	1
Type 2 Water Tender	
Station 12 - Jack's Valley	
Station	1
Type 1 Engine	1
Type 3 Brush Unit	2
Utility	1
Rescue	1
Station 14-Minden	1
Station	1
Rescue	1
Quick Response Unit	

Figure 12.9 5-mile Response



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Library

Current Facilities

The current 2000 inventory of the County's library facilities totals 14,617 square feet of main library space located in Minden and approximately 5,875 square feet in the branch library at Lake Tahoe. The library also occupies approximately 450 square feet at the China Spring Youth Camp high school and dormitories and approximately 40 square feet at the Lake Tahoe Juvenile Detention Facility (these two locations are not public facilities). Figure 12.10 "Current Facilities Inventory" lists the facilities, as well as its current capacity and location.

Level of Service (LOS)

The current LOS for the Library space in the Minden public facility is 423 square feet per 1,000 population in the East Fork Township, which is based on the existing inventory divided by the 2000 East Fork population of 34,525, excluding Lake Tahoe. The proposed LOS of 604 square feet per 1,000 population is 181 square feet higher (42 %) than the current LOS. The revised LOS capacity analysis is shown on Figure 12.11 and 12.12.

Capital Facility Projects and Financing

The Minden main library was expanded in 1999-2000 and increased the space from the existing .32 square foot per capita to the current .42 square feet per capita, still below the recommended average of .6 square foot per capita. To resolve existing deficiencies and to provide for future growth, the Library needs to be expanded. The expansion could take place under several scenarios; (a) an expansion at the current location with land acquisition, (b) a new main library at a different location with (1) either utilizing the existing facility or (2) disposing of the existing facility; or (c) utilizing the existing facility and constructing branch libraries.

Operating Impact of LOS Capital Improvements

There would be an operating impact with a Main Library expansion or any additional facilities. This impact could be reduced somewhat by co-location of branch facilities with other county departments.

Concurrency

In compliance with County CFP Policy adequate Library Facilities must be available within three years of occupancy and use.

Figure 12.10
CURRENT FACILITIES INVENTORY

LIBRARY

The inventory of current Library facilities include the following:

<u>Name</u>	<u>Current Capacity</u>	<u>Location</u>
A. Main Library	14,617 sq. ft.	Minden
B. Tahoe Branch Library	5,875 sq. ft.	Lake Tahoe
C. China Spring Library	450 sq. ft.	China Spring
D. Juvenile Detention Facility	40 sq. ft.	Lake Tahoe

Figure 12.11
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LIBRARY – MAIN

COUNTY PROPOSED LOS = 735 SQUARE FEET PER 1,000 POPULATION (excluding Lake Tahoe)

<u>Time Period</u>	<u>Population</u>	<u>Square Feet @ 0.604 Per Capita</u>	<u>Current Square Feet Available</u>	<u>Net Reserve or Deficiency</u>
2000 ACTUAL	34,525	20,853	14,617	(6,236)
2001-2005 GROWTY	11,608	7,011	0	(13,247)
TOTAL CAPACITY PROJECTS:	46,133	27,864	14,617	(19,483)

Library Expansion

Figure 12.12
CAPITAL PROJECTS LOS CAPACITY ANALYSIS

LIBRARY-TAHOE BRANCH

COUNTY PROPOSED LOS = 735 SQUARE FEET PER 1,000 POPULATION

<u>Time Period</u>	<u>Population</u>	Square Feet @ 0.604 <u>Per Capita</u>	Current Square Feet <u>Available</u>	Net Reserve or <u>Deficiency</u>
2000 ACTUAL	8,065	4,871	5,875	1,004
2001-2006 GROWTH	0	0	0	0
TOTAL AS 2001 CAPACITY PROJECTS:	OF8,065 None	4,871	5,875	1,004

School District

Current Facilities

The Douglas County School District serves all of Douglas County. Currently, the District has 7 Elementary Schools, 3 Middle Schools and 2 High Schools of which one elementary school, one middle school, and one high school are located within the Tahoe Basin. Extensive analysis and demonstration of the need for school facilities is contained in the Douglas County School District School Facilities Plan adopted March 8, 1994, by the Douglas County School District and is incorporated as a part of this Master Plan by reference. The name, location, and capacity of current school facilities (excluding the Tahoe Basin) are listed in Figure 12.13.

Figure 12.13		
CURRENT FACILITIES INVENTORY		
DOUGLAS COUNTY SCHOOL DISTRICT		
The inventory of current School facilities include the following:		
<u>Name</u>	<u>Capacity</u>	<u>Location</u>
Elementary Schools		
Scarselli	831	Ranchos
C. C. Meneley	831	Ranchos
Gardnerville	831	Gardnerville
Jack's Valley	898	Indian Hills/Jacks Valley
Piñon Hills	500	Johnson Lane
Minden	350	Minden
Zephyr Cove	350	Lake Tahoe
Middle Schools		
Carson Valley	900	Gardnerville
Pau-Wa-Lu	950	Ranchos
Kingsbury Middle	350	Lake Tahoe
High Schools		
Douglas	1,800	Minden
Whittell	250	Lake Tahoe

Level of Service (LOS)

The current and proposed LOS for public schools in the Douglas County School District is:

- Elementary Schools: 92 sq. ft./student
- Middle School: 115 sq. ft./student
- High School: 135 sq. ft./student

Capital Facility Projects and Financing

Preliminary discussions with the Douglas County School District have identified the need for a second high school located near the County Fairgrounds and a new elementary and middle school in the Topaz Ranch Estates community. The capital facility projects for the School District are identified in the District's School Facilities Plan.

Operating Impact of LOS Capital Improvements

The net operating impact of capital improvement projects required for the 5-year CIP program has not been calculated.

Concurrency

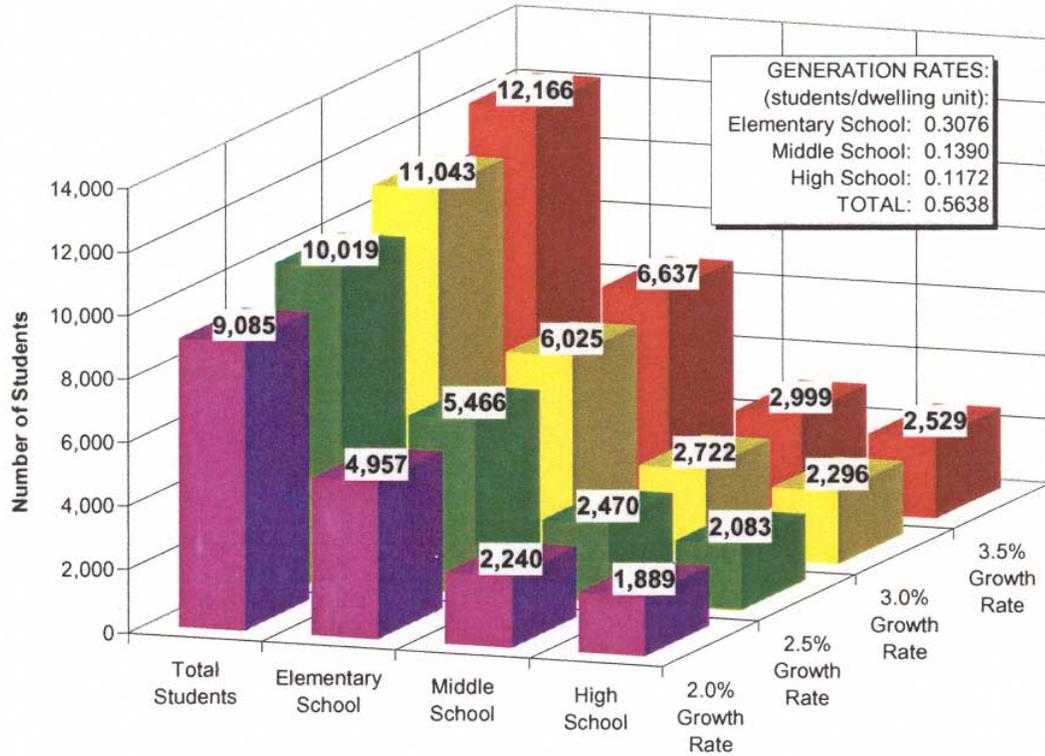
In compliance with County CFP Policy, adequate School Facilities must be available within four years of occupancy and use.

Student Growth Projections

Figure 12.14 provides for a projection of school population through the year 2015 based on growth rates from 2 to 3.5 percent. This is a simplistic approach to student population growth, but is provided to develop a sense of the growth of student population over time.

Figure 12.14

School Population Projection



Solid Waste Management

Waste Transfer and Disposal

Current Facilities

Solid waste disposal services in Douglas County are provided by Douglas Disposal, Inc., and Tahoe Refuse, Inc. Collection services are provided by the Towns of Minden and Gardnerville, Douglas Disposal, and Tahoe Refuse. Douglas Disposal owns and operates a transfer station west of Highway 395, south of Gardnerville, and south of Pinenut Road. This transfer station receives solid waste from the valley, either delivered by collection trucks or by local residents. Waste is transferred at the facility to large trailers that are transported to the Lockwood Landfill in Storey County, owned and operated by Reno Refuse, Inc. Waste generated in the Lake Tahoe basin portion of Douglas County is transported to a transfer station owned and operated by Tahoe Refuse, Inc. This facility is located west of Highway 50 in South Lake Tahoe, California. Waste is also transported from that transfer station to the Lockwood Landfill.

The Douglas Disposal, Inc., transfer station that serves the valley was developed in 1993 as a temporary facility. The transfer station building has yet to be constructed and waste transfer operations currently take place in an area intended only for use for oversized materials and recycling. When fully developed, the transfer station is proposed to be sized to serve a population of 81,000 and should be adequate well past the year 2015. In 1994, Douglas County voters passed a citizen's initiative, which only allows additional transfer stations to be owned by the County.

Capital Facility Projects and Financing

The completion of the transfer station and associated financing is anticipated to be the responsibility of Douglas Disposal, Inc.

Landfills

There are no operating landfills in Douglas County that receive municipal solid waste. The County had an operating landfill that served all of Douglas County and those portions of California in the South Lake Tahoe portion of the basin. This landfill was closed in 1993. The closure project included considerable regrading of the landfill and construction of a closure cap that included manufactured liner material covered with soil. Groundwater monitoring wells are located in the vicinity of the closed landfill.

Level of Service

No level of service standards is proposed for this service.

Solid Waste Management Goals and Policies

Goal 12.04 The County shall promote reliable and cost-effective solid waste management services.

Policy 12.04.01 The County shall seek to implement solid waste management processes that reduce the waste stream, promote recycling, and provide for the separation of waste prior to incineration or landfilling.

Policy 12.04.02 The County shall seek to expand its recycling program to include commercial recycling in addition to single-family and multi-family recycling.

Policy 12.04.03 The County shall seek to implement additional waste diversion programs, such as plastics recycling and yard waste collection for composting.

Policy 12.04.04 The County may evaluate the development of a landfill site within Douglas County if necessary in the future.

Policy 12.04.05 The County should evaluate alternative waste management programs, including but not limited to, waste energy programs.

Water and Wastewater Systems Element

The Water and Wastewater Systems Element establishes policies which address key county-wide infrastructure and service issues. Potable water, for domestic and commercial use, is a critical service for development; the collection, treatment, and disposal of wastewater is a second service requiring significant investments in infrastructure and operations. These two services, provided by Douglas County and others, are needed for expansion and growth of the County's communities. By locating more intensive land uses in areas with existing water and sewer systems, service can be provided more efficiently and at lower cost than for development in areas requiring significant new extensions. For these reasons, the County's Master Plan seeks to coordinate land use planning with provision of these services. It uses the designation of Urban and Rural Development Areas (detailed in the Land Use Element) as a means to identify geographic areas where particular levels of service will be needed during the planning period. It establishes the concept of "adequate public facilities" as one factor in the planning, review, and approval of development projects. Adequate public facilities are required to be constructed and timed so that when a development is completed and occupied, the facilities will be available and will have enough capacity to serve residents and businesses. Future demand on water and wastewater facilities is based on a 3.5 percent annual population growth rate.

Following are descriptions of systems which serve the Carson Valley and Topaz Regions of the county. There are a number of systems which serve the Tahoe Basin area of Douglas County which are not included within this plan at this time.

County-Owned Facilities

China Springs Youth Camp

The China Springs water system in the Pinenut planning community serves only the China Springs Youth Camp. Expansion to serve other communities is not anticipated. The water system consists of 1-240,000 gallon water tank, 1-production well, and 1-irrigation well. The domestic water supply is treated for removal of iron and manganese. Improvements to the distribution system were made to meet fire flows requirements for the camp.

Douglas County Fairgrounds

The Douglas County Fairgrounds water system in the Ruhenstroth planning community currently serves the Fairgrounds, Ruhenstroth fire station, transfer station and animal control facility. The water system currently consists of 1-well and a 250,000 water storage tank.

Expansion of the system is anticipated to serve Ruhenstroth, Sunrise Estates and the light industrial zoning districts along East Valley and Sawmill roads. Efforts are currently underway to interconnect Sunrise Estates with the Fairgrounds water system.

East Valley Water System

The East Valley Water System serves the Mountain View, Johnson Lane residential communities, the Minden/Tahoe Airport and the Jonson Lane, Heybourne Road and Airport Road commercial/industrial areas. The system is currently served by 3-production wells. Storage is currently provided by 1-1.5 million gallon storage tank, 1-600,000 gallon storage tank, and 1-500,000 gallon water storage tank. A fourth 250,000 gallon storage tank provides emergency fire flows utilizing a fire drive system for the airport.

The County is currently in the process of developing a facilities plan to address the newly adopted arsenic standard of 10 ppb. All 3 of the existing production wells are impacted by the new standard. The facilities plan will review on-site treatment options, development of new water supplies meeting the arsenic standard of 10 mg/L, and an interconnection to the Town of Minden.

West Valley “Genoa” Water System

The Genoa water system currently serves Genoa Lakes, Sierra Shadows, Walley’s Hot Springs Resort, Eagle Ridge and portions of the Town of Genoa. Water supply is provided by 2-infiltration wells adjacent to Sierra Canyon Creek, and 1-groundwater well near Walley’s Hot Springs Resort. Storage is currently provided by 1-400,000 gallon water tank, 1-300,000 water tank, and 1-650,000 water storage tank utilizing booster pumps and fire drivers.

It is contemplated that the Mountain Meadows Estates community water system serving James Canyon Creek, Summit Ridge, and Montana subdivisions will be interconnected to Genoa to provide a regional water system.

The County is in the process of developing a facilities plan to extend water service to North County to serve the commercial areas. Additionally, the plan will evaluate servicing the proposed Clear Creek Development and portions of the Jacks Valley Planning area community along Jacks Valley Road.

Foothill Water System

The Foothill water system currently serves the Sheridan Acres and Jobs Peak service areas. The systems have been interconnected to develop a regional system along Foothill Road. Future consideration will be given to incorporating Sierra County Estates into the

regional water system. The Foothill water system currently consists of 3-wells and 1-550,00 gallon storage tank, and 1-60,000 gallon storage tank.

Planned improvements for the Sheridan Acres service area include replacing the 60,000 gallon storage tank with a new 250,000 storage tank, and upgrades to the residential service laterals and water meters. The Sheridan Acres well is treated to lower the naturally occurring pH of the water to meet State standards. Improvements to the Jobs Peak system will include replacing 1-well to maximize water supply capacity and well-head treatment for corrosion control.

North County Water System

The North County water system currently serves the commercial and retail centers along Topsy Lane and US 395. The water system currently consists of 2-wells and 1-1.5 M gallon storage tank. An emergency interconnection has been provided between Indian Hills General Improvement District and the County's North County water system to provide a backup and redundant water supply.

The system has been designed to extend water service to portions of the residential zoning districts along Jack Valley Road and the Redevelopment Agency on the eastside of US 395. Planning efforts are underway to develop additional water supplies and an interconnection with the Genoa water system.

Lampe and Topaz Lake Parks

The Douglas County Parks and Recreation Department operates 2-water systems serving County park facilities.

Lampe Park serves a multi-use park and County office facility in Gardnerville. The water system consists of 1-well, booster pump and pressure tank. The Topaz Lake Park serves a ranger station and campsite. The water system consists of 1-well, booster pump and pressure tank.

Public-Owned, Non-County Facilities

Gardnerville Ranchos General Improvement District (GRGID)

GRGID serves approximately 3,500 residential and 23 commercial customers in the Gardnerville Ranchos Planning Community. The system utilizes seven wells with a combined production of 4,800 gpm without its two booster stations; the first booster station is capable of 1,500 gpm, and the second capable of 1,600 gpm. System storage is provided by a 1.5 million gallon tank and a 3 million gallon tank.

Indian Hills General Improvement District (IHGID)

IHGID serves residential, commercial, and other customers in the Indian Hills/Jacks Valley Planning Community. IHGID operates two water systems; all customers are served by the main system except for the Jacks Valley School District which is served by a subsystem. The school's subsystem is comprised of two wells, each capable of producing 100 gpm, and a 600,000 gallon storage tank. This subsystem is not connected to the main system. The Ridgeview water system, previously owned and operated by Douglas County, has been dedicated to IHGID and consolidated in the IHGID water system.

Seven wells, with a combined capability of 715 gpm supply the District's main system. System maps indicate a line extension for future use to the Brown well in the southern portion of the service area. The District has recently received approval from the State Engineer to increase the Brown well pumpage from 450 gpm to 1,872 gpm. Sand quality problems, however, have mandated that improvements be made to the Brown well, including a liner and gravel pack. With these improvements, the District expects the well to produce 1,000 gpm. A water treatment facility is proposed for the Hobo Hot Springs well which has had water quality problems requiring treatment. Improvements are expected to be completed in 1998.

Storage for the main system is provided by two above-ground tanks, one with 100,000 gallon capacity and the other with 420,000 gallon capacity. The current intertie with the Ridgeview water system allows for the exchange of water in emergency situations. The full intertie of the systems will result in the expansion of IHGID storage capacity.

Sierra Estates General Improvement District

This system is located in the Indian Hills/Jacks Valley Planning Community and served 64 residential customers in 1994. The system consists of two wells located within the Eagle Valley groundwater basin which are capable of producing 250 gpm. The District has one 60,000 gallon storage tank.

Town of Minden

The Town of Minden, in the Minden-Gardnerville Planning Community, served 907 residential customers and 188 commercial customers in 1994. There are currently five wells connected to the system, only four of which are used on a regular basis; the fifth well is capable of being used on an occasional basis. The four main wells have a combined production capability of 5,485 gpm. There is no system storage for the Town of Minden aside from hydropneumatic tanks located at Well sites 1 and 2. The Towns of Minden and Gardnerville are currently evaluating the possibility of an intertie between the two Town systems.

Kingsbury General Improvement District (KGID)

KGID, a Tahoe-based system, serves the portion of the Summit Village and Tahoe Village areas which extends into the Sierra Planning Region. This element assumes that these areas currently receive service and will continue to be adequately served by KGID.

Topaz Ranch General Improvement District

This system serves a portion of Topaz Ranch Estates. The system consists of several wells and tanks, although little is known about its supply, pumpage or storage capabilities.

Private Systems

Bently Science Park

This system currently serves the Bently Nevada Corporation and other industrial facilities at the Bently Science Park located in the East Valley Planning Community. At this time, the system is comprised of two wells, both of which are equipped with pressure tanks to provide system pressure. The primary well has two pumps, one capable of producing 80 gpm and the other 280 gpm. This well is reportedly able to produce 1,000 gpm on the basis of pumping tests conducted in 1985. The second well is equipped with a 70 gpm pump, but is capable of producing 1,750 gpm based on tests conducted in 1994. Fire flows are provided by a fire drive system fed by a 2.5 million gallon surface reservoir. Proposed expansions to the water system will serve future occupants due to the development of the industrial park.

Gardnerville Town Water Company (GTWC)

The GTWC is a non-profit corporation owned by the residents of Gardnerville. The system consists of nine wells, one of which is out of service due to sand problems. The remaining wells have a combined capacity of 7,400 gpm. Storage presently consists of small tanks at several well locations, a 29,000 gallon tank and a 1.5 million gallon tank located off of Virginia Ranch Road. An additional 2.6 million gallon tank is to be constructed at the Virginia Ranch site in 1999.

Sierra Country Estates

The Sierra Country Estates water system is presently under construction in the Foothill planning community and will be dedicated to Douglas County upon completion. System components include two wells with a combined production of 200 gpm and a 235,000 gallon steel tank. This volume includes additional storage capacity to serve the adjacent Sierra Ranchos Estates subdivision. The system is currently in operation; however, outstanding corrections are still not completed. The system, while operating independently, will be included in the Foothill Water System Utility Enterprise Fund.

Williams Ridge Technology Park

This system presently serves the Aervoe-Pacific buildings at the Williams Ridge Technology Park in the East Valley Planning Community, consists of a 225,000 gallon steel water tank and two wells. The primary well is capable of producing approximately 150 gpm.

Topaz Lake Systems

According to the “Topaz Area Water and Wastewater Master Plan”, 1991, there are two semi-public systems in the Topaz Lake Planning Community, Topaz Lake Water Company and the K & K Water Company. Each of these systems has one well. At the time of the study, seven lots were being served by the K & K Water Company, and the Topaz Lake Water Company was serving 18 lots.

An additional private system, the Topaz Lodge Water System, serves lodge facilities in the Topaz Lake community. This system consists of two wells with a total pumping capability of 110 gpm and a 300,000 gallon storage tank.

Future Water Demand

The water demand within each community was determined for the years 2000, 2005, 2010 and 2015, assuming a county population annual growth rate of 3.5 percent. Where demand is based on area, such as with commercial and industrial land uses, development of the areas is assumed to be linear with time, i.e., 25 percent per each five-year period.

Since infrastructure will be concentrated in more urban areas, not all populations and areas will be served by a community water service. This creates a three-tiered organization of service. The first tier includes uses that are assumed to always be served: single- and multiple-family residential population, commercial and industrial areas, certain community facilities such as schools, and future development and receiving area population. These uses are located within the proposed community water system service areas. Demands from the first tier are noted as “Municipal Demands”. The second tier incorporates other population in the rural residential and residential estates land uses which are located within a water system’s service area and may possibly be served by the community water system. Demands from the second tier are identified as “Other Demands in Service Area”. The third tier includes all uses which are not expected to be served by a community water system during this plan’s 20-year time-frame and will remain on wells. This category includes all agricultural domestic uses as well as some community facilities and population in rural residential and residential estates land use areas which are located outside the proposed service area boundaries. Demands from the third tier are identified as “Demands Outside Service Area”.

The average daily demand as listed below for each use is based on current State and County standards and practical engineering experience:

- Residential population on community system (except Minden & Gardnerville): 400 gallons per capita per day;
- Residential population on community system (Minden & Gardnerville): 434 gallons per capita per day;
- Industrial: 1,500 gallons per acre per day;
- Community Facility-Recreation: 1,500 gallons per acre per day;
- Community Facility-Support & Institution: 1,500 gallons per acre per day;
- Residential population on domestic wells: 720 gallons per capita per day.

The 2015 average daily demands for each tier within each community are listed in Figure 12.16.

Figure 12.16				
2015 Water Demands				
COMMUNITY OR USE	AVERAGE YEARLY DEMAND IN 2015 (AC-FT/YR)			
	1st Tier	2nd Tier	3rd Tier	Total
CARSON VALLEY DRAINAGE BASIN				
Indian Hills/ Jacks Valley ¹	1,747	455	863	3,065
Genoa	358	377	254	990
Foothill	5	593	922	1,519
Johnson Lane	80	2,144	296	2,519
Airport	1,781	13	63	1,857
Minden-Gardnerville	6,091	93	55	6,239
Gardnerville Ranchos	6,304	318	479	7,102
East Valley	2,736	0	901	3,636
Fish Springs	0	0	726	726
Ruhenstroth/ South Valley	301	673	215	1,189
North Agriculture	0	0	175	175
South Agriculture	0	0	393	393
Central Valley	0	0	34	34
Pinenut ²	67	0	247	314
Total Community Demands	19,470	4,665	5,622	29,758
Irrigation Demand				10,000
Stockwater Demand				200
Other Demand				2,400
Reduction for Conversion from Domestic Well to Water System				-1,657
TOTAL CARSON VALLEY BASIN DEMANDS				40,701
ANTELOPE VALLEY DRAINAGE BASIN				
Topaz Lake	278	53	337	668
Topaz Ranch Estates	1,852	887	1,382	4,121
Antelope Valley	0	0	11	11
Pinenut ²	0	0	61	61
Total Community Demands	2,130	939	1,791	4,860
Irrigation Demand				1,500
Other Demand				30
Reduction for Conversion from Domestic Well to				-337

Water System		
<i>TOTAL ANTELOPE VALLEY BASIN DEMANDS</i>		6,053

¹ Does not include use by Sierra Estates GID which draws from the Eagle Valley groundwater basin (78 AC-FT/YR).

² Approximately 83% of third tier land area in the Pinenut Region is located in the Carson Valley Basin with the remainder in the Antelope Valley Basin. Demands were divided proportionately.

The summary table also includes demands in addition to those based on land use. These demands are from agricultural irrigation, stockwater, and other demands, including 1,600 AF/Y used by Lahontan Fish Hatchery in the Carson Valley Planning Area. While these demands will not be served by a community water system, they do constitute a significant draw on the groundwater resource.

Water System Evaluation by Community for 2015 Demands

Using the minimum facilities criteria and the demand projections for 2015, each water system or proposed water system combination, has been evaluated on the basis of existing water rights, pumping capacity, and storage. The minimum facilities criteria used in this evaluation are reiterated below:

- Water supply or water rights must be equal to or greater than the demand;
- Minimum pumping capacity must equal the maximum daily demand with the largest well out of service; and
- Minimum storage capacity equals the average daily demand plus fire flow requirements, or pumping capacity must meet peak hour plus fire flow.

The evaluations assume that all recommended system combinations have occurred by the year 2015 and, that all demands within the service area, both first and second tier demands, will be served by a community water system by the year 2015.

System Recommendations

Based upon review of future water service requirements, the following are the water system service recommendations:

- Indian Hills GID, and Ridgeview water systems should combine to form an expanded water system operated by IHGID. IHGID is already planning this intertie. To avoid problems encountered with mixing water rights and use of water from both the Carson Valley and Eagle Valley groundwater basins, Sierra Estates GID should connect to the combined system for fire flow storage only.

<i>Indian Hills GID/ Ridgeview/ Sierra Estates GID (Storage Only) - Figure 12.17</i>					
	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	1,837		2,202		(365)
<i>Pumping Capacity, gpm</i>	Total Capacity:	2,335	Maximum Day:	3,412	(2,077)
	Without Largest Well:	1,335	Average Day:	1,365	
<i>Storage</i>	1,600		2,215		(0.615)

<i>Sierra Estates GID - Figure 12.18</i>					
	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	78		78		0
<i>Pumping Capacity, gpm</i>	Total Capacity:	250	Maximum Day:	122	(22)
	Without Largest Well:	100	Average Day:	49	
<i>Storage, mg</i>	NA		NA		NA

Foothill Consolidated Water System

- The Sheridan Acres system, Sierra Country Estates water system, and the Job’s Peak Ranch development’s water system should combine to serve first- and second-tier demands in the Foothill area with operation by Douglas County. Expansion of the system to serve the Foothill community is anticipated.

<i>Foothill - Figure 12.19</i>					
	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	237		598		(361)
<i>Pumping Capacity, gpm</i>	Total Capacity:	350	Maximum Day:	926	(676)
	Without Largest Well:	250	Average Day:	371	
<i>Storage, mg</i>	0.319		0.654		(0.335)

- In the Topaz Planning region, the Topaz Ranch Estates General Improvement District Water System should be upgraded and expanded to serve the service area demands in the Topaz Ranch Estate/Holbrook areas, including the future development and receiving areas. The Topaz Lake Area systems, with the exception of the Topaz Lake Park system, should be combined to serve the Topaz Lake service area demands. The TRE GID or other public entity should be first consideration in the ultimate ownership and operation of the systems.

<i>Topaz Lake - Figure 12.20</i>					
	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply,</i>	88		330		(242)

<i>AF/Y</i>				
<i>Pumping</i>	Total Capacity:	110	Maximum: Day:	512 (462)
<i>Capacity, gpm</i>	Without Largest Well:	50	Average Day:	205
<i>Storage, mg</i>		0.302		0.475 (0.173)

Topaz Ranch Estates - Figure 12.21

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
Water Supply, AF/Y	0		2,739		(2,739)
Pumping Capacity, gpm	Total Capacity:	0	Maximum Day:	2,498	(2,498)
	Without Largest Well:	0	Average Day:	1,698	
Storage, mg	0.000		2.625		(2.625)

- The Fairground’s system service area should be expanded to serve Ruhestroth and be operated by Douglas County. This system would receive supply from the Town of Minden/Gardnerville Town Water Company interconnected system.

Ruhestroth/South Valley - Figure 12.22

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
Water Supply, AF/Y	104		974		(870)
Pumping Capacity, gpm	Total Capacity:	85	Maximum Day:	1,509	(1,424)
	Without Largest Well:	85	Average Day:	604	
Storage, mg	0.250		1.049		(0.799)

- The Town of Minden and Gardnerville Town Water Company water systems should be interconnected to serve the Minden-Gardnerville areas. The Williams Ridge Technology Park and expanded industrial area and Bently Science Park systems should connect to the interconnected system as well as any residential systems in the vicinity of these areas.

Minden-Gardnerville/ Gardnerville Ranchos (supply only)/ East Valley Industrial - Figure 12.23

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
Water Supply, AF/Y	27,595		13,817		13,778
Pumping Capacity, gpm	Total Capacity:	13,465	Maximum Day:	11,150	315
	Without Largest Well:	11,465	Average Day:	4,460	
Storage, mg	2.814		6.602		(3.788)

- The Gardnerville Ranchos General Improvement District may not be able to obtain the substantial additional well capacity needed in the vicinity of the Ranchos. It is recommended, therefore, that it connect to the Town of Minden/Gardnerville Town Water Company interconnected system for supply purposes.

Gardnerville Ranchos - Figure 12.24

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	NA		NA		NA
<i>Pumping Capacity, gpm</i>	Total Capacity:	4,800	Maximum Day:	10,263	(6,863)
	Without Largest Well:	3,400	Average Day:	4,105	
<i>Storage, mg</i>	4.500		6.092		(1.592)

- The East Valley demands will remain primarily on individual wells. The exception would be the Williams Ridge Technology Park and Bently Science Park water systems and the Sunrise Estates system, all of which are planned to connect to the combined Towns system.
- The East Valley water system should remain a combined system owned and operated by Douglas County.

East Valley - Figure 12.26

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	2,889		4,018		(1,129)
<i>Pumping Capacity, gpm</i>	Total Capacity:	1,700	Maximum Day:	5,452	(4,552)
	Without Largest Well:	900	Average Day:	2,491	
<i>Storage, mg</i>	2.4 mgd		3.767		(2.917)

- The China Springs water system will remain a stand-alone system, but requires improvements to meet the minimum facilities requirements.
- The three systems in the Genoa Planning Community, Little Mondeaux, Walley's Hot Springs, and the Genoa system, encompassing Genoa Lakes and Sierra Shadows, should be combined into one system operated by Douglas County.

Genoa - Figure 12.27

	<i>Existing System(s)</i>		<i>2015 Demand</i>		<i>Excess or (Deficiency)</i>
<i>Water Supply, AF/Y</i>	900		736		164
<i>Pumping Capacity, gpm</i>	Total Capacity:	1,670	Maximum Day:	1,140	30

<i>Capacity, gpm</i>	Without Largest Well:	1,170	Average Day:	456	
<i>Storage, mg</i>		1.343		0.837	0.506

The following maps Figures 12.28 and 12.29 show the water system service areas for the Carson Valley and Topaz regions.

Water Supply Goals and Policies

The primary goal of this element is to ensure adequate water supply to serve the various demands in Douglas County with a focus on providing adequate water facilities for urban development areas.

GOAL 12.05 **All water systems shall provide a minimum level of service, designated by this element as the minimum facilities requirement, in identified areas.**

Policy 12.05.01 All water systems currently not meeting minimum facilities requirements for their existing service areas should either make improvements to rectify the deficiency or combine with another system able to provide the minimum facilities requirements for its own service area as well as the deficient system.

Policy 12.05.02 Water systems should expand service area boundaries as necessary and provide service to first-tier demands as they develop. Provisions shall be made for future service of second-tier demands. The County shall set milestones to determine when to provide water service to either first- or second-tier demands, either by distance to water mains, by physical constraints such as excessive drawdown in areas with a high density of domestic wells, by total demand in an area, or due to groundwater quality concerns.

Policy 12.05.03 A majority of water systems will be deficient in minimum facility requirements as demands develop over time. Systems will need to combine storage, pumpage, and supply capabilities to meet these future demands. System combinations or improvements will be made when demands would otherwise result in a level of service for the whole system being less than the minimum requirements.

Policy 12.05.04 New development must maintain a system's minimum level of service.

Policy 12.05.05 Major water purveyors in the Carson Valley, including the Gardnerville Ranchos General Improvement District, the Indian Hills General Improvement District, Washoe Tribe, and Douglas County should join the Carson Valley Water Authority formed by the Town of Minden and the Gardnerville Town Water Company for proper management of the Carson Valley basin water rights and resources.

Policy 12.05.06 Douglas County shall evaluate and implement system recommendations contained within this plan.

Wastewater Plan

This element provides for wastewater treatment facilities to meet the expected wastewater generation in 2015.

Existing Wastewater Facilities

There are currently three public wastewater treatment facilities that currently provide service in the Carson Valley Planning Area and one permitted private package treatment plant serving the Williams Ridge Industrial Park . There is one private treatment facility in the Topaz Planning Area. Two wastewater districts located in the Tahoe Basin dispose of secondary treated effluent in the Carson Valley.

Minden-Gardnerville Sanitation District (MGSD)

The MGSD Wastewater Treatment Facility is located in Minden and serves the towns of Minden and Gardnerville and by contract, the Gardnerville Ranchos area, as well as other developments, such as the Bently Science Park, which are not located within the previously-mentioned entities' boundaries. The treatment facility currently has an average flow of 1.4 mgd and a design capacity of 2.0 mgd using a trickling filter/solids contact aeration process system. The secondary treated effluent is stored in a 500 acre-foot reservoir located on Muller Lane. Effluent disposal is by irrigation on approximately 2,000 acres of land, the Gallepi Ranch and former Dangberg Ranch, which are north of the treatment facility. The "Minden-Gardnerville Sanitation District Master Plan" indicates flow-related phased plant expansions of 0.5 mgd per phase up to a final capacity of 4.0 mgd.

Indian Hills General Improvement District (IHGID)

The IHGID Wastewater Treatment Facility is located in the southern portion of the district and serves the Indian Hills/Jacks Valley community as well as portions of the Genoa community. Conveyance facilities have recently been completed to serve the Genoa Lakes and Little Mondeaux area. The plant's current capacity is approximately 0.50 mgd using aerated lagoons. Average flows are approximately 0.27 mgd to 0.30 mgd. Effluent is stored in a series of storage ponds. Disposal is on agricultural lands owned by the Washoe Tribe for an interim period of five to ten years. The permanent disposal location for up to .5 mgd is on the Sunridge golf course located east of Highway 395. Improvements to the system are generally development-driven based on new community growth. An expansion of 100,000 gpd is proposed to be completed in 1999.

North Valley Wastewater Service Area (Douglas County)

Douglas County operates the North Valley Wastewater Treatment Facility (NVWWTF) in the Johnson Lane Planning area, serving the Johnson Lane, Airport, Walley's Hot Springs, Genoa and North County sewer services areas. The NVWWTF is a secondary

activated sludge (Biolac extended aeration) process operated in an advanced nitrogen removal mode. The design capacity of the current Phase I Plant is 0.45 mgd. Treated effluent is disinfected and reused in the Incline Village General Improvement District Wetlands. Sludge handling and disposal is managed by sludge storage lagoons.

In 1999, the County adopted a Facilities Plan to incrementally expand the plant capacity to 2.0 mgd to meet future service area needs. The facilities plan identifies 4-phased expansions, including new odor control and sludge dewatering facilities.

In 2004, the County adopted an Effluent Storage Facility Plan to develop a comprehensive effluent reuse and management program. The facilities plan identifies the implementation of on-site ponds for winter storage and summer agricultural reuse.

In August 2006, the County adopted the Heybourne Road Sewer Line Facilities Plan to provide collection system improvements needed to meet the build-out demands of the service area. The facilities plan identifies a 3-phased expansion, including a new sewer lift station to serve the Airport Road light industrial zoning district.

Incline Village General Improvement District (IVGID)

The IVGID Treatment Facility is located in the Tahoe Basin, and the District disposes of its treated effluent within an engineered wetlands area adjacent to the North Valley Wastewater Treatment Facility and through sprinkler irrigation of agricultural fields in Jacks Valley.

Douglas County Sewer Improvement District No. 1 (DCSID)

The DCSID Treatment Facility is also located in the Lake Tahoe Basin, and the District disposes of its treated effluent on irrigated fields on the Marvin Settlemeyer Ranch and a portion of Bently Agrowdynamics property. The District has constructed a storage facility on the east side of the valley comprised of three reservoirs capable of storing approximately 1,800 acre-feet of effluent. The treatment facility exports an average of 2.1 mgd with a maximum export capacity of 3.21 mgd.

Private Package Systems

- Topaz Lodge Wastewater Treatment System: The Topaz Lodge in the Topaz Lake planning area is served by a package treatment plant with a secondary treatment process, extended aeration, with filtration and chlorination. Effluent disposal is through a leach field. The rated capacity of the treatment plant is 0.025 mgd which, according to the “Topaz Lake Area Water & Wastewater Master Plan” can be reached on a busy weekend day. This facility serves only the Topaz Lodge; all other uses in the Topaz Region are served by individual sewage disposal systems.
- Williams Ridge: A package treatment plant serves the Williams Ridge Technology Park under a NDEP discharge permit.

Kingsbury General Improvement District (KGID)

KGID, a Tahoe-based system, collects wastewater from the portion of the Summit Village and Tahoe Village areas, which extends into the Sierra Planning Region. KGID contracts with DCSID (Not affiliated with Douglas County) for sewer treatment and disposal services. This element assumes that these areas currently receive service and will continue to be adequately served by KGID.

Future Wastewater Generation

Wastewater generation within each community was determined for the years 2000, 2005, 2010, and 2015. As with the water demand projection, wastewater generations are based on a county-wide 3.5 percent annual population growth rate. Where generation is based on area, such as in commercial and industrial land uses, development of the areas is assumed to be linear with time, i.e., 25 percent per each 5-year period.

The methodology used in this element is similar to that used for the water system element since not all uses will be served. Each community was divided into three tiers which are described below:

First Tier (Municipal Demands)

- Are always served by a wastewater treatment facility.
- Are located within a wastewater service area.
- Include population and area in the following land uses: single- and multiple-family residential, future development and receiving area, industrial, commercial, community facility-schools, and some facilities in the Recreation and the Support and Institution sub-categories under Community Facility designation.

Second Tier (Other Demands in Service Area)

- May or may not be served by a wastewater treatment facility.
- Are located within a wastewater service area.
- Include population in the rural residential and the residential estates land uses located in a service area.

Third Tier (Demands Outside Service Area)

- Will remain on individual sewage disposal systems for the duration of this element's 20-year time-frame.
- Are located outside service area.
- Include population in rural residential and residential estates land uses not located in a service area, community facilities not located in a service area, and all agricultural domestic population.

The unit generation for each use is based on current State and County standards and practical experience:

- All Residential: 80 gallons per capita per day;
- Commercial: 1,000 gallons per acre per day;
- Community Facility - Elementary Schools : 20 gallons per capita per day;
- Community Facility - Middle and High Schools: 25 gallons per capita per day;
- Community Facility - Recreation: 2,500 gallons per acre per day;
- Community Facility - Support and Institution: 600 gallons per acre per day;
- Industrial: 1,000 gallons per acre per day;
- Future Development and Receiving Area: 80 gallons per capita per day;
- Agricultural Domestic: 80 gallons per capita per day.

These unit rates include allowances for the effects of inflow and infiltration. Figure 12.30 shows the average daily wastewater flow from each community for both community wastewater and septic systems.

Figure 12.30

2015 COMMUNITY WASTEWATER GENERATION

<i>COMMUNITY</i>	<i>AVERAGE DAILY FLOW IN 2015 (MGD)</i>			
	<i>1st Tier</i>	<i>2nd Tier</i>	<i>3rd Tier</i>	<i>Total</i>
Indian Hills/ Jacks Valley	0.44	0.07	0.41	0.93
Genoa	0.14	0.07	1.53	1.74
Foothill	0.00	0.00	0.20	0.20
Johnson Lane	0.05	0.38	0.78	1.21
Airport	0.82	0.00	0.50	1.33
Minden-Gardnerville	1.44	0.02	0.01	1.46
Gardnerville Ranchos	1.28	0.06	0.10	1.43
East Valley	0.92	0.02	1.01	1.95
Fish Springs	0.00	0.00	0.09	0.09
Ruhenstroth & South Valley	0.12	0.12	0.03	0.27
North Agriculture	0.00	0.00	0.02	0.02
South Agriculture	0.00	0.00	0.12	0.12
Central Valley	0.00	0.00	0.00	0.00
<i>CARSON VALLEY PLANNING REGION</i>	5.22	0.73	4.81	10.76
<i>PINENUT PLANNING REGION</i>	0.00	0.00	0.34	0.34
Topaz Lake	0.09	0.01	0.10	0.20
Topaz Ranch Estates	0.61	0.00	0.42	1.04
Antelope Valley	0.00	0.00	0.00	0.00

<i>COMMUNITY</i>	<i>AVERAGE DAILY FLOW IN 2015</i>			
	<i>(MGD)</i>			
	<i>1st Tier</i>	<i>2nd Tier</i>	<i>3rd Tier</i>	<i>Total</i>
<i>TOPAZ PLANNING REGION</i>	0.70	0.01	0.53	1.24

Wastewater Facility Recommendations

The following wastewater facility recommendations are based on review of future wastewater service requirements for 2015. The expected flow to each community facility is included in the accompanying tables.

Interim 20-Year Recommendations:

- Indian Hills GID should serve all first- and second-tier demands within the Indian Hills General Improvement District boundary, Ridgeview area, as well as the residential areas located west of the boundaries, north and south of Jacks Valley Road. Douglas County and IHGID should work cooperatively toward improving plant capacity, effluent disposal and system interconnection/redirection to maximize efficiency, cost savings and ongoing operation and maintenance. An expansion of no more than 100,000 gpd should be considered to address development related capacity needs.

Indian Hills Wastewater Treatment Facility Flows (mgd) - Figure 12.31

<i>Community</i>	<i>1995 Existing</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
		<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Indian Hills/ Jacks Valley		0.51			
Total	0.50	0.51	0.96	(0.22)	(0.46)

- The North Valley Wastewater Treatment Facility should extend its service area to include the North Valley area, Genoa area and all non-agricultural uses in the Airport and Johnson Lane areas, including all community facilities. Expansion should also include up to the Walley’s Hot Springs development: eliminating the need for the private package treatment plan. The addition of a portion IHGID flows should be investigated.

North Valley Wastewater Treatment Facility Flows (mgd) - Figure 12.32

<i>Community</i>	<i>1995 Existing</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
		<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Johnson Lane		0.43			
Airport		0.82			
East Valley Non-Industrial		0.38			
Total	0.30	1.63	1.94	(1.33)	(1.64)

**Combined North Valley & Indian Hills GID Service Area Flows
 (mgd) - Figure 12.33**

<i>Community</i>	<i>1995</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
	<i>Existing</i>	<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Indian Hills/ Jacks Valley		0.51			
Genoa		0.21			
Johnson Lane		0.43			
Airport		0.82			
Subtotal		1.98	2.21	(1.98)	(2.21)
East Valley Non- Industrial (Alternate)		0.38			
Total	0.30	2.36	2.62	(2.06)	(2.32)

- Minden-Gardnerville Sanitation District should serve all first- and second-tier demands in the Minden-Gardnerville and Ranchos communities and should extend service to East Valley industrial land uses as well as non-agricultural land uses in the Ruhestroth area.

MGSD Wastewater Treatment Facility Flows (mgd) - Figure 12.34

<i>Community</i>	<i>1995</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
	<i>Existing</i>	<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Minden- Gardnerville		1.45			
Gardnerville Ranchos		1.34			
Ruhestroth/ South Valley		0.24			
East Valley Industrial		0.60			
Total	2.00	3.64	4.00	(1.64)	(2.00)

- The Topaz Lake Planning Community as well as the Holbrook area are planned to be served by a new treatment facility in accordance with recommendations in the “Topaz Lake Area Water & Wastewater Master Plan”. The treatment facility and development in the area are interdependent; if the treatment facility does not proceed, the area would not be able to support extensive development planned for the area.

Topaz Wastewater Treatment Facility Flows (mgd) - Figure 12.35

<i>Community</i>	<i>1995</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
	<i>Existing</i>	<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Topaz Ranch Estates/ Holbrook		0.62			
Topaz Lake		0.10			
Total	0.00	0.71	0.95	(0.71)	(0.95)

- Population and areas not served by a community wastewater facility will be served by individual sewage disposal systems.

Long-Term Recommendations

- After 20 years, the Indian Hills, East Valley, and MGSD treatment facilities are planned to be phased out with flows going to the North Valley Wastewater Treatment Facility or a comparable consolidated facility. A phasing and financing plan to achieve relocation and development of facilities should be undertaken to insure that adequate funding for the major expenses are in place.

Combined North Valley, Indian Hills GID & MGSD Service Area - Figure 12.36

<i>Community</i>	<i>1995</i>	<i>2015 Flows</i>		<i>Excess or (Deficiency)</i>	
	<i>Existing</i>	<i>Avg. Day</i>	<i>Max. Month</i>	<i>Avg. Day</i>	<i>Max. Month</i>
Indian Hills/ Jacks Valley		0.51			
Genoa		0.21			
Johnson Lane		0.43			
Airport		0.82			
East Valley		0.98			
Minden- Gardnerville		1.45			
Gardnerville Ranchos		1.34			
Ruhenstroth/ South Valley		0.24			
Total	0.30	5.99	6.59	(5.69)	(6.29)

Wastewater Service Areas

The following maps (Figures 12.37 and 12.38) show the wastewater facility service areas for the Carson Valley and Topaz regions.

Effluent Reuse and Storage

Provided environmental thresholds are not exceeded, the reuse of treated effluent through crop irrigation provides a cost-effective means of disposal as well as making groundwater earmarked for irrigation available for municipal purposes. The table below (Figure 12.39) shows the area required to dispose of a 12-month volume of effluent, through either flood or sprinkler irrigation of alfalfa, for various treatment plant capacities. Irrigation method efficiencies were assumed to be 60 percent for flood irrigation and 75 percent for sprinkler irrigation. Effluent application rates were assumed to not exceed an evapotranspiration rate of 38 inches per acre per year; the nitrogen demand of alfalfa eliminates groundwater nitrate pollution concerns. Effluent irrigation would occur in a six-month growing season, thus requiring six months of effluent storage in winter for future irrigation. The table indicates the required area for six months of storage considering a nine-foot operating depth and no losses due to percolation or evaporation.

Figure 12.39

Required Irrigation and Winter Storage Area by Treatment Facility Capacity

Treatment Facility Capacity (mgd)	Irrigated Area		Six-Month Volume (ac-ft)	Winter Storage Surface Area (ac)
	Flood Irrigation (ac)	Sprinkler Irrigation (ac)		
0.00	0	0	0	0
1.00	212	265	560	62
2.00	425	531	1,120	124
3.00	637	796	1,680	187
4.00	849	1,061	2,240	249
5.00	1,061	1,327	2,801	311
6.00	1,274	1,592	3,361	373
7.00	1,486	1,857	3,921	436
8.00	1,698	2,123	4,481	498

This is a very general analysis of effluent reuse and storage area requirements. Additional detail is necessary for each facility based on actual flows and availability or suitability of land in the facility's vicinity. The above areas do not include areas for appurtenant facilities such as roads, pretreatment facilities, embankments or buffer zones, which can increase needs by 20 percent or more.

Wastewater Level of Service

The following are the level of service standards for the wastewater treatment facilities**:

- Treatment Capacity: 250 gallons per day per Equivalent Residential Unit (gpd/ERU)
- Storage Capacity: 250 (gpd/ERU)

- Disposal Capacity: 250 (gpd/ERU)

** Subject to revision by the County with the approval of the State of Nevada.

Wastewater Goals and Policies

Goal 12.06 Urban Service Areas will be served by community wastewater facilities.

- Policy 12.06.01 The County shall encourage wastewater utilities to meet first- and second-tier demands as necessary, based on the defined service area boundaries. The County shall facilitate modifications to current wastewater utility facility and financing plans.
- Policy 12.06.02 The County shall designate a level of service for public wastewater treatment, storage, and disposal facilities as part of the CIP process.
- Policy 12.06.03 Neither new development nor the expansion of service areas should be allowed to decrease a system's level of service below the specified minimum.
- Policy 12.06.04 The County shall promote a coordinated regional approach to the disposal and use of treated effluent. The County shall encourage the reuse of treated effluent to promote the goals and policies of the Master Plan. The County shall periodically review and inspect monitoring and control of effluent to protect surface and groundwater resources.

Individual Sewage Disposal (Septic) Systems

While the major concentration of development will be in urban areas where infrastructure exists or is nearby, demands outside wastewater service areas will be served by individual sewage disposal (septic) systems. Figure 12.19 indicates, by community, the third-tier demands to be served by septic systems. Concerns with groundwater degradation due to inadequate treatment of wastewater from septic systems prompted an evaluation of septic systems in the Carson and Antelope Valleys by Lumos and Associates in the report titled "Douglas County Wastewater Boundary Study."

The evaluation uses the Le Grand method for assessing contamination potential based on the following factors:

Distance to Water Table

This distance between the bottom of the disposal field and the groundwater table, known as the zone of aeration, is the area where soil contaminants are treated or removed. The

greater the thickness of the zone of aeration, the greater the potential for contaminant treatment or removal prior to reaching the groundwater table.

Sorption

Chemical and physical sorption are the means by which contaminants in septic system effluent are retained on soil particles. Sorptive capacity is dependent on soil type; clays have greater sorptive capacity than sands. The greater a soil's sorptive capacity, the more likely the soil will treat or degrade contaminants.

Permeability

The Le Grand method analyzes soil permeability in two ways: the soil's capacity to allow water to pass through it and the sorptive qualities of clays contained in the soil matrix. The greater the soil permeability, the faster septic effluent can travel through the soil and the less likely contaminants will be treated prior to reaching groundwater. A soil with too low permeability, however, may cause wastewater to be shunted to the surface in the vicinity of the septic system.

Water Table Gradient

The water table gradient indicates the direction and rate of groundwater flow. The greater the gradient toward a water supply, the more rapidly contaminants can be carried to a water supply.

Distance to a Point of Use

The farther a point of effluent discharge is from a point of water use, the more likely contaminants in the effluent will be treated, diluted, degraded, or removed prior to reaching the point of water use.

The study made assumptions about soil types and soil-related factors noted above by linking them to depth to groundwater. Groundwater depth information was obtained from well data accurate to the nearest quarter quarter section. The County should utilize its geographical information system (GIS) to compile available information for further analysis of areas' conduciveness to new septic systems.

The study also addresses the effect of hydrogeologic features on septic system suitability.

Flood plains

The study recommends special design of septic systems to prevent sheet flow or ponding over leach fields.

High Ground Water

As discussed previously, the shorter the distance to the groundwater table, the less the treatment which can occur before contaminants reach groundwater. The study identifies areas with groundwater depths of ten feet or less and considers septic systems in these areas as ineffective in wastewater treatment.

Excessive Slopes

This situation encompasses several factors affecting septic suitability, including effluent surfacing, slope instability, and steep groundwater gradients. The study identifies areas with slopes 15 percent or greater as unsuitable for septic systems.

Soils

The study identifies shallow soils, five feet or less in depth, as unsuitable.

Bedrock

Shallow bedrock can trap and collect minimally-treated septic system effluent, which may eventually cause downgradient surfacing. Effluent can also migrate rapidly to the groundwater through fissures in the bedrock. Also, shallow bedrock is generally associated with soils which have limited effectiveness for effluent treatment.

Density

Nevada Division of Environmental Protection requires a hydrologic assessment for new subdivisions, which propose septic system densities of 117 septic systems per square mile in Carson Valley and 111 septic systems per square mile in Antelope Valley. This requirement shall not be circumvented through parcel map process.

Several of the factors noted above may be overcome through special design of a septic system; a special design should be performed when any of the above contaminant or hydrogeologic concerns are apparent at an individual site.

Recommendations

The following are recommendations for septic systems:

- Septic systems are temporary means of wastewater treatment. Once a system fails, the system must be abandoned and another constructed to current standards. When located near a public wastewater system, connection may be required.
- Special evaluation and design must be performed for a proposed septic system site, which exhibits any of the following characteristics: high groundwater table,

minimal sorptive capacity, too low or too high permeability, inadequate distance to point of water use, location in flood plain, excessive slopes, shallow bedrock, or excessive septic system density. If any of these concerns cannot be corrected by special design, a septic system is unsuitable.

Individual Sewage Disposal System Goals and Policies

GOAL 12.07 Rural areas may be served by individual sewage disposal systems if groundwater quality will not result in degradation beyond Federal and State standards.

- Policy 12.07.01 The County shall utilize State of Nevada standards for the evaluation of new septic systems on the basis of the site's susceptibility to groundwater pollution by septic effluent. The standards include, but are not limited to, depth to groundwater, soil qualities, water table gradient, distance to point of water use, slope, depth to bedrock, and parcel size.
- Policy 12.07.02 The County shall evaluate new parcel maps and subdivisions to determine whether the maximum densities of 117 per square mile in the Carson Valley watershed and 111 per square mile in the Antelope Valley watershed could be exceeded. Where it is determined densities could be exceeded, a groundwater study, in accordance with the NDEP standards, shall be prepared to indicate whether proposed densities are: a) acceptable, or b) need to be reduced. In the alternative, the County may require connection to a community wastewater system or allow the use of an alternative wastewater septage system.
- Policy 12.07.03 The County shall monitor areas with high septic system densities for signs of groundwater contamination. The County shall develop standards for determining when an area will need to be connected to a community wastewater treatment facility.
- Policy 12.07.04 The County shall proceed with the planning, design, and construction of a septage receiving and treatment facility at the North Valley Treatment Facility to encourage and promote the effective routine maintenance and servicing of individual sewage disposal systems.
- Policy 12.07.05 Septic systems are a temporary means of wastewater treatment. Once a system stops functioning, the system must be abandoned and another constructed to current standards. Where the property is located near a community sewer system, connection will be required.