Geiger Grade/Toll Road Flood Control Project

Existing Condition Analysis Memorandum

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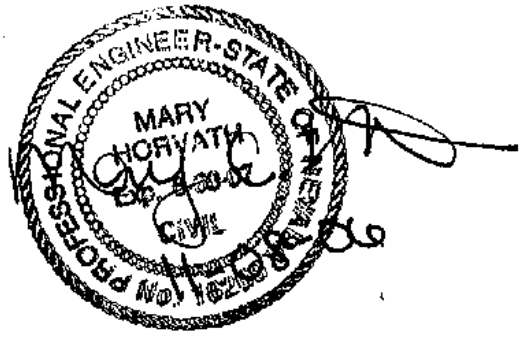

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1.0 INTRODUCTION

The Washoe County Department of Water Resources obtained funding in 2006 to complete a preliminary design of flood control facilities near the confluence of Bailey Canyon Creek and Steamboat Creek. This memorandum summarizes existing and available data while also making recommendations regarding the additional data collection and analyses needed to design and permit the project.

Bailey Canyon Creek is problematic from the upstream crossing of Toll Road to near its confluence with Steamboat Creek. During significant storm events culverts fill with sediment and flow overtops the banks and floods Geiger Grade and Toll Road and surrounding private property. In addition, the channel is unstable through the residential neighborhoods between the two Toll Road crossings and has undermined the yards of private residences. At the crossing of Toll Road near the intersection with Geiger Grade, the culverts and downstream channel of Bailey Canyon Creek are significantly undersized. Consequently, flow leaves the channel, overtops Geiger Grade to the north and floods the neighborhood directly to the south. A wall built by the Rock Yard just downstream of Toll Road and the piped crossing of the Chandler Ditch further exacerbate flooding issues.

The primary goals of the Geiger Grade and Toll Road Flood Control Project are to address these problems and ease the drainage issues through the lower section of Bailey Canyon Creek from the upstream crossing of Toll Road to near the confluence with Steamboat Creek. The project includes the design of facilities for sediment retention, conveyance of peak flows within the channel on the south side of Geiger Grade, and reduction of peak flows. A project criterion is that implemented improvements can not result in an increase in downstream flooding or an increase in peak flows on Steamboat Creek.

1.1 Background

The Bailey Canyon Creek watershed is approximately 15.8 square miles in size and outlets into Steamboat Creek near the intersection of Geiger Grade and US395 (Figures 1 and 2). The headwaters of the Bailey Canyon Creek extend to the west of Virginia City and the eastern watershed boundary follows Geiger Grade in sections. Bailey Canyon Creek is ephemeral. Its channel substrate consists of a range of sands, cobbles, and boulders depending on channel slope.

Based upon historic aerial photographs of the Geiger Grade area, the alignment of lower Bailey Canyon Creek was altered from a sinuous channel to a confined and straightened channel configuration between 1956 and 1972. The section of Bailey Canyon Creek from its lower crossing of Toll Road downstream to Steamboat Creek has remained in its current position since the 1970's. Developments of homes along Mira Street, in addition to the establishment of a park and later a Rock Yard, have necessitated the channel's configuration. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and the Nimbus Engineers (1995) and CFA (2006) flood studies predict that 100-year flows immediately upstream of Mira Street, near the intersection of Toll Road and Geiger Grade, will split and a portion of flows will cross Geiger Grade toward the north.

In 1999, Stantec Consultants prepared the "Master Drainage Report for the Geiger Grade/Toll Road Project". In addition to designing the drainage facilities for the realignment of Geiger Grade and Toll

Road, the report included the 30% design of flood control improvements along Bailey Canyon Creek including culvert structures under Toll Road, channelization of Bailey Canyon Creek from Cottonwood Creek Estates to Steamboat Creek, and the design of sediment trap basins along Bailey Canyon Creek just upstream of the realigned Toll Road. Peak flows of 3,673 cfs for Bailey Canyon Creek were used in the design of a ten cell, 12-foot by 4-foot reinforced concrete box culvert to convey flows under the realigned Toll Road. This peak flow of 3,673 cfs takes into account the assumption that all flows remain in the Bailey Canyon Creek channel to the south of Geiger Grade. The culverts under Toll Road were constructed as part of the roadway realignment project; the Bailey Canyon Creek channelization and sediment basins were not constructed. To match existing condition peak flows downstream of Toll Road, a single box culvert was left open to convey flows beneath it. The nine remaining box culverts were sealed by the Washoe County Regional Transportation Commission and will remain so until the final project conditions are met.

The Bailey Canyon Creek watershed, which is underlain by soils classified as having a moderate to high erosion hazard, experienced a fire during the summer 2004. The August 2004 fire burned a total of 2,693 acres, a majority of which is not located in the Bailey Canyon Creek watershed. The area burned by the fire has been described as low rolling topography with steep north facing slopes along the foothills of the Virginia Range. Parts of the burn area have been classified by the Bureau of Land Management (BLM) as being extremely susceptible to erosion and sedimentation into stream areas due to the complete removal of vegetation across the burned area. Offsite sediment damage to private property and threats to human life were considered moderate to high by the BLM. In order to stabilize and rehabilitate the area following the August 2004 fire, the BLM performed aerial native and urban seeding of the burned areas within the Bailey Canyon Creek watershed. In addition, residents were encouraged to seed their property.

In December 2005, Bailey Canyon Creek experienced significant flooding negatively impacting the adjacent neighborhoods and residents. The "Drainage Study for Bailey Canyon Basin," by CFA, Inc. indicates that the December 2005 precipitation event approximated the 20-year, 24-hour storm in the upper sections of the Bailey Canyon Creek watershed. However, precipitation gage data from the Steamboat Creek watershed downstream of Bailey Canyon Creek suggest the 200-year, 24-hour event. Without stream gage records on Bailey Canyon Creek, it is difficult to determine what magnitude event occurred in the project watershed. Because of the storm, homes and properties were damaged, culverts filled with sediment, significant sediment was deposited in stream and flood channels. A field investigation by Wood Rodgers during the summer 2006 noted erosive damage to yards of private parcels near Moon Lane along the channel of Bailey Canyon Creek.

1.2 Previous Reports & Studies

Numerous reports and studies have analyzed the hydrology and hydraulics of the Geiger Grade and Toll Road area. The focus of each project is discussed in the following paragraphs.

1. In 1995, Nimbus Engineers prepared "The Flood Control Master Plan for the Southeast Truckee Meadows, Washoe County, Nevada," to provide a framework for future development in the area of Steamboat Creek and Whites Creek. This study quantified flows of contributing major

drainages and provided conceptual designs of channels, bridges, and roadway structures. The study also outlined mitigation strategies for increased flows on Steamboat Creek due to development in the Damonte Ranch/Double Diamond area. The HEC-1 model developed for this Master Plan effort quantified the peak flow in Bailey Canyon Creek as 2,158 cfs for the 100-year event.

2. Nimbus Engineers prepared "Hydrology and Hydraulics Analysis for Cottonwood Creek Estates" in April 1995 with amendments in June and July of the same year. This subdivision is located on approximately 85 acres immediately downstream of Comstock Estates along Toll Road. Nimbus Engineers calculated a 100-year peak flow of 3,673 cfs for Bailey Canyon Creek (vs. the 100-year peak flow of 1,120 cfs in the Flood Insurance Study). For the Cottonwood Creek study, the U.S. Bureau of Reclamations (USBR) S-lag equation was converted by Nimbus Engineers to a dimensionless unit hydrograph equation for translation of excess precipitation to runoff. To determine flood limits and water surface elevations in Bailey Canyon Creek, HEC-2 models were developed and run with the peak flow of 3,673 cfs and the regulatory flow of 1,120 cfs. Manning's coefficients of 0.035 and 0.04 were applied to the channel and overbank areas respectively.

3. "The Master Drainage Plan for Cottonwood Creek Estates" was prepared by Nimbus Engineers in October 1995. Based upon the peak flows determined in the Hydrology and Hydraulics Analysis for Cottonwood Creek Estates, grading and channel improvements were proposed for the project site. A flood control channel was designed to convey the regulatory flow of 1120 cfs. To provide stabilization of the channel, a channel lining with minimum rip rap size of d_{50} = 14 inches was proposed with maximum channel side slopes of 2:1. Subdivision pad elevations adjacent to the channel were recommended to be elevated above the water surface elevations as established from peak flows of 3673 cfs.

4. Stantec Consulting, Inc. prepared "The Master Drainage Report for Geiger Grade/Toll Road Project" for Washoe County in August 1999. The purpose of the study was to design improvements for Geiger Grade. The study anticipated construction of the intersection of Geiger Grade, Pioneer Parkway, and Steamboat Parkway as well as the realignment of Geiger Grade with the north end of Toll Road. Flood control improvements associated with this project include design of a new bridge over Steamboat Creek, removal of the existing culverts under Geiger Grade, incorporation of a drop structure through a channelized section of Steamboat Creek, culvert structures under Toll Road, channelization of Bailey Canyon Creek from Cottonwood Creek Estates to Steamboat Creek, and the design of sediment trap basins along Bailey Canyon Creek.

   The proposed flood control improvements for Bailey Canyon Creek and Steamboat Creek were designed to convey the 100-year peak flows. The Steamboat Creek channel stabilization located immediately upstream of the Geiger Grade bridge was designed for a peak flow within Steamboat of 7,530 cfs. The Bailey Canyon Creek channel and box culverts were designed to accommodate

flows of 3,673 cfs, as determined by Nimbus Engineers (1995). To pass the Bailey Canyon Creek flows under Toll Road, ten 12 ft by 4 ft reinforced box culverts were designed.

The sediment yield of Bailey Canyon Creek was determined by applying the Modified Universal Soil Loss Equation (MUSLE). Stantec calculated a sediment yield of 52.5 acre-feet of sediment resulting from the 100-year event using a peak flow of 3,673 cfs and a flood volume of 954 acre-feet. Wash load was estimated to be 39.4 acre-feet while the bed load was estimated at 13.1 acre-feet.

5. FEMA Flood Insurance Study (FIS) for Washoe County, Nevada and Incorporated Areas with a revised date of June 6, 2001, lists a 100-year peak discharge for Bailey Canyon Creek of 1,120 cfs as determined from regional analyses based on 18 moderate-sized, natural drainage basins in the Truckee River and Carson River basins. A revised analysis had been performed in 1992 that included the effects of levee and channel improvements along Bailey Canyon from the Chandler Ditch to Steamboat Creek. The changes to peak flows and floodway data were incorporated into the revised FIS.

6. Nimbus Engineers submitted an application for Conditional Letter of Map Revision (CLOMR) for the Damonte Ranch/Double Diamond Ranch area in March 2001. The FEMA map revisions did not impact the floodway of Bailey Canyon Creek, as this area was outside of the limits of study. Peak 100-year event flows are equivalent to those modeled as part of the Flood Control Master Plan for the Southeast Truckee Meadows.

7. A "Hydrology and Hydraulics Report for Curti Ranch Two – Unit 3" was prepared by CFA, Inc. in December 2001 and updated in June 2003. The Curti Ranch Two project site is located north of Geiger Grade, west of Curti Ranch Unit I and Sagewood Estates, and east of Caramella properties. The CFA study quantified and designed facilities for the conveyance of the 10-year and 100-year peak flows for the developed conditions for the subdivision. To handle the anticipated sheet flows from Bailey Canyon Creek which overtop Geiger Grade, a cut-off channel was proposed parallel to Geiger Grade. The channel extends from the southeast corner of the project site to downstream of the Curti farmhouse. The channel and culverts under the new Mira Loma Drive have been sized to handle the 100-year flows while the Curti driveway culvert will convey enough flow to approximate pre-development conditions.

8. A Special Use Permit was prepared by CFA, Inc. in 2002 for the Curti Ranch Two Detention Basin. This report focused on the hydrologic and hydraulic studies necessary to size a detention pond for mitigation of project development.

9. In January 2003, CFA, Inc. submitted a "Master Drainage Report for the Curti Ranch Two Development" to provide an update to the previous Master Hydrology study performed by Pyramid Engineers in 1997. Restudy was necessary because predicted flow conditions on the Curti Ranch had changed following improvements to Geiger Grade and the detailed off-site basin studies for Curti Ranch Unit 3. The CFA report determined existing and proposed runoff

conditions in addition to providing a preliminary design for stormwater conveyance for the Curti Ranch Two development project.

10. CFA, Inc. submitted the "Hydrology and Hydraulics Report for Curti Ranch Two – Unit 5 and the Detention Basin" in March 2003. Unit 5 is located in the central section of the Curti Ranch Two development project. This report focused on hydrologic and hydraulic calculations for Unit 5 and the proposed detention basin. The 10-year and 100-year peak flows were determined and the detention basin was sized. Design of the stormwater system and detention basin mitigates the increase in peak flows due to project development.

11. In April 2006, CFA, Inc. submitted the "Drainage Study for Bailey Canyon Basin" to the City of Reno. The purpose of their study was to estimate basin discharge for the 100-year, 24-hour storm event and to perform a hydraulic analysis of Bailey Canyon Creek near Geiger Grade. This detailed study compared the results computed by applying the National Resource Conservation Service (NRCS, previously Soil Conservation Service or SCS) method within a HEC-HMS model (2,824 cfs) to peak flow resulting from analyses with the Green and Ampt Loss Method, a Frequency Analysis, and through application of the United States Geologic Survey (USGS) Regression Equation. CFA, Inc. also compared their results to those of the Flood Insurance Study for Washoe County, the Cottonwood Creek Estates Study, and the Southeast Truckee Meadows Flood Control Master Plan. They concluded that predicted peaks flows vary significantly for the Bailey Canyon Creek Basin depending on model parameters and methodologies applied. The hydraulic analysis by CFA, Inc. determined that under current conditions, 245 cfs from Bailey Canyon Creek will flow over Geiger Grade during the 100-year, 24-hour event leaving 2,487 cfs in the Bailey Canyon Creek channel downstream of the Toll Road and Geiger Grade intersection. The curve number of 74.4 applied in the CFA, Inc. analysis proved reasonable compared to model results from a similar watershed. The CFA, Inc. study also noted that although precipitation records for South Reno indicate that the December 30 and 31, 2005 storm had precipitation depths with an approximate recurrence interval of 200 years and the NEXRAD radar images appear similar between South Reno and Bailey Canyon, the rainfall gage data in Bailey Canyon do not support a 200-year precipitation event. The Bailey Canyon gage showed a 3.07 inch cumulative 24-hour rainfall which approximates a National Oceanic and Atmospheric Administration (NOAA) Atlas 14 20-year, 24-hour event.

12. FEMA provides the floodplain boundary for the Bailey Canyon Creek Basin on the FIRM panels 3188 and 3189 of 3350, Washoe County, Nevada and Incorporated Areas. The effective date of these panels is September 30, 1994. Although there have been numerous Letter of Map Amendments for panel 3188, they have only modified floodplain areas outside of the Bailey Canyon Creek watershed. In November 2001, Stantec requested that FEMA revise the FIRM and FIS report to show the effects of updated topographic information and channelization on the floodplain of Bailey Canyon Creek from approximately 600 feet to 5,000 feet upstream of Toll Road. This Letter of Map Revision request was accepted resulting in changes to the Base Flood Elevation (BFE), Special Flood Hazard Areas (SFHA), and floodway width.

3.0 FIELD INVESTIGATION

In August 2006, Wood Rodgers met with Walt West of Washoe County Public Works at the project site to view and discuss drainage issues along Bailey Canyon Creek. Walt West indicated that the reinforced concrete box culvert near the intersection of Toll Road and Ravazza Road was completely blocked by sediment accumulation following the December 2005 flood event. Deposited sediment also filled up most of the channel near the culvert. During the storm, flows overtopped Toll Road at the culvert, flooding adjacent properties. Washoe County Public Works removed the accumulated sediments and reopened the Bailey Canyon Creek channel. Between the December 2005 flood event and the field visit in August 2006, sediment accumulation has blocked approximately half the flow capacity of the culvert.

Mr. West indicated that the flood waters from the December 2005 event overtopped Toll Road near the intersection of Geiger Grade and Toll Road. Downstream of the crossing, the walls constructed by the Rock Yard deflected water and directed it towards the residences on Mira Street.

Following the December 2005 event, a CMP culvert was installed to convey the Chandler Ditch over the Bailey Canyon Creek channel just downstream of the Toll Road crossing. The culvert further constricts flow at this location. According to Jeanne Ruefer and Walt West of Washoe County, the irrigation season of 2006 will be the Chandler Ditch's final year of use, thereby removing a potential project constraint.

Inspection of the channel during the field investigation demonstrated that property owners along the section of Bailey Canyon Creek from Wild Mustang Lane to Moon Lane are experiencing erosion along their parcel boundaries. The creek channel has meandered and is currently undercutting its south bank. Refer to Appendix A for photographs of conditions.

4.0 PROPERTY OWNERSHIP

As shown in Figure 3, a majority of property along Geiger Grade and Toll Road in the Bailey Canyon Creek watershed is privately owned with a small percentage of properties under control of public entities, homeowners associations, or community groups such as churches. The homeowners associations for the Cottonwood Creek Estates and the Comstock Estates maintain parcels through which Bailey Canyon Creek channel flows. Washoe County Parks maintains a parcel adjacent to Bailey Canyon Creek near Moon Lane. The Washoe County Regional Transportation Commission (RTC) owns two parcels located near the intersection of Geiger Grade and Toll Road. Downstream of the RTC parcels along Geiger Grade, the Washoe County School District parcel lies adjacent to the Bailey Canyon Creek channel.

The BLM owns a large amount of land within the Bailey Canyon Creek Watershed. The BLM has expressed interest in placing five of the properties (approximately 81 acres in total) located within the Bailey Canyon Creek watershed up for public sale (Figure 4).

Immediately downstream of the intersection of Geiger Grade and Toll Road along Bailey Canyon Creek is a privately owned Rock Yard. This property lies almost entirely within the floodway of Bailey Canyon Creek. The channel design by Stantec (1999) encroaches into the Rock Yard property as it would be virtually impossible otherwise to design any improvement to the channel of Bailey Canyon Creek downstream of Toll Road that would convey the 100-year peak flow.

5.0 UTILITY INVESTIGATION

This section summarizes information on the existing surface, underground, and overhead utilities occurring within the Geiger Grade and Toll Road area. Data were provided to Wood Rodgers by Charter Communications, Washoe County, and Sierra Pacific Power Company (Figures 5a-5d). To incorporate the data into GIS, paper records from Charter Communications were scanned, scaled, and digitized. Thus, the utility lines showing underground and overhead lines as provided by Charter Communications only represent an approximate location. Washoe County provided ArcGIS shapefiles of alignments and features related to sewer and water service lines. Utility data provided by Sierra Pacific is in the form of AutoCAD drawings. Overhead cables, underground cables, gas lines, and poles were selected and imported into ArcGIS. Some overlap of features may be noted between the Charter Communication data and Sierra Pacific utility data. During final design, a field survey of utility locations will be undertaken as needed.

Due to the proximity of the project boundary to Geiger Grade, Right-of-Way information was requested from the Nevada Department of Transportation for the section of roadway extending from US 395 South to Rim Rock Drive. These data were provided both digitally and on paper records and were incorporated into the ArcGIS database (Figure 6).

6.0 NATURAL RESOURCES

The following is a summary of the existing biological resources occurring within the Geiger Grade and Toll Road project area based on existing available information and a site reconnaissance for threatened and endangered species, vegetative communities, wildlife resources, and US Army Corps of Engineers jurisdictional resources. The purpose of this analysis was to document existing conditions, determine the potential for environmental impact and identify additional studies required.

Database searches and field reconnaissance activities were completed to evaluate the potential for proposed flood control facilities to result in significant impacts to special interest species resources. Lands evaluated included private lands, State/Federal/Utility lands, and homeowners associations (HOA) holdings.

6.1 Sensitive Species

6.1.1 Agencies and Definitions

Several federal and state agencies have identified special status species for the Toll Road/Geiger Grade project area. The agencies and their definitions are provided below.

United States Fish and Wildlife Service (USFWS)

As defined by the Endangered Species Act (ESA) of 1973, a "threatened species" is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An "endangered species" is any species that is in danger of extinction throughout all or a significant portion of its range. "Proposed species" are those that are proposed in the Federal Register by the USFWS to be listed as threatened or endangered.

"Candidate species" receive no legal protection under the ESA, but could be proposed for listing in the near future. Consideration of these species during the planning process may assist species conservation efforts and may prevent the need for future listing actions.

"Species of concern" are taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking. Section 7 of the ESA directs federal departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat.

BLM

The BLM State Office maintains a list of plant and animal species that are designated as "sensitive species" for which population viability is a concern. Sensitive species are defined as taxa that are not already included as BLM Special Status Species under (1) Federally listed, proposed, or candidate species; or (2) State of Nevada listed species. BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06 C, that is to "ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed".

The Sensitive Species designation is normally used for species that occur on Bureau administered lands for which BLM has the capability to significantly affect the conservation status of the species through management.

State of Nevada

Nevada Revised Statute 501 administers and enforces the wildlife provisions on behalf of the State of Nevada, including species designated as protected. Nevada Division of Wildlife (NDOW) accepts and adopts the species classification status set by the USFWS. The NDOW routine informal consultation process dictates any necessary protection measures for the affected species. Typical protection measures may include avoidance of designated critical habitat.

6.1.2 Pre-field Investigation

A database query request was submitted to the USFWS and the Nevada Natural Heritage Program (NNHP) for information on special status plant and wildlife species that may occur within or adjacent to the project area. Copies of the response letters from the USFWS and NNHP are provided in Appendix B.

Vegetation

Results of the USFWS information request (File No. 1-5-06-SP-300) stated that one federally endangered, threatened, candidate, and/or sensitive plants species has the potential of occurring within the project area.

- Steamboat buckwheat (*Eriogonum ovalifolium var. williamseae*), Endangered

Results of the NNHP database search indicated that one state endangered, threatened, candidate, and/or sensitive plants species was identified as having potential of occurring within the project area.

- Altered andesite buckwheat (*Eriogonum rosustum*), Nevada Special Status Species

Wildlife

Results of the USFWS information request (File No. 1-5-06-SP-300) identified one federally endangered, threatened, candidate, and/or sensitive wildlife species has the potential of occurring within the project area.

- bald eagle (*Haliaeetus leucocephalus*), Threatened

Results of the NNHP database search indicated that two state endangered, threatened, candidate, and/or sensitive wildlife species were identified as having potential for occurring within the project area.

- Fringed myotis (*Myotis thysanodes*), Nevada Special Status Species, Species protected under NRS 501
- Great grey owl (*Strix nebulosa*), Species protected under NRS 501

6.1.3 Field Investigation

Vegetation

A reconnaissance survey of the Geiger Grade and Toll Road project area was conducted on September 22, 2006 to characterize the vegetation communities present, and to determine if potential habitat for special status plant species may be present. A plant species list for the project area was developed and is presented in Appendix C. No federally listed or sensitive plant species were observed during the site visit.

Existing Vegetation Communities

Five vegetation communities occur in the study area. These communities are Urban, Northern Desert Shrub, Pinyon-Juniper Woodland, Riparian, and Disturbed.

The majority of the project area is comprised of a Northern Desert Shrub Community dominated by big sagebrush (*Artemisia tridentate*). Other plant species that are common throughout the project area include rabbitbrush (*Chrysothamnus sp.*), cheatgrass (*Bromus tectorum*) and four-wing saltbush (*Atriplex canescens*). In addition, Pinyon-Juniper Woodland and Riparian vegetation communities occur within the project area.

The Northern Desert Shrub Community is the major vegetation type found in the study area. This community is located in areas of the Great Basin where annual precipitation is greater than seven inches. It is best developed on the deep, permeable soils along the base of the mountains. The aspect of the community is fairly dense to open vegetation with relatively large (2-6 feet high) non-spiny shrubs with perennial and annual grasses and forbs. Big sagebrush is the dominant species. Other shrubs include Mormon tea (*Ephedra viridis*), rabbitbrush and bitter brush (*Purshia tridentate*). Other associated species include squirreltail (*Sitanion hystrix*), needle and thread grass (*stipa comata*) and Indian rice grass (*Oryzopsis hymenoides*).

Those areas that have been modified to include an ornamental landscape are designated as Urban. In the urban community, native species have been replaced by pavement and suburban development. Trees include Russian olive (*Eleaunus augustifolia*) and willows *Salix sp.*). Ornamental shrubs include red-hot poker (*Kniphofia uvarua*), orniemtal arvorviteae (*Platycladus orientalis*) and several varieties of junipers (*Juniperus sp.*). Flowers include gaillardia (*Gaillardia sp.*), Shasta daisy (Chrysanthemum maximum) and iris (*Iris sp.*). Kentucky bluegrass (*Poa pratensis*) is extensively planted.

The Pinyon-Juniper woodland is an open forest type. This community occurs on alluvial fans and dry rocky hillsides. Its overstory is dominated by Pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*). The understory is dominated by big sagebrush and other species associated with Northern Desert Shrub. It intergrades with the Northern Desert Shrub.

Riparian Communities are those areas where vegetation is strongly influenced by the presence of water. These riparian communities are often dominated by native grasses, flowers, shrubs and trees that occur adjacent to stream banks. Native plant species that commonly occur along the riparian zone include

sedges (*Carex sp.*), rushes (*Juncus sp.*), willows (*Salix sp.*), cottonwood (*Populus sp.*) and grasses. Additionally, non-native species such as saltcedar (*Tamarix ramossima*) are commonly found in the riparian area along stream.

Disturbed Communities are those areas where human activity has reduced the Pinyon-Juniper Woodland and Northern Desert Shrub. Human activities include low density single family dwellings, commercial development, grading and access roads. The remnant plants represent the Pinyon-Juniper Woodland and Northern Desert Shrub.

Special Status Vegetation Species

Plant species identified as either having potentially suitable habitat or being within the known range of occurrence for the species are discussed below.

Steamboat buckwheat

The endangered Steamboat buckwheat is known to occur within close proximity to the western side of the project area. Steamboat buckwheat is found in the Steamboat Hot Springs area of southern Washoe County, Nevada. It has not been found on any other hot spring areas in the Western United States. Its habitat area is approximately 150 acres, comprised of both private and public lands where young, shallow, poorly-developed soils have been derived from siliceous sinter materials deposited by past thermal spring flows. These soils range from highly acidic to moderately alkaline, with variable levels of soluble salts. Steamboat buckwheat does not tolerate competition from native vegetation found in deeper, better-developed soils adjacent to its habitat. When competitive vegetation is absent, steamboat buckwheat will grow temporarily on other soils (NDF).

Occurrence in the Project Area: Potential habitat for the Steamboat buckwheat is present within three parcels of land within the project area (017-11-02, 017-11-03 and 017-11-23). The three parcels of land are located on the east side of HWY 395 and are owned by private land owners. Known habitat for the Steamboat buckwheat is located on the west side of Hwy 395 (USDI 1995), indicating that suitable habitat may be present at similar locations on the east side of the highway. Focused surveys for Steamboat buckwheat will be needed to identify if the plant occurs within the project area prior to construction of any of the three identified parcels.

Altered andesite buckwheat

Altered andesite buckwheat, a state special status species potentially occurs in the Steamboat Springs area. The multi-branched tufted perennial grows on barren slopes and is generally associated with big sagebrush, single-leaf pinyon, ponderosa pine (*Pinus ponderosa*), and jeffrey pine *(Pinuss jeffreyi)* (Mozingo and Williams, 1980). Altered andesite buckwheat appears entirely restricted to shallow, rocky, highly acidic (pH 3.3-5.5), Smallcone soils derived from weathering of hydrothermal iron sulfide deposits formed mainly in andesite, and occasionally in rhyolitic or granitoid rocks. These soils are found mainly on dry, nearly barren ridges, knolls, and steep slopes on all aspects between 4410 and 7325 feet (1345-2235 meters) elevation (Morefield, J.D. 2000).

Occurrence in the Project Area: Since altered andesite buckwheat is known to occur on barren slopes within the Steamboat Springs area it is recommended that surveys be conducted for the species within potential habitat.

Wildlife

A field survey was conducted in the project area on September 22, 2006. The objectives of the site visit were to compile a species list of wildlife directly observed or detected by their sign (e.g., scat, tracks, burrows, etc.) and to evaluate the habitat's suitability for special interest wildlife species. A wildlife species list is presented in Appendix D.

A variety of wildlife species were observed within the project boundaries. Bird species included the western scrub-jay (*Aphelocoma californica*), mourning dove (*Zenaida macroura*), California quail (Callipepla californica) and house finch (*Carpodacus mexicanus*).

Other vertebrate species that were observed included the western fence lizard (*Sceloporus occidentalis*), desert cottontail (*Sylvilagus audubonii*), horse (*Equus caballus*) and coyote (*Canis latrans*).

Existing Wildlife Habitat

Wildlife habitat occurring within the project area includes shrub and open upland, and water-based communities (riparian/wetland). Most species are associated with the Northern Desert Shrub Community and Pinyon-Juniper Woodland.

Special Status Wildlife Species

The following three species may be potentially affected by the proposed project, as they are known to inhabit the project area during part or all of the year, or potential habitat is present:

- Bald eagle
- Fringed myotis
- Great grey owl

An account of the potential for these special status species that may be affected is provided below.

Bald Eagle

Bald eagle habitat consists of mature coniferous forests with the presence of dominant and co-dominant trees (defined as trees taller and with a greater circumference of the upper canopy relative to the surrounding stand) in close proximity to large bodies of water (Golightly 1991).

Bald eagle nests are usually located in uneven-aged (multi-storied) stands with old growth components. Trees selected for nesting are characteristically one of the largest in the stand or at least co-dominant with the overstory (Lehman et al. 1979). Nests are typically established in large, dominant live trees with open branch work. Nest trees and branches of nest trees must be strong enough to support the massive stick platform nests that are constructed and added to annually. Breeding is initiated as early as January via courtship, pair bonding, and territory establishment. The young typically fledge and leave the nest site by the end of August.

Snags, trees with exposed lateral limbs, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. Most tree perches selected by eagles provide a good view of the surrounding area (USDI 1986). Bald eagles typically perch in large, robustly limbed trees, on snags, on broken topped trees, or on rocks near water (Peterson 1986, Laves and Romsos 1998).

Occurrence in the Project Area: No bald eagle nesting locations were observed within the project area during site surveys. Limited habitat for bald eagles is present along Steamboat Creek; however, nesting habitat is not expected to be present in that area.

Fringed myotis

Fringed myotis habitat consists of oak, pinyon, juniper forests and desert scrub. They roost in caves, mines, buildings and other protected locations. This colonial bat is active from April through September. It roosts by day in protected spots, and may rest between foraging bouts in night roosts in tightly packed clusters. Its diet includes moths, crickets, and daddy longlegs. This bat is known to migrate to a winter roost, but its winter habits are unknown. Mating is in fall, with ovulation occurring between late April and mid-May. As with many bat species, the birth of the young is synchronized within the colony. Nursery colonies, from which males are usually absent, sometimes number in the low hundreds (Knopf 1996).

Occurrence in the Project Area: No fringed myotois or nesting locations were observed during site surveys. Nesting sites may potentially be present within the project area; however, this project is not expected to have any impact to habitat or potential nesting locations.

Great grey owl

The Great Gray Owl inhabits many types of forests in North America. It favors dense coniferous forests with close proximity to muskegs, meadows or open fields. This combination allows conifer nesting and roosting along with the abundance of small rodents that occur in forest openings. In the Sierra Nevada's of California the Great Gray owl is a summer resident from 4000 -7000 ft. in elevation and winter resident from 3000 - 5000 ft. Nesting and summer owl locations seem to concentrate in the 6000 - 7000 ft. meadows although there are nesting records as low as 2800 ft. and as high as 11,000 ft. They breed in mixed-conifer forests from 3000 - 6000 ft. and red fir from 6000 - 9000 ft. in elevation. The owls are prone to moving into the higher lodge pole pines in the late summer. In the winter the records seem to indicate that the owls concentrate around the 4000 ft. level. Other records including the Pale arctic habitat ranges are from sea level to 3200 ft (Owling).

Occurrence in the Project Area: No great grey owls or nesting locations were observed during site surveys. Nesting sites may potentially be present within the project area; however, this species is known to occur in coniferous forest and is not likely to be a permanent resident of this area. Individuals may be found passing through, but are not expected to be impacted by this project.

6.2 Jurisdictional Resources

6.2.1 Agencies and Definitions

The US Army Corps of Engineers regulates activities that have the potential to impact Waters of the United States (WOUS) and wetlands with authority under Section 404 of the Clean Water Act.

US Army Corps of Engineers

Waters of the United States

Waters of the United States (WOUS) are defined by 40 CFR 230.3 and 33 CFR 328.3 as:

> All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce…;
>
> All interstate waters including wetlands;
>
> All others waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce…;
>
> All impoundments of water otherwise defined as waters of the United States under this definition.

The limits of jurisdiction in non-tidal waters, according to 33 CFR 328.4, are:

1. In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark, or
2. When adjacent wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands.
3. When the water of the United States consists only of wetlands, the jurisdiction extends to the limit of the wetland.

Criteria used to determine whether a drainage constitutes a water of the United States include:

- Presence of a defined bed – a linear bed in a topographic depression that would transport surface water from a watershed.
- Presence of defined banks – near vertical or steep-sided banks formed by erosion from flowing water.
- Evidence of an ordinary high water mark – some indicator(s) that the drainage is subject to surface flows on an average annual basis. Such indicators include scoured bed, shelving, an absence of terrestrial vegetation (particularly perennials), recent alluvial or litter deposition.

Wetlands

Wetlands are defined by the US Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) in 40 CFR 230.3 and 33 CFR 328.3 as:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

As noted in the waters of the United States discussion, if adjacent wetlands are present, USACE jurisdiction extends beyond the ordinary high water mark (OHWM) to the limit of the adjacent wetlands.

Pre-field Investigation

A FOIA request (No. 06-09-0318) was submitted to the USACE and was fulfilled on October 24, 2006 (Appendix E). Information obtained included related previous jurisdictional decisions and the need for Nationwide Permits for construction and improvement for both Steamboat Creek and Bailey Canyon Creek.

The National Wetlands Inventory (NWI) mapping as well as USGS 7.5 minute quadrangle Steamboat (1994) (sections 27, 28, and 34, Township 18 north, Range 20 east) were reviewed to determine the potential occurrence of jurisdictional resources. The NWI mapping for the project area is presented in Figure 7.

A review of the Steamboat 7.5 minute quadrangle map showed that four (4) perennial features were present within the proposed project area. The perennial features (Steamboat Creek, Bailey Canyon Creek, Crain Ditch and Chandler Ditch) were identified as either creeks or irrigation ditches.

Field Investigation

Based on the information obtained from the FOIA request, review of the NWI and USGS quadrangle, and the onsite review of the project area, potential and/or known jurisdictional resources are discussed below.

Steamboat Creek

Steamboat Creek is a perennial creek that flows through the project area from south to north. Steamboat Creek originates at Little Washoe Lake and flows north into the Truckee River. Steamboat Creek is considered a "Waters of the United States" by the USACE due to the hydrologic connection to an interstate navigable water way (i.e., the Truckee River). These waters are regulated under Section 404 of the Clean Water Act, as it is a tributary to the Truckee River. Proposed impacts to this stream or its associated wetlands would require a permit from the USACE. Steamboat Creek currently flows through four private ownership properties along the west side of the project area (Table 1).

Bailey Canyon Creek

Bailey Canyon Creek is an ephemeral stream that flows out of the Virginia Hills and continues northwest to Steamboat Creek. This creek has been deemed jurisdictional in nature by the USACE as a "Waters of the United States" because it is a tributary to Steamboat Creek. Any impacts to this stream or its associated

wetlands would require a permit from the USACE. Bailey Canyon Creek currently flows through four private ownership properties, five state/federal/utility ownership properties and three HOA ownership properties throughout the project area from southeast to northwest (Table 1).

Crane Ditch

The Crane Ditch originates from Steamboat Creek north of the Steamboat Hot Springs. This ditch carries water north through the project area paralleling Steamboat Creek until it reaches SR-341 (Geiger Grade), at that point the ditch turns northeast. The ditch finally flows back into Steamboat Creek and then on into the Truckee River. Though no record of USACE jurisdiction over the Crane Ditch was found during the FOIA request, it is expected that the USACE would take jurisdiction over this ditch because of its connection to an interstate navigable water way (i.e., the Truckee River). Thus, it is expected that any impacts to this ditch or its associated wetlands would require a permit from the USACE. The Crane Ditch currently flows through four private ownership properties along the west side of the project area (Table 1).

Chandler Ditch

The Chandler Ditch originates from Steamboat Creek south of the Steamboat Hot Springs. The ditch parallels Steamboat Creek through the west part of the project area carrying water north. Just south of Vega St., the ditch makes a turn to the northeast and flows towards Toll Road. Prior to crossing under SR-341(Geiger Grade) the ditch flows directly over Bailey Canyon Creek in a corrugated metal pipe, and then flows under SR-341 to the northeast. Though no record of USACE jurisdiction over the Crane Ditch was found during the FOIA request, it is expected that the USACE would not take jurisdiction over this ditch because of its lack of connection to an interstate navigable water way. After the water from this ditch is removed from Steamboat Creek, it appears to only flow to agricultural fields to the north. The remaining water in the ditch does not appear to return to Steamboat Creek. Additionally, the use of the Chandler Ditches is for seasonal irrigation purposes, and does not flow year round. The Crane Ditch currently flows through one private ownership property and one state/federal/utility ownership property along the west side of the project area (Table 1).

Table 1. **APN properties with known USACE Jurisdiction (Parcels are shown in Figure 8)**

	Steamboat Creek	Bailey Canyon Creek	Crane Ditch	Chandler Ditch
Private Ownership				
017-011-02	√		√	√
017-011-03	√		√	
017-011-20		√	√	
017-011-23	√		√	
017-031-03		√		
017-031-05		√		
017-031-10		√		
017-261-01		√		
017-261-02				
017-261-03				
State/Federal/ Utility Ownership				
017-011-22		√		
017-032-01		√		
017-032-03		√		
017-033-01				√
017-122-03		√		
017-173-01		√		
017-173-07		√		
017-211-20		√		
050-520-07		√		
HOA Ownership				
017-480-01		√		
017-492-20		√		
140-132-07		√		

7.0 CULTURAL RESOURCES

Cultural resource activities for with Geiger Grade and Toll Road Flood Control Project include resource identification and evaluation. Archival research data has been developed for the area extending from Steamboat Creek to the mouth of Bailey Canyon along Toll Road. The purpose of this archival research was to determine the extent and location of previous inventory efforts and the location and nature of previously recorded cultural resources. The Class I cultural resources overview for the Geiger Grade and Toll Road Flood Control Project area as performed by Zeier & Associates is included in Appendix F.

Information regarding previous studies and document resources for the Geiger Grade and Toll Road Flood Control Project was developed based on a search of the NVCRIS system as maintained by the Nevada State Historic Preservation Office (SHPO), archeological records maintained by the Nevada State Museum and the BLM, and standard historical and archaeological references related to the area. The archeological inventories suggest that approximately one-third of the 534-acres in the project area had been previously examined. However, 19 of the 25 studies that occurred in the project area are more than 10 years old and may not be considered acceptable by SHPO in support of a project specific consultation (Figure 9).

Previous studies and document resources for the Geiger Grade and Toll Road Flood Control Project area indicate that no properties located within the archival or Project area are listed on the National Register of Historic Places. However, the Crane Ranch, an unnamed ranch, as well as one other site are considered "Eligible" for inclusion into the Registry. Twenty three sites of cultural resources have been recorded as either lying completely or partially within the Geiger Grade and Toll Road Flood Control Project area. Fifteen prehistoric period sites, six historic period sites, and two sites with both periods represented have been recorded. Based upon the average site density of one site per 40-acres, the site density for this project area is considered very high. Site densities are highest in areas closest to Steamboat Creek. Sites located along Bailey Canyon Creek at the base of the Virginia Range, if present, would be small in size and might take the form of isolated artifacts. The few sites located to date have been found on flat alluvial fan remnants. Resources that may be encountered along the old alignment of historic Geiger Grade (current Toll Road) include abandoned sections of the old roadway, wagon or vehicle parts, or discarded debris. Just inside the mouth of Bailey Canyon, remains of the old Magnolia Station may be found.

Due to the age of the previous archaeological work in the Geiger Grade and Toll Road Flood Control Project area, Washoe County should re-examine project specific areas unless the inventory has been prepared within the past ten years. In addition, any project activity proposed in the lower portion of the Bailey Canyon Creek watershed located west of Toll Road requires detailed scrutiny, including sub-surface geo-archaeological evaluation.

8.0 HYDROLOGIC/HYDRAULIC ANALYSIS

A review of existing hydrologic and hydraulic reports for the Bailey Canyon Creek watershed indicate that a range of peak flows were predicted depending on the methods and modeling parameters applied (Table 2). Following a detailed review of the Drainage Study for Bailey Canyon Basin by CFA, Inc., Wood Rodgers feels confident in the computed 100-year flows as defined by CFA. CFA modeled the basin by applying the SCS Curve Number Method, the USBR lag equation and the U.S. Army Corps of Engineers HEC-HMS software program. To evaluate their model, they applied several other methodologies including the Green & Ampt Loss Method, the USGS Regression Equation, and the USGS Frequency Analysis Program. Results demonstrated that the Green & Ampt Loss Method predicts peak flows close to those computed by the SCS Curve Number Method. CFA, Inc. modeled a similar watershed to determine the reasonableness of the curve number applied to Bailey Canyon Creek. Due to the thorough study of peak flows for the Bailey Canyon Creek watershed performed by CFA, Inc., Wood Rodgers advises acceptance of their peak flows for the 100-year event.

Table 2. Peak flows determined for the Bailey Canyon Creek watershed

Study	Peak Flow (cfs)		
	Upstream of Toll Road	North of Geiger Grade	South of Geiger Grade
Flood Insurance Study for Washoe County (FEMA 1990, 2001)	1,120 cfs	-	-
Hydrologic and Hydraulic Analysis for Cottonwood Creek Estates (Nimbus, 1995)	3,673 cfs	-	-
Southeast Truckee Meadows Flood Control Master Plan (Nimbus, 1995)	2,158 cfs	-	-
Master Drainage Report for Geiger Grade/Toll Road Improvement Project (Stantec, 1999)	3,673 cfs	678 cfs	2,995 cfs
Master Drainage Report for Curti Ranch Two Development (CFA, 2003)	3,673 cfs	548 cfs	3,125 cfs
Drainage Study for Bailey Canyon Basin (CFA, 2006)	2,824 cfs	337 cfs	2,487 cfs

The Bailey Canyon Creek floodplain boundary is shown on panels 3188 and 3189 of 3350 of the Flood Insurance Rate Map for Washoe County, Nevada and Incorporated Areas. September 30, 1994, is the effective date for the original panels. In November 2001, Stantec requested that FEMA revise the FIRM and FIS report to show the effects of updated topographic information and channelization on the floodplain of Bailey Canyon Creek from approximately 600 feet to 5,000 feet upstream of Toll Road as associated with the construction of Cottonwood Creek Estates. This Letter of Map Revision request was accepted resulting in

changes to the Base Flood Elevation (BFE), Special Flood Hazard Areas (SFHA), and floodway width. The current FEMA defined Flood Zones AE (100-year floodplain with elevations), A (100-year floodplain without elevations), and X (500-year floodplain) are shown in Figure 10.

9.0 SEDIMENT ANALYSIS

The 100-year event sediment yield calculation for the Bailey Canyon Creek watershed is presented in the Stantec study (1997). The analysis utilized the MUSLE, which predicts sediment yield resulting from the peak flow and volume of runoff from specific storm events. The analysis was done for the watershed at the downstream crossing of Toll Road and predicted a sediment yield of 52.5 acre-feet resulting from the 100-year rainfall/runoff event.

To verify the Stantec sediment yield volume and to calculate the sediment yield volume upstream at the first crossing of Toll Road by Bailey Canyon Creek as well as from two additional tributaries, peak flows and volumes were re-calculated for the 5-, 25-, and 100-year events using the NRCS methodology within HEC-HMS (Appendix G). The MUSLE was then used to predict the sediment yield for the 5-, 25-, and 100-year events for the three watersheds. Curve numbers and lag times were calculated according to Washoe County Hydrologic Methods. Precipitation depths were obtained from NOAA Atlas 14. K values for the underlying soils were obtained from the Washoe and Storey County Soil Surveys. Additional MUSLE parameters (LS, C and P) were calculated according to observed watershed conditions and NRCS methods.

The results are presented in the following table. The watersheds refer to those outlined in Figure 11.

Table 3. Sediment Yield

Watershed	Area (sq. mile)	K Value	Q_p 100-yr (cfs)	Runoff Volume 100-yr (acre-feet)	Y 100-yr (tons)	Y 100-yr (acre-feet)
A	12.737	0.309	2,653	1,282	116,431	48.6
B	0.772	0.299	240	56	5,273	2.2
C	0.927	0.303	254	59	5,519	2.3

The sediment yield results for the 100-year storm event are similar to Stantec's results. The calculated sediment yields for Bailey Canyon Creek's main watershed (A) are 29 acre-feet for the 25-year event and 11 acre-feet for the 5-year event. These results are consistent with the magnitude of sediment produced in the 2005 event.

It will be difficult to obtain sufficient right-of-way to construct facilities to contain the full predicted 100-year sediment yield from Bailey Canyon Creek. Maintainable facilities that could capture the volume produced by a more frequent event, such as the 25-year, may be an attainable goal and would help to stabilize the channel, lower the burden on homeowners adjacent to the creek and allow less frequent maintenance of ditches and culverts. Examining the available public owned parcels that would be suitable sites for on-line sediment basins, a total of nine sites are potentially available (see Figure 12). Roughly estimating the possible foot-print of each basin and using reasonable depths of one to three feet, approximately 24 acre-feet of sediment storage could be captured.

10. OPPORTUNITIES AND CONSTRAINTS

Land ownership, the presence of mineral rights and claims, cultural resources, utility conflicts, and environmental constraints will affect the placement and design of sediment and detention facilities along Bailey Canyon Creek. As discussed in the Property Ownership section of this report, the BLM is interested in selling a number of properties within the Pleasant Valley and Steamboat Springs areas of Washoe County through competitive bid. The BLM properties labeled as 15380 Pinion Drive & 15230 Westwind Circle, Temple Hill Road "A", and Toll Road could be potential areas for sediment and/or water detention facilities. Of these properties, mining claims on the Toll Road parcel will prohibit the sale of the property and will dictate the use of this land for flood control purposes.

The 30% design of flood control facilities by Stantec in 1999 for the Geiger Grade and Toll Road area placed a flood control channel on private lands immediately downstream of Toll Road near the intersection with Geiger Grade. Figure 13 is the Stantec channel design overlaid onto the 2004 aerial photography. A large portion of the parcel would be affected by the Stantec design. Willingness of the landowner to reconfigure the business layout may be a significant constraint on the project. Ten, 12-foot by 4-foot reinforced concrete box culverts have been installed under Toll Road to convey the 100-year peak flows. However, the box culverts would outlet directly onto the property thereby requiring a flood control channel immediately downstream of Toll Road to safely convey peak flows. Therefore, nine out of the ten culvert cells are currently blocked.

Opportunities to construct facilities to control sediment volumes and peak flows exist in the reach upstream of Toll Road. The use of lands owned by the RTC, the Cottonwood Creek Estates Homeowners Association, Comstock Estates Homeowners Association, or a private land holder will be required. Cooperation by these entities could place a constraint on design options.

The location of utility lines may act as a constraint on the placement of flood control facilities. Depending on the location, depth, and type of utility feature in relation to the proposed flood control structure, relocation of utility lines may be required. Due to financial burden, the cost of relocating utility lines may act as a constraint on the proposed project.

The presence of cultural resources or T&E species may have an impact on the proposed locations of flood control facilities. Cultural resources have been located in the general project area and further analysis will be required upon selection of flood control facility sites, especially downstream of the second crossing of Toll Road.

11. FURTHER ANALYSIS/ RECOMMENDATIONS

The next phase of the project is the identification of specific alternative options. This will be done with input from Washoe County, RTC and residents near the project area. The options will include locations for potential sediment basins, possible locations of detention basins, and channelization options. Once specific options are selected, the proposed features will be evaluated to determine the best course of action. The existing hydrologic and hydraulic analyses and models will be adjusted to evaluate the proposed facilities. Geotechnical analysis will be done to determine the suitability of the selected potential sediment and detention basin sites. The biological resources specific to the proposed sites will be identified.

Further examination of cultural resources will be required once specific flood control facility sites have been identified. Any project activity proposed in the lower portion of the Bailey Canyon Creek watershed located west of Toll Road, will require a sub-surface, geo-archaeological component. Due to the age of the previous archaeological work in the Geiger Grade and Toll Road Flood Control Project area, Washoe County should re-examine project specific areas unless the inventory has been prepared within the past ten years.

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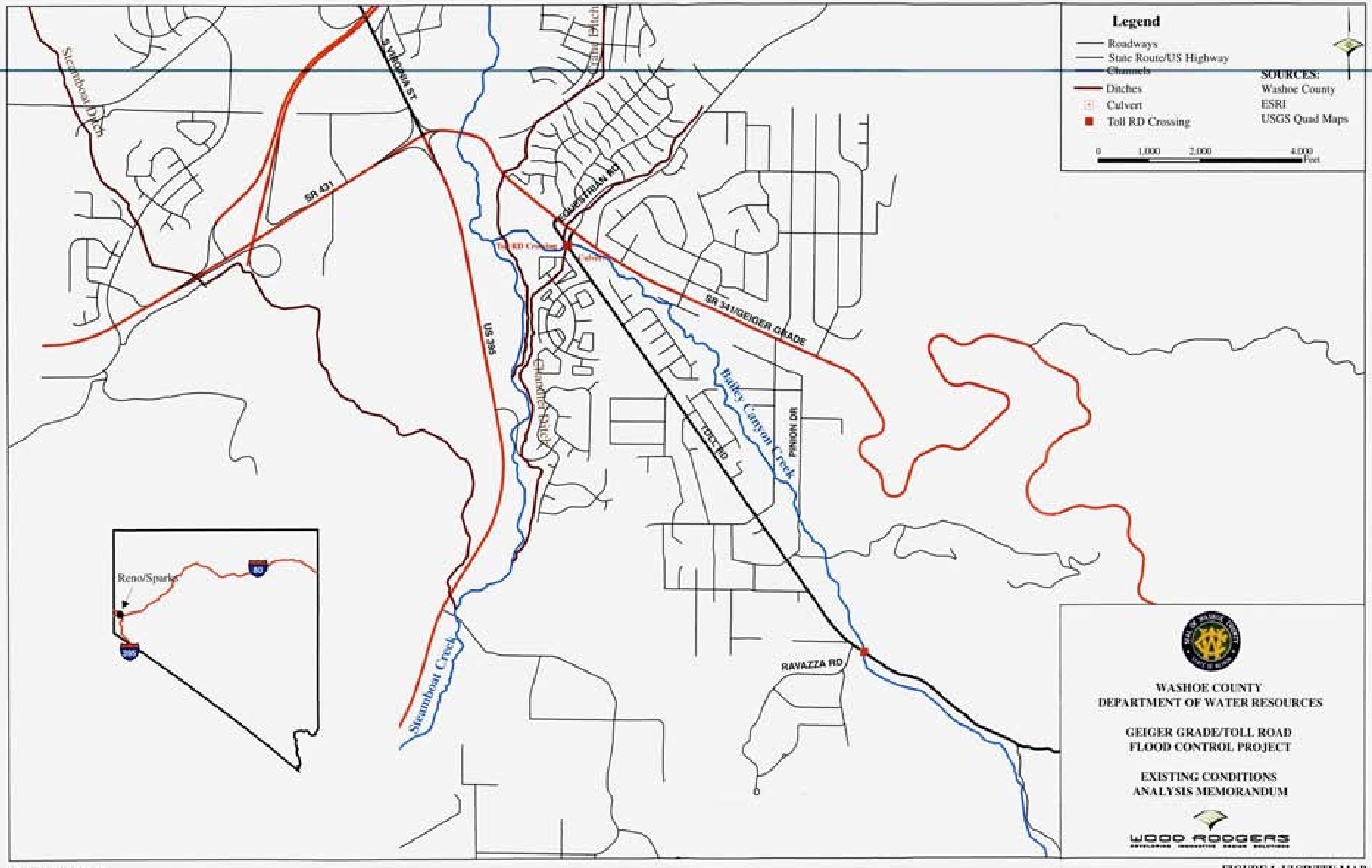
FIGURES



NOVEMBER 2006

FIGURE 1. VICINITY MAP

WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

WOOD RODGERS

LEGEND

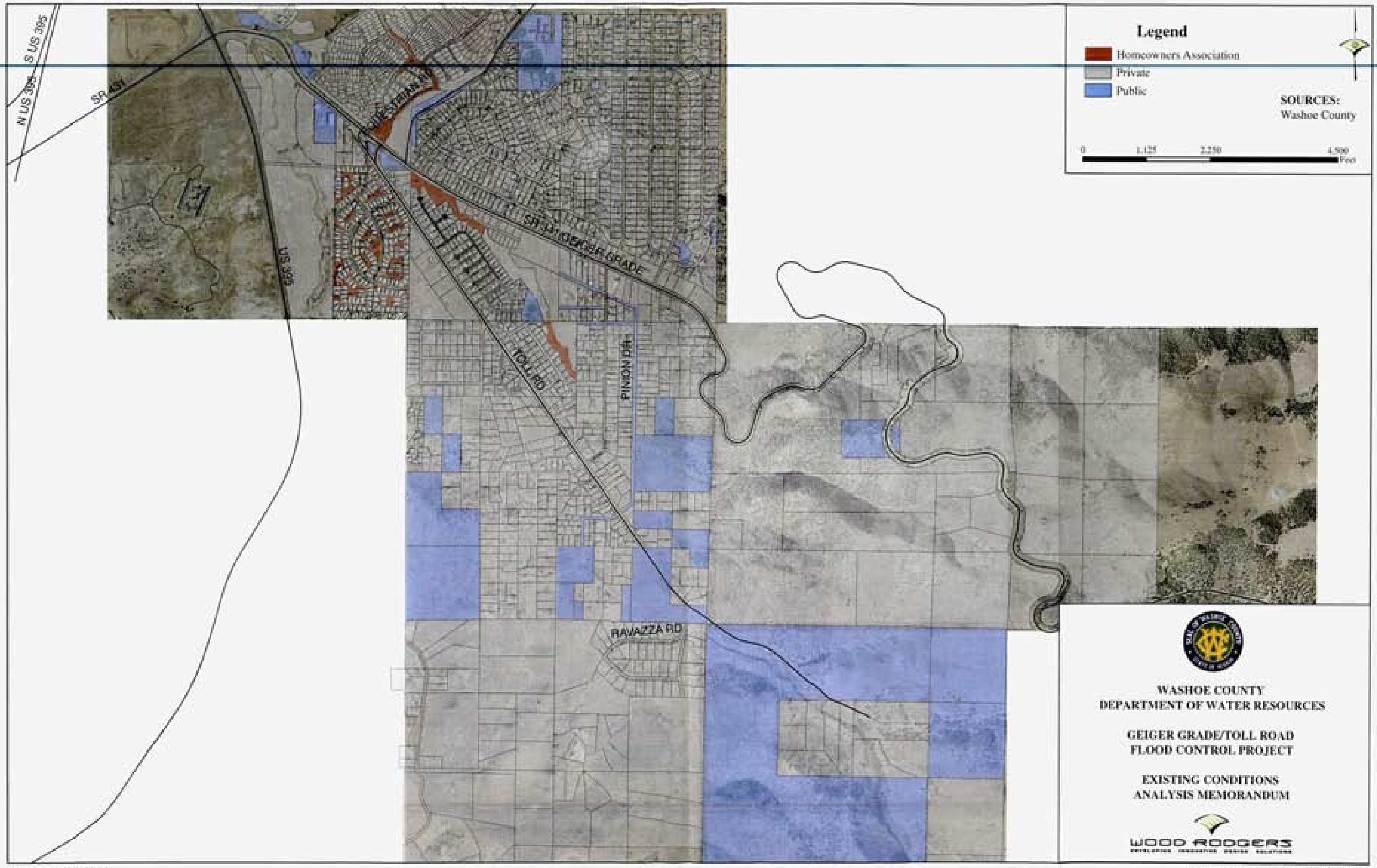
Bailey Canyon Creek Watershed

SOURCES:
Nevada Bureau of Mines and Geology
Natural Resource Conservation Service

0 2,000 4,000 8,000 Feet

NOVEMBER 2006

FIGURE 2. WATERSHED MAP



WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

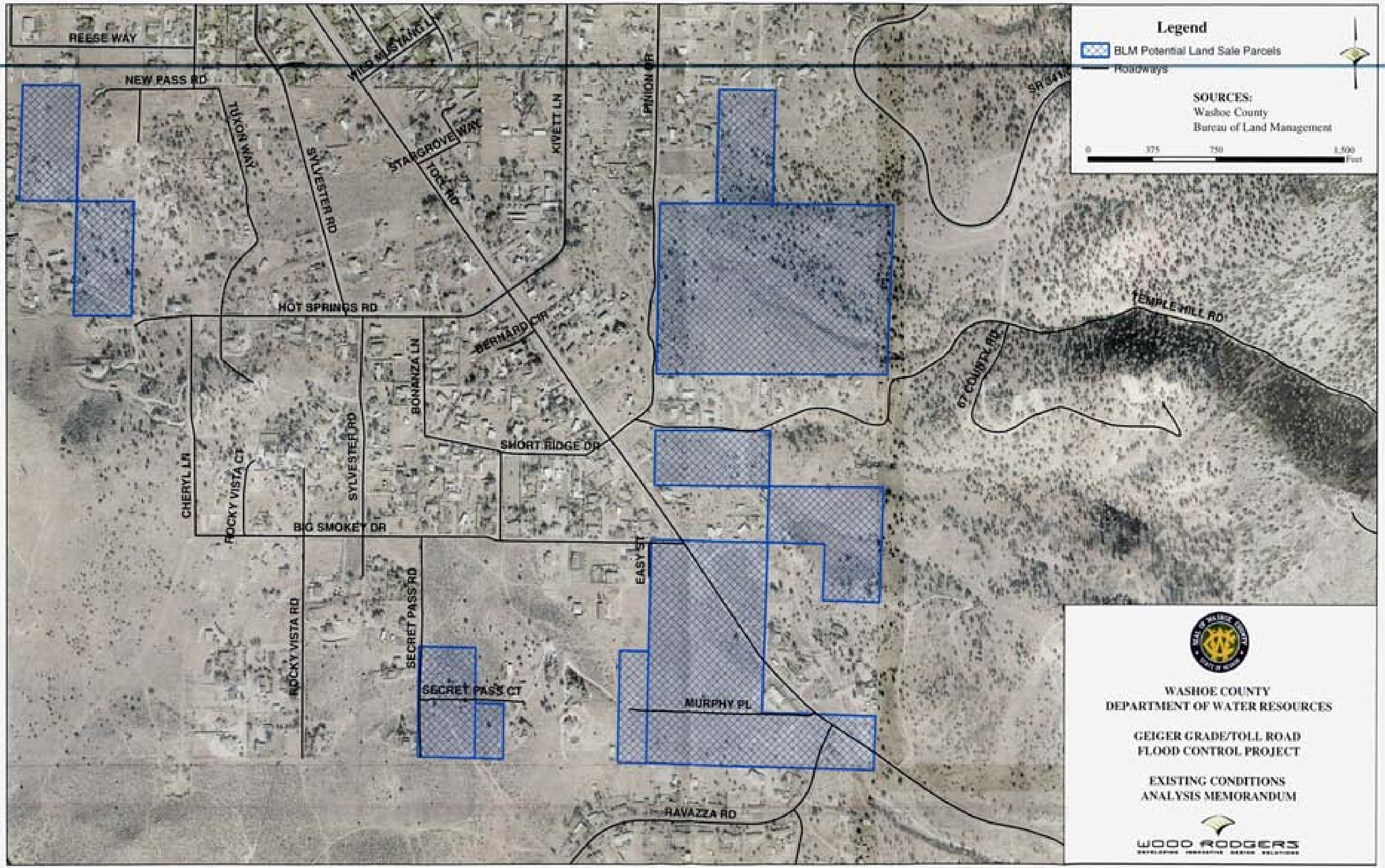
GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

WOOD RODGERS

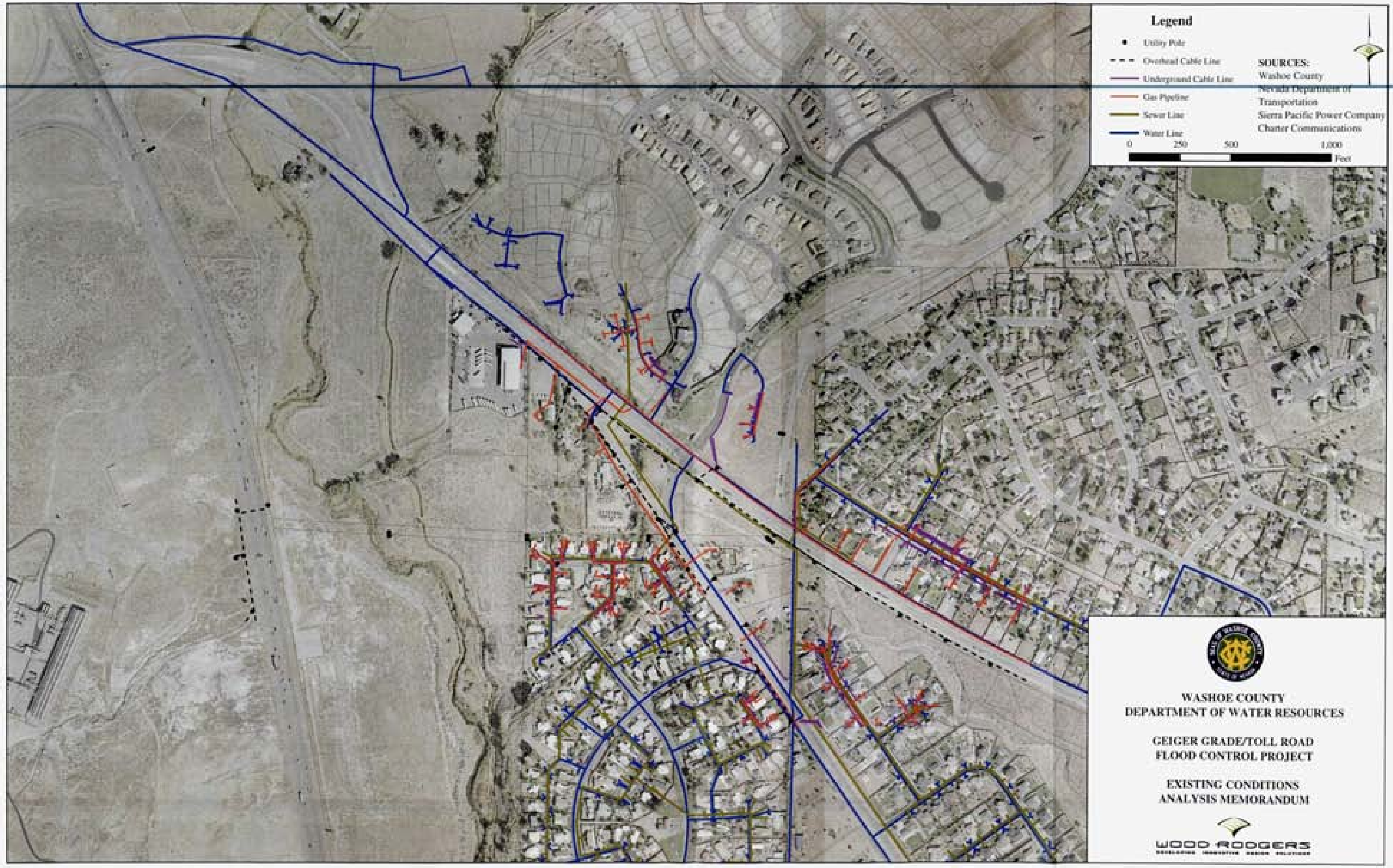
NOVEMBER 2006

FIGURE 3. PARCEL OWNERSHIP



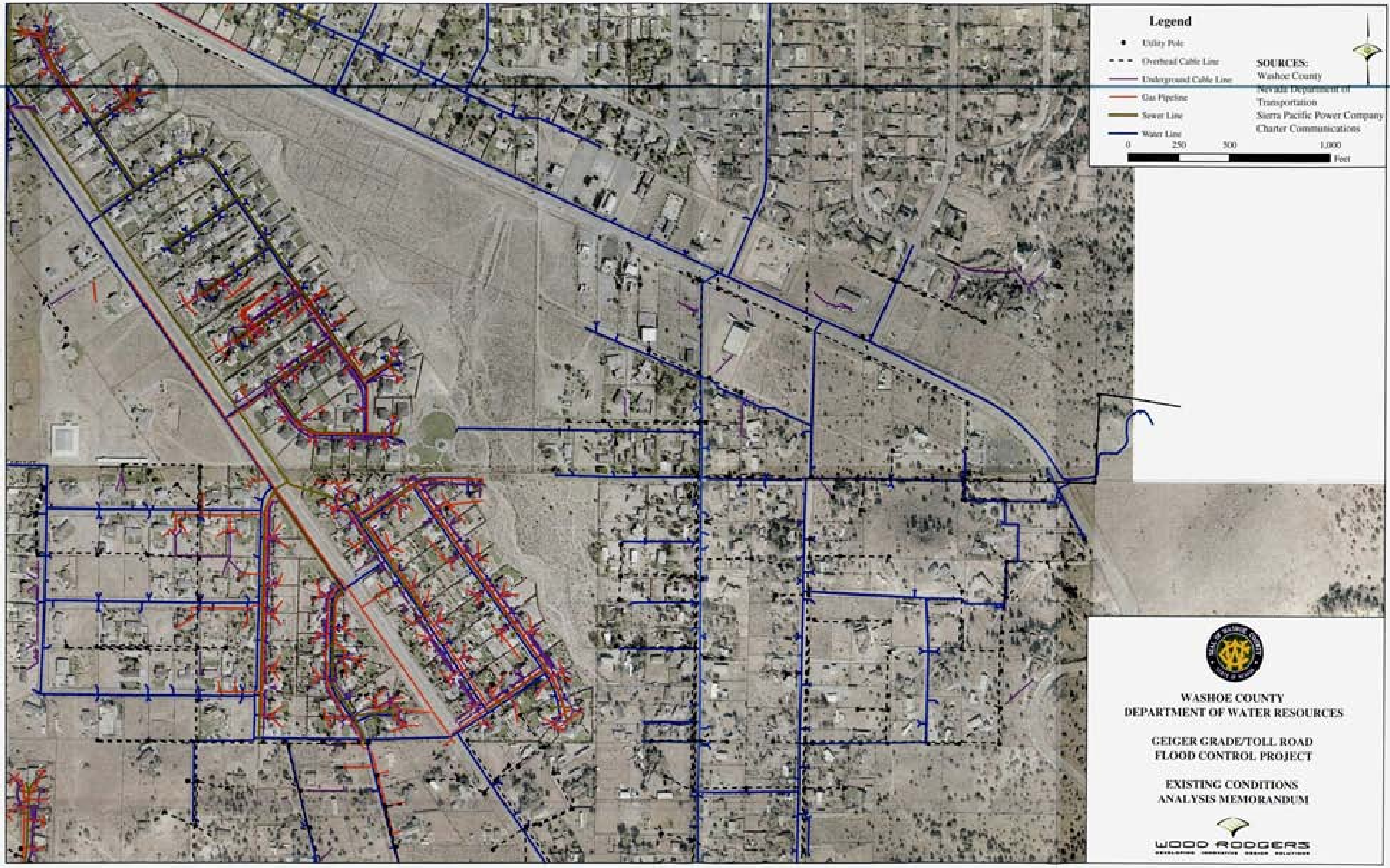
NOVEMBER 2006

FIGURE 4. BLM SALE PARCELS



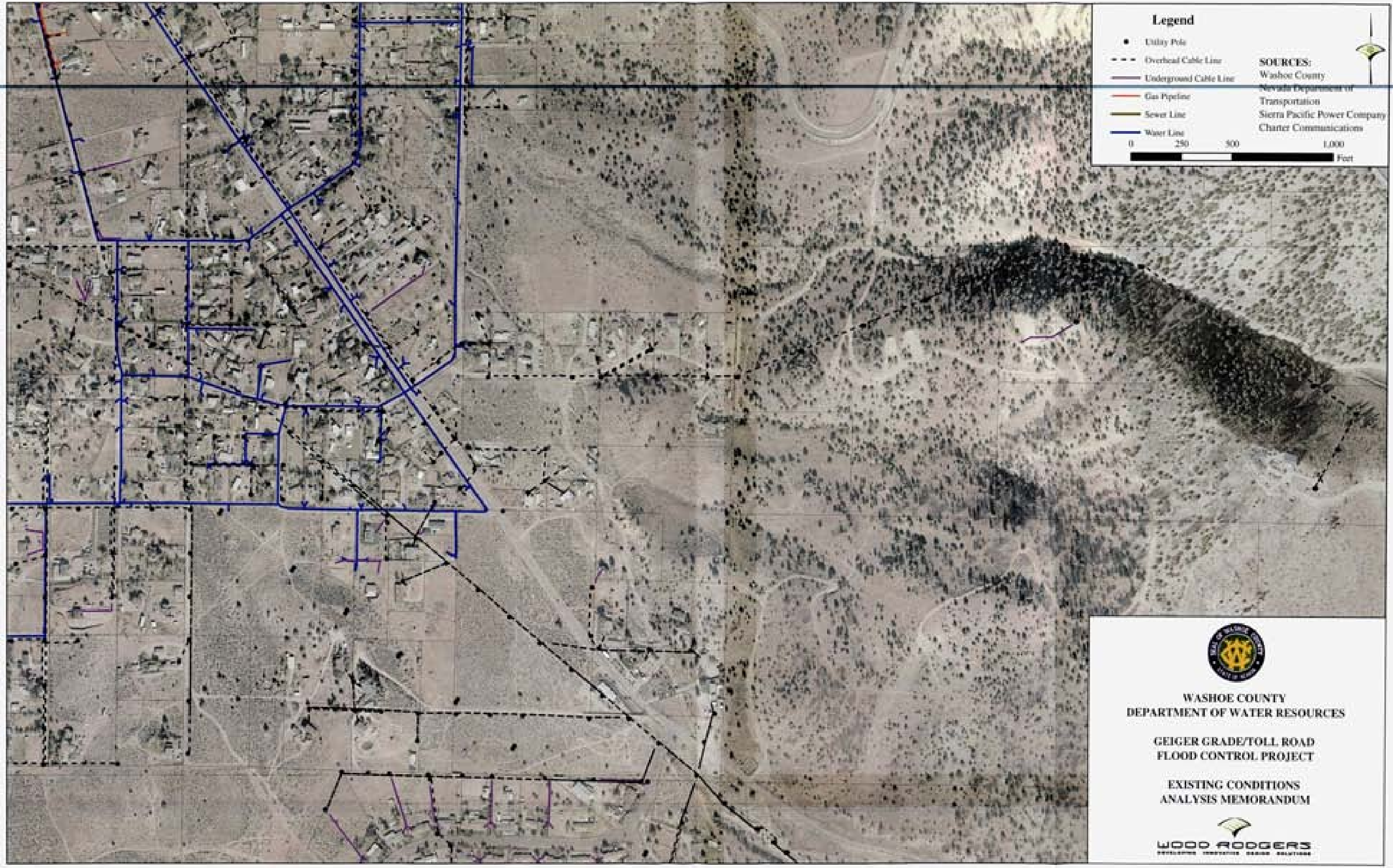
NOVEMBER 2006

FIGURE 5a: Utilities



NOVEMBER 2006

FIGURE 5b: Utilities



WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

WOOD RODGERS

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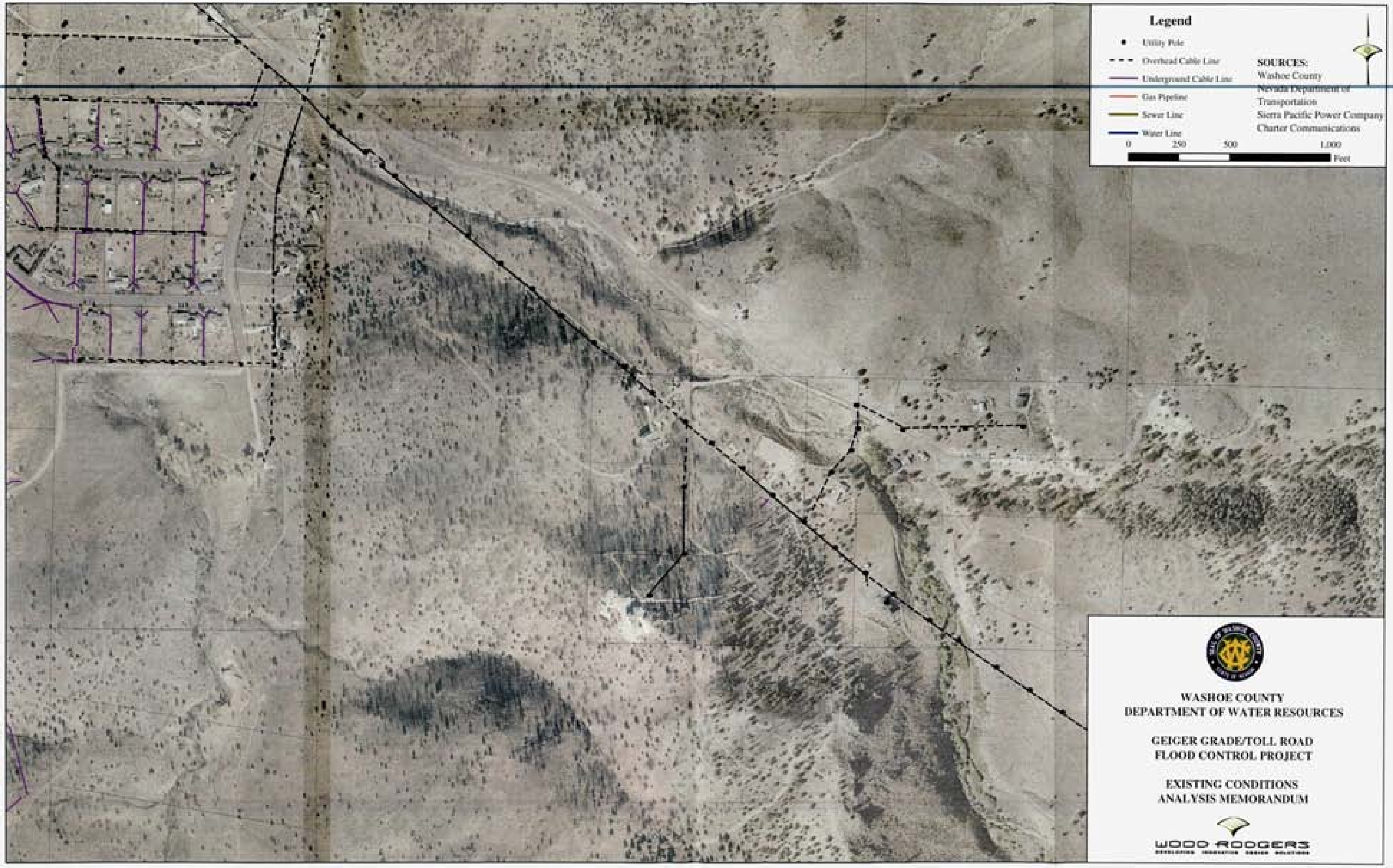
FIGURE 5c: Utilities



NOVEMBER 2006

FIGURE 5d: Utilities

NOVEMBER 2006

FIGURE 6. RIGHT-OF-WAY

USFWS NWI Wetlands

Map center: 39° 23' 11" N, 119° 43' 41" W

Legend

- Interstate
- Major Roads
- Other Road
- Interstate
- State highway
- US highway
- Roads
- Cities
- USGS Quad Index 24K
- Lower 48 Wetland Polygons
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine
- Lower 48 Available Wetland Data
- Non-Digital
- Digital
- No Data
- Scan
- NHD Streams
- Counties 100K
- States 100K
- South America
- North America

Scale: 1:35,743

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

SOURCES:
USFWS

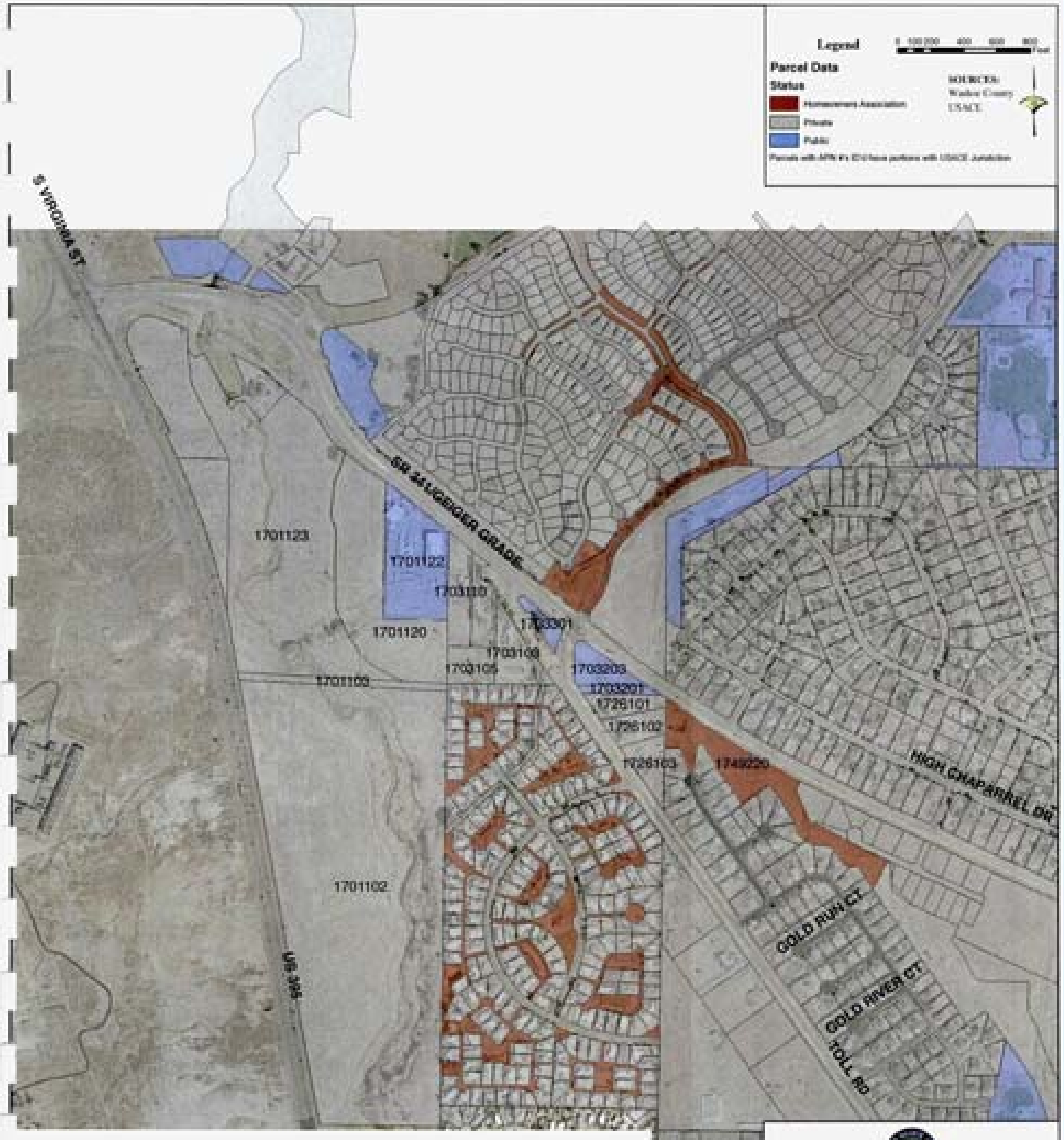
WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

WOOD RODGERS

FIGURE 7. WETLANDS MAP



WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

WOOD RODGERS

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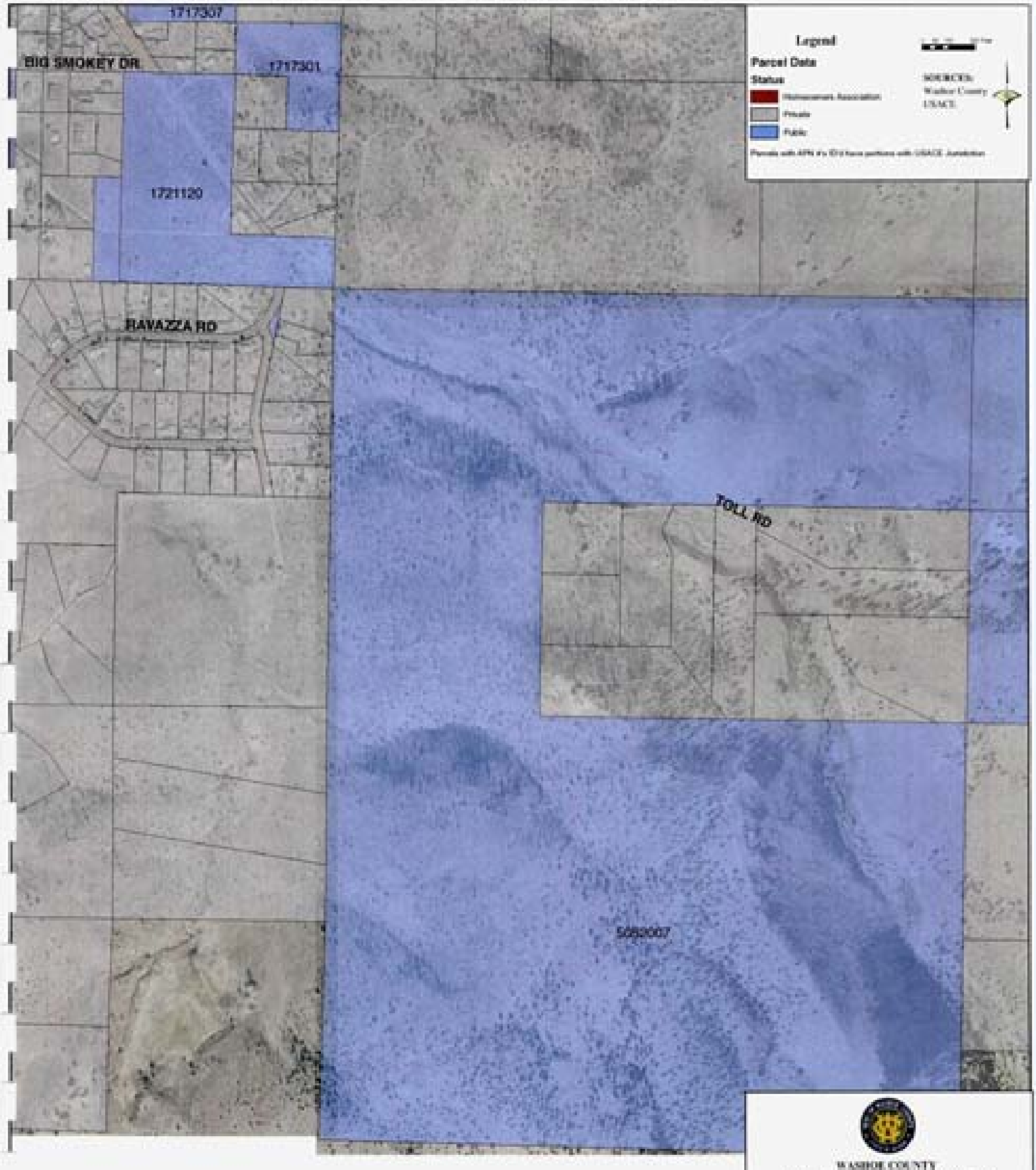
FIGURE 8a: Parcels with USACE Jurisdiction

NOVEMBER 2006

FIGURE 8c: Parcels with USACE Jurisdiction



NOVEMBER 2006

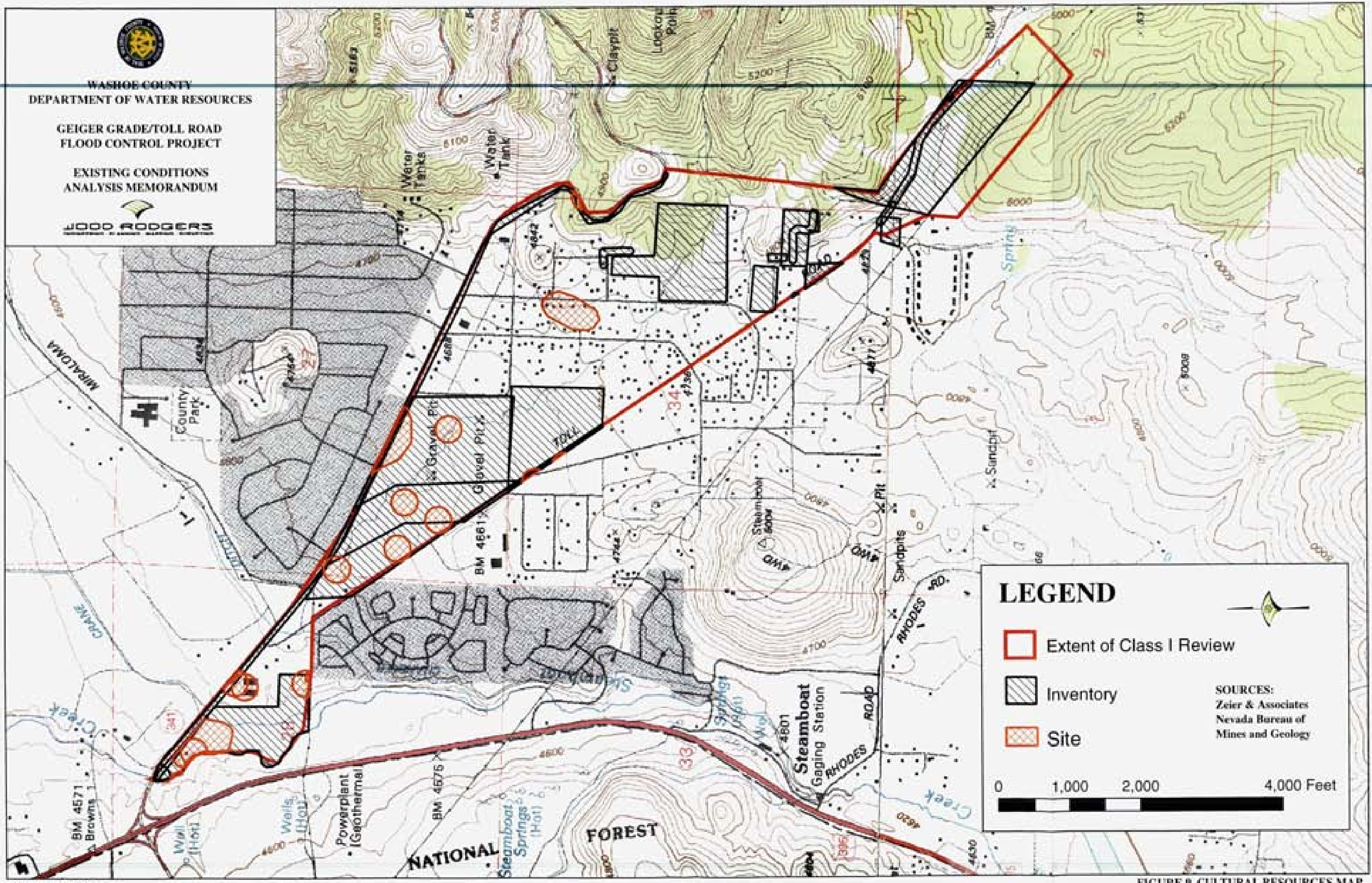
FIGURE 8c: Parcels with USACE Jurisdiction

WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

JOOD RODGERS



NOVEMBER 2006

FIGURE 9. CULTURAL RESOURCES MAP

WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

JOOD RODGERS

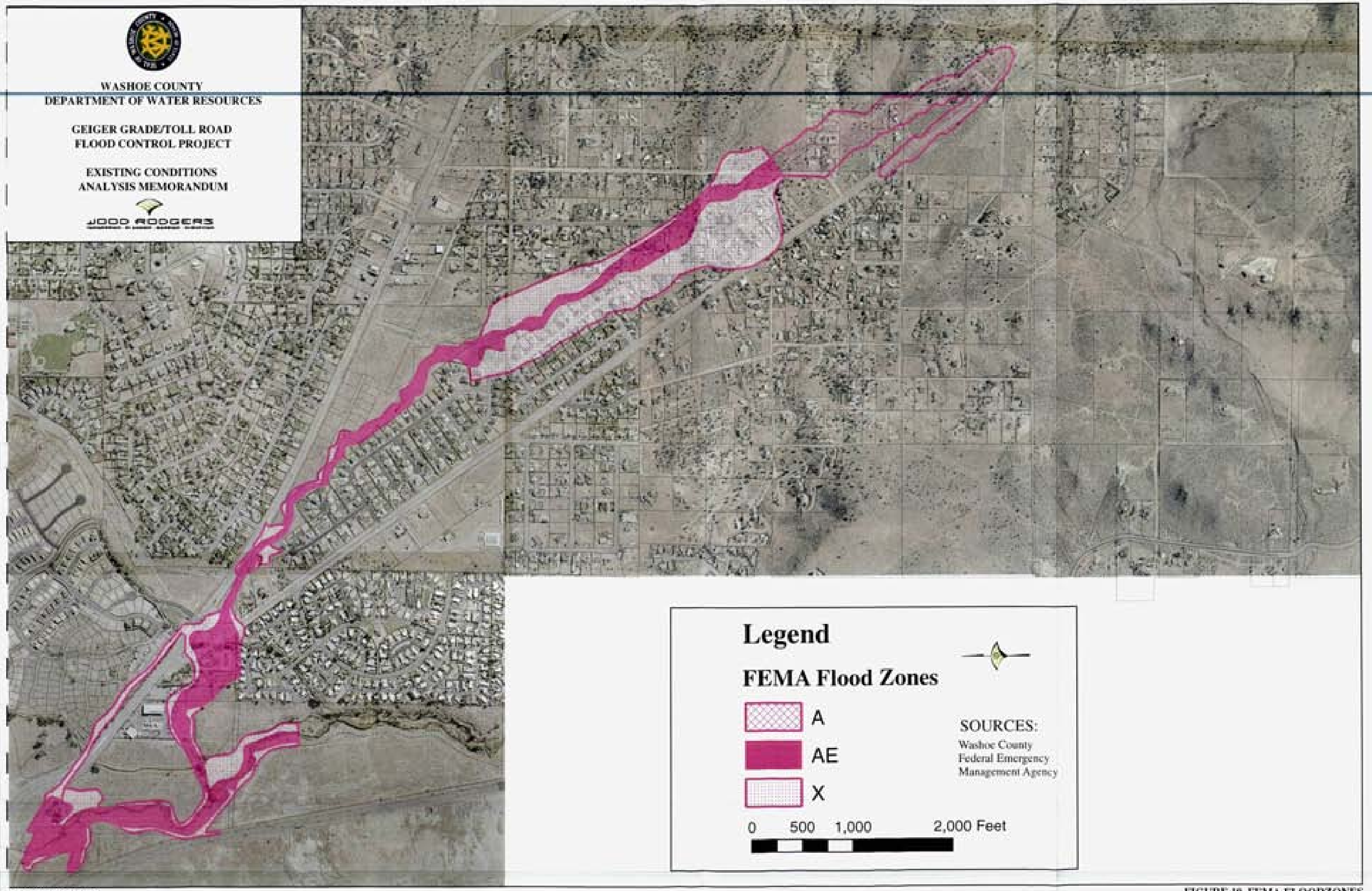


FIGURE 10. FEMA FLOODZONES

WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

EXISTING CONDITIONS
ANALYSIS MEMORANDUM

JOOD RODGERS

Contributing Watershed A

Contributing Watershed B

Contributing Watershed C

LEGEND

Contributing Watershed

Soil Type labeled by
Map Symbol

0 2,000 4,000 8,000 Feet

SOURCES:
Nevada Bureau of
Mines and Geology
Natural Resource
Conservation Service

NOVEMBER 2006

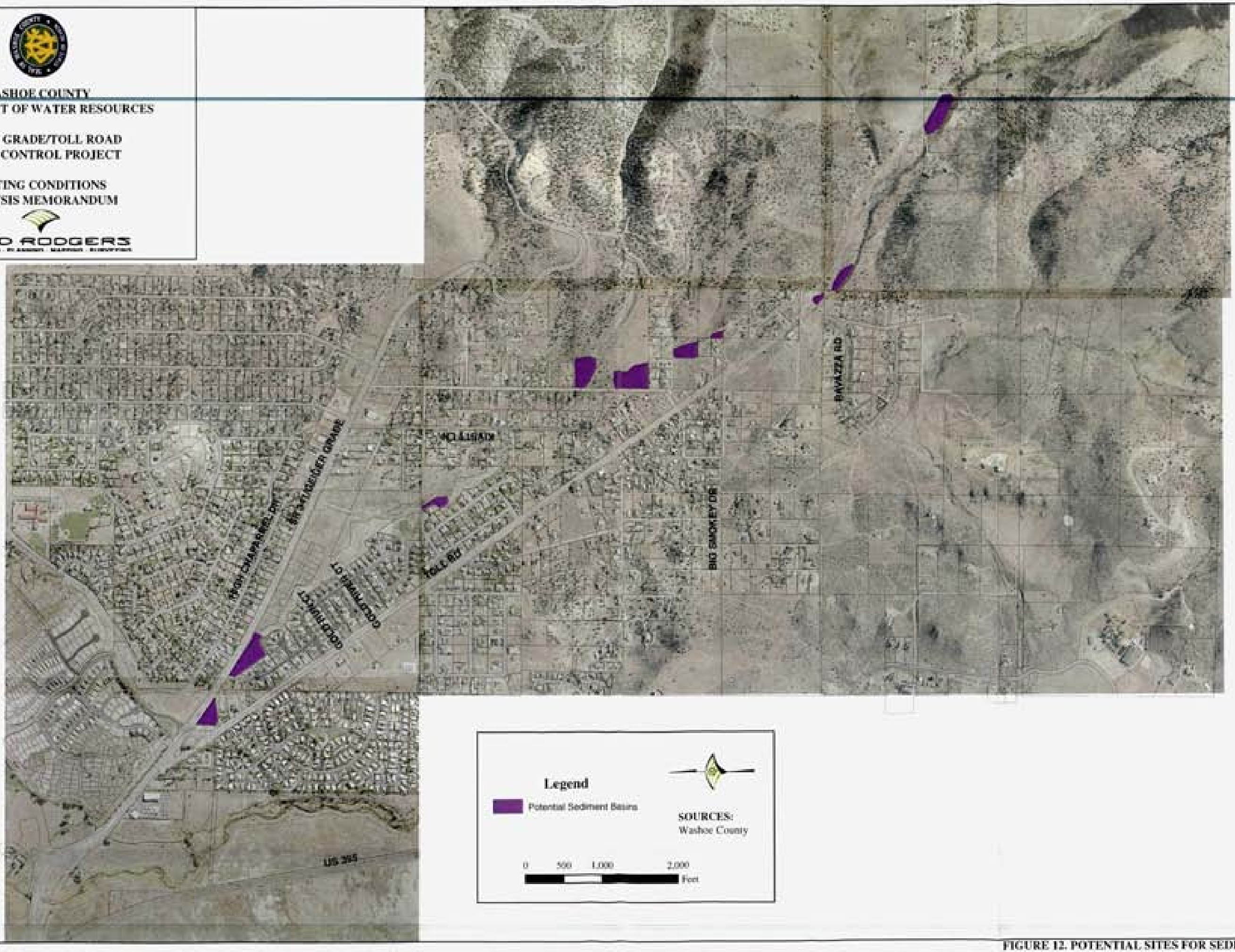
FIGURE 11. SEDIMENT YIELD ANALYSIS

WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES

GEIGER GRADE/TOLL ROAD
FLOOD CONTROL PROJECT

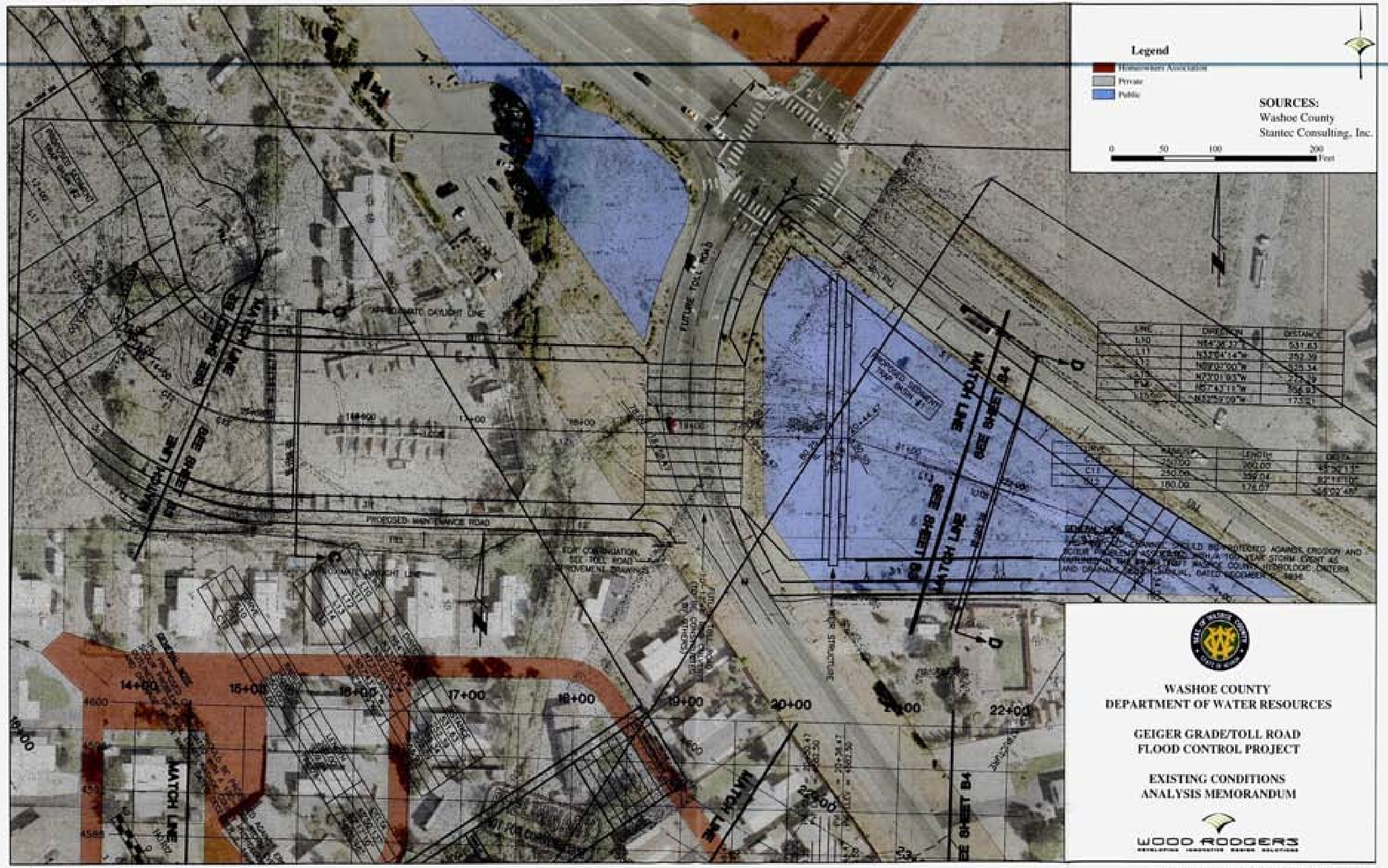
EXISTING CONDITIONS
ANALYSIS MEMORANDUM

JOOD RODGERS



NOVEMBER 2006

FIGURE 12. POTENTIAL SITES FOR SEDIMENT BASINS



NOVEMBER 2006

FIGURE 13. STANTEC CHANNEL DESIGN

APPENDIX A

Appendix A – Field Investigation Photos from June 2006.

Erosion along Bailey Canyon Creek adjacent to Undercutting along a private parcel

SR 341/Geiger Grade near Moon Lane

Bank erosion near Moon Lane

Sediment accumulation in the 12-foot by 4-foot RCB culvert under Toll Road near the intersection with Geiger Grade.

Channel configuration and sediment accumulation in the RCB culvert under Toll Road near Ravazza Road.

APPENDIX B

Geiger | Toll

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Nevada Fish and Wildlife Office
1340 Financial Blvd., Suite 234
Reno, Nevada 89502
Ph: (775) 861-6300 ~ Fax: (775) 861-6301

September 29, 2006
File No. 1-5-06-SP-300

Leslie M. Burnside
Program Manager-Environmental
Wood Rodgers, Inc.
680 West Nye Lane, Suite 204
Carson City, Nevada 89703

Dear Ms. Burnside:

Subject: Species List for the Geiger Grade/Toll Road Flood Control Project

In response to your letter received on September 19, 2006, the following federally listed species may occur in the subject project area:

- Bald eagle (*Haliaeetus leucocephalus*), Threatened
- Steamboat buckwheat (*Eriogonum ovalifolium* var. *williamsiae*), Endangered

This list fulfills the requirement of the Fish and Wildlife Service (Service) to provide information on listed species pursuant to section 7(c) of the Endangered Species Act of 1973 (Act), as amended, for projects that are authorized, funded, or carried out by a Federal agency.

Enclosure A provides a discussion of the responsibilities Federal agencies have under section 7 of the Act and the conditions under which a biological assessment (BA) must be prepared by the lead Federal agency or its designated non-Federal representative. If it is determined by the responsible Federal agency that a listed or proposed species may be affected by the proposed project, then consultation should be initiated pursuant to 50 CFR § 402.14. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to listed species. If a BA is required and it is not initiated within 90 days of the receipt of this letter, you should informally verify the accuracy of this list with our office. If, through informal consultation or development of a BA, it is determined that a proposed action is not likely to adversely affect the listed species, and the Service concurs in writing, then the consultation process is terminated and formal consultation is not required.

The Nevada Fish and Wildlife Office no longer provides species of concern lists. Most of these species for which we have concern are also on the sensitive species list for Nevada maintained by the State of Nevada's Natural Heritage Program (Heritage). Instead of maintaining our own list, we are adopting Heritage's sensitive species list and partnering with them to provide distribution data and information on the conservation needs for sensitive species to agencies or project proponents. The mission of Heritage is to continually evaluate the conservation priorities of native plants, animals, and their habitats, particularly those most vulnerable to extinction or in serious decline. Consideration of these sensitive species and exploring management alternatives early in the planning process can provide long-term conservation benefits and avoid future conflicts.

For a list of sensitive species by county, visit Heritage's website at www.heritage.nv.gov. For a specific list of sensitive species that may occur in the project area, you can obtain a data request form from the website or by contacting Heritage at 901 South Stewart Street, Suite 5002, Carson City, Nevada 89701-5245, (775) 684-2900. Please indicate on the form that your request is being obtained as part of your coordination with the Service under the Act. During your project analysis, if you obtain new information or data for any Nevada sensitive species, we request that you provide the information to Heritage at the above address. Furthermore, certain species of fish and wildlife are classified as protected by the State of Nevada (see http://www.leg.state.nv.us/NAC/NAC-503.html). Before a person can hunt, take, or possess any parts of wildlife species classified as protected, they must first obtain the appropriate license, permit, or written authorization from the Nevada Department of Wildlife (visit http://www.ndow.org or call 775-688-1500).

Because wetlands, springs, or streams are known to occur in the project area, we ask that you be aware of potential impacts project activities may have on these habitats. Discharge of fill material into wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (Corps) pursuant to section 404 of the Clean Water Act of 1972, as amended. We recommend you contact the Corps' Regulatory Section at 300 Booth Street, Room 2103, Reno, Nevada 89509, (775) 784-5304, regarding the possible need for a permit.

Based on the Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act of 1918 (MBTA), as amended (16 U.S.C. 703 *et seq.*), we are concerned about potential impacts the proposed project may have on migratory birds in the area. Given these concerns, we recommend that any land clearing or other surface disturbance associated with proposed actions within the project area be timed to avoid potential destruction of bird nests or young, or birds that breed in the area. Such destruction may be in violation of the MBTA. Under the MBTA, nests with eggs or young of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend land clearing be conducted outside the avian breeding season. If this is not feasible, we recommend a qualified biologist survey the area prior to land clearing. If nests are located, or if other evidence of nesting (*i.e.*, mated pairs, territorial defense, carrying nesting material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active.

Please reference File No. 1-5-06-SP-300 in future correspondence concerning this species list. Please contact me or Todd Gilmore at (775) 861-6300, if you have any questions or require additional information.

Sincerely,

Robert D. Williams
Field Supervisor

Enclosure

ENCLOSURE A

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7 (a) AND (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7 (a): Consultation/Conference
Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with the Fish and Wildlife Service (Service) when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species or critical habitat;

3) Conference with the Service when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7 (c): Biological Assessment - Major Construction Activity 1/
Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action on listed and proposed species. The process begins with a Federal agency requesting from the Service a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with the Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA:

An onsite inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present.

A review of literature and scientific data to determine species distribution, habitat needs, and other biological requirements.

Interviews with experts, including those within the Service, State conservation departments, universities, and others who may have data not yet published in scientific literature.

An analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat.

An analysis of alternative actions considered.

Documentation of study results, including a discussion of study methods used, any problems encountered, and other relevant information.

Conclusion as to whether or not a listed or proposed species will be affected.

Upon completion, the BA should be forwarded to our office with a request for consultation, if required.

1/ A construction project (or other major undertaking having similar physical impacts) is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332 (2) C).

Nevada Natural Heritage Program

Nevada Natural Heritage Program

Nevada Department of Conservation and Natural Resources
Richard H. Bryan Building
901 South Stewart Street, suite 5002 • Carson City, Nevada 89701-5245, U.S.A.
tel: (775) 684-2900 • internet: http://heritage.nv.gov

21 September 2006

Leslie Burnside
Wood Rodgers, Inc.
575 Double Eagle Court
Reno, NV 89521

RE: Data request received 21 September 2006

Dear Ms. Burnside:

We are pleased to provide the information you requested on endangered, threatened, candidate, and/or at risk plant and animal taxa recorded within or near the Geiger Grade/Toll Road Flood Control project area. We searched our database and maps for the following, a three kilometer radius around:

Township 17N Range 20E Section 02
Township 18N Range 20E Sections 27, 28, 34, and 35

The enclosed printout lists the taxa recorded within the given area. Please be aware that habitat may also be available for, the Steamboat buckwheat, *Eriogonum ovalifolium* var. *williamsiae*, a Federally Endangered Species. We do not have complete data on various raptors that may also occur in the area; for more information contact Ralph Phenix, Nevada Division of Wildlife at (775) 688-1565. Please note that all cacti, yuccas, and Christmas trees are protected by Nevada state law (NRS 527.060-.120), including taxa not tracked by this office.

Please note that our data are dependent on the research and observations of many individuals and organizations, and in most cases are not the result of comprehensive or site-specific field surveys. Natural Heritage reports should never be regarded as final statements on the taxa or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

Thank you for checking with our program. Please contact us for additional information or further assistance.

Sincerely,

Eric S. Miskow
Biologist III/Data Manager

SEP 26 2006

At Risk Taxa Recorded Near the Geiger Grade/Toll Road Flood Control Project Area

Compiled by the Nevada Natural Heritage Program for Wood Rodgers, Inc.
21 September 2006

Scientific name	Common name	Usfws	Blm	Usfs	State	Srank	Grank	Lat	Long	Prec	Last observed
Plants											
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392215N	1194204W	S	1995-06-29
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392302N	1194229W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392316N	1194232W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392223N	1194131W	S	1995-06-29
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392329N	1194222W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392243N	1194146W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392254N	1194211W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392310N	1194229W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392213N	1194120W	S	1995-06-29
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392323N	1194156W	S	1996-07-12
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392208N	1194153W	S	1995-06-29
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392214N	1194153W	S	1995-06-29
Eriogonum robustum	altered andesite buckwheat		N			S2S3	G2G3	392340N	1194102W	S	1995-06-29
Mimulus ovatus	Steamboat monkeyflower					S1S2	G1G2Q	392322N	1194250W	S	1971-09-22
Mimulus ovatus	Steamboat monkeyflower					S1S2	G1G2Q	392318N	1194156W	S	1988-05-30
Mimulus ovatus	Steamboat monkeyflower					S1S2	G1G2Q	392225N	1194019W	M	1972-10-11
Mimulus ovatus	Steamboat monkeyflower					S1S2	G1G2Q	392313N	1194218W	S	1988-07-20
Plagiobothrys glomeratus	altered andesite popcornflower		N			S2S3	G2G3	392310N	1194225W	S	1998-06-29
Plagiobothrys glomeratus	altered andesite popcornflower		N			S2S3	G2G3	392254N	1194211W	M	1884-07
Mammals											
Myotis thysanodes	fringed myotis	xC2	N;C		YES	S2	G4G5	392343N	1194944W	G	1995-05-31
Birds											
Strix nebulosa	Great Gray Owl			S;I;L	YES	SNA	G5	392902N	1194218W	G	1980-10-14

U. S. Fish and Wildlife Service (Usfws) Categories for Listing under the Endangered Species Act:

x C2 Former Category 2 Candidate, now species of concern

Bureau of Land Management (Blm) Species Classification:

N Nevada Special Status Species - designated Sensitive by State Office
C California Special Status Species (see definition S and N)

United States Forest Service (Usfs) Species Classification:

S Region 4 (Humboldt-Toiyabe NF) sensitive species
I Region 5 (Inyo NF) sensitive species
L Region 5 (Lake Tahoe Basin Management Unit) sensitive species

Nevada State Protected (State) Species Classification:

Fauna:
YES Species protected under NRS 501.

Precision (Prec) of Mapped Occurrence:

Precision, or radius of uncertainty around latitude/longitude coordinates:

S Seconds: within a three-second radius
M Minutes: within a one-minute radius, approximately 2 km or 1.5 miles
G General: within about 8 km or 5 miles, or to map quadrangle or place name

Nevada Natural Heritage Program Global (Grank) and State (Srank) Ranks for Threats and/or Vulnerability:

G Global rank indicator, based on worldwide distribution at the species level
T Global trinomial rank indicator, based on worldwide distribution at the infraspecific level
S State rank indicator, based on distribution within Nevada at the lowest taxonomic level
- 1 Critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats, or other factors
- 2 Imperiled due to rarity or other demonstrable factors
- 3 Vulnerable to decline because rare and local throughout its range, or with very restricted range
- 4 Long-term concern, though now apparently secure; usually rare in parts of its range, especially at its periphery
- 5 Demonstrably secure, widespread, and abundant
  - A Accidental within Nevada
  - B Breeding status within Nevada (excludes resident taxa)
  - H Historical; could be rediscovered
  - N Non-breeding status within Nevada (excludes resident taxa)
  - Q Taxonomic status uncertain
  - U Unrankable
  - Z Enduring occurrences cannot be defined (usually given to migrant or accidental birds)
  - ? Assigned rank uncertain

APPENDIX C

APPENDIX C:
PLANT SPECIES OBSERVED WITHIN THE PROJECT AREA

Common Name	Scientific Name	Special Status
Trees		
Singleleaf pinion	*Pinus monophylla*	
cottonwood	*Populus sp.*	
Utah juniper	*Juniperus osteosperma*	
Russian olive	*Eleaunus augustifolia*	
Shrubs		
Antelope bitterbrush	*Purshia tridentata*	
Mormon tea	*Ephedra viridis*	
Four-wing saltbush	*Atriplex canescens*	
Rabbitbrush	*Chrysothamnus sp.*	
Big Sagebrush	*Artemisia tridentate*	
Herbaceous Plants		
Russian thistle	*Salsola kali*	
Common cocklebur	*Xanthium strumarium*	
Cheatgrass	*Bromus tectorum*	
Perennial pepperweed	*Lepidium latifolium*	
clover		
Riparian		
Bulrush	*Scirpus* sp.	
Willow	*Salix sp.*	
Saltcedar	*Tamarix ramossima*	

APPENDIX D

APPENDIX D:
WILDLIFE SPECIES OBSERVED WITHIN THE PROJECT AREA

Scientific Name	Common Name	Sign
CLASS REPTILIA	**REPTILES**	
PHRYNOSOMATIDAE	**ZEBRA-TAILED, EARLESS, FRINGE-TOED, SPINY, TREE, SIDE-BLOTCHED, AND HORNY LIZARDS**	
Sceloporus occidentalis	western fence lizard	**O**
CLASS AVES	**BIRDS**	
ANATIDAE	**DUCKS, GEESE, SWANS**	
Anas platyrhynchos	Mallard	**O**
ACCIPITRIDAE	**HAWKS, KITES, EAGLES**	
Accipiter cooperii	Cooper's hawk	**O**
ODONTOPHORIDAE	**NEW WORLD QUAIL**	
Callipepla californica	California quail	**O, V**
COLUMBIDAE	**PIGEONS & DOVES**	
Columba livia	rock dove	**O**
Zenaida macroura	mourning dove	**O, V**
CORVIDAE	**JAYS, CROWS & MAGPIES**	
Aphelocoma californica	Western scrub-jay	**O**
Pica pica	Black-billed magpie	**O, V**
ICTERIDAE	**BLACKBIRDS**	
Sturnella neglecta	western meadowlark	**C**
EMBERIZIDAE	**EMBERIZIDS**	
Melospiza melodia	song sparrow	**O**
Zonotrichia leucophrys	white-crowned sparrow	**O, V**
FRINGILLIDAE	**FINCHES**	
Carpodacus mexicanus	house finch	**O**
CLASS MAMMALIA	**MAMMALS**	
LEPORIDAE	**HARES & RABBITS**	
Lepus californicus	black-tailed jackrabbit	**O**
Sylvilagus audubonii	desert cottontail	**O**
CANIDAE	**WOLVES & FOXES**	
Canis latrans	coyote	**S, T**
EQUIDAE	**HORSES & BURROS**	
Equus caballus	horse	**S, T**

B = Burrow, C = Carcass, N = Nest, O = Observed, S = Scat, T= Tracks, V= Vocalization

APPENDIX E

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

October 24, 2006

Office of Counsel

SUBJECT: Freedom of Information Act Request No. 06-09-0318; Request for Washoe County Wetland Delineation, Permitted Actions and Proposed Mitigation Records

Ms. Leslie Burnside
Wood Rodgers, Incorporated
680 West Nye Lane, Suite 204
Carson City, Nevada 89703

Dear Ms. Burnside:

This letter is to confirm that you were provided with the agency records responding to your Freedom of Information Act request received in this office on September 14, 2006. On October 11 and October 3, 2006, Mr. Erik Bray of your office stopped by our Nevada Regulatory Office to review the requested subject documents. He selected ten total pages for reproduction from all of the files together.

For the purpose of assessing fees, I have classified you as a commercial requester under 32 C.F.R. § 518.85(b)(2)(i). The charge for providing the requested information is less than $15.00 therefore no fee payment is required for this request.

If you have any question regarding the provided information, please contact me directly at (916) 557-6619 or by e-mail at Sondra.c.sperr@usace.army.mil.

Sincerely,

Sondra C. Sperr

Sondra C. Sperr
Assistant Freedom of Information Act Officer

APPENDIX F

Zeier & Associates, LLC 1751 Pinewood Street, Apt. 7-D, Minden, Nevada 89423
Archaeological, Historical, and Genealogical Research 775-315-3002

October 17, 2006

Ms. Christine Kirick, E.I.
Wood Rodgers
575 Double Eagle Court
Reno, Nevada 89521

Subject: Geiger Grade/Toll Road Flood Control Project

Dear Ms. Kirick:

Wood Rodgers was recently retained by Washoe County to provide engineering services in conjunction with the proposed Geiger Grade/Toll Road Flood Control Project. Wood Rodgers retained Zeier & Associates, LLC to prepare a brief Class I cultural resources overview of the project area as shown on the attached map. That overview was to summarize previous archaeological studies in the project area, as well as the number, type and density of archaeological resources known and likely to be present. The work product would be a short narrative report describing the known prehistory and history of the area. This report was to provide a listing of previously recorded sites within the project area, a bibliography of all previous inventories located within the project area, and, to the extent practical, a discussion of which portions of the project area have the greatest cultural resource sensitivity. Please accept this letter report as the requested work product. Also, Zeier & Associates was to submit to Wood Rodgers information regarding the location and extent of previously conducted cultural resource studies and previously recorded archaeological and historical sites in an electronic format. That information has been provided on a CD under separate cover.

General Setting

The Flood Control Project area is located in Steamboat Valley, a comparatively narrow alluvial plain that represents the southern most extension of the Truckee Meadows. A low divide separates Steamboat from Pleasant Valley to the south. The Steamboat Hills are located west of Steamboat Valley, grading eventually into the Carson Range. The Virginia Range is located to the east.

The Flood Control Project area is situated on the east side of Steamboat Valley. For much of its length, the project area extends along low fan remnants located along either side of Bailey Creek and an inset fan located within the mouth of Bailey Canyon. Viewed somewhat differently, the project area extends from near the historic Crane Ranch located along the east edge of Steamboat Creek into the mouth of the narrow Bailey Canyon. Drainages in the project area (including Bailey Creek) flow only intermittently, during spring snowmelt and times of heavy rainfall. The nearest source of permanent water is Steamboat Creek and a series of hot springs situated at the base of the Steamboat Hills.

Cultural Setting

The following discussion is intended to provide contextual information, albeit brief, against which the significance of cultural resources can be evaluated.

Prehistory

Pendleton et al. (1982), Hardesty (1982), Elston (1982, 1986), and Turner (1993) provide recent summaries of western Great Basin and eastern Sierra prehistory. Studies focus on adaptive strategies consisting of technological, subsistence, settlement, and ideological elements that were expressed over broad regions. Four such strategies are recognized for the Western Great Basin, including the Pre-Archaic (prior to 7000 years before present), the Early Archaic (7,000 to 4,000 B.P.), the Middle Archaic (4,000 to 1,500 B.P.), and the Late Archaic (1,500 B.P. to the time of historic contact).

The Pre-Archaic strategy prevailed in the Great Basin from about 11,500 to 7,000 B.P., a period marked by cool, moist conditions which fostered an abundance of surface waters. Originally thought to represent an adaptation to pluvial lakeshore environments, Pre-Archaic sites have increasingly been recognized in a variety of riverine and upland settings. Subsistence revolved around lake shore-marsh resources and the taking of large game; the use of processed seeds and nuts was not prevalent. Population density was quite low, and groups were highly mobile.

Environmental conditions changed gradually toward the end of the pre-Archaic period; temperatures increased, moisture patterns changed, and the amount of available surface water decreased. Eventually, these changes caused a shift in adaptive strategy. Early Archaic patterns are markedly different from those of the pre-Archaic period. Seed processing tools make their first appearance, indicating that the resource base had become more diversified. Hunting remained a prevalent activity. The variety of site types increases during this period, suggesting again the diversity of the resource procurement strategy. Initially, the population density was lower than during the pre-Archaic, but increased gradually.

At the onset of the Middle Archaic, about 4,000 B.P., environmental conditions again changed. Most notably, increases in effective precipitation caused the expansion of resources associated with lakes and marshes. Population increased, and pronounced cultural elaboration occurred, as evidenced by an abundance of textiles and other perishables, and more complex houses. Subsistence practices continued to emphasize large game hunting, but the use of seed expanded. The use of upland resources also increased notably. Wherever they were available, lacustrine and riverine resources were used intensively, and there is evidence of trans-Sierran trade during this period. Population densities were higher than during earlier periods, but were still low enough that groups enjoyed considerable lateral mobility. Low cost procurement strategies yielded a high return from areas of high resource abundance. The local manifestation of the Middle Archaic is the Martis Phase (Heizer and Elsasser 1953; Elsasser 1960; Elston 1986).

The transition from the Middle to the Late Archaic is marked by changes in technology, subsistence patterns, and settlement. Technologically, the Late Archaic saw the introduction of the bow and arrow, a diversification in the types of ground stone implements used, and a greater emphasis on the use of small flake stone tools. Subsistence and settlement changes appear to reflect increased local

and regional population. This prompted an intensification and diversification in subsistence practices not noted previously. Low-ranked resources seldom used during earlier periods were added to the diet. The use of pinyon also became pronounced during this period. Along the eastern Sierran front, the Late Archaic is represented by the Kings Beach Phase. Population densities appear to have increased substantially during this phase, causing a marked decrease in lateral mobility. Any given group had fewer optimal locations into which they could move. They began occupying less than optimal camps, and often stayed in any given camp for a longer period of time. The Late Archaic is thought to represent populations ancestral to the present day Washoe, Paiute, and other Great Basin groups.

Ethnohistory

As of the mid-1800s, the Washoe inhabited the project area. The Washoe are a Hokan-speaking, hunting and gathering group that inhabited the chain of valleys along the eastern slope of the Sierra Nevada, from Honey Lake to Antelope Valley (Downs 1966:4, Price 1963:77). The Pine Nut Mountains and the Virginia Range formed the eastern boundary of Washoe territory, while the western boundary extended several miles beyond the Sierra crest (Price 1963:77). Ethnographic data on the Washoe are contained in d'Azevedo (1956, 1963, and 1986), Barrett (1917), Curtis (1926), Downs (1966), Fowler et al. (1981), S. and R. Freed (1963), Kroeber (1925), Lowie (1939), Nevers (1976), Price (1962, 1980), and Siskin (1941).

Washoe subsistence involved seasonal shifts in resource selection and concomitant settlement location. With the coming of spring, small bands or individual families left their winter base camps to take advantage of ripening plant foods in low-lying valleys. As soon as the snow melted, many people began moving to higher elevations in the Sierra Nevada. By early June, most Washoe were at Lake Tahoe encampments, there to take trout, sucker, and white fish spawning in streams emptying into the lake (Downs 1966:13-15). Stores of dried fish were developed.

Washoe left Lake Tahoe in the late summer and early fall. They dispersed in small groups to the valleys east of the Sierra. Antelope and rabbit were hunted in early fall, both by individuals and in communal drives. Rabbits were dried for winter use. Late fall found the Washoe collecting pine nuts along the eastern face of the Sierra and in the Virginia Range and the Pine Nut Hills; deer hunting was an important ancillary activity in these locations. With the coming of heavy winter storms, Washoe families returned to their favored base camps, there sustained by stored pine nuts, seeds, and dried meat (Downs 1966:17).

The basic Washoe social and economic unit was a household composed of a married couple, their dependent children, and one or more relatives, in-laws, or close friends (Price 1963; Downs 1966). Each household occupied a *galis dangal*, or winter house, that was four to five meters in diameter, had an east facing doorway, and a central hearth. A winter base camp contained two to ten such houses. Zeier (1986:341-356) and Zeier and Elston (1992) have reviewed ethnographic and archaeological data pertaining to *galis dangal* and winter village patterning. Numerous winter villages are known to have been present adjacent to the Truckee River, at nearby springs, and along Steamboat Creek especially in the area near Steamboat Hot Springs.

History

Some themes central to the history of Reno and the Truckee Meadows are not reflected in the southern Truckee Meadows. For example, Euro-American history in western Nevada began with the activities of trappers and explorers. Settlers soon followed the trappers to the west. During 1844, members of the Stevens-Murphy party were the first to pass through the Truckee Meadows. They followed the Humboldt River across the state, crossed to the Truckee River, and ascended the Sierra Nevada via the Truckee River and Donner Pass. In 1846, an estimated 1,500 emigrants followed the California Trail (Carlson 1974, Elliot 1973). The California Gold Rush of 1849 caused a marked increase in westward traffic. Approximately 197,600 emigrants used the Emigrant Trail between 1849 and 1860. Many of those passed through the Truckee Meadows. The predominantly westward movement continued until 1859 when the Comstock boom reversed this flow. Settlement of northern Nevada began in earnest.

The number of emigrants had so increased by 1859 that a small lodging house and ferry were established at what would become known as Lake's Crossing in the heart of present day Reno. Between Wadsworth and the Truckee Meadows, the Truckee River Route crossed the river in several locations. After coming out of the Truckee River canyon near Vista, the route turned south to avoid the swampy ground of the Truckee Meadows. The route passed through Hidden Valley before arriving at the Huffaker Hills. There, the route turned to the west-northwest, eventually crossing the Truckee River again at Mayberry Bridge.

While mining was the industrial mainstay of Nevada during its early years, mining features are not common in the hills surrounding Steamboat Valley. The nearest mining areas were located in the Steamboat Hills. The Galena Hill Mine was located about one-half mile east of the summit of Steamboat Hills. Pits and adits are present that date to the late 1920s.

Agriculture: One aspect of local history in which Steamboat Valley did play a role was agriculture. Agriculture in the Truckee Meadows began in the mid-1850s when settlers cut native grass for sale to those passing along the emigrant trail. Seasonal flooding and ground saturation kept the meadows productive without the need for irrigation (Townley 1980:41). The onset of mining activities on the Comstock in 1859 added yet one more customer. Farmers in the Truckee Meadows and surrounding valleys cut hay as it rose every spring and stockpiled it for sale over the year. The lush meadows provided an estimated 5,000 tons of hay annually, which was consumed by livestock or baled and sold in Virginia City. For over a decade, native grasses supplied the needs of transportation and dray animals in the region (Townley 1983:121).

Two early Steamboat Valley settlers were involved in agricultural pursuits. In 1859 Mr. Granville Huffaker settled in the southern-most portion of the Truckee Meadows and sold beef to stores in Virginia City. Ervin Crane established a ranch near Steamboat Springs in 1864. The ranch house, a carriage house, and a barn are still present, adjacent to SR 341. Thompson and West (1881:632) provided a short biography of Crane.

This dependence on native grasses continued until the transcontinental railroad was completed through the meadows. With its completion, local farmers lost a sizable portion of their market -

emigrants and those attending to the emigrants. This loss was soon offset, however, as teamsters began to use Reno as a base from which to supply areas to the north and south.

Prior to the advent of the railroad, California had been the regional center of cattle production. Even western Nevada relied on California as a source of beef cattle during these early years. Droughts in California during the late 1860s caused local shortages in the supply of quality beef cattle. After the advent of the railroad in 1868, the beef industry became regional in scope (Townley 1983:121). Cattle could be taken off of the range in Elko County, fattened in the Truckee Meadows, and shipped to the bay area where they would be slaughtered for sale. Stockmen from Oregon, northern California, and Nevada trailed cattle and sheep to Reno and boarded the animals with a local stockyard. The cattle and sheep spent weeks to months in the meadows where they were fed and finished. Once they met butchering weight, they went west by boxcar. Local farmers and stockmen feed 5,000 to 10,000 cattle and 30,000 to 50,000 sheep annually (from December to May) (Townley 1983:115).

With its new role, Truckee Meadows farmers recognized a need for the production of forage at levels well above what could be supported by native grasses. First experimented with in the 1860s, alfalfa soon became the prominent crop grown in the meadows. Experience showed that alfalfa grew best on higher sage flats, not in wetter river bottoms. With this realization and as demand for forage increased, more areas were cleared for development as fields and the construction of irrigation ditches was planned. Some of the earliest experimentation with alfalfa occurred on the Crane Ranch, part of which is within the Flood Control Project area.

Water had been diverted in small amounts during the late 1850s. The 1860s saw construction of the first ditch of note, the Pioneer Ditch, and several others including the English Mill, Sessions, North Truckee, and Lake ditches (Townley 1983:137). The 1870s saw a pronounced expansion in the length and number of ditches. The most complex systems - the Steamboat, Orr, and Highland ditches - were all constructed during this period (Townley 1983:137-138). The Steamboat Ditch took water from the Truckee River near Verdi, brought it around the southwest margin of the Truckee Meadows where it crossed over Steamboat Creek, and extended five miles to the north before flowing into Steamboat Creek. In all, the canal is some 34 miles in length (Thompson and West 1881:634). The ditch was begun in 1878 and completed in 1880. By the end of the 1870s, 20,000 acres of cropland were open to irrigation and alfalfa production had increased from 5,000 to 15,000 tons (Townley 1983:129).

Alfalfa prices declined in the late 1870s due to over production and the decline of Comstock related markets. Some farmers attempted to combat the lower priced by increasing production. Others shifted, to a limited degree, to other aspects of agriculture - orchards, berry crops, and truck farming to name a few. Truck farming in the meadows included potatoes, greens, berries, and chickens. Potatoes were a big cash crop in California until the turn of the century when Idaho took over the market (Townley 1983:136). Despite such flirtations, Truckee Meadows kept to its hay culture during the 1880s (Townley 1983:132). Toward the end of the 1870s, midwest markets became more accessible to Nevada and some cattle started being shipped east.

In summary, the agricultural and economic system established in the Truckee Meadows during the 1870s was highly specialized. Valley ranchers seldom strayed from the forage production and livestock-feeding venue. They satisfied a narrowly defined component of a regional cattle production

system. Local ranchers and stockmen were part of a complicated, outsider-dominated agricultural and transportation system over which they had little control. This forage-based economy persisted well past 1900 when Reno's expansion and the effects of federal reclamation efforts caused the system to change. Also, by that time the cattle industry had become national is scale. While this opened new market opportunities, it also increased the level at which ranchers and stockmen had to compete.

Transportation: During the 1850s, a route was developed connecting the Truckee Meadows and Carson City. In 1860 the Langton Pioneer Express established an office at Huffaker's ranch and in 1862 a post office was opened there. Wells Fargo & Co. subsequently replaced Langton's line. In 1863, Straus and Cramer opened a store at the station, which continued in operation until 1869. In that year, the express line and the post office were removed (Thompson and West 1881:643). Also during the 1860s, Felix Brown built an early stage station about 2.5 miles north of Steamboat Hot Springs. This station was located west of Steamboat Creek near its confluence with what was then called Brown's Creek.

Mineral deposits were discovered in the Comstock Lode Area in 1859. Initially, travel into the Comstock was via Carson City. An alternative to this long route was sought. On November 29, 1861, the Territorial Legislature granted a franchise to Dr. D. M. Geiger and J. H. Tilton for the construction of a road between the southern end of the Truckee Meadows and Virginia City (Galloway 1947:35). The road was named for one of its owners, Dr. Davison M. Geiger (1821-1895). After serving in the Mexican War, Dr. Geiger settled in Plumas County, California. Geiger bought out his partner, John Tipton, shortly after completion of the grade (Earl 1991). Geiger ran the toll road until late 1868 when it was purchased by Washoe and Storey counties. The following tolls applied: 40 cents for each wagon or vehicle, 15 cents for each draft animal, 25 cents for each saddle animal, and 10 cents for each pack or loose animal (Koval 1994:8). Over the next 15 years a series of operators won the bid to run the toll road on behalf of the counties (Earl 1991). After selling his franchise, Geiger moved to Virginia City.

The original Geiger Grade veered off from the Truckee Meadows to Carson City road near Brown's station (Figure 1, Road 1). From there it crossed Steamboat Creek and headed southeast to the mouth of Bailey Canyon. The roadway extended up the north branch of Bailey Creek to Five Mile Flat and then onto Virginia City (Mulcahy 1956). The toll station was located just inside the mouth of the canyon. Known as Magnolia House, the station consisted of a blacksmith shop, wagon yard, corrals, tollhouse, and possibly a farm. The Nevada Historical Society (1940:276) provides interesting tidbits regarding the history of the grade (also see Mack 1959).

> "The original Geiger Grade, built in 1861-62, sweeps up a steep canyon, ascending some 2000 feet in five miles. Over it on October 16, 1869, 14 yoke of oxen hauled the first locomotive of the V&T. During the 1860s both the Wells Fargo and Pioneer Stage companies kept a continuous procession of swift carts shuttling over the route and there were several hotels and stores along the way; not a trace of these remains. When the Central Pacific Railroad reached Reno in 1868, the Geiger Grade became a veritable racetrack. Virginia City turned out en masse, and thousands of dollars changed hands as the stages of the two companies wheeled into town. The best time from Reno to Virginia was an hour and 32 minutes, but a horse once made the trip in two minutes less than an hour."

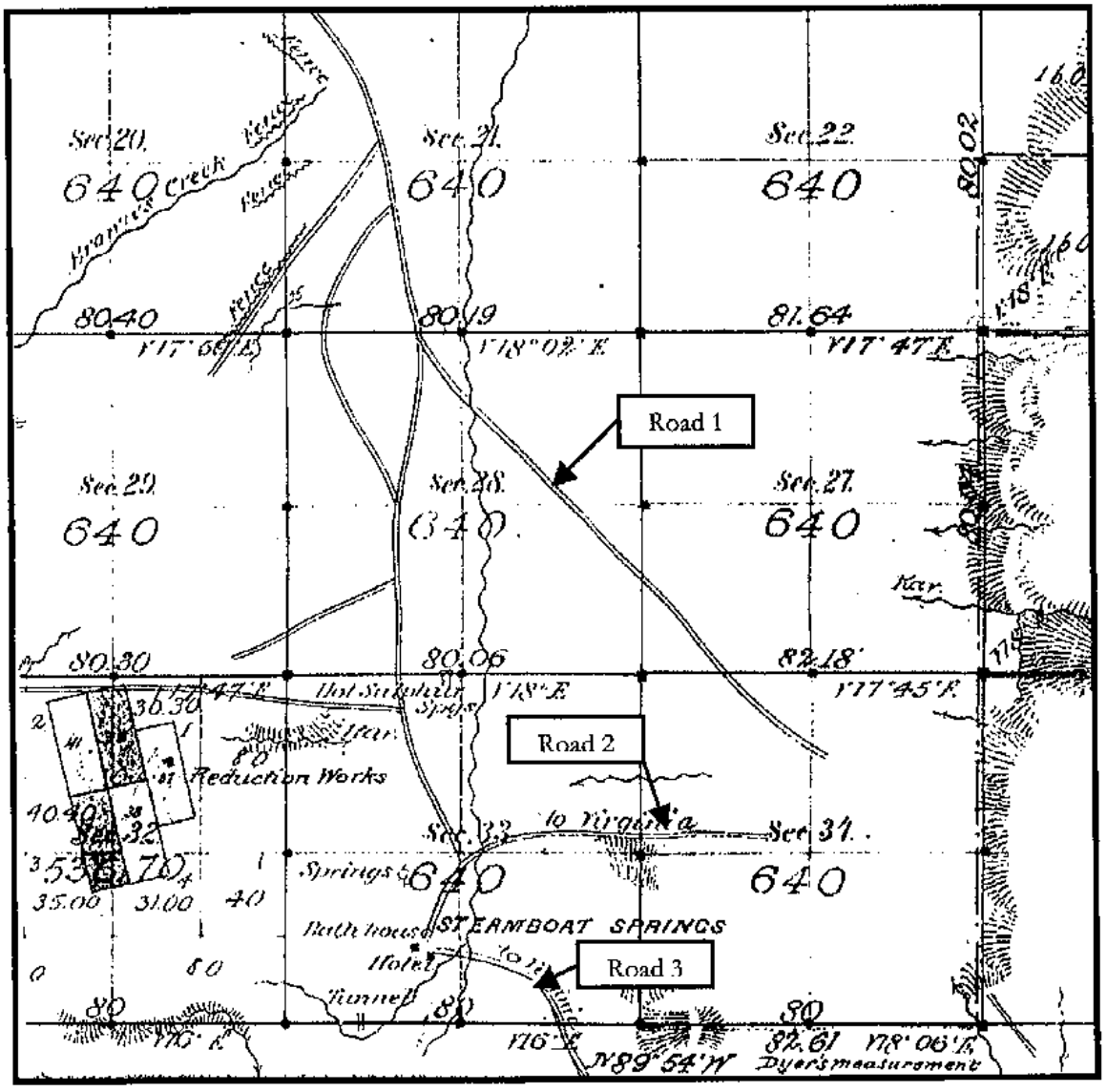


Figure 1: 1884 Surveyor's Plat, Township 18 North, Range 20 East (partial).

Note three roads leading to Virginia City (also shown on 1863 plat):

Road 1 – road from "Henness Pass" to Virginia City. On some maps referred to as the road from Truckee Meadows to Virginia City.
Road 2 – road from Steamboat Springs to Virginia City
Road 3 – road from Steamboat Springs to Virginia City via Newton Creek Canyon

Construction of the V&T Railroad from Reno to Carson City occurred in two "spurts." The first saw construction from Reno (where it tied into the Central Pacific Railroad) to Steamboat Springs. This work was completed in July of 1871. As part of this effort, stations were established at Huffaker's Ranch, Brown's Station, and at Steamboat Springs. The Huffaker and Brown stations were located at the termini of V-flumes that brought lumber down from the Carson Range. The El Dorado Flume ended at Brown's Station, while the Pacific Wood, Lumber and Flume Company ended at Huffaker's. As many as 35 carloads of timber a day left Huffaker's for the Comstock (Myrick 1962:157).

It was the better part of a year before construction of the remaining leg to Carson City began. During that year, Steamboat was the endpoint on the line where all of the freight bound for the Comstock, Carson City, and points beyond was offloaded onto wagons. Extensive wagon yards, storage buildings, and corrals were present just north of the springs. Much of that traffic went to the Comstock via Geiger Grade. A shortcut was established between the wagon yards just north of Steamboat Springs and Geiger Grade (Figure 1, Road 2). That shortcut crossed Steamboat Creek, went through a saddle between two hills and then proceeded easterly to Geiger Grade. Completion of the V&T to Carson City in the summer of 1872 had an immediate impact on Steamboat Springs and Geiger Grade. Gone was the busy transshipping business and all that it entailed. Use of Geiger Grade and Magnolia House declined through the mid-1880s by which time the road saw comparatively limited use. Steamboat remained a stop along the way until the railroad ceased operation in the 1940s.

The surface of the Geiger Grade was macadamized and oiled for the first time in 1923. The Geiger Grade alignment was deeded to the State of Nevada by the J.U. Land and Livestock Company in October of 1932. A modern road was built to replace old Geiger Grade in 1936 (Clark 1936); that road (SR 341) remains in use today (Galloway 1947:35). Sometime in the 1940s or 1950s, the Highway Department paved what was then called Toll Road (old Geiger Grade) from Crane Ranch to the mouth of Bailey Canyon (Figur 2). The State transferred the right-of-way to Washoe County in 1972. By the mid-1970s, the road was so full of potholes that people routinely drove along the dirt shoulders of the road (R. Reno and H. Turner, personal communication). No V-ditches were present at that time. The County did a full overlay of the roadway in 1984. The V-ditches present today were excavated at that time.

Recreation: Throughout the 1850s the area known as the Washoe Geysers was a welcome spot visited by numerous westbound emigrants. By 1857 the area had become known as Steamboat Springs. Doctor Ellis constructed the first on site improvements in 1862. He built six bathhouses and a hospital with accommodations for 34 patients, all catering to those living on the Comstock. Some of the facilities were consumed by fire in 1867, but by 1871 a new hotel was in business that could accommodate 50 guests (Townley 1983:259-263). Between 1871 and 1872, Steamboat was the terminus of the V&T Railroad. This had an immense impact on businesses in the small community. Completion of the railroad to Carson City in the summer of 1872 had the reverse effect. Steamboat settled back into its earlier role as a resort facility. A post office was established at Steamboat in 1880, which has served the area ever since. By that time Steamboat Springs was fast becoming the favorite resort for invalids and tourists. As of 1881, there was a hotel with twenty rooms, five cottages, fifteen baths, a drug store, and an "electric bath with all the latest improvements" (Thompson and West 1881: 645). A new attraction was added in 1891 when the owner of the resort

cleared an oval racetrack and began inviting horse owners and racing buffs to participate in weekend meets. In one form or another, Steamboat Hot Springs have served the recreational needs of the area up to the present.

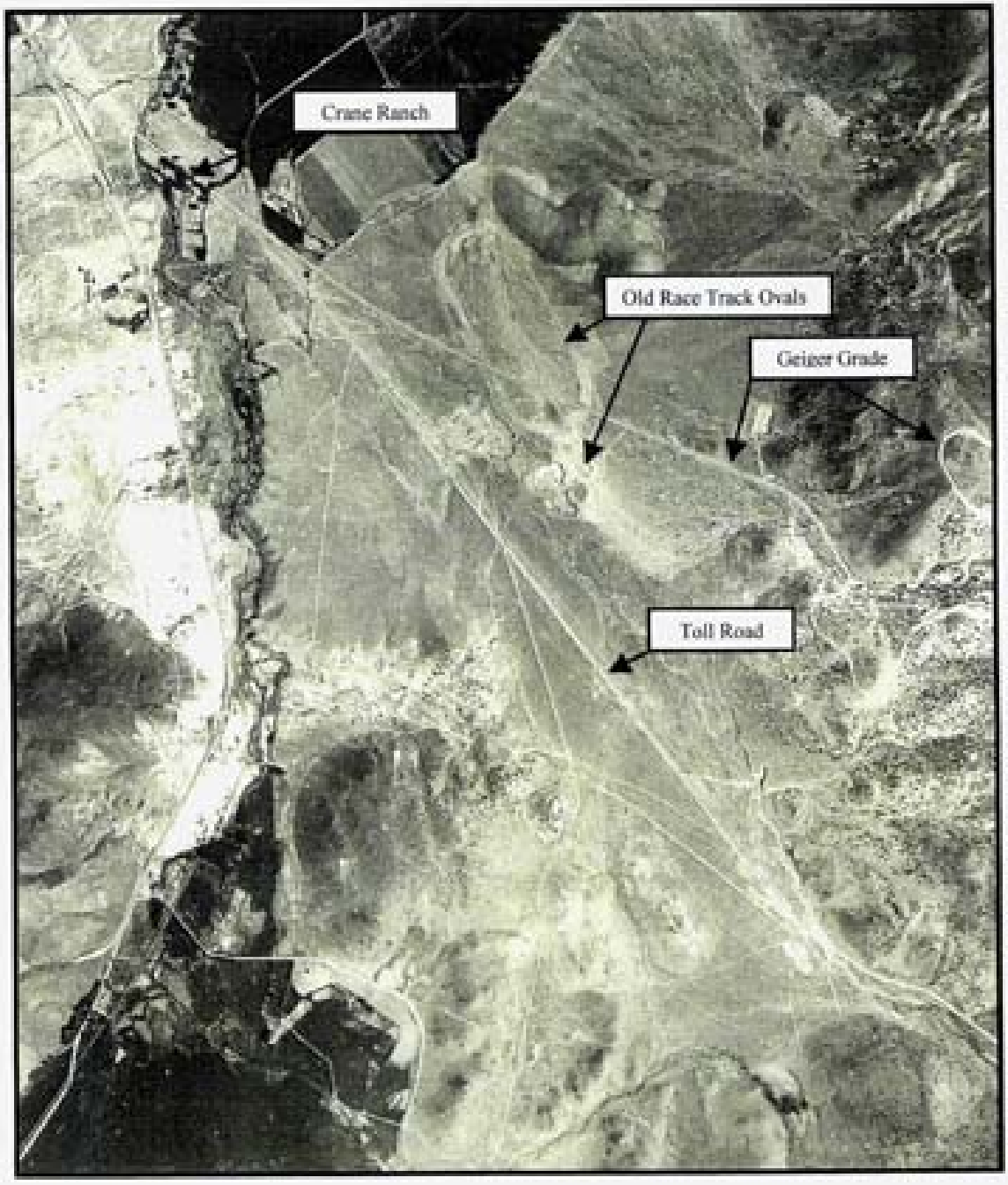


Figure 2: Toll Road Area as of 1948

Archival Information

Information regarding previous studies and documented resources in the study area was developed base on a search of the NVCRIS system maintained by the Nevada State Historic Preservation Office, archaeological records maintained by the Nevada State Museum and the Bureau of Land Management, and standard historical and archaeological references related to the area. An archival study area was defined that include the area within a one-mile radius of the proposed project area. This area was sufficient to document the intensity and type of activities that occurred around the Flood Control Project area both historically and prehistorically.

Results of Previous Investigations

Twenty-five previous projects have occurred completely or partially within the Flood Control Project area (Table 1). This does not include the substantial amount of archaeological research that has occurred in the Steamboat Springs area, including several studies conducted during the 1960s and 1970s (Elston and Davis 1972, Elston and Lemler 1973, Frank 1974), and studies conducted along the banks of Steamboat Creek (Elston 1986). Excavations at two sites, the Towne site (26Wa1416) and the Thompson site (26Wa1435), by Elston and Davis (1972) were important in the definition of regional chronologies. Both sites are located within or near the archival study area.

Table 1. Previous Studies Conducted in the Flood Control Project Area.

NSM Number	BLM Number	Author	Year	Resources Recorded	Source
		Elston & Turner	1968	Yes	NSM
16-17		Dunbar	1975	No	NSM
16-29	3-47	Pinzl, J.	1976	No	NVCRIS
16-42	3-422	Townsend & Elston	1975	Yes	NSM
16-105	3-579	Stearns et al.	1980	Yes	NVCRIS
16-183	3-336	Hatoff	1979	No	NVCRIS
16-223	3-659	Anderson	1981	No	NVCRIS
16-270	3-946	Hufnagle	1984	No	NVCRIS
16-290	3-1135	Pierce	1987	No	NSM
16-291	3-432	Townsend	1974	Yes	NSM
16-299	3-1050	Otto, C.	1988	No	NVCRIS
16-304	3-1160	Elston	1986	Yes	NVCRIS
16-308	3-1161	Clerico	1986	No	NVCRIS
16-522		McCabe, A.	1991	No	NVCRIS
16-527		Kautz & Botti	1991	No	NSM
16-650-1		James	1984	Yes	NSM
16-702		Matrin & Johnson	1994	Yes	NVCRIS
16-813	3-1825	Pope, C.	1997	No	NVCRIS
16-832	3-1839	Mecham, P.	1998	No	NVCRIS
16-833	TY-98-1250	Lindström	1998	No	NVCRIS
18-185	3-935	James, S.	1984	Yes	NVCRIS
18-276	3-1396	Stornetta & Hangen	1990	No	NVCRIS
	3-2193	BLM	2003	No	NVCRIS
	3-2242	Deis, R.	2005	No	NVCRIS
		Zeier, C.	2002	Yes	

As is evidenced by this table, archaeological activities have been ongoing in the Flood Control Project area since the late 1970s. Mapped data showing the extent of the archaeological inventories suggests that about one-third (approximately 176 acres) of the 534-acre Flood Control Project area has been examined previously. It is important to realize, however, that professional standards and agency requirements have changed over time. The Nevada State Historic Preservation Office typically assigns a shelf life of ten years to archaeological reports. Of the 25 projects that have occurred in the study area, 19 (76 percent) are older than ten years and might not be accepted by the Nevada State Historic Preservation Office in support of a project specific consultation. Also, not all of the reported inventories are of the same type. For example, the most recent inventory (Deis 2005) is a fire rehabilitation inventory carried out in advance of reseeding efforts following a range fire. This type of inventory is not performed to what is referred to as a Class III, or intensive inventory standard. As such, it also would be of little utility when conducting a project specific consultation. If old (prior to 1996) and non Class III inventories are removed from consideration, five of the inventories remain pertinent (Pope 1997, Mecham 1998, Lindström 1998, Zeier 2002, and BLM 2003).

Previously Recorded Sites

Twenty-three cultural resources have been identified that are completely or partially located within the Flood Control Project area (Table 2). Fifteen prehistoric period sites, six historic period site, and two sites with both period represented have been recorded. Eligibility statements contained in Table 2 were derived from numerous sources: the SHPO "stamp" on the front of the report, recommendations provided in technical reports, or notations made on site forms. Whenever SHPO data are available, that information is used. It should be noted that many of the sites listed in Table 2 were first recorded in the 1960s and 70s. Few of those sites were evaluated in a manner consistent with current standards. Some have been revisited and re-recorded over the years. Register eligibility was typically addressed as part of this re-recording. Available data indicate that three sites have been recommended National Register eligible, seven have been recommended not to be National Register eligible, four are unevaluated, and no information was available regarding the remaining nine. Many of the sites were recorded prior to proposed development activities. Some, presumably, were impacted by those development activities. As a result, it is unknown how many of the listed archaeological sites still exist, or in what condition. Answering questions regarding the continued existence and condition of previously recorded sites would require that each location be revisited.

National Register Review

Listings of properties on the National Register of Historic Places were reviewed to see if any such properties are in, or near the project area. That review indicates that the nearest property listed on the National Register is the Alamo Ranch House located along U.S. 395 in the southern portion of Steamboat Valley. A nearby property that is listed on the State Register is Steamboat Hot Springs. No properties listed on the National Register of Historic Places are located within the archival, or the Flood Control Project area.

Information provided in Table 2 indicates that three sites in the Flood Control Project area have been recommended to be National Register eligible. Seven have been recommended as ineligible for listing on the National Register. The remainder have not been evaluated regarding their eligibility.

Table 2. Previously Recorded Sites in the Archival Study Area.

NSM Number	Agency Number	Project Reference	Period	Type	Eligibility
Wa1117	CrNv 3-992		Prehistoric		No Info
Wa1145			Prehistoric		No Info
Wa1444	CrNv 3-812	Elston & Turner 1968, Elston 1986	Prehistoric / Historic	Lithic Scatter / Crane Ranch	Eligible
Wa1445	CrNv 3-813	Elston & Turner 1968	Prehistoric	Lithic Scatter	Unevaluated
Wa1445A	CrNv 3-813	Elston & Turner 1968	Prehistoric	Lithic Scatter	No Info
Wa1445B	CrNv 3-813	Elston & Turner 1968	Prehistoric	Lithic Scatter	No Info
Wa1446	CrNv 3-814	Stornetta & Hangan 1990	Prehistoric		Eligible
Wa1484	CrNv 3-839		Prehistoric		No Info
Wa2042	CrNv 3-2659	Townsend & Elston 1975	Prehistoric	Base Camp	Unevaluated
Wa2097	CrNv 3-2703	Townsend 1974	Prehistoric		Unevaluated
Wa2098	CrNv 3-1733	Townsend 1974	Historic	Race Track	Unevaluated
Wa2835	CrNv 3-2471	Stearns et al. 1980	Prehistoric		No Info
Wa2835	CrNv 3-2471	Stearns et al. 1980	Prehistoric		No Info
Wa3186	CrNv 3-3393	James 1984	Prehistoric	Lithic Scatter	Not Eligible
Wa3188	CrNv 3-3395	James 1984	Prehistoric		No Info
Wa3336	CrNv 3-3753	Elston 1986	Prehistoric		Not Eligible
Wa5262		McCabe 1991	Prehistoric		No Info
Wa5263		McCabe 1991	Historic		Not Eligible
Wa5804		Martin & Johnson 1994	Historic		Not Eligible
Wa5805		Martin & Johnson 1994	Historic		Not Eligible
Wa5806		Martin & Johnson 1994	Historic		Not Eligible
Wa5807		Martin & Johnson 1994	Historic		Not Eligible
TR-1		Zeier 2002	Prehistoric / Historic	Lithic Scatter / Ranch	Eligible

Site Expectations and Management Recommendations

Archival and National Register eligibility data allowed for the development of preliminary inventory expectations. To date, 23 sites have been recorded as a result of inventories that covered approximately 176 acres of the Flood Control Project area. This represents a site density of about one site for every eight acres inventoried. An average site density is one site for every 40 acres inventoried. As a result, the site density noted for the Flood Control Project area is very high.

Site densities are the highest in areas close to Steamboat Creek. The south end of the Truckee Meadows and Steamboat Valley were rich in grasses and game, and there was an ample supply of lithic raw material nearby in the Steamboat Hills. The Washoe favored hot springs, such as those at Steamboat Hot Springs, as year-round residential spots. Steamboat Creek was the scene of intense occupation and the east bank appears to be a more or less continuous archaeological site. Evidence of many of those sites has been buried as a result of historic period flooding along Steamboat Creek. Over time, this area has been recorded as a number of semi discrete sites, many of which represent winter village locations. Two of the three National Register eligible sites known to be present in the Flood Control Project area are located adjacent to Steamboat Creek. Any project activity proposed in the lower portion of the Flood Control Project area (west of Toll Road) will most likely require

detailed scrutiny, including sub-surface geo-archaeological evaluation. Primary questions will be, is archaeological material present sub-surface and, if so, how deep of a layer of more recent sediment is located atop the archaeological deposits?

In comparison, site densities appear to be somewhat lower along Bailey Creek and the base of the Virginia Range. Prehistoric sites recorded to date in this area tend to be small in size and, presumably, reflect foraging activities carried out by individuals living at residential sites located elsewhere (along Steamboat Creek?). These smaller sites might take the form of isolated artifacts (projectile points, ground stone, or other procurement implements), or small debitage scatters reminiscent of tool maintenance. If present, these sites will most likely reflect use of the area during the Middle or Late Archaic. The few sites recorded to date have been found on flat alluvial fan remnants.

Activities associated with historic themes will most likely be concentrated along the old alignment of historic Geiger Grade (now Toll Road). Resources likely to be encountered include abandoned segments of the old roadway, wagon or harness parts reflecting vehicles that passed along the roadway, and debris discarded by those using the roadway. Remains of the Magnolia Station should be present just inside the mouth of Bailey Canyon. That station is known to have included a tollhouse, a blacksmith shop, a wagon yard, corrals, and possibly a farm. What appeared to be remains of a small ranching operation (the third National Register eligible site in the Flood Control Project area) were recorded just outside of the canyon mouth (Zeier 2002) and might be related to the old Magnolia Station. It is unlikely that any other stations would have been present along other portions of the roadway included in the project area.

Residential development along Toll Road began just after World War II. Buildings and structures that date to the earlier portion of this development (mid 1940s up to the mid 1950s) might be subject to recordation and evaluation.

As noted above, much of the archaeological inventory work performed in the Flood Control Project area is dated (greater than 10 years in age) and might not be accepted by the Nevada State Historic Preservation Office in support of a project specific consultation. Unless a proposed project element is located within the bounds of an inventory prepared within the last ten years, Washoe County should have the proposed project area re-examined. This will be the easiest way to assure state and federal agencies have information necessary to determine if impacts to National Register properties will occur. Also, any inventory activity in that portion of the Flood Control Project area located west of Toll Road should include a sub-surface, geo-archaeological component. This will be necessary to determine whether or not buried deposits are present. This type and level of activity should not be required in portions of the Flood Control Project area located east of Toll Road.

Summary

Wood Rodgers was retained by Washoe County to provide engineering services in conjunction with the proposed Geiger Grade/Toll Road Flood Control Project. Wood Rodgers requested that Zeier & Associates, LLC prepare a brief Class I overview of the project area. This letter report constitutes the work product associated with that request. A brief discussion is provided regarding the prehistory, ethnohistory, and history of the Flood Control Project area. Information

was collected regarding previous cultural resource studies conducted in the area, and prehistoric and historic period archaeological sites recorded as a result of those inventories. Finally, observations are provided regarding site expectations and management recommendations.

Please call me at 775-315-3002 should you have any questions regarding the work performed by Zeier & Associates, or the provided recommendations.

Sincerely,
Zeier & Associates, LLC

Charles D. Zeier
Principal Researcher

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APPENDIX G

MUSLE Sediment Yield Calculations

Waters	K Value	Area (sq mi)	L (m)	Delt H (ft)	slope (ft/ft)	Lc (m)	Kn	Tlag (hours)	Cn	LS	C	Qp100	Volume100	Ys (tons)	Acre/ft	Qp25	Volume25	Ys (tons)	Acre/ft	Qp5	Volume5	Ys (tons)	Acre/ft
A	0.309	12.737	9605	1730	0.0549	5229	0.08	1.85	76.49	5.81	0.15	2653	1281.5	116431.147	48.60	1613.5	827.5	68984.989	28.79	652.9	369.9	26478.614	11.05
B	0.299	0.772	3426	1750	0.1557	1902	0.08	0.79	76.31	15.92	0.15	240	56.4	5273.373	2.20	130.5	33.9	2819.081	1.18	39.09	14.04	876.065	0.37
C	0.303	0.927	3888	1804	0.1415	1805	0.08	0.82	76.43	14.61	0.15	254	57.8	5518.745	2.30	135.3	35.8	2965.891	1.24	37.8	14.4	872.032	0.36

K: Determined from NRCS soil surveys
Ls: Lc^0.5 x (0.0076 + 0.53 x slope + 7.5 x slope^2) from NRCS literature
C : Cover Factor (0.15 taken from Stantech report)
Qp: Calculated with HMS with Cn and Lag times from Washoe County Methods

From Washoe and Storey County NRCS Soil Surveys

Id	area (M^2)	MUSYM	K value	Soil Group
A	184289.95	151	0.37	D
A	119528.29	251	0.32	C
A	89921.97	482	0.2	B
A	132294.94	561	0.36	D
A	650970.83	561	0.36	D
A	1632269.04	393	0.4	C
A	399713.58	983	0.4	C
A	429657.57	1010	0.37	D
A	584847.74	1011	0.32	D
A	206118.90	1011	0.32	D
A	25230440.48	1520	0.3	D
A	11309.14	1520	0.3	D
A	2819295.55	1520	0.3	D
A	498962.10	1520	0.3	D
B	67811.83	251	0.32	C
B	45176.56	482	0.2	B
B	1838838.60	1520	0.3	D
B	11309.14	1520	0.3	D
B	22945.76	1520	0.3	D
B	15548.03	1520	0.3	D
C	131098.27	251	0.32	C
C	65056.13	280	0.32	C
C	52992.91	1010	0.37	D
C	1924333.33	1520	0.30	D
C	22945.76	1520	0.30	D
C	203385.23	1520	0.30	D