# Lander County
# Water Resources Plan

2010

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**Adopted:**
**March 24, 2011**

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## 1.0 INTRODUCTION

Lander County Nevada is valued for historical significance, mountain scenery, rich natural resources, and diverse recreational opportunities. The County's natural resources have attracted residents since the 1800's when prospectors sought the area's gold and silver. Today mining, outdoor recreation, and agriculture serve as a basis for the County economy.

The "boom or bust" nature of the mining industry has resulted in periods of rapid growth and corresponding economic declines throughout the County. Both Austin and Battle Mountain have experienced these cyclical growth patterns that have resulted in reactive development to satisfy immediate needs. By establishing long-range planning goals through a water planning effort, the quality of life for all Lander County residents can be improved and protected.

The Lander County Water Resources Plan is intended to provide guidance for the development, management, and use of water in the County. It focuses primarily on current and future water demand, and provides an overview of water resources throughout Lander County. Figure 1-1 (page 4) shows hydrographic basins in Lander County and major surface water features.

The use of water in Lander County is critical to current and future development of the region. Water resources play a key role in the major economic activity for the county including mining, agriculture, and tourism and recreational activity. Even with the relatively small population base in the County, competing uses of water resources is particularly evident throughout many areas of Lander County.

### Purpose of the Plan

The purpose of the Lander County Water Resources Plan is to:

- Identify current and future water demands for municipal and industrial, irrigation, mining, and other domestic water uses within Lander County,
- Identify current water use, water quality and water quantity in Lander County,
- Identify committed water resources by place and manner of use,
- Identify critical water resource issues and establish priorities for areas throughout the County; and,
- Establish water resource policies and action programs.

### Water Plan Goals and Objectives

Lander County Water Resources Plan policies are organized according to three primary goals:

**Goal 1: Plan for the development and use of sustainable water supplies for long-term growth and development of Lander County.**

Objective 1.1 Promote efficient use of resources.
Objective 1.2 Provide an acceptable level of service in Lander County communities.
Objective 1.3 Implement measures to protect water resources for beneficial use within Lander County.
Objective 1.4 Ensure land use planning incorporates water resources.

**Goal 2: Protect Surface and Groundwater Quality in Lander County**

Objective 2.1 Establish measures to prevent surface and groundwater contamination.
Objective 2.2 Manage wastewater for protection of water resources.
Objective 2.3 Establish well-head protection areas for groundwater resources

**Goal 3: Ensure proper floodplain and watershed management to protect human health, property, water quality, and the environment.**

Objective 3.1 Effective and integrated watershed management.
Objective 3.2 Protect critical flood zones.
Objective 3.3 Monitor areas with groundwater and surface water contamination.
Objective 3.4 Establish watershed management programs for the Reese River, Kingston Creek, Humboldt River, and Pony Canyon areas.

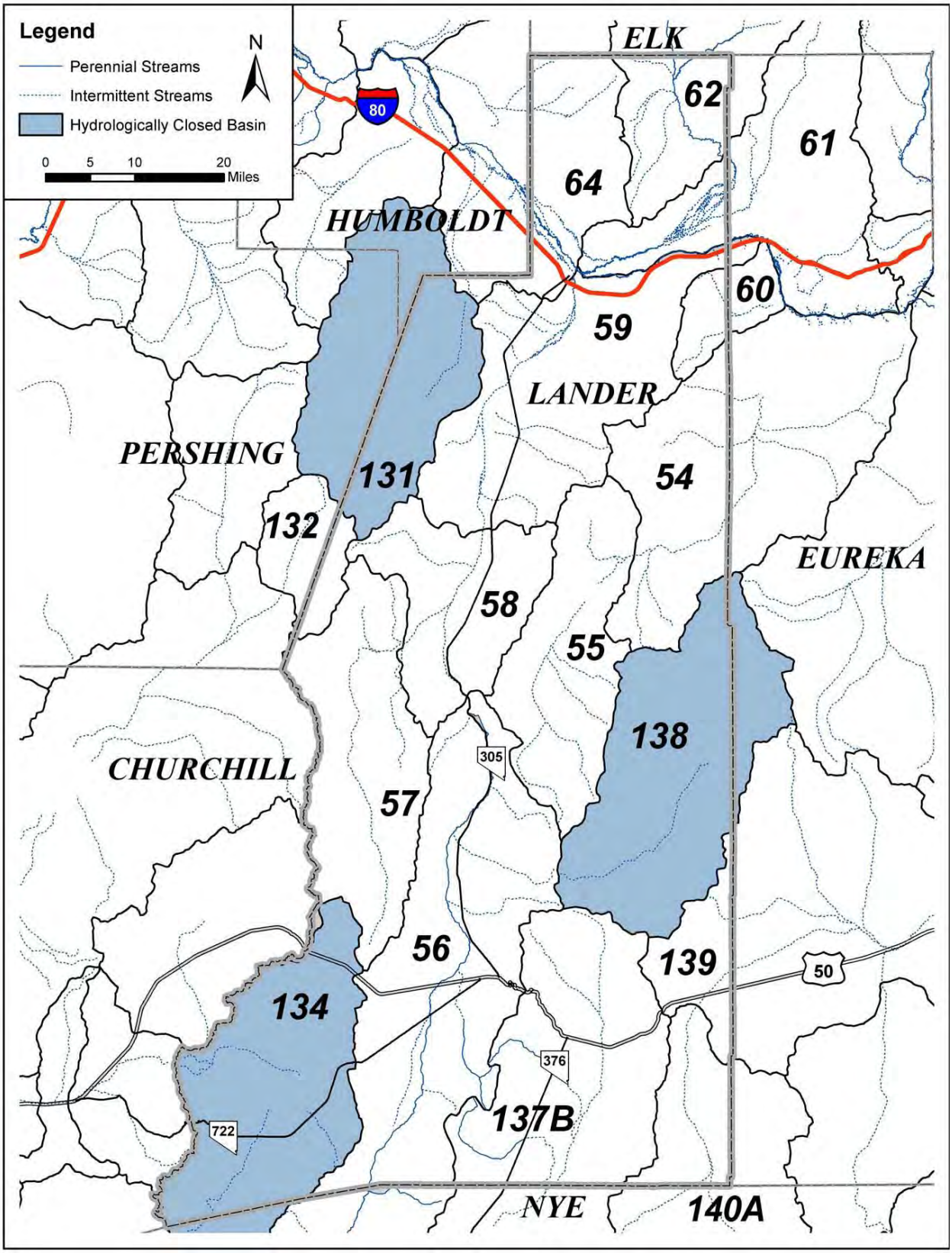
**Statutory Authority**

Nevada Revised Statutes (Section 278.150) directs the planning commission to prepare and adopt a comprehensive, long-term general plan for the physical development of the city, county or region that in the Commission's judgment bears relation to the planning thereof. The Master Plan is designed to promote the public health, safety, and general welfare of the County. The Plan is both long-term and comprehensive in nature. It sets forth policies and action programs for the County to follow when making decisions concerning the County's future. The policies and action programs are intended to ensure that the County's livability is enhanced, rather than reduced, as the county grows. One primary policy objective identified in the Master Plan was the development and adopt an update to the county-wide water resource management plan.

In addition to the Master Plan, Lander County also draws policy direction from the Revised Policy Plan for Federally Administered Lands. The initial Lander County Policy Plan for Federally Administered Lands was adopted on October 4, 1984 by the Lander County Board of County Commissioners. An Interim Plan for the management of these lands was approved by the Board of County Commissioners in 1995. The Board authorized an update to the Interim

Plan and subsequently adopted the Revised Lander County Policy Plan for Federally Administered Lands in 2005. The plan is a set of policies and measures designed to increase the role Lander County residents have in determining the management of federally administered lands.

**Figure 1-1: Groundwater Basins in Lander County**



The Elko, Eureka, Lander, Humboldt, and Pershing County Commissions pursuant to NRS 277.080 and 277.140 inclusive of the interlocal Cooperation Act organized the Humboldt River Basin Water Authority (Authority). The Authority is governed by a fifteen-member board of directors with three directors appointed by each of the five member counties, one county commissioner from each member county serves on the Authority's board. The Authority has functioned since 1993.

The Central Nevada Regional Water Authority is a unit of local government that collaboratively and proactively addresses water resource issues common to communities in Nevada's rural interior. The Authority exists under Nevada's Interlocal Cooperation Act (NRS Chapter 277) and has delegated authorities separate and apart from its member counties. The Central Hydrographic Region, as defined by the Nevada Division of Water Resources consists of 78 ground water basins in 11 Nevada counties. The region is the largest of our state's 14 Hydrographic Regions, encompassing much of central, eastern and southern Nevada. Member Counties include Churchill, Nye, Lander, White Pine, Esmeralda, Eureka and Elko. The Members share a common interest in the protection, enhancement and beneficial use of surface water and ground water originating within the unique hydrographic region serving the greater community of the members.

**Organization**

The Lander County Water Resources Plan contains the following sections:

- Section 2.0 provides a summary description of water resources and current uses in Lander County.

- Section 3.0 discusses population growth, and future demands for water resources including municipal and industrial use, irrigation, mining, and other domestic uses. This section also discusses long-term water resource requirements for Lander County.

- Section 4.0 provides estimates of long-term water resource needs for Lander County This section considers a variety of uses and needs within Lander County over a period of 50 or more years.

- Section 5.0 includes information related to the County's three primary community areas. This section also identifies important water related issues and priorities and major capital improvements for the three water service providers in Lander County.

- Section 6.0 establishes water management policies and action programs for Lander County necessary to meet the Plan's goals and objectives.

Finally, the Appendix contains a summary of hydrographic basins located entirely or in part in Lander County. It contains information on water rights, yield, groundwater levels, current water use, and surface water resources in each basin.

## 2.0 WATER RESOURCES SUMMARY

### 2.1 Water Quality and Quantity

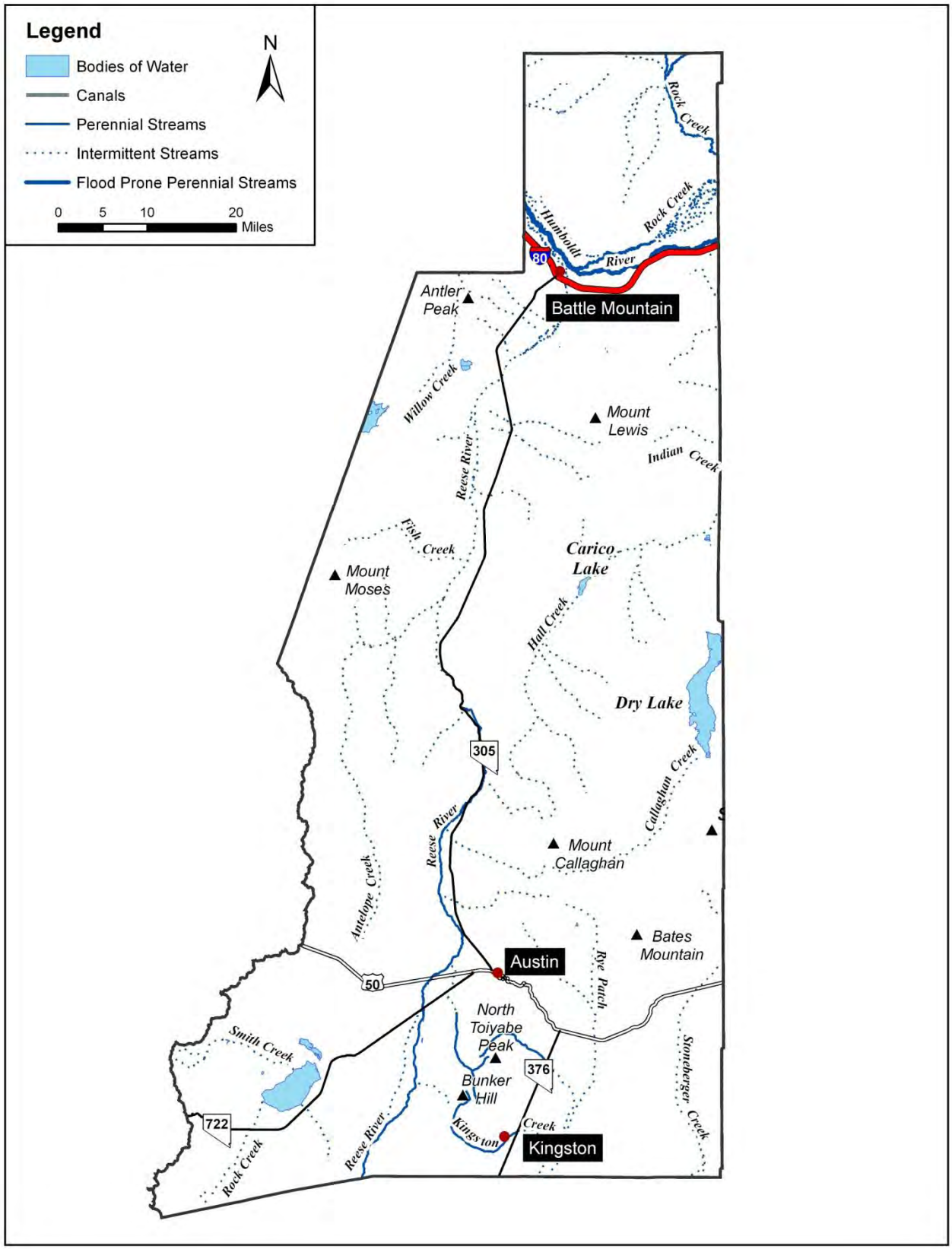
#### 2.1.1 Surface Water

The hydrology of Lander County is typical of the basin and range environment. Precipitation is seasonal with rain or snow in the winter and thunderstorms in the summer. Stream flows are seasonal with the peak flows typically occurring in the spring. Major surface water features in Lander County are shown in Figure 2-1. There are three major streams in Lander County. They include the Humboldt River, the Reese River, and Rock Creek. Other surface water features are described in more detail in Appendix A (Basin Summaries).

The dominant hydrologic feature in the region is the Humboldt River, which has had a significant impact on the history of the development of Battle Mountain. Water records kept sporadically for flow in the River since 1896, show an average discharge of 302 cubic feet per second (cfs), or 218,600 acre-feet per year. The drainage area above Battle Mountain is an impressive 8,870 square miles, which can cause serious flooding during unusual conditions. Several irrigation diversions exist upstream which have some impact on flow in the Humboldt River during the growing season. During the 1990s, the highest peak flow occurred on June 13, 1995 when the Humboldt River reached a flow of 4,010 cfs. High flows in the River begin to build in February and March, with the onset of spring snowmelt. Peak flows historically occur in June and rapidly decrease in July, to base flow conditions by August. Base flows continue until February of the following year.

The Reese River in contrast, has a drainage area of 2,330 square miles at Battle Mountain, and an average discharge of 10.4 cfs or 7,530 acre-feet (measured at Ione, upriver). Peak flow on the Reese River during the 1962 flood was estimated at 4,760 cfs, compared to 167 cfs at Ione. It has a similar hydrograph as the Humboldt River with peak flows occurring in June in most years. Periods of no flow are recorded in some years. The Reese River is fed by several tributaries draining the west slopes of the Toiyabe Mountains including Cottonwood Creek, Big Creek, Italian Creek, Silver Creek and Boone Creek. During intense or unusual storm events surface flows from Antelope Valley can reach the Reese River.

# Figure 2-1: Lander County Surface Water Features



Rock Creek and its tributaries drain much the area west of the Tuscarora Mountains. The headwaters of Rock Creek are in the unnamed mountain range on the northern side of Willow Creek Valley in Elko County. Rock Creek is joined by Willow Creek and flows southward in a rugged canyon to Rock Creek Valley. Flows of each stream are influenced by irrigation diversions and releases from Willow Creek Reservoir. Rock Creek is then joined by Antelope Creek, cuts through the Sheep Creek Range by way of another rugged canyon, and enters Boulder Flat. Rock Creek at the gaging station where it enters Boulder Flat discharges about 29,000 acre-feet/year. Flow of the stream probably enters Humboldt River in years of above-normal runoff. Rock Creek is joined by Boulder Creek in the lowlands between the Sheep Creek Range and the Argenta Rim and then enters the Humboldt River about 2 miles east of Battle Mountain. Rock Creek has no baseflow near the Humboldt River.

Other significant surface water features include a number of smaller streams located throughout the County most of which are perennial in the upper reaches then becoming ephemeral near the valley floors. There are no major lakes or reservoirs in the County with the exception of Groves Lake which is approximately 10 acres in size. There are a host of smaller reservoirs associated with local ranching operations. Two of the largest are located at Iowa Creek Ranch and Smith Creek Ranch. Specific information on surface water features in Lander County can be found in the individual hydrographic basin summaries contained in Appendix A.

Surface water quality is generally good in Lander County. Surface waters have variable amounts of total dissolved solids (TDS), but generally have less than 325 milligrams per liter (mg/l) making them suitable for all uses. Specific conductance, a good measure of water quality typically ranges from 300-500 micromhs. The pH of local surface water is in the mildly alkaline range around 8.0 with dissolved calcium, sodium, and sulfate. Suspended sediments can be very high at times during runoff events. Based upon information in individual basin summaries (Appendix A), surface water in Lander County is generally acceptable for most uses.

Table 2-1 shows a summary of surface water rights. The total quantity of surface water resources in Lander County is not known and the quantity of committed resources is not known with certainty. These data have not in all cases been supplementally adjusted, and may, therefore include water rights that are used supplemental with groundwater rights or with multiple points of diversion. Total water rights include vested, reserved, permitted, certificated, and decreed water rights.

### 2.1.2 Groundwater

Ground water occurs in porous alluvial basins adjacent to the Humboldt and Reese Rivers, as well as Rock Creek and other water courses in the region. Ground water also occurs with fractures in the bedrock of upland mountain ranges.

Recharge occurs primarily from precipitation, and infiltration in the case of the Humboldt River. Ground water discharge from the Humboldt River Basin is estimated to be about 30,000 acre-feet per year (Rush et al, 1971). There are two major hydrographic basins/regions (Humboldt River Basin and the Central Region) in Lander County. Figure 2-2 shows groundwater basins contained in whole or in part within Lander County.

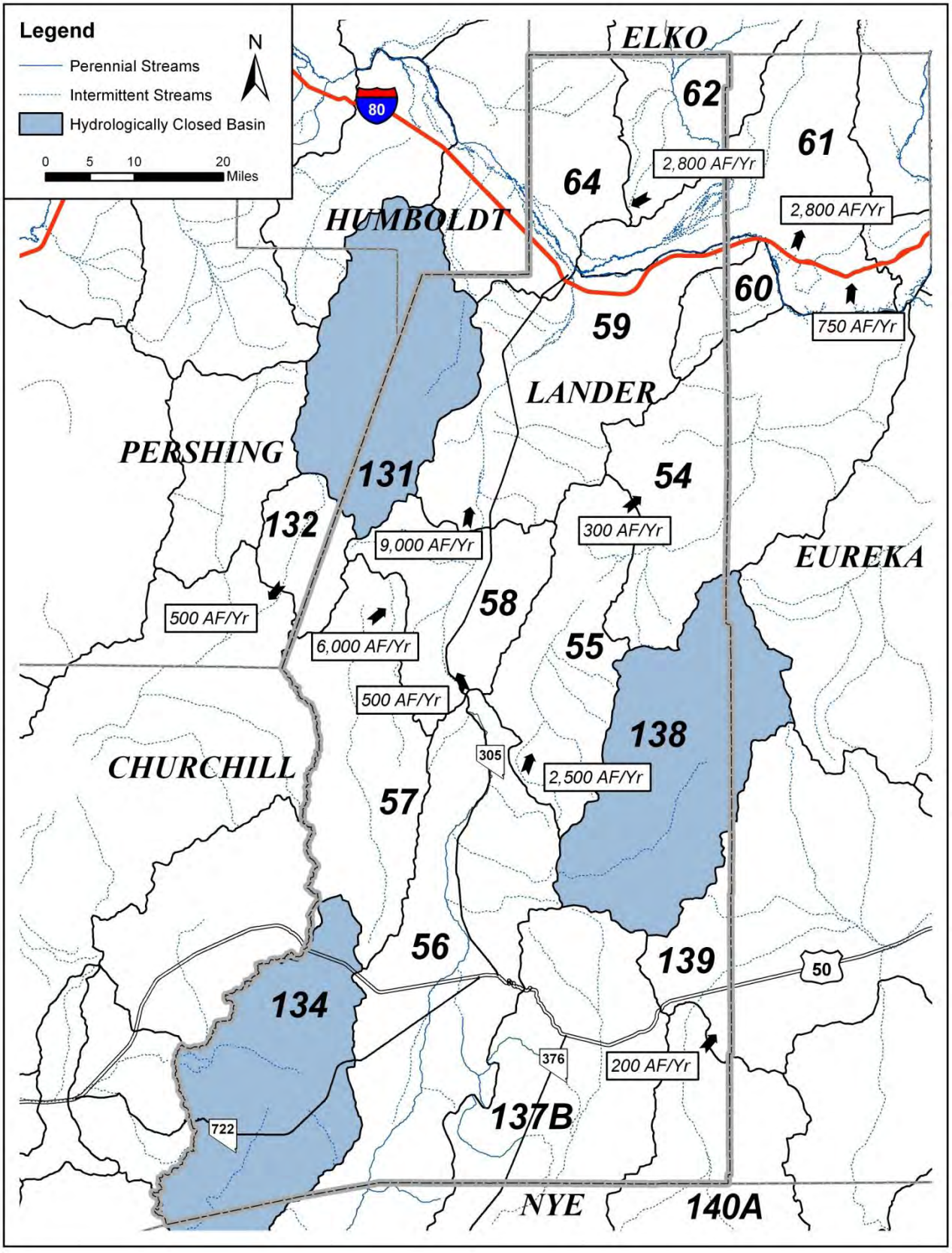
There are a total of 18 groundwater basins in Lander County. Only three of the groundwater basins in Lander County are hydrologically closed units. Figure 2-2 also shows which basins are closed and the amount of subsurface flow moving between each groundwater basin. As shown in Figure 2-2 subsurface flow from Upper Reese River, Antelope Valley and Middle Reese River ultimately contributes to groundwater recharge in the lower Reese River Valley basin. Each year the lower Reese River Valley receives approximately 9,000 acre-feet of subsurface flow from the Middle Reese River Valley. The majority of Lander County's population currently lives within four major groundwater sub-basins (See Table 3-4). Three basins bisect the Battle Mountain area, they are 64 Clovers Area, 61-Boulder Flat, and 59 Lower Reese River Valley. All three sub-basins are currently designated. The Austin area is located in basin 56-Upper Reese River Valley and Kingston/Gilman Springs is located in 137B-Big Smoky Valley.

**Table 2-1**
**Summary of Surface Water Rights and Applications in Lander County**
**As of August 2010**

| Basin | Certificated | Decreed | Permitted | Vested | Reserved | Ready for Protest | Ready for Action |
|---|---|---|---|---|---|---|---|
| 54 | 190.95 | | 123.4 | 120.46 | 0 | 0 | 0 |
| 55 | 2,187.60 | 1,392.48 | | 539.69 | | | |
| 56 | 13,351.65 | 1,568.65 | 3,008.96 | 4,378.59 | 4.24 | | |
| 57 | 341.24 | | | 1,404.73 | 21.05 | | |
| 58 | 1,493.55 | | | 1,523.98 | | 58.63 | |
| 59 | 5,089.92 | | 2,503.51 | 1,096.73 | | 30.69 | 1,280 |
| 60 | | | | 6.94 | | | 4.48 |
| 61 | 2,456.45 | | | | | | |
| 62 | 67.76 | | | | | | |
| 64 | | | | | | | |
| 131 | 103.199 | | 1,874.81 | | | | |
| 132 | 33.60 | | | | | | |
| 134 | 3,853.97 | | 640 | 1,482.68 | | | |
| 137b | 7,409.20 | 290 | 6,252.72 | 5,113.69 | 33.60 | | |
| 138 | 2,727.81 | | 9.09 | 5.21 | | | |
| 139 | 175.47 | | | | | | |
| 140A | 280.78 | | | | | | |

**Source: Nevada Division of Water Resources, 2010**

**Figure 2-2: Groundwater Basins and Subsurface Flows**



Certain areas of Lander County have been "designated" by the State of Nevada. This designation means that permits to pump water are not being issued, being issued with limitations, or issued for preferred uses only. Possible appropriations are allowed for industrial, municipal, domestic mining, and stock watering, but are restricted for irrigation purposes. The depth of water in the valleys of Lander County varies tremendously. On average, ground water is as shallow as 10 feet and as deep as 460 feet. The depth of domestic water wells reported to the Nevada Division of Health Protection Services is generally less than 200 feet.

Lander County includes all or part of 18 hydrologic ground water basins. The amount of water that can be removed from a basin without causing the depletion of the resource is defined by the perennial yield. Estimates for the perennial yields of several basins in Lander County are shown in Table 2-2. Seven basins are open to additional groundwater appropriations for all uses. Eight basins are designated preferred use (domestic, municipal, and quasi-municipal) and are closed to further irrigation permits. The three remaining basins are partially closed to further irrigation permits. Table 2-3 summarizes groundwater rights in basins contained wholly or in part in Lander County.

**Table 2-2**
**Perennial Yield**
**Groundwater Basins in Lander County: 2010**

| Basin | Region | Name | Perennial Yield | Designated, Engineers Order |
|---|---|---|---|---|
| 54 | Humboldt River | Crescent Valley | 16,000 | Y-All, O-755 |
| 55 | | Carico Lake | 4,000 | N |
| 56 | | Upper Reese River V. | 37,000 | N |
| 57 | | Antelope Valley | 9,000 | Y-Portion, O-276 |
| 58 | | Middle Reese River V. | 14,000 | Y-Portion, O-276 |
| 59 | | Lower Reese River V. | 17,000 | Y-All, O-739 |
| 60 | | Whirlwind Valley | 3,000 | Y-All, O-799 |
| 61 | | Boulder Flat | 30,000 | Y-Preference,O-799 |
| 62 | | Rock Creek Valley | 2,800 | N |
| 64 | | Clovers Area | 40,000 | Y-All, O-700 |
| 128 | Central Region | Dixie Valley | 15,000 | Y-All, |
| 131 | | Buffalo Valley | 8,000 | N |
| 132 | | Jersey Valley | 250 | Y-All, O-715 |
| 134 | | Smith Creek | 10,000 | N |
| 137B | | Big Smoky NP | 65,000 | Y-All, O-852 |
| 138 | | Grass Valley | 13,000 | N |
| 139 | | Kobeh Valley | 16,000 | Y-All, O-816 |
| 140A | | Monitor Valley | 8,000 | N |

Source: Nevada Division of Water Resources, 2009

**Table 2-3**
**Summary of Groundwater Rights**
**By Type of Use for Basin in Lander County: 2000 and 2010**

| Type of Use | Active-2000 | Active 2010 | Pending 2010 |
|---|---|---|---|
| Commercial | 22.21 | 47.83 | 0.00 |
| Construction | 325.78 | 0.00 | 0.00 |
| Domestic | 120.58 | 66.80 | 0.00 |
| Environmental | 108.24 | 583.51 | 0.00 |
| Industrial | 47,727.06 | 33,310.95 | 14.30 |
| Irrigation © | 0.00 | 0.00 | 0.00 |
| Irrigation DLE | 44,227.33 | 21,279.90 | 16,960.00 |
| Irrigation | 244,949.19 | 237,584.93 | 52,467.97 |
| Mining | 90,574.80 | 145,335.96 | 24,861.50 |
| Municipal | 3,690.37 | 6,096.21 | 0.00 |
| Power Generation | 0.00 | 0.00 | 0.00 |
| Quasi-Municipal | 4,278.63 | 3,575.82 | 0.00 |
| Recreation | 555.48 | 534.27 | 0.00 |
| Stock Water | 2,125.37 | 2,450.92 | 160.13 |
| Storage | 0.00 | 0.00 | 0.00 |
| Wildlife | 0.00 | 0.00 | 0.00 |
| Other/Decreed | 46.46 | 46.46 | 0.00 |
| | 438,751.50 | 450,913.56 | 94,463.90 |

Totals in Table 2-3 include water rights that have not been adjusted for supplemental relationships with other water rights (surface or groundwater). Values are subject to change due to pending water right applications, and possible cancellations and forfeitures.

There are seven hydrographic basins in Lander County that are open to additional groundwater appropriations. With the exception of basin 140A and 134, current groundwater withdrawals are at or near the basin's perennial yield. Basin 140A's current groundwater duty is 280.78 acre-feet annually with a perennial yield of 8,000. Basin 134's current groundwater duty is 1,915.57 acre-feet annually with a perennial yield of 10,000 acre-feet. Nearly all of this water is in basins that are entirely contained within Lander County. Recent studies by the USGS WRI Report 99-4272 suggests that recharge to Carico Lake Valley and Upper Reese River Valley may be significantly higher than previous estimates.

### 2.1.3 Groundwater Levels

Groundwater levels vary from location to location based upon uses impacting groundwater basins. Important to the continued health of water resources is the trends in groundwater depths as a result of withdrawals and use. Short-term changes in groundwater levels can occur with fluctuations in annual precipitation which in turn affects available recharge. Mining water use can have temporary and dramatic impacts on local groundwater aquifers.

The State Engineer's Office maintains well records and groundwater depths for hydrographic basins. An extensive review of the well data for basins contained within Lander County shows that water levels remain relatively unchanged in a number of basins. Such basin include 138, 137B, 55, 60, 140a and 134. Water use and development in these areas is relatively limited or well data does not exist.

Mining operations impact groundwater in several basins. Such basins include 59, 60, 61, 62, 64, and 54. Basins 59 to 64 include areas influenced by the Humboldt River. Because mine dewater directly or indirectly influences the amount of recharge in the Humboldt River Basin, groundwater levels in basins 59, 60, 61, 62, and 64 have remained unchanged and in some instances have increased due to dewatering activities influencing the Humboldt River Basin.

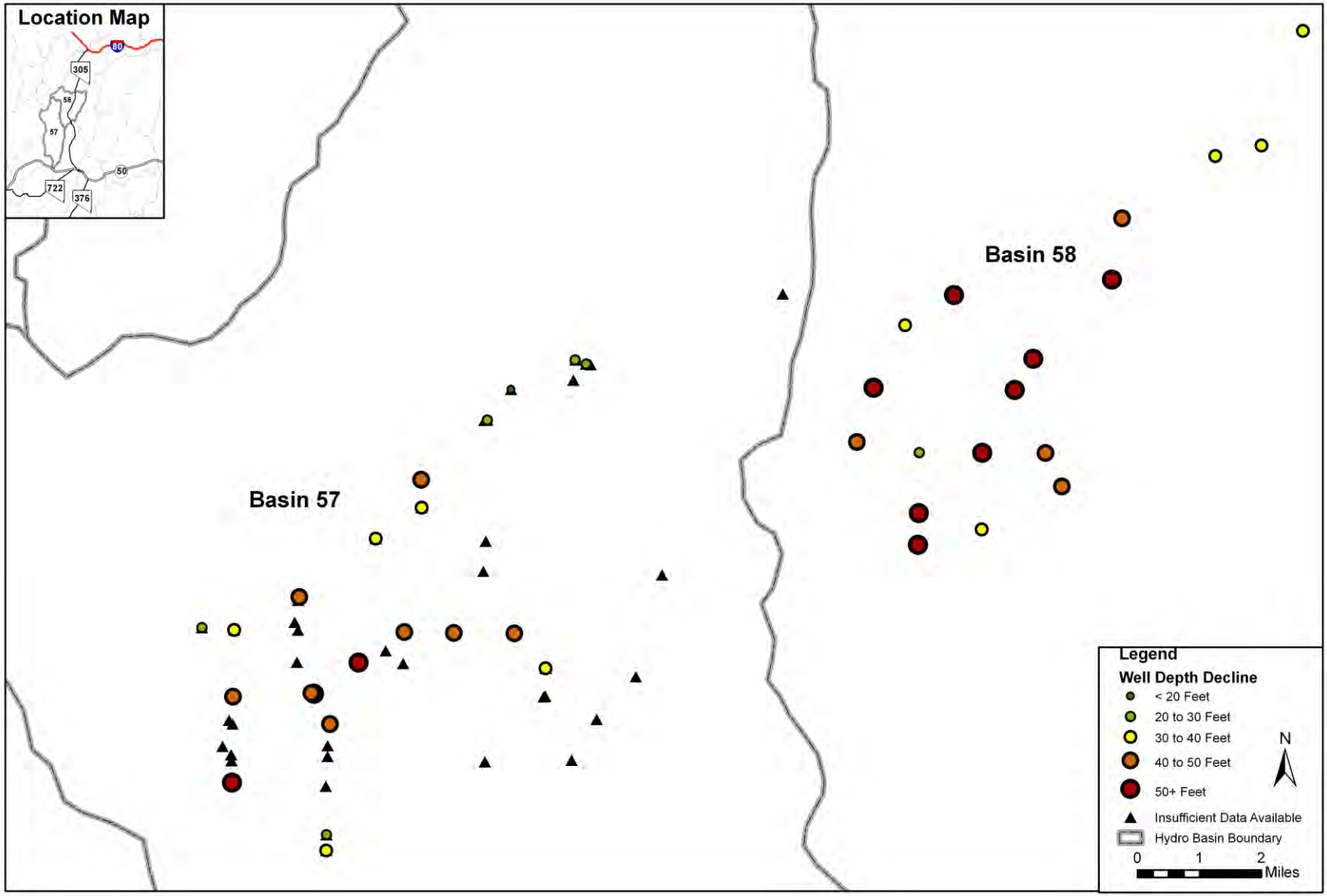
Basin 54 contains Cortez mines and the Town of Crescent Valley. Pit dewatering has reduced groundwater depths in the southwest region of the basin near the Lander County line. Lower elevations of Crescent Valley to the north are experiencing increases in groundwater levels. Once mining operations stop, changes to groundwater levels will likely revert back to pre-dewatering conditions and levels.

Basins 56, 58 and 59 encompass the Reese River Valley. Basin 57 is the Antelope Valley. Overall, few changes in groundwater levels are occurring in the 56 and 59. Substantial groundwater declines have occurred in Basins 57 and 58 where agricultural water use and groundwater pumping have resulted in significant declines over the last 20 years (See Figure 2-3). Groundwater pumping in Basin 57 has probably eliminated or reduced any groundwater flow between the two basins. A similar situation may exist in Basin 58. Underflow from Antelope Valley to Middle Reese River Valley and Middle Reese River Valley to Lower Reese River Valley is estimated to be 6,000 and 9,000 acre-feet per year, respectively (NDCNR 1963).

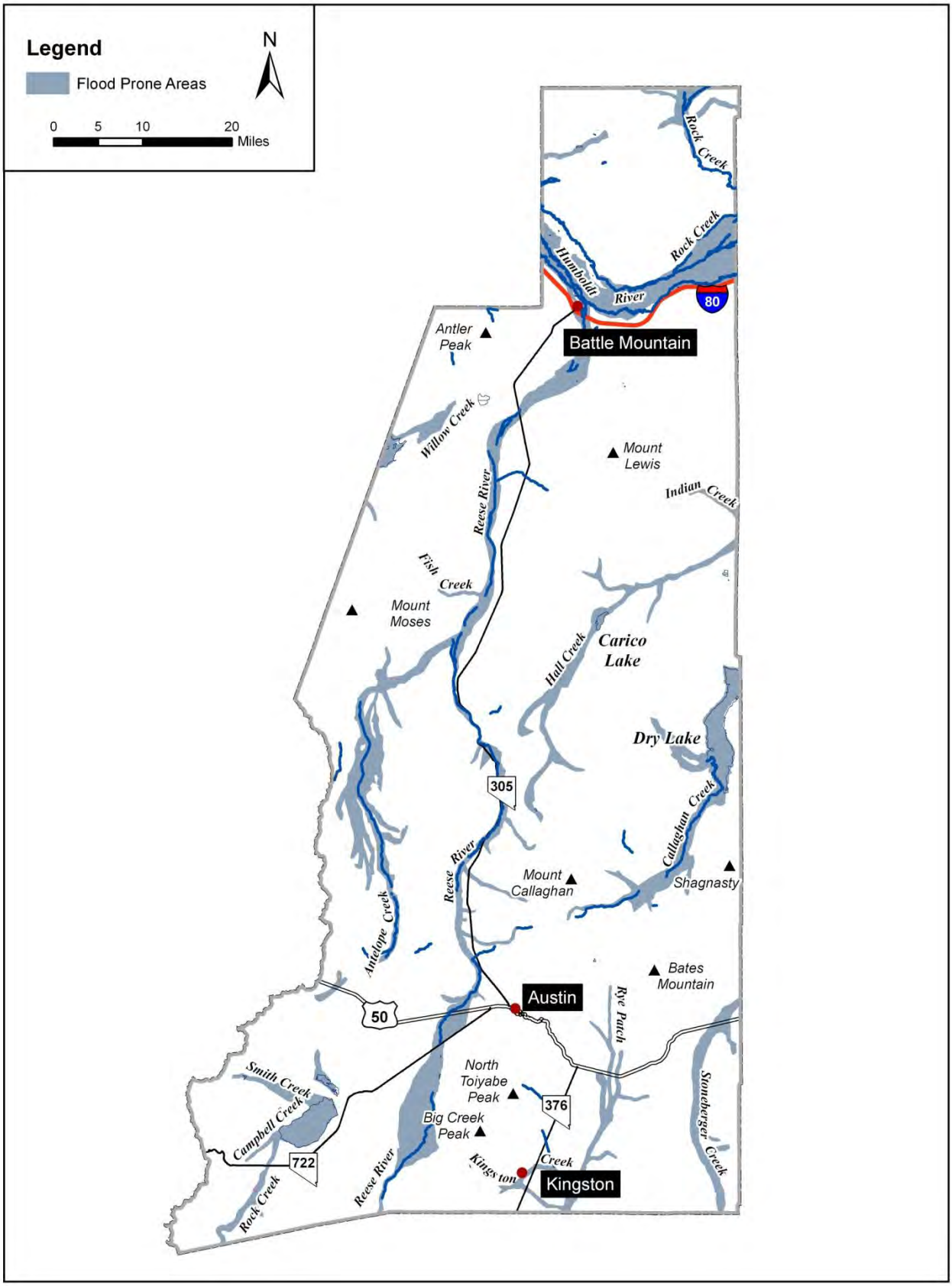
## 2.2 Flood Hazards

Figure 2-4 shows flood prone areas in Lander County. Figure 2-4 is for orientation purposes only and should not be used as an authoritative source for determining whether specific streets, properties, or buildings are within a flood hazard area. The appropriate Flood Insurance Rate Map panel must be consulted for these purposes. The greatest flood potential exists along the Humboldt River. The townsite of Battle Mountain is located very near the confluence of the Humboldt and Reese Rivers. There is limited historical data documenting flooding in the area, it is likely that periodic flooding has occurred. Flow in these rivers is highly variable. Peak flows for the Humboldt on May 3 and 4 1952 were 5,800 cfs, and for the Reese River on June 26, 1963 peak flow was 2,140 cfs. No flow was recorded in September and October 1948, September 1949, and September 1959. During a wet year, like 1962, annual discharge was 331,000 acre-feet on the Humboldt River.

**Figure 2-3: Groundwater Level - Basins 57 and 58 (1989 – 2009)**



## Figure 2-4: Lander County Flood Prone Areas



Severe flooding last occurred at Battle Mountain in May 1984, when a sudden warming trend melted the snow pack. This flow was estimated between the stations at Elko and Imlay by the US Geological Survey (USGS) to be about 7,500 cfs. This is close to the 100-year peak flow for the Humboldt River (FEMA, 1990). The resulting 100-year flood plain (See Figure 2-5) as defined by the Federal Environmental Management Agency covers most of the Battle Mountain townsite, and all of the Humboldt and Reese River Valleys (FEMA, 1990).

Extensive flooding occurred at Battle Mountain in February 1962, before construction of the US Army Corps of Engineers (COE) levee (FEMA, 1990). Flood waters were impounded by the southern Pacific Railroad line, and the embankment had to be breached. The levee now extends along the western bank of the Reese River from Interstate 80 to State Highway 305. It is important to note, however, that the levee does not meet the current FEMA evaluation criteria for the no Special Flood Hazard Area. The levee does not provide 3 feet of minimum freeboard during the 100-year flood. As a result, growth is hampered because of the high cost of insurance and businesses are reluctant to locate in a floodplain.

Resolution to the flood plain issue in Battle Mountain is not expected for several years. As a result the current flood zone designations remain in place for the foreseeable future.

Peak flow in Kingston Creek during May of 1984, was 221 cfs. Some roads were washed out in this area. A maximum of 385 cfs was measured a year earlier on May 28, 1983. Kingston Canyon reservoir has a moderating effect on peak flows in this watershed (FEMA, 1990). Proper spillway functioning has always been a concern for Groves Lake.

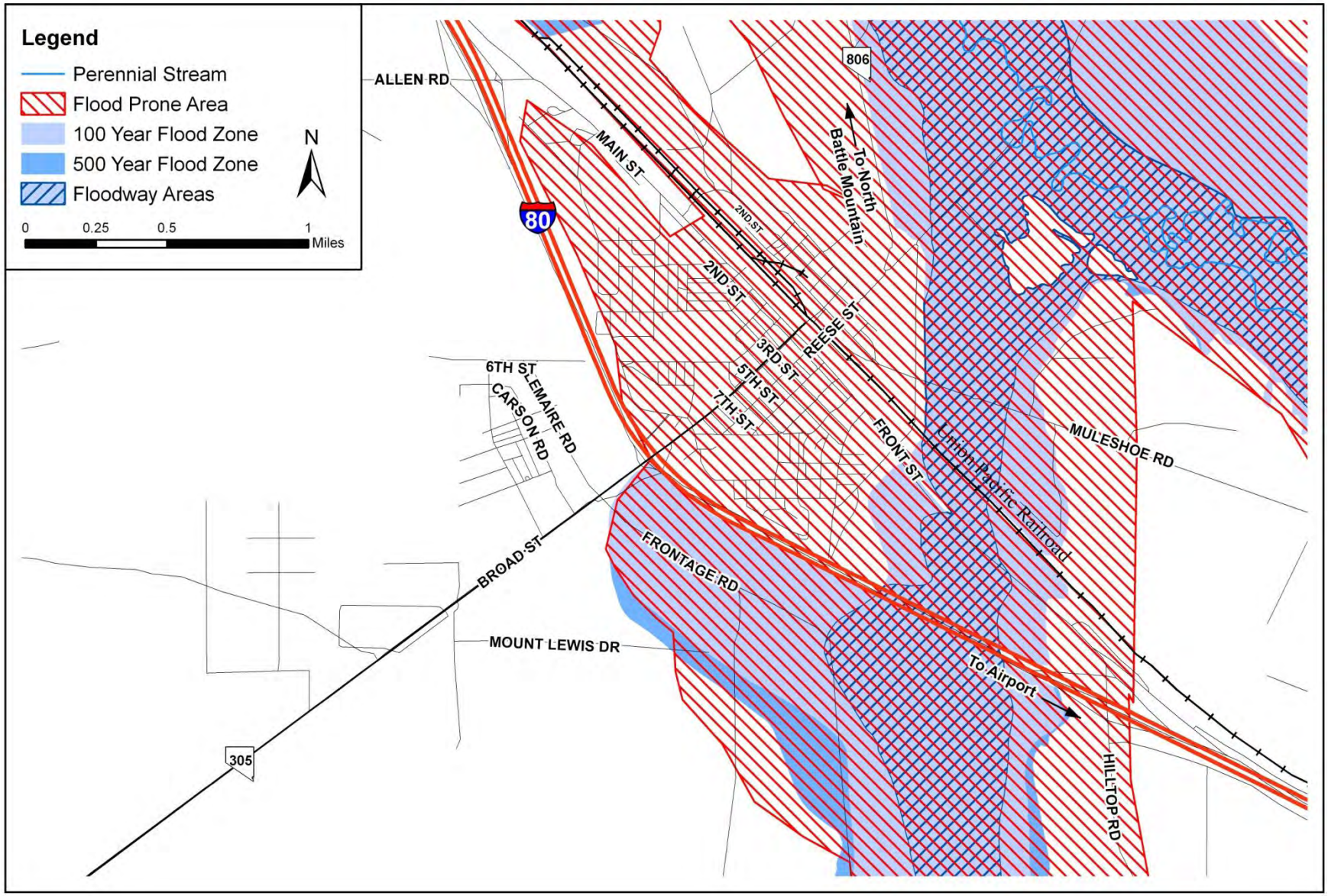
## 2.3 Humboldt River Basin and Central Hydrographic Region

### 2.3.1 Decrees and Agreements

The Bartlett Decree applies to and is used in the distribution of the Humboldt River and its tributaries below Palisades, Nevada (except, as noted for the Reese River and Little Humboldt River sub-basins, while the Edwards Decree applies to and is used in the distribution of water above Palisades.

Water rights for the lower Humboldt River Basin (below Palisade and excepting the Little Humboldt River and Reese River Systems) were established by the 1931 Bartlett Decree. In addition to adjudicating the river system's water rights, this decree also recognized that the surface waters within the Humboldt River system were already fully appropriated, leaving no surplus water for irrigation during an average, or normal water year. Another important finding of the Bartlett Decree recognized the differences in growing seasons between the Humboldt River's upper basin and its lower basin and therefore divided the river system in two districts.

## Figure 2-5: Battle Mountain Flood Prone Areas and Flood Zones



The Bartlett Decree also recognized the seasonal and ephemeral nature of many streams within the Humboldt River Basin through the concept of "flash streams" and the special need to accommodate water appropriations along such stream systems. These watercourses were defined as streams "that have a sudden or flash flow for a comparatively brief period of time, while such stream is draining the particular basin or source of supply fed by melting snows. These flash streams in varying degrees are typical of the necessity of cumulating the flow during the flush for the particular rights to be served. Where lands are entitled to irrigation from such flash streams, they must be served at the times when the water is available.

Also in most cases under the Bartlett Decree the water rights are appurtenant to the land and irrigation is confined to land specifically described in the decree. The Bartlett Decree also incorporates the "doctrine of relation" while the Edwards Decree does not. This concept means that a water priority is claimed as of the date of appropriation for the amount appropriated, even though a part of it may not have been put to beneficial use until a later date. The irrigation season on the Bartlett Decree extends from March 15 to September 15. The decree establishes water duties and irrigation days for types of land classifications.

### 2.3.2 Humboldt River Basin Authority

The Elko, Eureka, Lander, Humbolt, and Pershing County Commissions pursuant to NRS 277.080 and 277.140 inclusive of the Interlocal Cooperation Act organized the Humboldt River Basin Water Authority (Authority). The Authority is governed by a fifteen-member board of directors with three directors appointed by each of the five member counties, one county commissioner from each member county serves on the Authority's board. The Authority has been functioning since 1993.

The functions of the Authority as defined in NRS 277 include:

- To oversee water supplies and to develop and implement plans relating to the enhancement of the environment, social conditions, and economy of member counties as such may be dependent upon available water supplies.

- To monitor (1) water supplies available within the Humboldt River Basin and separately to each party from all sources, (2) demand for water within each county from all sources both of a consumptive and non-consumptive nature, (3) the extent to which proposals to develop and export Humboldt River Basin water may adversely affect the water balance for member counties of the Authority.

- To prepare, update and oversee recommendations for water management and conservation plans for consumptive and non-consumptive uses of ground and surface waters originating in or passing through the local jurisdiction of member parties of the Authority.

- To encourage citizen participation in water supply and management issues of concern to member counties of the Authority.

- To recommend appropriate federal and state legislation for the management of surface and groundwater within the Humboldt River Basin.

- To conserve the levels and flows of surface water within the Humboldt River Basin.

- To protect and conserve the environmental balance of the Humboldt River Basin and recharge area ecosystem.

- To recommend cooperative programs and management of the water resources of the Humboldt River Basin.

- To facilitate the development and maintenance of a common base of data and information regarding the use and management of Humboldt River Basin water resource and the establishment of systematic arrangements for the exchange of water data and information.

Lander County Board of County Commissioners have identified issues that affect Lander County with respect to the Humboldt River. Lander County recognized that the majority of previously proposed water resource projects and proposals have occurred outside of their county, however, the Board of County Commissioners felt that the improvement of managing the water resources of the Humboldt River Basin or the development of specific projects could benefit the watershed as a whole. The issues that were identified by the Lander County Commission were:

- Identify and develop potential surface water storage sites in the Upper Humboldt River Basin.

- Protect appropriated surface water rights and historic uses of surface waters.

- Identify any economic benefits that could be realized by better management of the water resources of the Humboldt River specifically water that is flowing out of the Humboldt Sink towards Carson Sink.

### 2.3.3 Central Nevada Water Authority

The Central Nevada Regional Water Authority (CNRWA) is a 8 county unit of local government that collaboratively and proactively addresses water resource issues common to communities in Nevada's rural interior. CNRWA exists under Nevada's Interlocal Cooperation Act and has delegated authority separate from its member counties.

The goal of CNRWA is to protect the water resources of Nevada's Central Hydrographic Region so the Region will not only have an economic future, but its valued quality of life and natural environment will be maintained.

The Central Hydrographic Region, as defined by the Nevada Division of Water Resources consists of 78 ground water basins in 11 Nevada counties. The region is the largest of the state's 14 Hydrographic Regions, encompassing much of central, eastern and southern Nevada. The Central Region is distinguished by

- Its arid environment
- Absence of regional surface water flows
- Productive alluvial aquifers
- Deeper, largely uncharacterized bedrock aquifers.

Ground water basins in the Central Region receive little contemporary recharge, are often interconnected by subsurface flows and depend largely on ground water discharge to supply present and future natural and human uses.

## 3.0 POPULATION AND WATER USE

### 3.1 Historic Population Trends

The population of Lander County is concentrated in three areas: Battle Mountain, Austin, and Kingston. The majority of the County's population lives in and around the Battle Mountain area. Population growth has and will likely continue to be influenced by the mining industry. Although Lander County population estimates (Table 3-1) show a decline from 1990 to 2009, Lander County has experienced periods of population increases.

Over the past 20 years, the mining industry has had an influence on the population and demographics of northern Nevada creating periods of population increases and declines. More recent trends in Lander County are:

- Battle Mountain has rebounded somewhat with modest increases in population over the last few years.

- The number of working family households relocating to Battle Mountain for mining jobs has been limited even though mining employment in the County has increased substantially. Workers from the nearby Lone Tree mine transferred to sites in Lander County but kept their place of residence in the Winnemucca area.

- Current mining operations are expected to be relatively long-term depending upon the price of the underlying commodity.

- The southern portion of the County is seeing more population but fewer school age children. The area is attracting retirees and older adults.

**Table 3-1**
**Population Growth: Lander County Communities: 1990-2010**

| Area | 1990 | 2000 | 2009 | 2010 | 2000-2010% Chg. |
|---|---|---|---|---|---|
| Lander County | 6,266 | 5,794 | 6,003 | 5992 | 3.3% |
| Battle Mountain | 3,542 | 3,453 | 2,967 | 2922 | -15.4% |
| Austin | | 305 | 304 | 312 | .03% |
| Kingston | | 219 | 331 | 328 | 51.0% |

Source: U.S. Census 1990 and 2000, and Nevada State Demographer 2009

### 3.2 Near-Term Population Forecasts

Developing a population forecast is difficult due to mining's historic influence on Lander County communities. In recent years, the northern portion of the County has seen the greatest fluctuations in population. The communities in southern Lander County have not been directly affected by cyclical changes in the mining industry. Southern Lander County has experienced a more stable population growth scenario with moderate increases over the last several years. Table 3-2 shows projected population growth in Lander County and the communities of Battle Mountain, Austin and Kingston.

**Table 3-2 Population Projections 2008 – 2015**
**Lander County, Battle Mountain, Austin and Kingston**

| Population | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|
| **Lander County-State Demographer** | 5,891 | 6,022 | 6,031 | 6,047 | 6,065 | 6,084 | 6,109 | 6,116 |
| Town of Battle Mountain | 2,922 | 2,987 | 2,991 | 2,999 | 3,008 | 3,018 | 3,030 | 3,034 |
| Battle Mountain Area | 4,817 | 4,926 | 4,933 | 4,946 | 4,961 | 4,977 | 4,997 | 5,003 |
| Austin | 309 | 316 | 316 | 317 | 318 | 319 | 320 | 320 |
| Kingston | 320 | 328 | 328 | 329 | 330 | 331 | 332 | 333 |
| **Lander County-Trend Forecast** | 5,891 | 6,014 | 6,137 | 6,260 | 6,383 | 6,506 | 6,629 | 6,752 |
| Town of Battle Mountain | 2,922 | 2,983 | 3,044 | 3,105 | 3,166 | 3,227 | 3,288 | 3,349 |
| Battle Mountain Area | 4,817 | 4,919 | 5,020 | 5,121 | 5,221 | 5,322 | 5,423 | 5,523 |
| Austin | 309 | 315 | 322 | 328 | 334 | 341 | 347 | 354 |
| Kingston | 320 | 327 | 334 | 341 | 347 | 354 | 361 | 367 |
| **Lander County - 1 Percent Growth** | 5,891 | 5,950 | 6,009 | 6,070 | 6,130 | 6,192 | 6,253 | 6,316 |
| Town of Battle Mountain | 2,922 | 2,951 | 2,981 | 3,010 | 3,041 | 3,071 | 3,102 | 3,133 |
| Battle Mountain Area | 4,817 | 4,867 | 4,916 | 4,965 | 5,015 | 5,065 | 5,115 | 5,166 |
| Austin | 309 | 312 | 315 | 318 | 321 | 324 | 328 | 331 |
| Kingston | 320 | 324 | 327 | 330 | 333 | 337 | 340 | 344 |

The Battle Mountain area encompasses the Town of Battle Mountain and surrounding areas such as Hilltop. Total County population is expected to rise between 225 and 860 by 2015 representing a projected 3.8 percent to 14.5 percent increase. The majority of the population increase will likely occur in northern Lander County consistent with historical trends. It is difficult to make accurate projections beyond 5 years. However, the total County population could rise to 7,530 by 2020 under the trend forecast with Battle Mountain reaching 3,730, Austin 380, and Kingston 450 for the same period.

### 3.3 Municipal and Industrial Water Use

Table 3-3 shows usage rates for Lander County under various types of use. Municipal and industrial water use includes public supplied domestic, commercial, industrial, and thermoelectric water withdrawals. Recently, municipal and industrial water use per person per day was estimated for Lander County Sewer and Water District No. 1, (Battle Mountain area), Lander County Sewer and Water District No. 2 (Town of Austin), and the Town of Kingston (See Table 3-4). Table 3-3 does not include water use at the Temoak Colony.

**Table 3-3**
**Municipal and Industrial Water Use**
**Per Capita Use Per Day**
**Lander County: 2009**

| Area | Withdrawals | Population | Per Capita Use/Day |
|---|---|---|---|
| Lander Co. Sewer & Water Dist. No. 1 | 337,900,000 | 2,967 | 310 gallons |
| Lander Co. Sewer & Water Dist. No. 2 | 48,000,000 gallons | 304 | 350 gallons |
| Town of Kingston | 18,000,000 gallons | 331 | 150 gallons |
| Total | 403,900,000gallons | 3,602 | 307 gallons |

Source: Lander County Sewer and Water District # 1 and # 2, and the Town of Kingston

### 3.4 Domestic Wells

In 2009 Lander County's total population was 6,003. Approximately 3,800 people in 1,753 households were served by public water systems in Lander County. The balance, approximately 2,200 people in 850 households use domestic wells as their primary source of water. Total water withdrawals associated with domestic wells is difficult to estimate. Currently, these un-permitted domestic wells may be pumped at a rate not to exceed 1,800 gallons per day as set forth by the State Engineer (NRS 534.180). Assuming maximum water usage, existing domestic well owners could use as much as 1,800 gallons per day or

about 2.016 acre-feet resulting in a total withdrawal of approximately 1,714 acre-feet, annually.

Most of the domestic wells are concentrated in areas around Battle Mountain. Of the estimated 850 domestic wells in Lander County, approximately 514 are located in and around Battle Mountain. Remaining wells are distributed throughout the County and concentrated in areas such as Reese River Valley, Antelope Valley, and Big Smoky Valley.

### 3.5 Population and Water Demand By Selected Groundwater Basin

Approximately 90 percent of Lander County's population lives in three groundwater basins. The Battle Mountain area is bisected by basins 59 and 64, the Town of Austin is located in Basin 56, and Kingston Gilman Springs is located in Basin 137B. Table 3-4 shows current population estimates by hydrographic basin and population forecasts for 2030.

**Table 3-4**
**Population and Water Demand**
**By Hydrographic Basin Within**
**Lander County: 2010**

| Year | Battle Mountain Hydrographic Basin 59-64 | Austin Area Hydrographic Basin 56 | Kingston/Gilman Spr. Hydrographic Basin 137B |
|---|---|---|---|
| **2010** | | | |
| Water System Pop. | 2,967, *(192) | 306 | 331 |
| Domestic Wells | 514 | 5 | 40 |
| Dom. Well Population | 1,250 | 15 | 100 |
| Total Population | 4,410 | 321 | 431 |
| Dom. Water Demand | 2,148 afa. | 197 afa. | 188 afa. |

***(192) population of Temoak Indian Colony**

### 3.6 Mining Water Use

Mining has and continues to be a substantial economic activity in Lander County. There are 31 mining districts in the County. Of the 31 mining districts located in Lander County, the Battle Mountain district has yielded the largest value. Production from this district together with the Reese River, Cortez, McCoy, and Bullion Districts accounts for most of the total metals production. Most of the community areas currently have or have had

recent mining activity near them. Today, major mining activity is centered in the North near Battle Mountain (Battle Mountain District/Buffalo Valley) and Crescent Valley (Cortez) with gold, silver, and barite production. However, recent exploration and drilling activity will likely lead to renewed mining activity in an around Austin.

Gold and silver production from open pit mining operations creates a potential for significant impacts to surface and groundwater resources (See Table 2-3). Directly, the area with the greatest potential for impacts to Lander County residents and its natural resources are mining operations in the Battle Mountain district. South of the Fortitude Complex near Buffalo Valley Road, elevated concentrations of chloride, sodium, and sulfate in the groundwater are present. The elevated concentrations are a result of a solute plume originating from a gold tailings facility. This plume is a result of an unlined disposal area that was used for copper and gold tailings intermittently from 1966 to 1993. The chlorine plum is currently being managed under the State of Nevada Water Pollution Control Permit.

Proposed mining operations in the Battle Mountain and Cortez District are projected to continue into the future. Battle Mountain Gold Company a wholly owned subsidiary of Newmont Gold Corporation proposes to expand its current operations approximately 12 miles southwest of Battle Mountain. The Phoenix open pit gold and copper mine, located in the high desert, began production in 2006. Phoenix was part of the Battle Mountain Gold acquisition in January 2001 and has one of the largest milling operations in North America. Upon commissioning in 2006, the operation had an estimated life of 20 years, but exploration could reveal deposits that would extend the mine's life (Newmont Mining Corporation, 2010).

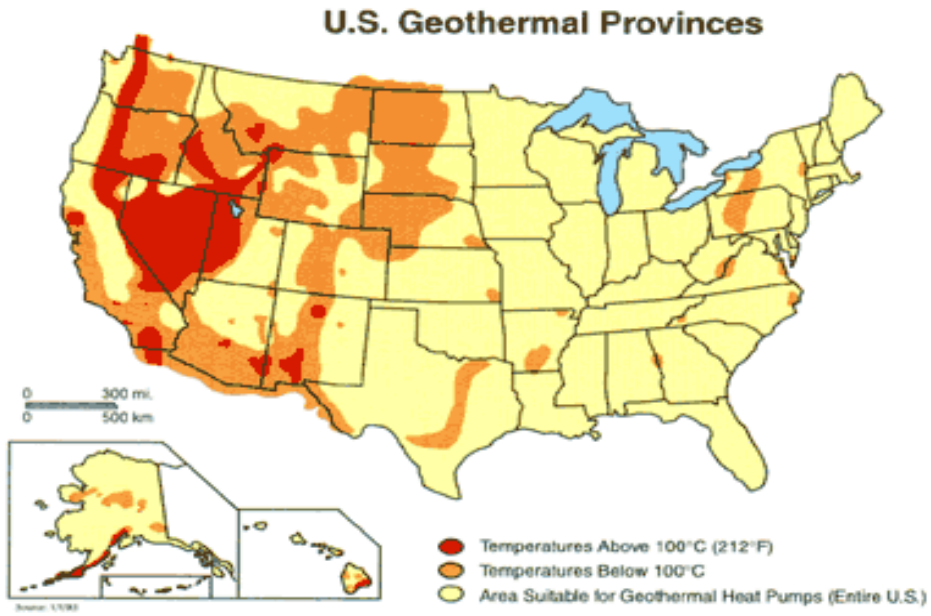
Mining water use will fluctuate with the boom and bust cycle of the mineral industry. The most recent estimates of mining water use show that nearly 145,000 acre-feet of water were used in 2009 as compared to 35,598 afa/year. in 1995. Current active groundwater permits for mining in projects in Lander County estimated to be just under 25,000 acre-feet. As with most mining projects, only a small portion of the water is used for consumptive purposes associated with the mining operation.

In many instance mining water withdrawals, particularly groundwater, are re-injected or used for agricultural purposes to offset negative impacts. Currently, major mining water use occurs in several Lander groundwater basins. They include Big Smoky Valley, Lower Reese River Valley, middle Reese River Valley, Crescent Valley, Buffalo Valley, Clovers.

**Geothermal Resources**

Hot Springs and wells are scattered over the entire State, with at least 300 thermal wells, springs, and spring clusters. Almost all of these waters have been appropriated for some beneficial use under Nevada water laws. Within Lander County, several significant geothermal resources areas exist. An area of high heat flow, compared to the rest of the State, is the "Battle Mountain High". This area, of which the boundaries have not fully been determined, may be the result of fairly recent intrusion by magma into the earth's crust. Temperatures indicate an average flow of about three heat flow units compared to two heat flow units for the rest of the State. The Beowawe Geysers located in Lander and Eureka Counties, have some of the highest reported subsurface temperatures of all geothermal areas within Lander County. Other geothermal areas are found at Smith Creek Valley, Buffalo Valley, Hot Springs Ranch south of Battle Mountain, Spencer Hot Springs, and the McGuiness Project in Grass Valley.

Lander County has the potential to develop additional geothermal resources. There are several Known Geothermal Area (KGA) and one operating plant at Beowawe on the Lander line with Eureka County. In 2008 the Beowawe Plant produced 129,000 Mega Watt Hours. Two additional geothermal plants are planned for construction, one in Grass Valley and the other in Jersey Valley. These plants are expected to come on line in 2011. In recent years exploration and possible development activity has increased in and around Lander County. Potential project sites include Jersey Valley, Pumpernickel Valley, Reese River, and Grass Valley in Lander County.



Geothermal sites have the potential for environmental impacts to such resources as noise, visual, hydrology, and seismic. Additionally, construction and site access can have impacts to local transportation facilities. With the increasing emphasis on renewable energy resources, Lander County needs to carefully evaluate the potential impacts associated with power plant construction and operations. Groundwater use can vary with the type of plant constructed. Adequate site monitoring and reclamation processes need to be established prior to permitting activity.

### 3.7 Agricultural Water Use

The majority of irrigation water in Lander County is used to produce alfalfa, other hay products and irrigated pasture. Current active groundwater rights for irrigation stands at just over 237,600 acre-feet annually (See Table 2-3). Future irrigation demands are projected to increase modestly as more lands are placed in production. In 2000 and 2001 Alfalfa production ranged between 62,000 and 67,000 tons. Alfalfa hay and other hay production averaged just over 90,000 tons in 2002 and 2003. Alfalfa production has shown strong gains in the last 8 years. By 2008 all hay production exceeded 150,000 tons with approximately 35,000 acres harvested.

Stock water use is influenced by herd size. Future stock water use is expected to remain relatively constant. Modest increases in alfalfa and irrigated crop production are likely to occur through the projection period. The Lander County cattle and calves inventory has increased from 1999 to 2007. In 2008 the inventory stood at 32,000 head up from 20,000 head in 1999. Slight declines were reported in 2009 with 30,000 head of cattle.

At one time, desert land entries had been successful bringing into production approximately 2,000 acres of irrigated crop land with a total water demand of approximately 8,800 acre-feet. Another source of irrigation demand are lands that are available for disposal by the BLM. Currently, there may be as much as 20,000 acres of public land available for disposal. Large tracts are available in the upper and middle Reese River Valley. Agricultural development in Antelope Valley has, in a large part, been the result of desert land entries and the disposal of public lands.

The Battle Mountain area overlaps two hydrobasins (59 and 64). Agricultural demand in the Battle Mountain area is expected to remain relatively constant with no projected increases or decreases in the Lower Reese River Valley. Basin 59 has approximately 20,000 acre-feet annually of perennial yield. Currently, just over 15,550 acre-feet are used for irrigation. The Clovers area including Basins (64, 65 and 66) could see an expansion of agricultural. Currently the Basin has a perennial yield of 72,000 and committed resources are approximately 89,590 acre-feet with 40,813 committed to mining.

Irrigated agriculture occurs in most Lander County groundwater basins. Relatively high use for agricultural can be found in basins 56, 57, 58, 59, 61, 64, 137B and 139.

### 3.8 Summary of Water Uses

Table 3-5 contains a summary of water use by groundwater basins. The summary shows the county location of the hydrobasin, the perennial yield of the basin, and active ground water rights available in each basin. Additionally, the summary contains whether or the basin is designated by the State Engineer and the order which established the designation, the amount of groundwater use in acre-feet for various categories and demographic information.

| Lander County Hydrograhic Basins: 2010 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Table 3-5** | **54** | **55** | **56** | **57** | **58** | **59** | **60** | **61** | **62** | **64** |
| County (Basin Location) | LA, EU | LA | LA, NYE | LA | LA | LA, EU | LA, EU | Elko, LA | Elko, LA | LA, HU, Elko |
| Perennial Yield(AF) | 16,000 | 4,000 | 37,000 | 9,000 | 14,000 | 17,000 | 3,000 | 30,000 | 2,800 | 40,000 |
| Active Ground Water Rights(AF) | 40,697 | 1,728 | 30,637 | 30,733 | 47,255 | 25,575 | 36,012 | 110,164 | 2,140 | 36,454 |
| Agricultural Water Use (AF) | 8,719 | 461 | 28,549 | 30,685 | 47,155 | 14,613 | 2,217 | 83,632 | - | 15,230 |
| Mining Water Use (AF) | 30,022 | 1,141 | 608 | 0 | 0 | 9,183 | 2,172 | 25,537 | 2,118 | 3,032 |
| Municipal Water (AF) | 1,626 | - | 1,380 | - | - | 1,307 | - | - | - | 1,866 |
| Industrial Water (AF) | - | - | - | - | - | 38 | 30,604 | 395 | - | 15,690 |
| Designated Basin | Yes, O-755 | No | No | Yes, O-276 | Yes, O-276 | Yes, O-739 | Yes, O-799 | Yes, O-799 | N | Yes, O-700 |
| Population | <10 | <25 | 375 | <50 | <50 | 4,410 | <20 | <10 | <20 | 4,410 |
| Municipal System | - | - | Yes | - | - | Yes | - | - | | Yes |
| Domestic Wells | <10 | <10 | <25 | <25 | <25 | 514* | <10 | <5 | <10 | 514* |
| Geothermal Use | Yes | | Pending | | | | | | | Pending |
| Active Mining District | Yes | No | Yes | No | No | Yes | Yes | Yes | No | Yes |
| Basin of Origin – Groundwater Flow (1) | 55 | 56 | | | 57,56 | 58 | | 60 | | 62 |
| Amount of Outflow (AF) (2) | 300 | 2,500 | | | 6,000,500 | 9,000 | | 2,800 | | 2,800 |

EU = Eureka County, HU = Humboldt County PE=Pershing County; (1) Basin contributing flow; (2) Estimated amount of groundwater flow from the basin. *Battle Mountain Area domestic wells. Population of basin 56 contains the town of Austin, Basin 59/64 includes Battle Mountain, and Basin 137B includes the town of Kingston

| Lander County Hydrographic Basins: 2010 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Table 3-5** | **131** | **132** | **134** | **137B** | **138** | **139** | **140A** |
| County (Basin Location) | LA,PE, HU | PE, LA | LA, NYE | LA, NYE | LA, EU | EU, LA | LA, NYE, EU |
| Perennial Yield (AF) | 8,000 | 250 | 10,000 | 65,000 | 13,000 | 16,000 | 8,000 |
| Active G.W. Rights | 19,977 | 27 | 1,879 | 31,882 | 4,659 | 18,634 | 292 |
| Agricultural Water (AF) | 4,948 | - | 828 | 28,796 | 4,464 | 17,703 | 175 |
| Mining Water Use (AF) | 14,863 | - | 6.7 | 1,077 | 95 | 722 | - |
| Municipal (AF) | - | - | - | 1,777 | 5 | - | - |
| Industrial (AF) | - | - | - | - | - | - | - |
| Designated Basin | No | Yes, Order 715 | No | Yes, Order-852 | No | Yes, Order-816 | No |
| Population | <20 | <10 | <20 | 400 | <20 | <10 | <10 |
| Municipal System | - | - | - | Yes | - | - | - |
| Domestic Wells | <10 | <5 | <10 | <50 | <10 | <10 | <10 |
| Geothermal Use | | | | | Pending | | |
| Active Mining District | Yes | No | No | Yes | No | No | Yes |
| Basin of Origin - Groundwater Flow (1) | | 129 | | 137A | | | 139 |
| Amount of Flow (AF) (2) | | 500 | | | | | 200 |

EU = Eureka County, HU = Humboldt County PE=Pershing County; (1) Basin contributing flow; (2) Estimated amount of groundwater flow. Basin 137B includes the Town of Kingston.

## 4.0 LONG-TERM WATER RESOURCE NEEDS

Water resources are critical to the long-term growth and development of communities in Nevada. Without available water resources to support local growth and development; future prospects in terms of economic growth, population, income generation, and environmental health can be adversely affected.

In recent years, urban communities in Nevada and water speculators have sought water resources in areas far removed from their proposed place of use. Removing water from a place of origin can have dramatic adverse impacts, particularly where the movement of water from a place of origin to a place of use has little or no direct economic or social connection. This situation is particularly evident where water transfers cross political boundaries.

The intent of this section is to summarize the long-term water needs of Lander County. Long-term being defined as a planning horizon of at least 50 years or longer. Ultimately, describing long-term trends is an expression of desired future conditions and the potential to develop to the level described.

**Agriculture.** Over the long-term Lander County will maintain the existing levels of water use for crop production and livestock use. Moderate increases in agricultural/crop production can be expected over the long run as more lands are placed into production for agriculture. Long-term water resources requirements are expected to be approximately 10 percent higher than 2009 usage based upon crop lands.

**Population and Community Development.** Sufficient water resources need to be available to support community populations in Lander County. Over the long-term such populations are achievable as these communities have sufficient land areas to support the level of development and the indicated population:

- Battle Mountain Area – 35,000 to 50,000 population
- Austin and Vicinity 10,000 population
- Kingston Area – 10,000 population
- Total Lander County 75,000 – 100,000 population

Municipal water uses would include domestic consumption, operation of municipal facilities, and other commercial and tourist commercial activities.

**Mining and Geothermal Operations.** Over the long-run water resources for mining should remain relatively constant with cyclical highs and low demand periods. As shown in Table 2-1 approximately 145,335 acre-feet of water rights were being used for mining

with 24,860 acre-feet of applications are pending. There are __ mining districts in Lander County. Over the past 100 years, many of these districts have been active. Over the long-run, mining will very likely have continued periods of booms and bust. As a result, the current mining water usage is a strong proxy for future needs.

Geothermal development is occurring in Lander County. As many as five new geothermal plants will be operating in Lander County over the next several years. It is conceivable that Lander County could host as many as 10 power plants. The level of exploration suggests that additional development will occur over longer periods of time. Geothermal water use is assumed to be 5,000 af/yr per operating plant.

**Tourism Recreation and the Environment.** Tourism and outdoor recreation will increase. Fisheries and instream flows are important recreational uses. Additionally, maintaining spring and seep flows will help wildlife populations and help to enhance hunting and wildlife related recreational opportunities throughout Lander County.

Table 4-1 summarizes the long-term groundwater requirements and current demand for major uses in Lander County.

**Table 4-1**
**Summary of Future Water Resource Requirements**
**Lander County**

| Type of Use | Estimated Future Groundwater Usage/Needs | Current Demand |
|---|---|---|
| Mining | 145,000 AF. | 145,000 |
| Geothermal | 50,000 AF. | - |
| Industrial Uses | 50,000 AF. | 33,310 |
| Irrigation-Agriculture | 260,000-275,000 AF. | 258,000 |
| Municipal | 60,000 –70,000 AF. | 9,670 |
| Other Uses | 15,000 AF | - |

## 5.0 PUBLIC WATER SYSTEMS

### 5.1 Battle Mountain Town

#### 5.1.1 Current Demand for Water

Currently, the service area has a population of approximately 3,000 not including the Battle Mountain Indian Colony, which serves approximately 200 residents and a few small commercial customers. The Indian Colony has its own private water system serving residential and commercial areas to the west of Battle Mountain.

The Battle Mountain Town system operates three main groundwater wells that currently produce approximately 1,000,000 gallons per day. The current service area has a build-out population of 5,000 to 6,000 based upon existing available lands within the District. As a result, the District must obligate nearly all of its groundwater resources to meet existing demand assuming total build out within its existing boundaries. Additionally, if the District expands as a result of new water sources south of Battle Mountain, it is likely that the total population and the number of homes and residents served could increase modestly in the near-term due to existing conversions from domestic wells to municipal water supply.

Additionally, the Battle Mountain Golf Course and the Battle Mountain Indian Colony may be served by the District. Because both entities have their own water rights, the District would pump more on an annual basis, but would not have to obligate additional groundwater resources to supply service. Table 5-1 summarizes current and near-term water demands in the immediate vicinity of Battle Mountain.

**Table 5-1**
**Population and Water Demand**
**Battle Mountain Sewer and Water District #1: 2010**

| User | Services/ Customers | Annual Water Use * | Per Capita Use | Total Water Use (AF) |
|---|---|---|---|---|
| Active Users | 1,200 | 337.9 million gallons | 312 gallons | 1,036 |
| Total Build-Out Service Area | 2,500 | 704 million gallons | 312 | 2,160 |
| Domestic Well Conversions | 30 | 3,514,950 gallons | 312 | 10.5 |
| Expanded Service Area | 1,000 | 281.6 million gallons | 312 | 864.1 |
| Total with Expansion | 3,530 | 1,027.015 gallons | 312 | 4,072.5 |

Source: Battle Mountain Sewer and Water Utility. *based upon total gallons pumped.

### 5.1.2 Municipal Water Service and Demand

Total near-term demand for municipal and industrial water in the Battle Mountain area is influenced by the following:

**Domestic Well Conversions-**With the development of a new water source south of town, an estimated 30 residential units currently on domestic wells are expected to convert to the municipal water provided by the District.

**Annexation of Lands/Expansion of Service Area** – In addition to well conversion, additional lands will likely be annexed into the District (See 2010 Lander County Master Plan). These lands are adjacent to the new water line. The annexation of lands will increase the population served by the District and the amount of groundwater resources required. Lands available for annexation exist in both Hydrographic Basin 59 and 64.

**Domestic Wells** - In 2010 there were approximately 514 domestic wells outside the current Battle Mountain Service area. As growth occurs in the outerlying area, additional domestic wells can be anticipated. Each new well increases the demand on groundwater by 2.016 acre-feet annually. Total demand associated with 514 domestic well is estimated to be 1,036 acre-feet.

**Airport Water System** - There is a small water system at the Battle Mountain airport. Total service is limited to a few commercial operations. It is possible that tank storage could be added to the system which might provide for more intensive commercial uses associated with the airport.

**Battle Mountain Indian Colony** - The Battle Mountain Colony has a private water system serving approximately 73 residential units and a few small commercial operations. Growth of this system over the next couple of years will likely be limited.

**Existing and Newly Created Parcels** - The demand for groundwater resources is also impacted by the availability of existing parcels which are undeveloped. Each existing undeveloped parcel is entitled to drill a domestic well. The total number of existing undeveloped parcels in the Battle Mountain area is approximately 692.

Currently, there are approximately 514 domestic wells which creates a estimated demand of 1,036 acre-feet based upon 1,800 gallons per day. The Battle Mountain area is under increasing pressure to allow creation of additional parcels. Former Railroad lands are now being sold off. Increasingly Lander County is experiencing greater demands for subdividing and parceling of these lands.

### 5.1.3 Service Area Expansion

**Battle Mountain Area-Lander County Sewer and Water District #1**

In 2010 the District developed new water sources south of Battle Mountain in an effort to comply with drinking water standards, most notably arsenic. As part of this project, the District developed additional storage with a pump station and extended its main service line **(**See Figure A-6, 2010 Lander County Master Plan**).** With the development of a new water source and tank storage, the water system will be better able to serve new development to the south of Battle Mountain. The project will also replace the existing Battle Mountain wells and tank storage. The existing storage tanks will be abandoned and or possibly moved to new location for reuse. Battle Mountain will construct two new 1.0 million gallon storage tanks. The new wells are expected to have a maximum capacity of 2,200 gallons per minute per well.

With the new water system, Battle Mountain will have the capability to extend service, particularly areas where water systems are not currently in compliance for arsenic. Lander County operates a small water system at the Battle Mountain airport and the golf course. The Battle Mountain Indian Colony maintains a water system which is not in compliance for arsenic. It is possible that the District could wholesale water to the Indian Colony in the near future. The District will also consider alternatives to providing more than one main service line connection between areas south and north of Interstate 80 in the event of a line break and to equalize pressure to areas north of the freeway and development of redundant loops.

The current service area is nearing full build-out. Since the development of the freeway off-ramps that connect state highway 305, the demand for commercial and industrial development has grown in the service area south of Interstate 80. Additionally, higher density development (residential and commercial) continues south along state route 305. Given these existing conditions, the Battle Mountain service area will likely continue to expand to the south in a tiered fashion to correspond with increasing residential and commercial demands in this area. Additional commercial and industrial development will likely occur as the service area expands. Proposed expansion areas are shown in Figure 5-1 (See page 39).

The service area is somewhat unique in that Lander County Sewer and Water District #1 serves customers in two different hydrographic groundwater basins. Additionally, there is a large number of individual domestic, commercial/industrial, and irrigation wells in the surrounding area which may be annexed into the District's service area. Basins 64 and 59 are currently designated and require water right dedication for new development. As a

result of these conditions, the District needs to obtain and hold water rights to meet the following obligations:

- Future development as envisioned in the 2010 Lander County Master Plan which is planned to occur in basins 59 and 64, and the expansion of water services to meet those needs.

- Development that is currently within or adjacent to the District's current and proposed boundaries that requires water right dedication.

- Non-consumptive uses of water for outdoor irrigation requirements. The District currently has the capability to produce and store untreated water that could be used for non-consumptive uses.

### 5.1.4 Treatment, Storage and Distribution

In 2010 the District developed new water sources south of Battle Mountain in an effort to comply with drinking water standards, most notably arsenic. As part of this project, the District will development additional storage with pump station and extend its main service line. With the development of a new water source and tank storage, the water system will be better able to serve new development to the south of Battle Mountain. The project will also replace the existing Battle Mountain wells and tank storage. The existing storage tanks will be abandoned and or possibly moved to a new locations for reuse. The utility will construct two new 1.0 million gallon storage tanks. The new wells are expected to have a maximum capacity of 2,200 gallons per minute per well. Secondary feeds are also needed in the 26$^{th}$ and 22$^{nd}$ street area. The secondary feeds add redundancy in the event of line breaks or maintenance requirements.

With the new water system, Battle Mountain will have the capability to extend service to new areas, particularly areas where water systems are not currently in compliance for arsenic. Lander County operates a small water system at the Battle Mountain airport and the golf course. The Battle Mountain Indian Colony maintains a water system which is not in compliance for arsenic. It is possible that the District could wholesale water to the Indian Colony in the near future. The District will also consider alternatives to providing more than one main service line connection between areas south and north of Interstate 80 in the event of a line break and to equalize pressure to areas north of the freeway.

### 5.1.5 Water Quality and Well Head Protection

LCSWD #1 is developing two wells south of Battle Mountain in Basin 59 in order to comply with drinking water standards for Arsenic. Protecting these resources from

contamination is critical given the significant investment required to meet drinking water standards. Once final production wells are completed well head protection areas will be established.

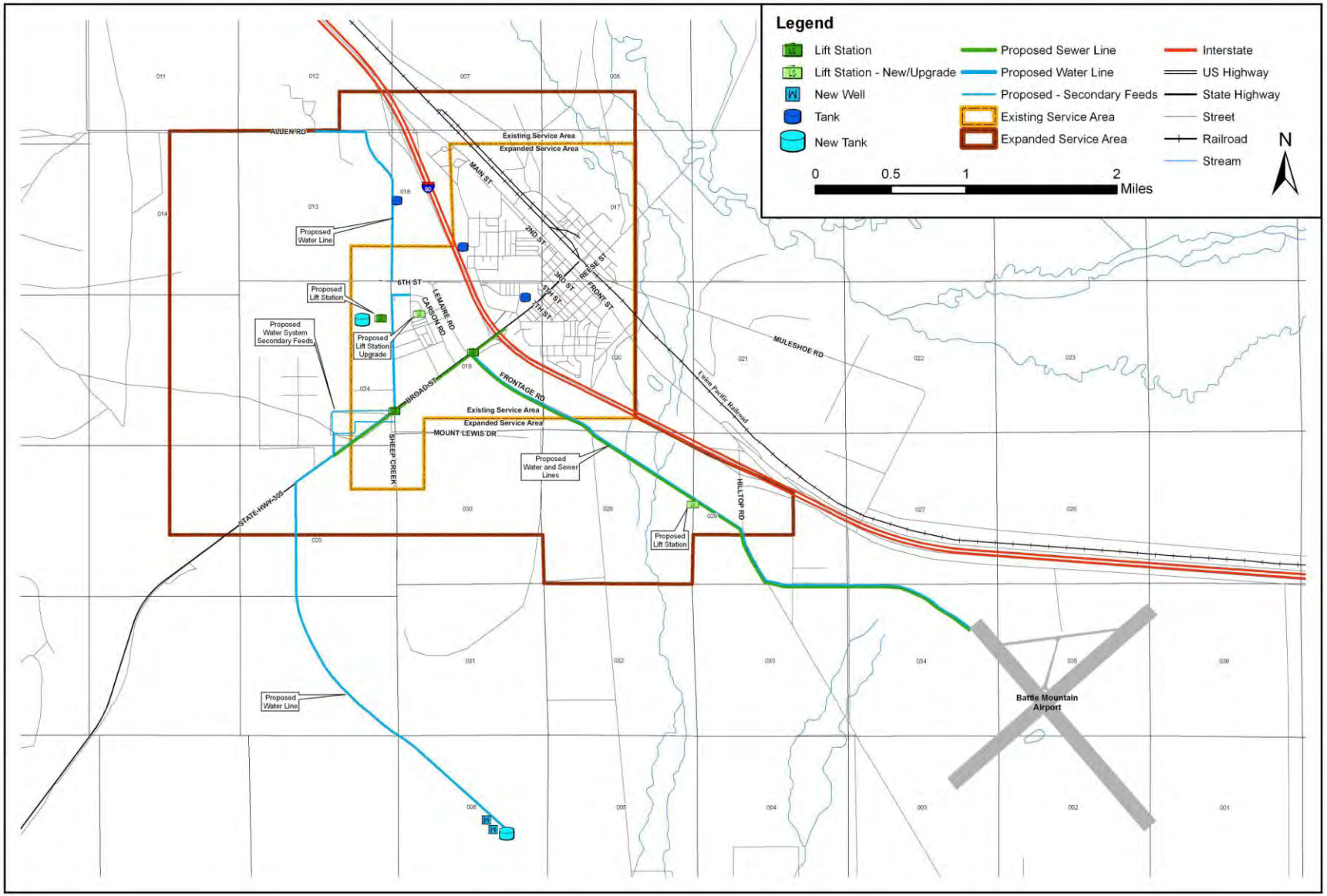
The District's current wells are located in heavily populated areas and near commercial and industrial developments. It is very important for the Town to take appropriate steps to protect against man-made and industrial contamination that may infiltrate the community's water system.

### 5.1.6 Capital Improvements (2010-2020)

Both the Austin and Battle Mountain water service providers face substantial capital investments over the next several years to meeting drinking water standards for Arsenic. Both service districts are pursuing options to develop new water sources which have arsenic levels below the compliance standard. Major improvements to the system are described in the Lander County Master Plan and are summarized as follows:

- Development of additional storage to serve areas south of Battle Mountain.
- The extension of water distribution lines toward the airport and other locations south of Battle Mountain.
- Upgrading water services and storage at the airport.
- Possible extension of water service to the Battle Mountain Indian Colony.
- Creation of secondary feed loops.
- Expansion of municipal water to industrial sites in the Battle Mountain area.
- Acquisition of additional water rights in hydrographic basins 64 and 59 as well as other surrounding basins to meet future needs.

## Figure 5-1 Battle Mountain Public Facilities and Service Area



### 5.1.7 Battle Mountain Area Priorities and Water Related Issues

A number of priorities and water related issues have been identified for the Town and the greater Battle Mountain area. They include:

1. Meeting Arsenic standards with a new water supply.

2. Protecting natural recharge areas, groundwater quality and quantity in the lower Reese River Valley and minimizing mining related impacts.

3. Future service area expansion for Battle Mountain water system, particularly south of Interstate 80.

4. Implementation of well-head protection areas and locations of groundwater wells.

5. Financing major capital improvements required to accommodate cyclical economic activity.

6. Development and use of Rock Creek water rights.

7. Expansion of distribution system to serve outerlying areas.

8. Creating secondary feeds and adequate looping in areas south of Battle Mountain.

9. Acquiring additional water rights for municipal and industrial uses in the Battle Mountain area.

10. Protect appropriated surface water rights and historic uses of surface waters.

11. Identify economic benefits that could be realized by better management of water resources of the Humboldt River.

12. Expansion of Municipal water supply to the Airport and Industrial Areas.

13. Maintaining adequate water resources for growth and development in Lander County and to maintain traditional uses such as mining and agriculture.

14. Develop long-term groundwater resources for future growth and development in Lander County. Local municipal water suppliers need to ensure that adequate resources are available for long-term growth prospects as outlined in Section 4.0.

15. Protection of Reese River watershed including Hydrobasins 56, 57, 58, and 59 which are connected by groundwater underflow and surface flow from the Reese River.

## 5.2 Lander County Sewer and Water District # 2-Austin Area

### 5.2.1 Current Demand and Water Quantity

The Austin Water System (Lander County Sewer and Water District #2) currently serves approximately 126 residential and 40 commercial customers within the 560 acre area of Town of Austin. The total population of Austin was 304 in 2009 (Nevada State Demographer). In addition to the 166 active services, there are approximately 93 inactive services and 20 system obligation fees. Based upon the total amount of available land, the existing service area could accommodate perhaps as many as 500-600 individual users at full build-out, assuming residential development occurs at about 1 home per acre. Presently there are nearly 340 parcels in the Town not including patented mining claims. Parcels in Austin are generally small, ranging in size from about 5,000 square feet to several acres in some cases. Table 5-2 summarizes current water demands based upon existing residential use and potential service area demands.

**Table 5-2**
**Lander County Sewer and Water District #2 2009 Population and Water Demand**

| Users | Customers | Annual Water Use | Per Capita Use | Total Water Use (AF) |
|---|---|---|---|---|
| Active Users | 166 | 48 Million gal. | 432 gal. | 147 |
| Active & Inactive | 258 | 76 Million gal. | 432 gal. | 233 |
| Total Build-out | 600 | 150 Million gal. | 432 gal. | 460 |

Source: Sewer and Water District #2

The current capacity of the system including two groundwater wells and springs is approximately 300 gallons per minute. For the 12-month period ending October 2009, the District delivered approximately 48 million gallons resulting in a fairly high per capita use rate of 432 gallons per person per day. The higher use is probably due to a number of factors including commercial water use (hotel/motels) and water use at local area recreation facilities relative to a small residential population.

Under permit number 52400 the District is allowed 2.0 cubic feet per second and 102.492 million gallons annually (314.5 acre-feet), which was the amount of water permitted for the District's first well. The District filed an application for permission to change the point of diversion (partial) for 1.44 second-feet and 79.794 million gallons. The water is to be used for a second groundwater well to supply the Town of Austin and surrounding areas.

In addition to groundwater wells, the District holds water rights at several surrounding springs located in Marshall and upper Pony Springs Canyon under permits 20157 and 20158 for a total of 338 million gallons annually. Permits 20159, 24426, 25452, 36615,

and 21576 are supplemental to the permits for Marshall and Pony Canyons. Total available water from the spring is approximately 1,040 acre-feet, annually.

### 5.2.2 Municipal Service and Near-term Demand

Current official State estimates place the population of Austin at 304 in 2009. Total demand for municipal and industrial water and hence the population in the Austin area is influenced by the following:

**Domestic Well Conversions-**With the development of a new water source west of Austin there will be a limited number of domestic well conversions.

**Annexation of Lands/Expansion of Service Area** – The District is considering an expansion of its service area to the West extending as far as the Austin Airport. The annexation of lands will increase the service obligation by the District. The total amount of land available for service ranges from 2,000 to 3,000 acres.

**Airport Water System** - There is a small water system at the Austin Airport. It is possible that municipal water service at the airport could increase the development potential. Extending water service to the airport could become feasible in the near future as the Districts seeks a new location for production wells which meet Arsenic standards.

### 5.2.3 Service Area Expansion

The District serves the Town of Austin, which encompasses approximately 560 acres. Future expansion areas will depend upon the level of population growth and development in the region. Because of the uncertainties associated with long-range population forecasts for small communities, identifying future potential services areas is another approach to estimating the future water needs of the District. In addition to Midas Canyon, there are two other areas that may require future service expansion. They include:

- Patented lands surrounding Austin
- Lower Valley and Airport Areas

Possible service area expansions are shown in Figure 5-2. Expansion in these areas will depend on the level of demand and other factors considered by the District that makes water service financially and operationally feasible. Having the ability to extend service could facilitate economic growth and development in the future. There are approximately 1,500 acres of patented lands immediately adjacent to the Town of Austin. These lands are located to the north and east of Austin as well as the Marshall Canyon area.

Development of resort and second home properties as well as new land for residential development could attract additional population to the Austin area and increase overall water demand.

Sizable land holdings are available in the lower valley west of Austin. The District has expanded its water services in the Midas Canyon Road area to serve the US Forest Service building. The District already serves the Austin Schools. Additionally, there are about 200 acres of lands available for development including 80 acres owned by the County and the District in the Midas Canyon Road area. Lander County also owns another 100 acres on the south side of U.S. 50 near Midas Canyon Road. Approximately 10 acres is currently being used as part of the Austin Roping Area.

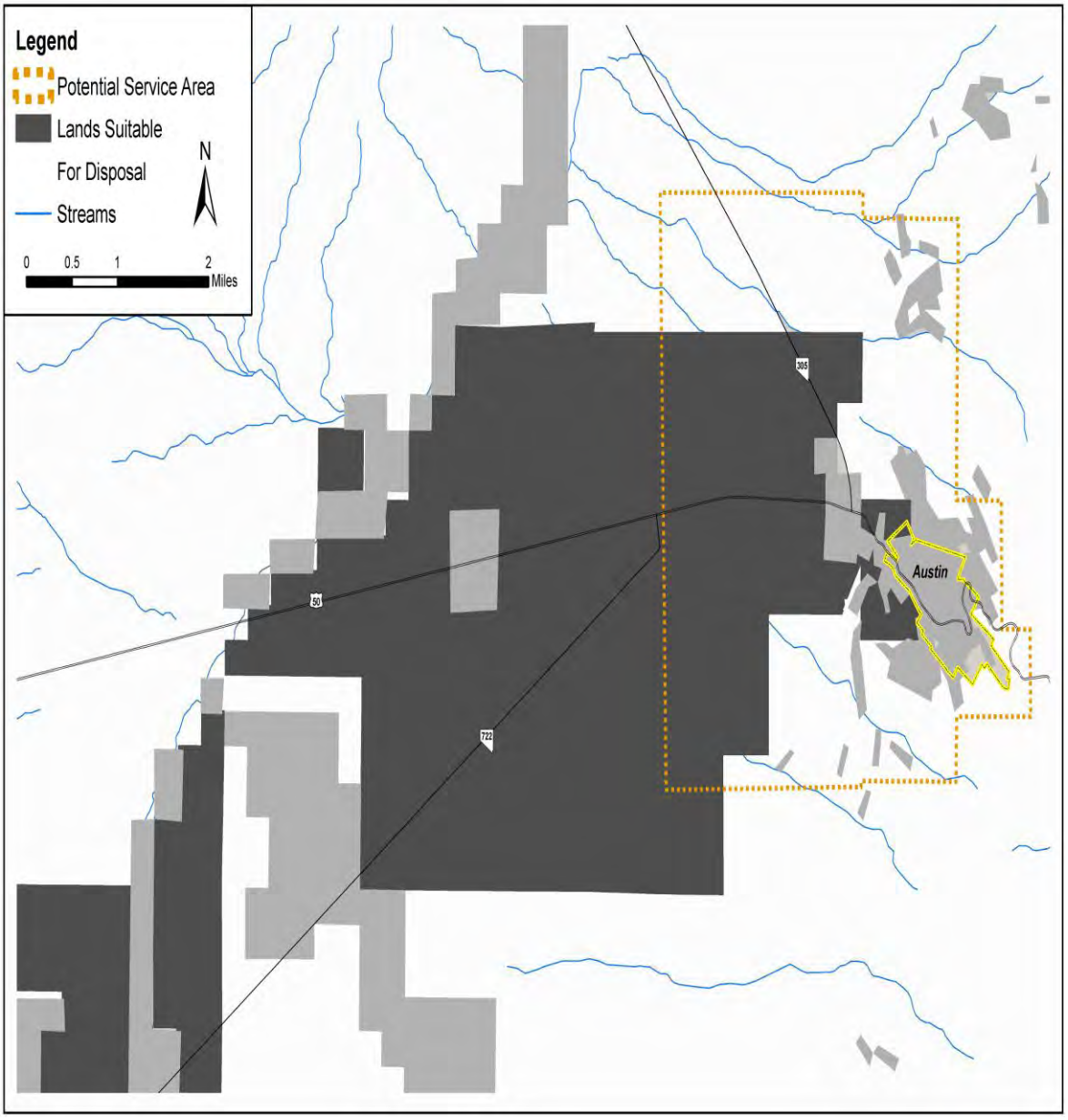
There are large tracts of public lands administered by the BLM that are available for disposal in the Reese River Valley. The disposal area west of Austin is primarily found in Township 19 North Range 43 East, and Township 18 North Range 42 East. There are an estimated 15,000 to 20,000 acres available for disposal. Although most of this land would probably be used for agricultural purpose and open space with low density development, the District may be requested to provide water service to parcels/development adjacent to the service area and parcels adjacent to the airport. As the District continues to investigate the development of water resources to the West to comply with arsenic standards, expansion of water services becomes increasingly feasible.

Table 5-3 shows estimated water demand of adjacent lands that could be served by the District. The amount of water required for each acre of land is based upon the ratio of current customers to water demand for Austin (147af./160 customers). Table 5-3 does not assume extra ordinary water use for commercial and industrial development on these lands. The majority of land would probably be used for residential development along with light industrial and associated commercial and tourist commercial uses.

**Table 5-3**
**Water Requirements and Future Services Areas**
**And Agricultural Development in Upper Reese River Valley**
**Lander County Sewer and Water District #2**

| Area | Land Available | Demand forWater (af/yr) |
|---|---|---|
| **Base Population** | 560 acres | 1,255 |
| **Expansion areas** | | |
| Patented Lands | 1,500 acres | 3,360 |
| Midas Canyon Rd | 300 acres | 670 |
| Lower Valley/Airport | 2,000 – 3,000cres+ | 4,480 -6,720 |
| **Total M&I** | 4,360-4,460 acres | 9,765-12,005 |

## Figure 5-2 Austin Area Service Expansion
## Lander County Sewer and Water District #2




### 5.2.4 Treatment, Storage and Distribution Systems

The Austin system is mostly new with the majority of the it being replaced in the last couple of years. In 1998 a new well and tank were put into service. The total water storage capacity of the Austin system is approximately 550,000 gallons. The District maintains two wells capable of producing approximately 250 gallons per minute. Springs utilized by

the District are capable of providing approximately 50 gallons per minute. The springs are primarily used as a back-up water source in the summer months.

The District does not treat its groundwater. Treatment capabilities might be required in the near future for arsenic content. Water quality analysis for the system shows arsenic levels to be below the new regulatory standard of 10 parts per billion in the Marshall Canyon and Pony Canyon springs and wells. Arsenic levels of the District's two wells are slightly above the proposed standards. Arsenic levels range from 11 to12 parts per billion.

### 5.2.5 Water Quality and Well Head Protection

Water quality for the District is generally good. Recent chemistry analysis of wells shows various constituents being below maximum contaminant levels with the exception of arsenic. Current water quality does not meet arsenic standards. The District completed a wellhead protection program for the existing sources. The wellhead protection area delineations for the Town of Austin's two valley wells were made by using the RESSQC module of the computer program WHPA. Five and ten-year capture zones were delineated for the groundwater wells (Figure 5-3).

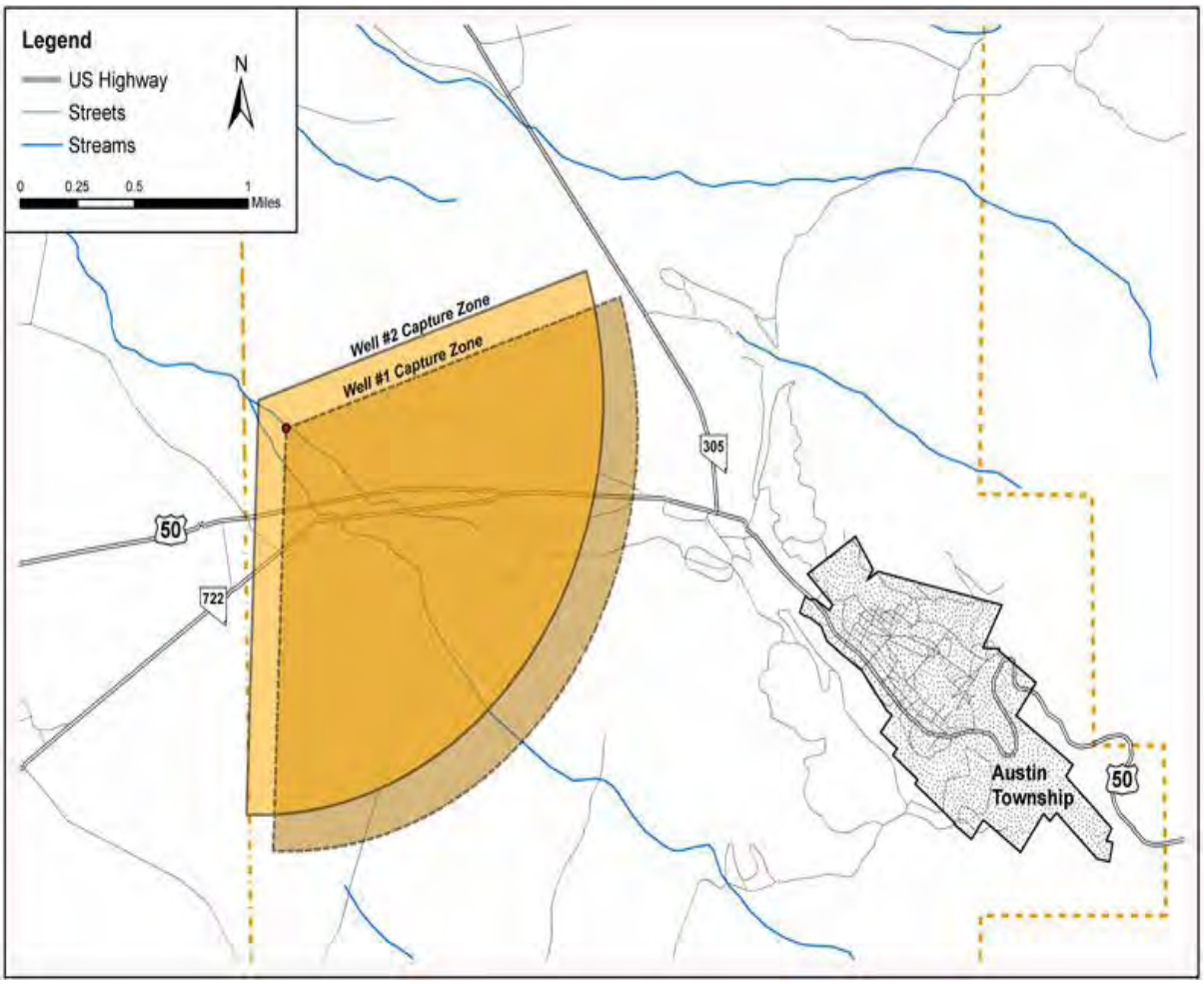
### 5.2.6 Capital Improvements and Financial Requirements

Major capital improvements will be centered on compliance with Arsenic standards for drinking water. Austin will need to implement treatment technologies or search for new water source that meets the Arsenic standard. The Lander County Sewer and Water District is undertaking a preliminary engineering report to analyze various options for arsenic compliance. The development of a new water source west of Austin will create a need for additional storage with booster pump capabilities and extension of distribution lines within the existing and proposed service areas.

Other major improvements to the existing system include:

- A new water supply which meets arsenic standards.
- A test well program.
- A new tank at the western end of Austin.
- Improvements to existing spring collection system.
- Replacement of pressure reducing valve and vault and other miscellaneous improvements to the existing distribution system.
- Expansion of the distribution system to serve areas in the expanded service area.

## Figure 5-3 Five and Ten Year Capture Zones




### 5.2.7 Austin Area Priorities and Water Related Issues

A number of priorities and water related issues have been identified for the District and greater Austin Area including the Reese River Valley and Toiyabe Range. They include:

- Acquiring and holding sufficient water resources to serve potential system expansion areas identified in Figure 5-2.

- Meeting financial requirements associated with arsenic treatment and other regulatory standards imposed.

- Preventing man contamination of water resources through the development of a well-head protection program and watershed management.

- Financing needed capital improvements and system expansion particularly in the lower valley and airport areas.

- Maintaining adequate water resources for future growth and development in Lander County, particularly in the Reese River Valley. Expanding opportunities to increase the Reese River agricultural operations.

- Protecting regional ground and surface water resources from exportation to areas outside Lander County.

- Geothermal development and related impacts in the Austin Area and southern Lander County.

## 5.3 Town of Kingston

### 5.3.1 Current Water Demand

The Town of Kingston is served by its own community water system. The service area had a population of approximately 328 in 2010. There are another 214 property owners in the area paying a standby fee for undeveloped parcels that could connect to the system in the future. The system's two main groundwater wells produce approximately 350 gallons per minute. As a result, the current per capita daily demand ranges from 150 to 200 gallons.

In a five year period, the Town of Kingston nearly doubled in size based upon utility hook-ups. In 1995 there were approximately 66 users compared to 115 users in December of 2000 and 144 users in 2010. The level of growth between 1995 and 2010 has been substantial. Commercial development in the Kingston area is somewhat limited. There are several parcels in the Town's service area that are currently used for tourist commercial and general commercial related activities such as a store, restaurant, lodging, real estate office, and a church. Future development of the community and surrounding areas as detailed in the Town of Kingston Master Plan and the Lander County Master Plan would require the Town's system to expand eastward toward SR376 consistent with the Lander County Master Plan.

Table 5-5 summarizes current water demands based upon existing residential use and potential service area demands. As shown in this table, the total number of active (144) and inactive (115) water customers would utilize approximately 68 percent of the water currently under permit for two groundwater wells.

**Table 5-4 Kingston Water System 2009 Population and Water Demand**

| Users | Customers | Annual Water Use in Gallons | Per Capita Water Use/Day | Water Use Acre-Feet/Yr. |
|---|---|---|---|---|
| **Active** | **144** | **18 million** | **150-200 gallons** | **110 AF.** |

Source: Kingston Town Water System, 2009

### 5.3.2 Factors Influencing Municipal Service and Demand

In 2000, the population of Kingston was 219. In recent years relatively significant growth rates have occurred between 2000 and 2009 with the population increasing to 331 in 2009.

**Town of Kingston Build-out -** Most of the growth in Kingston is occurring due to new residential construction within the Town's service area. Total build-out of the Town as it currently exists could exceed 600 units. Second home development and retirees are driving growth in the Kingston area growth.

**Annexation of Lands –** There are lands that surround the Town of Kingston. Such lands could be served by the Town of Kingston. Additionally, as more residential development occurs in and around the service area, more commercial uses are likely to occur. Such commercial development may occur along State Route 376 as shown in the Town's Master Plan.

**Gilman Springs –** Gilman Springs consists of approximately 40 home sites. Total demand for water is just over 80 acre-feet annually.

### 5.3.3 Service Area Expansion

Expansion of the Town's system would probably occur to areas on the perimeter of the existing boundary and east towards Highway 376 to serve commercial developments. It should be noted that the entire population of the Town of Kingston could be more than 2,500 at full build out. There are approximately 1,000 parcels within the Town's service area. With this level of growth approximately 1,065 acre-feet of water would be required to meet demands.

Public lands surrounding the Town are available for disposal. As the population continues to increase, there may be greater demands of retail and small commercial development for the Kingston area. The most appropriate area for this type of development would be to the east of Town along State Route 375.

### 5.3.4 Storage, Treatment and Distribution Facilities

The Kingston Water storage system has one new 225,000 gallon storage tank. The distribution system is currently in good condition with some leakage among old meters. In the past, breaks in the distribution system accounted for the relatively high pumping rates. The main line in the core community area was replaced in 2001. In the past several years approximately 5,000 feet of water distributions line has been replaced and new fire hydrants installed.

There are no treatment requirements for the system at this time. The Town's water quality is generally characterized as good and meets primary and secondary drinking water standards. It is important to note that the Town operates an induction well that receives infiltration from Kingston Creek. The current permit allows for diversion of 1.35 cubic-feet per second or 605 gallons per minute and a total withdrawal of 231.8 acre-feet per year. The Town is currently permitted to pump 2,500 gallons per minute for a total of 268.2 acre-feet annually from a second groundwater well. Both wells are located at a depth of approximately 85 feet. The Town has rights to two springs that have a total diversion rate of .0259 cfs or 11.6 gallons per minute.

### 5.3.5 Water Quality and Well Head Protection

Because the Town operates an induction well with surface water as the primary source and that both groundwater wells are relatively shallow, ensuring surface water quality is important for the system. Watershed management and protection is a critical element of maintaining the quality of water. Kingston Creek drains the upper reaches of Kingston Canyon approximately 23.4 square miles. Relatively intense use occurs in the Canyon primarily from outdoor recreation use along Kingston Creek and Groves Lake and mining in Victorine Canyon. Additionally, throughout the reach of Kingston Creek there is a county maintained road. In some areas the road is with a few feet of the Creek. Contaminants can be present from runoff and other human causes.

### 5.3.6 Capital Improvements and Financial Requirements

In the past several years, major capital improvements were completed for the Kingston area. Such improvements included installation of pressure reducing and isolation valves, replacement of main, new fire hydrants, and additional storage of 225,000 gallons. Future capital improvement needs include the following:

- Construction of a storage tank near the lower end of Kingston.

- An additional water source with possible treatment for future growth and community build-out.
- Construction of an intermediate tank near the center of the community.

### 5.3.7 Kingtson Area Priorities and Water Related Issues

1. Acquiring and maintaining sufficient water and water rights for future growth and development including future development areas around the town of Kingston.

2. Man caused contamination of ground and surface water. The area needs to develop well-head protection and or water shed management programs to protect critical resources.

3. Financing capital improvements and system operations and development of a fair and appropriate water rate for system users.

4. Agriculture, tourism and outdoor recreation uses are important to Kingston Area residents.

5. Develop adequate flood control for the Kingston Area.

6. Future consideration should be given to the development of a wastewater treatment facility as the town continues to develop and the number of on-site septic tanks increase.

7. Re-establishing community water based recreational facilities within the town of Kingston.

## 6.0 POLICIES AND ACTION PLANS FOR WATER MANAGEMENT

**Goal 1: Plan for the development and use of sustainable water supplies for Long-Range Growth and Development of Lander County.**

**Objective 1.1 Promote Efficient Use of Water Resources.**

WRP.1.1-1 Lander County shall develop and implement water conservation measures.

WRP.1.1-2 Minimize the use of high water demand vegetation for decorative uses on public and private project landscaping.

WRP.1.1-3 Lander County shall review landscaping requirements providing for drought resistant, low water consuming vegetation and efficient irrigation systems in all new developments.

WRP.1.1-4 Encourage new public and private development to use water conservation landscaping and fixtures.

> WRP.1.1-4.1 The Lander County Planning Commission should include xeriscaping provisions in the Lander County Development Code. The provisions will provide economic incentives to developers by adjusting water right dedication requirements to reflect the reduced water demand of water conservation landscaping and fixtures.
>
> WRP.1.1-4.2 The Lander County Building and Planning Department will develop and adopt standards for water conservation devices.
>
> WRP.1.1-4.3 Lander County shall establish requirements for water conservation programs.
>
> WRP.1.1-4.4 The Lander County Planning Department will attach conditions to all subdivision approvals mandating installation of conservation devices such as low flow fixtures.

WPR. 1.1-5 Maintain a tiered water rate structure for municipal water purveyors in Lander County.

**Objective 1.2 Provide an Acceptable Level of Service to the Community.**

WRP.1.2-1 Ensure that all community water systems meet drinking water standards.

WRP.1.2-2 Regularly update and maintain capital improvement and facility plans

WRP.1.2-3. Ensure adequate water rights are available for Lander County communities to accommodate long-term as defined in Section 4.0.

**Objective 1.3 Implement Measures to Protect Water Resources for the Beneficial use within Lander County and Support Existing Uses.**

WRP.1.3-1 Oppose water exportation projects which move water resources outside Lander County.

WRP.1.3-2 Use conservation easements and purchase of development rights which result in lands staying in agricultural production or the beneficial use of water remaining within Lander County.

WRP.1.3-3. Allow cluster zoning on agricultural lands in order to maintain agricultural lands and water rights in production.

WRP.1.3-4. Lander County should acquire or purchase groundwater rights for future use in municipal and industrial applications.

WRP.1.3-5. Participate in the development of monitoring, management of mitigation plans being established for Lander County hydrographic basins.

> WRP.1.3-5.1 Submit a request to the State Engineer's Office allowing Lander County to participate in the process to develop a monitoring, management and mitigation plan for projects affecting ground and surface water resources.
>
> WRP.1.3-5.2 Submit appropriate information to the State Engineer's office and participate in any studies or plans being developed by the State Engineer.

**Objective 1.4 Ensure that Land Use Planning is Linked to Water Resources.**

WRP.1.4-1 Maintain water right dedication requirements for newly created parcels in dedicated basins.

WRP.1-4-2 Lander County water purveyors should implement water right dedication or payment in lieu of water rights for new service commitments.

WRP.1-4-3 Recognize the importance of flood plain management in reducing the risk of future flooding within the community and implement appropriate policies to limit encroachment and development.

WRP.1-4-4 Lander County shall prepare land use plans for selected hydrographic basins.

**Goal 2: Protect Surface and Groundwater Quality**

**Objective 2.1 Establish measures to prevent groundwater contamination.**

WRP.2.1-1 Establish wellhead protection programs for current municipal wells and areas planned for future wellfields.

WRP.2.1-2 Wellhead protection areas should be delineated in map form and distributed to the local planning agencies. Future zoning and planning activities should be respectful of these areas.

WRP.2.1-3 Ensure that geothermal migration does not adversely affect existing well fields. Geothermal development near municipal and domestic well field require adequate evaluation, impact assessment and mitigation.

WRP.2.1-4 Monitor areas of existing groundwater contamination.

WRP.2.1-5 Monitor areas with declining groundwater levels and changes in groundwater quality from withdrawal and use.

**Objective 2.2 Manage Wastewater for Protection of Water Quality.**

WRP.2.2-1 Reduce development density for individual well and septic systems. New parcels served by individual well and septic systems should not exceed a gross density of 2.5 acres per residential or commercial/industrial unit.

WRP.2.2-2 Monitor septic densities in Lander County communities and work to ensure compliance with recommended density standards.

WRP.2.2-3 Service area expansion for both sewer and water service should occur in areas planned for higher density development.

**Goal 3: Establish measures to ensure proper floodplain and watershed management to protect human health, property, water quality, and natural resources.**

**Objective 3.1 Protect Critical flood zones.**

WRP.3.1-1 Prohibit/Minimize uses and structures within floodways.

WPR.3.1-2 Prohibit Floodway encroachments. Every new encroachment, including fill, new construction, substantial improvement and other development, is prohibited in a designated floodway, except as provided in WRP.3.1-2.1.

> WRP.3.1-2.1 Exceptions. Improvements may be allowed in the floodway if it is demonstrated through hydrologic and hydraulic analysis and certified by a Nevada registered engineer that the proposed improvements will not result in any increase in flood levels during the occurrence of the base flood discharge, and that the improvements meet County standards.
>
> WRP.3.1-2.2 Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
>
> WRP.3.1-2.3 Restrict development in floodplains that would constrict or otherwise result in higher floodwater levels or peak flows, or impact to floodplain functions.
>
> WRP.3.1-2.4 Lander County shall use the Federal Emergency Management Agency (FEMA) Flood Insurance maps as the basis for delineation of floodplains and floodways, unless more recent research and surveys are presented which establish a more accurate delineation.

**Objective 3.2 Implement measures to protect surface and groundwater resources.**

> WRP 3.2-1 Proposed development projects affecting water resources shall be reviewed to determine potential impacts.
>
> WRP 3.2-2 Ensure development projects comply with special use permit requirements outlined in the 2010 Lander County Master Plan.

WRP 3.2-3 Ensure that Lander County concerns are integrated into any monitoring and mitigation plan established by state and federal agencies for development projects affecting Lander County.

**Objective 3.3 Establish Watershed Management for Reese River, Kingston Creek, Humboldt River, and Pony Canyon.**

WRP.3.3-1 Basin 56, 57, 58, and 59 are hydraulically linked where groundwater underflow occurs. Lander County needs to establish watershed management efforts in this area and increase its understanding of the relationship and use of water which exists among these basins.

WPR.3.3-2 Kingston Creek provides groundwater recharge through infiltration and induction wells used by the Town of Kingston. Measures should be implemented to protect the creek from man-made sources of contamination.