Nevada Community Wildfire

Risk/Hazard Assessment Project

North Lake Tahoe Fire Protection District

July 2004

Prepared for:

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NORTH LAKE TAHOE FIRE PROTECTION DISTRICT

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This project was administered by the Nevada Fire Safe Council and funded through National Fire Plan grants from the Bureau of Land Management, the US Forest Service, and the Nevada Division of Forestry.

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EXECUTIVE SUMMARY

The Healthy Forests Initiative was announced by the White House in 2002 to implement the core components of the *National Fire Plan Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-year Comprehensive Strategy.* The Plan calls for more active forest and rangeland management to reduce the threat of wildland fire in the wildland-urban-interface, the area where homes and wildlands meet.

This report was prepared specifically for the Washoe County communities within the Lake Tahoe Basin in conjunction with the Nevada Community Wildfire Risk / Hazard Assessment Project. The communities included in this assessment are among those named in the 2001 Federal Register list of Communities-at-Risk within the vicinity of federal lands that are most vulnerable to the threat of wildfire. The two communities assessed in the Washoe County portion of the Lake Tahoe Basin are delineated on Figure 1-1 and are Incline Village and Crystal Bay.

An RCI project team consisting of experts in the fields of fire behavior and suppression, geographic information systems (GIS), natural resource ecology and forest health collaborated to complete the evaluation for each community. Data and local expertise were compiled from elected officials, fire personnel, and other individuals in the North Lake Tahoe Fire Protection District, the Tahoe Regional Planning Agency, the US Forest Service Lake Tahoe Management Unit, and the Nevada Division of Forestry. The field teams spent over a month inventorying conditions in the North Lake Tahoe Fire Protection District and completing the verification portion of the risk assessment.

To arrive at the community hazard assessment score, four primary factors that affect potential fire hazard were assessed: community design, structure survivability, availability of fire suppression resources, and physical conditions such as the vegetative fuel load and topography. Fuel density was assessed from the results of field measurements and ocular estimates based upon local calibration. The project fire specialist assigned an ignition risk rating of low, moderate or high to each community. The rating was based upon historical ignition patterns, interviews with North Lake Tahoe fire personnel and other agency Fire Management Officers, field visits to each community, and professional judgment based on experience with wildland fire ignitions in the eastern Sierra forest region.

This report describes in detail the factors considered and reviewed during the assessment of each community. The general results are summarized in Table 1-1.

Table 1-1. Community Risk and Hazard Assessment Results

COMMUNITY	INTERFACE CONDITION	OVERALL FUEL DENSITY	POTENTIAL IGNITION RISK	FIRE HAZARD RATING
Incline Village	Intermix	High	High	Extreme
Crystal Bay	Intermix	High	High	Extreme

Both Incline Village and Crystal Bay rated high for potential ignition risk and extreme for the fire hazard rating. These ratings are primarily attributed to inadequate defensible space, combustible building materials, heavy fuels, and steep southwest facing slopes.

Recommendations for creating defensible space were uniformly given to landowners in each community who have not yet reduced fuels on their private property. Defensible space is the homeowner's responsibility and is an essential first line of defense for saving lives and property during a catastrophic wildland fire.

Recommendations were formulated to mitigate the hazardous conditions for each problem area that was identified. The most widely needed treatment was directed to the US Forest Service and the State of Nevada to reduce the vegetative fuel load in the interface area. The recommended approach, known as "thinning from below," involves removal of smaller trees, brush, and dead and down materials to achieve the desired tree density and eliminate hazardous ground fuels that could spread fire into the forest canopy causing a crown fire. Implementation of the prescribed treatments will also reduce competition among the residual trees for sunlight and water, and improve forest health. Decreased tree mortality will reduce the amount of accumulated dead and down material contributing to the fuel load on the forest floor in the future.

Excessive amounts of biomass (vegetative fuel) will be generated from fuel reduction treatments in the North Lake Tahoe Fire Protection District that must be chipped, burned, or removed from the forest to achieve the required fuel load reduction. Two of the greatest obstacles to successfully completing the recommended fuel reduction projects will be acquiring access to the treatment areas with the necessary equipment and disposal of the accumulated biomass. Recommendations to overcome these complications were directed to the US Forest Service and the Tahoe Regional Planning Agency.

Currently, the most economical method approved in the Tahoe Basin for biomass removal on steep forested areas is to hand cut, pile, and burn. This method is both labor-intensive and untimely. It requires a minimum of two years to complete in order to allow piles to dry before they can be burned. Only a limited number of brush and slash piles can be burned during each burn season to comply with air quality regulations and safety considerations. National Forest lands in the Lake Tahoe Basin are already scattered with brush piles awaiting the appropriate conditions for burning. Helicopter logging has been used but is extremely expensive (current estimates are $7,000 per hour).

Alternative methods for biomass removal, such as cable yarding, and additional biomass disposal or utilization methods must be approved to complete the necessary fuel reduction treatments in a sensible timeframe that will be effective in reducing the threat to North Lake Tahoe residents and protect biodiversity, water quality, and the visual resources of the Lake Tahoe Basin.

Each recommended mitigation project will require detailed implementation plans, environmental analyses, and construction permits prior to commencement. The recommended priority for project implementation is identified in Table 1-2. The minimum cost for each project was estimated on currently accepted methods in the Tahoe Basin. If environmental permitting could be expedited, and temporary access and biomass removal alternatives were available, the costs for treatment may be substantially reduced.

Table 1-2. Summary of Recommended Hazard Mitigation Project Costs

PROJECT PRIORITY	COMMUNITY PROJECT	ACRES TO TREAT	COST ESTIMATE
1	Crystal Bay Unit 1 Brush Removal and Thinning; Fuelbreak	61	531,200
2	Incline Village Unit 3- Tyrolian Village; Champagne Burgundy Brush Removal and Thinning	339	1,552,000
3	Incline Village Unit 2 Tyrolian Village Brush Removal and Thinning	161	322,000
4	Incline Village Unit 6 Saddlehorn Tumbleweed Brush Removal and Thinning - Fuelbreak	524	1,676,800
5	Incline Village Unit 5 Upper Tyner; Allison Jennifer Brush Removal and Thinning; Fuelbreak	208	665,600
6	Incline Village Unit 4 Champagne Burgundy; Allison Jennifer Brush Removal and Thinning; Fuelbreak	389	1,244,800
7	Incline Village Unit 1 Rocky Point Brush Removal and Thinning	88	281,600
	Total	**1770**	**6,274,000**

Each of the following efforts must be undertaken immediately and simultaneously to reduce the risks and hazards in the Lake Tahoe Basin. Each are of equal priority:

- Homeowners must immediately implement defensible space in accordance with existing ordinances;
- The US Forest Service, fire districts, and other landowners must finalize detailed implementation plans and permitting for the priority treatment areas.
- The TRPA, US Forest Service, and Fire Districts must explore alternative treatment methods for steep slopes such as cable yarding.
- Funding needs to be secured as soon as possible to implement the proposed wildfire hazard mitigation projects identified in this report.

There is no guarantee that a wildfire will not occur in any of these communities in North Lake Tahoe Fire Protection District even if all of the recommendations in this report are implemented. However, community awareness and individual attention to fuels management on private property will help achieve the highest level of wildfire safety possible.

View of the North Lake Tahoe Fire Protection District. Agencies and landowners in the North Lake Tahoe Fire Protection District need to work together to achieve a common goal for creating firesafe communities and protecting the natural resource values in the Lake Tahoe Basin.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

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[August 9, 2004]

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

A key element of the Healthy Forests Initiative announced by the White House in 2002 is the implementation of core components of the *National Fire Plan Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10- year Comprehensive Strategy.* Federal agencies and western state governors adopted the Plan in the spring of 2002, in collaboration with county commissioners, state foresters, and tribal officials. The Plan calls for more active forest and rangeland management to reduce the threat of wildfire in the wildland-urban interface.

The Healthy Forest Restoration Act (H.R. 1904) was signed into law in December of 2003. This act creates provisions for expanding the activities outlined in the National Fire Plan. In this same year the Nevada Fire Safe Council received national fire plan funding through the Department of Interior's Bureau of Land Management to conduct a Community Risk/Hazard Assessment in at-risk communities across Nevada. The communities to be assessed are among those named in the Federal Register list of Communities-at-Risk within the vicinity of Federal lands. This list identifies the communities most vulnerable to wildfire threat in Nevada (66 FR 160).

Resource Concepts, Inc. (RCI), a Carson City-based consulting firm, was selected to conduct the Community Risk/Hazard Assessments for each of Nevada's 17 counties. Under the initial project scope, the Lake Tahoe communities were to be included with the Douglas and Washoe County assessments as appropriate. Prior to completion of the County Plans, the Lake Tahoe Basin was challenged by Senator Dianne Feinstein to complete the risk assessments and detailed hazard mitigation plans prior to the Lake Tahoe Environmental Summit on August 5, 2004. The Nevada Fire Safe Council responded to this challenge by funding two additional assessment plans to cover the Nevada portion of the Lake Tahoe Basin, designated as the Tahoe-Douglas Fire Protection District and the North Lake Tahoe Fire Protection District.

RCI specialists used procedures accepted by Nevada's wildland fire agencies, focusing their analysis on the wildland/urban interface areas, places where homes and wildland meet. The Tahoe-Douglas and North Lake Tahoe Basin Fire Protection Districts requested and funded the development of detailed planning information in addition to the risk/hazard assessment. Field assessments for the Lake Tahoe communities were expanded to include detailed proposed mitigation projects descriptions.

Mitigating the risks and hazards identified by these assessments is not only crucial to the long term goals of the National Fire Plan, but also to the short and long-term viability of communities, natural resources, infrastructures, and watersheds. The information and recommendations compiled from this assessment, and similar information being compiled for California communities will be used to develop a Lake Tahoe Basin-wide list of projects and associated costs. The project list will be used by congressional delegations to solicit funding under the Healthy Forest Initiative for implementation of priority wildfire mitigation projects in the Tahoe Basin.

1.2 PUBLIC PARTICIPATION

Public involvement in the project was important to the Fire Protection Districts and the Nevada Fire Safe Council to ensure strong consensus and support within the communities for fire mitigation projects. The Fire Protection Districts held public meetings in each district to discuss the planning process, the objectives for the plans, and the resultant proposed mitigation projects. The Districts worked closely with the Tahoe Regional Planning Agency, the US Forest Service, and local public interest groups to develop planning objectives that all groups could support. A list of persons contacted and public meetings held to date is provided in Appendix A.

The results of the assessments are presented in a way that facilitates ease of reference and reproduction for individual communities. Risks and hazards are described for each community. Landscape-scale mitigation projects such as fuel breaks and fuel reduction treatments are mapped for each community. These maps and the mitigation project worksheets will aid local, state and federal agencies in strategic planning, public awareness, and acquiring funding for project implementation.

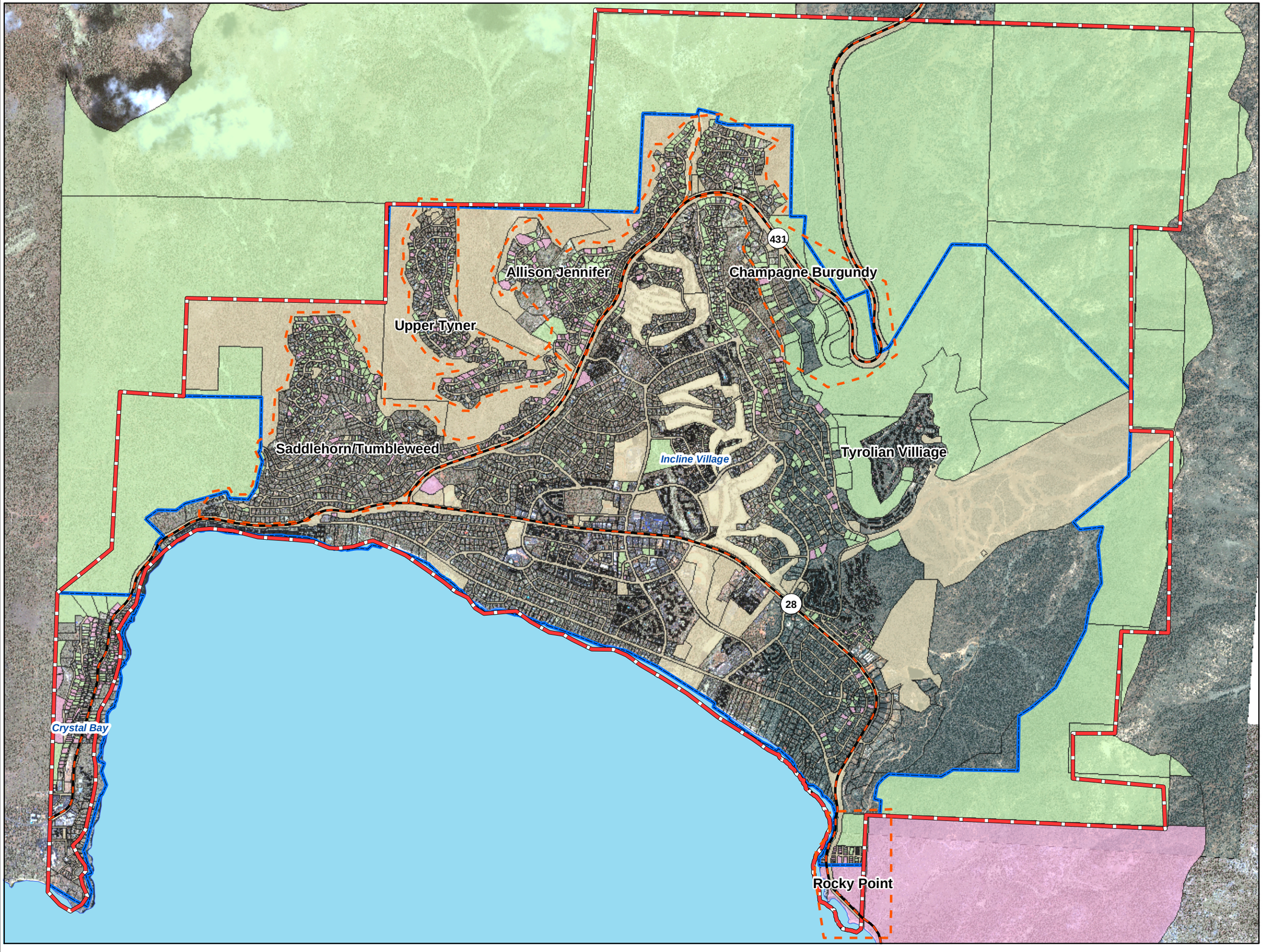
Numerous agencies and individuals were involved in the planning and implementation of this effort. Special thanks and acknowledgement is given to:

- Nevada Fire Safe Council (NFSC)
- U.S.D.A. Forest Service (US Forest Service)
- U.S.D.A. Natural Resource Conservation Service (NRCS)
- Nevada Division of Forestry (NDF)
- University of Nevada Cooperative Extension
- Nevada Association of Counties (NACO)
- Lake Tahoe Fire Protection District Chiefs and Firefighters

1.3 COMMUNITIES ASSESSED

The communities identified within the North Lake Tahoe Fire Protection District in the Federal Register as at risk are included in this assessment. The community locations are illustrated by Figure 1-1 and detailed below.

Incline Village
Crystal Bay



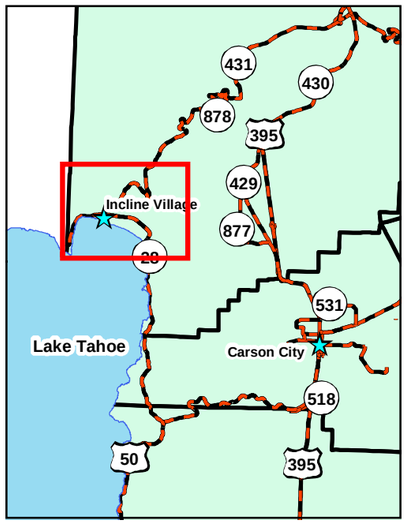


Figure 1-1. Land Ownership, Communities, and Neighborhoods within the North Lake Tahoe Fire Protection District

Legend

- NLTFPD District
- Community Boundary
- Neighborhood Boundary

Land Ownership

- FEDERAL
- LOCAL
- PRIVATE
- STATE

N
W E
S

0 0.25 0.5 1
Miles

Nevada Community Wildfire Risk/Hazard Assessment

Resource Concepts, Inc. has made every effort to accurately compile the information depicted on this map, but can not warrant the reliability or completeness of the source data.

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2.0 METHODOLOGY

2.1 PROJECT TEAM

A project team including experts in the fields of fire behavior and suppression, geographic information systems (GIS), natural resource ecology, and forest health collaborated to complete a Community Risk/Hazard Assessment for each community. Teams included personnel with extensive working wildland fire experience in Nevada and resource specialists experienced in the natural resource environment of the Great Basin.

The teams used standardized procedures developed from the *Draft Community Wildland Fire Assessment For Existing and Planned Wildland Residential Interface Developments in Nevada* (Nevada's Wildland Fire Agencies, Board of Fire Directors, April 2001; revised 2002) during the assessment process. This approach incorporates values for fuel hazards, structural hazards, community preparedness, and fire protection capabilities into an overall community rating.

A glossary of terms is included in Appendix B.

2.2 BASE MAP DATA COLLECTION

The project geographic information specialists compiled and reviewed existing statewide geospatial data to provide the assessment teams with maps for use and verification in the field. Data sources for the maps were the Nevada Fire Safe Council, the Nevada Department of Transportation, the Natural Resource Conservation Service, the US Forest Service, the Bureau of Land Management (BLM) and the Tahoe Regional Planning Agency (TRPA). Data sets and sources utilized include:

- Land ownership
- Vegetation communities
- Topography
- Roads
- Fire suppression equipment and personnel (hydrants, stations)
- Fire history
- Fuel types
- Wildfire hazard
- Current aerial photos and satellite data
- 1-meter resolution satellite color imagery

Existing data was reviewed and pertinent information compiled on maps in geographic information system (GIS) format and then field verified during the data collection phase of the Community Risk/Hazard assessments. Geographic information system specialists provided data management to assure accuracy and effective analysis of the statewide geospatial data and the production of the maps in this report.

2.2.1 Wildfire History

Wildfire history information was obtained from US Forest Service Lake Tahoe Basin Management Unit GIS databases that locate multiple years of wildfire perimeters and ignition points on USFS and private land. Fires were mapped using GPS and screen digitizing, with the smallest scale being 1:250,000. The data set is intended to be a central

source of historical GIS fire data to be used in supporting fire management efforts and land use planning.

This data set forms the base for the wildfire history table presented in the county description and provides the ignition point locations for the maps in this report. In many cases, the ignition point location is only accurate to within the section; in such cases, the point coordinate is located in the section center on maps.

The fire history data and ignition patterns were used to formulate risk ratings and to develop recommendations specific to areas that have been repeatedly impacted by wildland fires. Observations made from the project team members and comments from local fire agencies also allowed for the development of recommendations for areas absent of recent wildfire activity where a significant buildup of fuels or expansion of urban development into the interface area represents a growing risk.

2.3 COMMUNITY RISK/HAZARD ASSESSMENT

The wildland/urban interface is the place where homes and wildland meet. This project focuses on identifying hazards and risks in the wildland/urban interface areas District-wide, assessing each community individually. Site-specific information for the North Lake Tahoe Fire Protection District was collected during field visits conducted June 7 through 11, 2004. The predominant conditions recorded during these site visits were used as the basis for the Community Risk and Hazard Assessment ratings.

2.3.1 Hazard Assessment Criteria

The Community Risk/Hazard Assessments were completed using methodology outlined in the *Draft Community Wildland Fire Assessment For Existing and Planned Wildland Residential Interface Developments in Nevada*. This system assigns community risk values (Low through Extreme) based on the following scoring system:

Hazard Category	Score
Low Hazard	< 41
Moderate Hazard	41-60
High Hazard	61-75
Extreme Hazard	76+

To arrive at a score for the community, four primary factors that affect potential fire hazard are assessed: 1) community design, 2) structure survivability, 3) availability of fire suppression resources, and 4) physical conditions such as fuel loading and topography. A description of each of these factors and the importance in developing the overall score for the community is provided below. Copies of the rating sheets used by the project teams and copies of the Community Risk/Hazard Assessment summary sheets are provided at the end of each community section.

Community Design

Community design accounts for 26% of the total score of the risk assessment. Many aspects of community design can be modified to make a community more fire safe. Factors considered include:

- **Interface Condition**. Describes the density and distribution of structures with respect to the surrounding wildland environment. The four Interface Condition Classes are: Classic, Intermix, Occluded, and Rural. Definitions for each Condition Class are defined in the glossary (Appendix B).

- **Access.** Design aspects of roadways influence the hazard rating assigned to a community. A road gradient of greater than five percent can imply increased response times for vehicles carrying water; roads less than 20 feet in width often impede two-way movement of vehicles and fire suppression equipment; and hairpin turns and cul-de-sacs with radii of less than 45 feet can cause problems for equipment mobility. The presence of secondary entrances and exits, and loop roads in a community can lower a hazard rating.

  In addition, visible, fire-resistant street and address identification signs and adequate driveway widths are aspects of access infrastructure that also influence the hazard rating of a community.

- **Utilities.** Poorly maintained overhead power lines are a potential ignition source. Fires have been known to start from arcing power lines during windy conditions. In the event of a fire, a burning power pole could contribute to a short, causing power failures downline. A power failure in a community without backup energy generation may leave residents without water for protecting their homes and leave firefighters without pumps for the community's fire suppression water system. Energized power lines may fall and create an additional hazard for citizens and fire fighters. In some areas these downed power lines could block road access. Properly maintained rights-of-way (ROWs) underneath power lines greatly reduce the risk of fire ignitions along power line corridors during fire events.

Construction Materials

Construction materials account for 31% of the total score of the risk assessment. While it is not feasible to expect all structures in the wildland/urban interface area to be rebuilt with non-combustible materials, there are steps that can be taken to reduce the risks associated with hazardous construction in the interface area. Factors considered in the assessment include:

- **Structure Building Materials.** The composition of building materials determines the length of time a structure could withstand high temperatures before ignition occurs. Houses composed of wood siding and wood shake roofing are usually the most susceptible to ignitions. Houses built with stucco exteriors and tile, metal or composition roofing are able to withstand much higher temperatures and heat durations.

- **Architectural Features.** Unenclosed balconies, decks, porches, or eaves on homes can create drafty areas where sparks and embers can smolder and ignite, rapidly spreading fire to the house. A high number of houses within a wildland/urban interface with these features implies a greater risk to the community.

- **Defensible Space.** Density and type of fuel around a home determine the potential fire exposure levels to the home. A greater mass of trees, shrubs, dry weeds and grass, woodpiles, and other combustible materials near the home will produce more intense heat during a fire, increasing the threat of losing the home. Additionally, fuels close to structures become a source of wind driven, burning embers that can blow into attics or crawl spaces through unscreened vents or accumulate in other unenclosed spaces. These embers can rapidly spread fire to the home.

Suppression Capabilities

Suppression capabilities account for 16% of the total score for the assessment. Knowledge of the capabilities or limitations of the fire suppression resources in a community can help the residents take action to maximize the resources available. Factors considered in the assessment include:

- **Availability, Quantity, and Training Level of Firefighting Personnel**. When a fire begins in or near a community, having the appropriate firefighting personnel to respond quickly is critical to saving structures. Whether there is a local paid fire department, volunteer department, or no local fire department impacts how long it takes for firefighting personnel to respond to a reported wildland fire.

- **Quantity and Type of Fire Suppression Equipment**. The quantity and type of available fire suppression equipment has an important role in minimizing the effect of a wildfire on a community. Wildland firefighting requires specialized equipment.

- **Water Resources**. The availability of water resources is critical to fighting a wildland fire. Whether there is a community water system with adequate fire flow capabilities, or whether firefighters must rely on local ponds or other drafting sites may indicate whether firefighters will be able to adequately protect the community.

Physical Conditions

Physical conditions account for 27% of the assessment. Fire behavior is influenced by numerous physical conditions and is dynamic throughout the life of the fire. With the exception of changes to the fuel types and density, the physical conditions in and around a community cannot be altered to make the community more fire safe. Understanding these physical conditions, fire behavior specialists can predict fire growth patterns and help fire suppression personnel respond appropriately to a fire threatening a community. Physical conditions considered in the assessment include:

- **Slope, Aspect and Topographical Variations.** In addition to local weather conditions, slope, aspect, and topographical variations can be used to predict fire behavior. West and south facing aspects are most prone to severe fire behavior due to preheated vegetation that has lower moisture content from daylong sun exposure. Steep slopes greatly influence fire behavior. Fire usually burns upslope with greater speed and flame lengths than on flat areas. Fire will burn downslope; however it usually burns downhill at a slower rate and with shorter flame lengths than in upslope burns. Canyons, ravines, and saddles are topographical features that are prone to higher wind speeds than adjacent areas. Homes built mid-slope, at the crest of slopes or in saddles are most at risk due to topography in the event of a wildfire.

- **Fuel Type and Density.** Vegetation type and density around a community affect the potential fire behavior. Areas with thick, continuous, vegetative fuels are at a higher risk than communities situated in areas of mosaic or broken fuels. Weather conditions that dry the vegetation in combination with steep slopes or high winds can create situations in which the worst-case fire severity scenario can occur.

2.3.2 Hazard Mapping

The wildfire hazard data compiled for the project originate from a number of past projects. Data from these projects formed the foundation for the hazard mapping effort. The Wildfire Susceptibility Analysis conducted for the Lake Tahoe Basin Watershed Assessment and the Wildfire Hazard Rating dataset crated by Karl Kratuer for the Sierra Front Wildfire Cooperators were reviewed.

Information from each of these previous studies was useful, but had limitations. The Sierra Front Hazard data was a direct analysis, combining fuel model mapping with slope classes to develop a hazard rating. However the vegetation layer used in the fuels mapping was from the late 1980s. The Wildfire Susceptibility Index data used more current vegetation mapping and included more complex analysis; however a key analytical component was the ignition history which was inconsistent throughout the Tahoe Basin. Both datasets were used as a guide to help identify priority areas, but field verification was employed to completely address hazardous conditions.

2.3.3 Fire Behavior Worst-Case Scenario

The worst-case scenarios described in this document are based on the project wildfire specialists' estimation of severe fire behavior that could occur given a set of weather conditions, observed fuel loading conditions, and minimum fire suppression resources. These scenarios describe a maximum potential for loss of property and in some cases human lives. The worst-case scenario does not describe the most likely outcome of a wildfire event at the interface, but illustrates the potential for damage if a given set of conditions were to occur simultaneously. The worst-case scenarios are described in this document for public education purposes and are part of the basis for the fuel reduction recommendations.

2.4 INTERVIEWS WITH FIRE PERSONNEL

The Project Team interviewed local fire department personnel to obtain information on wildfire training, emergency response time, personnel and equipment availability, evacuation plans, pre-attack plans, and estimates of possible worst-case scenarios. Local fire personnel reviewed maps showing the history of wildfires to ensure that local information on wildland fires was included. Refer to Appendix A for a list of persons contacted.

2.5 RECOMMENDATION DEVELOPMENT

A wide variety of treatments and alternative measures can be used to reduce ignition risks, mitigate fire hazards, and promote fire-safe communities. Proposed recommendations typically include physical removal or reduction of flammable vegetation, increased community awareness of the risk of fires and how to reduce those risks, and coordination among fire suppression agencies to optimize efforts and resources. The project team met repeatedly to analyze community risks, treatment alternatives, and treatment benefits. Treatment recommendations to reduce existing risks were formulated based upon professional experience, quantitative risk assessment, and information developed in conjunction with the National Fire Plan and FIREWISE resources (National Fire Plan website, FIREWISE website and Nevada Cooperative Extension publications).

2.6 HAZARD MITIGATION PROJECT DEVELOPMENT

Modifying the fuel structure around communities is necessary to effectively address wildfire hazards. Based on field review of the existing conditions, the RCI Resource and Fire specialists developed detailed mitigation projects or prescriptions for areas surrounding communities in North Lake Tahoe Fire Protection District. Prescription areas were delineated based on continuity of fuel bed, appropriate treatment alternatives, and topography. Each prescription area was mapped, and detailed project worksheets specifying estimated costs, timelines, and material removed, were developed for each recommended project. The prescription areas are detailed on Figure 3-2. Recommended treatment methods are described in Chapter 7.

- **Methodology for Biomass Estimates**

  The ultimate goal of the mitigation projects is to reduce the wildfire hazard by altering the amount and characteristics of fuel in the forest. Fuels can be reduced by either burning or removing biomass. Given the amount of material to be removed and the amount of material that can typically be burned annually (due to air quality restrictions and burning windows), some of the material will have to be removed as biomass.

  To estimate the amount of biomass to be removed in the project areas, variable plot sampling was used to count the number of trees, basal area per acre, and amount of material to be removed as biomass. A basal area factor of 20 was used in the sampling process. The basal area, the number of trees, and the cubic foot volume were calculated on a per acre basis for each sample plot. Volume estimates for material to be removed was consistent with a silvicultural prescription

to thin from below, or remove smaller diameter, non-merchantable trees. A photograph and UTM coordinate (NAD 83) was recorded at each plot location. Further photo points were located in areas demonstrating important forest characteristics. The results of this sampling effort were used to calibrate the fuel load estimates for each recommended treatment area.

- **Methodology for Cost Estimates**

  The actual cost per acre for the recommended thinning treatments was obtained from recent projects completed in the North Lake Tahoe Fire Protection District.

3.0 DESCRIPTION OF THE NORTH LAKE TAHOE FIRE PROTECTION DISTRICT SERVICE AREA

3.1 DEMOGRAPHICS, LOCATION, TOPOGRAPHY, AND CLIMATIC DATA

The North Lake Tahoe Fire Protection District (NLTFPD) is located in the northeastern portion of the Lake Tahoe Basin, on the Nevada side of the Lake. The district serves the communities of Incline Village and Crystal Bay an area of approximately 16 square miles. The District's Mutual Aid responsibilities cover an area of about 65 square miles. A summary of land management in the District's service area is provided in Table 3-1.

Table 3-1. Land Management Acreage Within North Lake Tahoe Fire Protection District

LAND ADMINISTRATOR	ACRES
Nevada State	3,945
USFS	9,925
Private/Municipal	6,187
Total	**20,057**

Source: TRPA and Washoe County GIS Databases

The area has a permanent population of approximately 10,000 residents; however the population more than doubles during peak winter and summer recreational periods. The economy in the area is based primarily in tourism. Skiing and snowboarding, camping, hiking, mountain biking, fishing, summer water sports, and the Lake Tahoe Shakespeare Festival at Sand Harbor, bring thousands of tourists from all over the world to the area each year. (Nevada Commission on Tourism website).

Elevations within the NLTFPD range from 6,230 feet above mean sea level at Lake Tahoe to nearly over 9,600 feet at Rose Knob Peak east of Incline Village. The area is cut by several steep drainages, with Third Creek and Incline Creek the largest.

3.2 SUMMARY OF FEMA PLAN

Washoe County has developed their FEMA hazard mitigation Plan in close cooperation with the NLTFPD. Pertinent elements of this report will be included the FEMA document.

3.3 WILDFIRE HISTORY

Wildfire and ignition history was compiled from GIS data provided by the Lake Tahoe Basin Management Unit. This data included ignition points and wildfire perimeters for the NLTFPD. USFS staff members indicated that there are approximately 125 ignitions per year throughout the entire basin.

No fire perimeters are recorded in the database within the NLTFPD. Local fire protection districts are not required to report incidents within their districts to the US Forest

Service. Each district tracks it's own data. NLTFPD ignition and fire records are not mapped in a GIS and are not included in this report. NLTFPD staff reviewed this data and added major incidents where appropriate. Ignition data are categorized by source, either human or natural. As expected, many of the human ignition sources cluster around highways and recreational use areas, while natural ignitions tend to be located away from population centers.

The historical data suggests that large, catastrophic wildfires can occur in the district. Ignitions are common but generally do not expand into a sizeable wildfire. A professional fire department and relatively short response times have been effective in keeping fires controllable and short-lived. Good access on paved roads helps shorten the response time. To date, fire suppression resources have been able to stop ignitions from becoming large fires.

Climate may also contribute to the lack of large fires. Though still fire prone, the seasonal window at which the fuels are most explosive is fairly short, and suppression resources are increased during that time.

Wildfire history in the NLTFPD is illustrated by Figure 3-1.

3.4 FIRE ECOLOGY

The science of fire ecology is concerned with understanding how past fires have determined the present forest structure and species composition, and describing the role of fire in altering or maintaining forest structure and composition. A fire regime is defined as the frequency and severity of fire occurrence in a given forest type.

Some plant communities depend upon stand-replacing, high intensity fires. Lodgepole pine and fir forests evolved with the occurrence of infrequent, high-intensity, "stand destroying" wildfires that would have completely eliminated the existing forest stand. Few trees within the fire perimeter would have survived. The low frequency of fires in these plant communities would have allowed long periods of time for the accumulation of fuels and the reestablishment of vertical continuity ("ladder fuels") and horizontal continuity (closed canopies) in the fuel strata. The resulting forest condition would have been conducive to the simultaneous combustion of all fuels during a single fire event.

Other plant communities such as Jeffrey pine forests evolved to burn frequently with low intensity. Under this historic fire regime, low-intensity surface fires would have reduced ground fuels of grasses and shrubs and would have suppressed regeneration of shade-tolerant white fir seedlings, leaving the mature Jeffrey pine trees protected by thick, fire-resistant bark unaffected. Forests with frequent fire occurrence would have had an open, "park-like" appearance with a sparse understory of grass or low shrubs. Though shaded by large, mature trees, the spacing between trees was sufficient to allow sunlight to reach the forest floor and encouraged regeneration of shade-intolerant species like ponderosa pine. Pockets of heavy fuels would have existed under these conditions, but their discontinuous nature reduced the likelihood that a fire would burn with enough intensity to affect mature trees. Frequent surface fires also would have removed accumulated dead and down woody fuels and the green "ladder fuels" that

could otherwise have carried flames into the coniferous overstory, potentially provoking a catastrophic, stand-destroying crown fire.

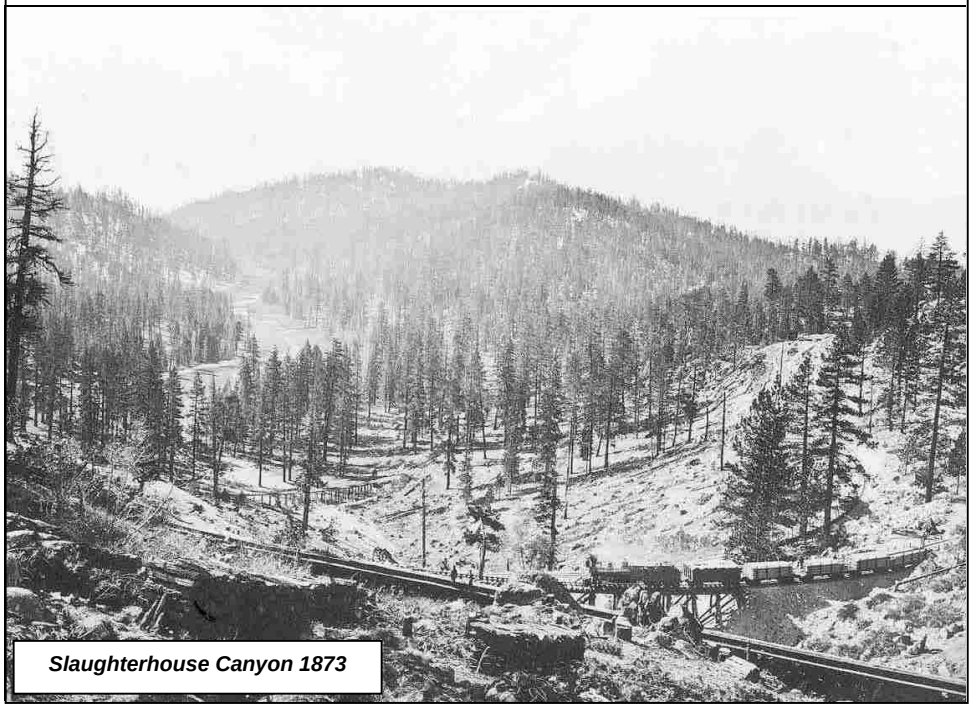
The forest that regenerates with an infrequent, high-intensity crown fire regime is generally very dense and of a single age structure. This density often results in the exclusion of sunlight to the forest floor and subsequent recruitment of shade-tolerant species such as white fir, which contributes to extremely high fuel loadings in the understory.

Research by Dr. Alan Taylor, University of Pennsylvania Department of Geography, (Taylor et al. 2000) suggests that both forest types would have occurred naturally prior to early settlement in the Tahoe Basin but were separated by elevation at roughly the 8,000-foot contour. Above 8,000 feet, low temperatures and moisture high moisture conditions would have only infrequently allowed ignitions to grow into large fires. Below 8,000 feet, in warmer, drier areas, frequent ignitions would have occurred and resulted in consumption of the fuels. This constant consumption of fine fuels kept fuel loadings and fire intensity low.

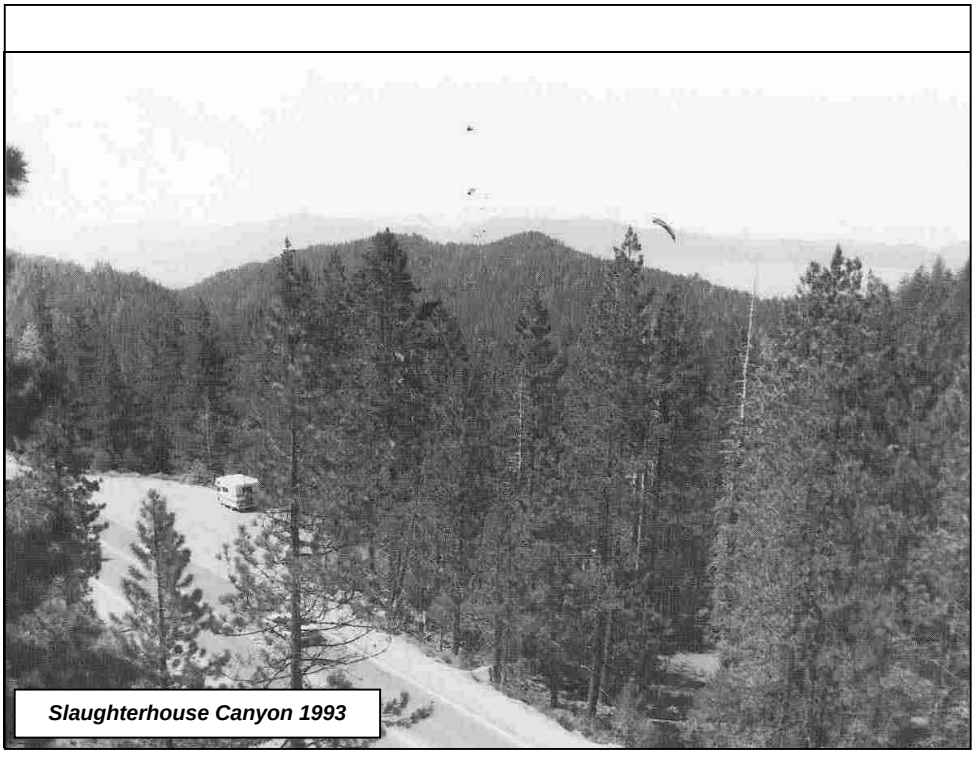
Altered plant communities and fuel conditions and 20th century fire suppression policies have affected natural fire regimes. Areas that formerly burned with high frequency but low intensity (fires more amenable to control and intervention) now have large accumulations of unburned fuels, which once ignited, will burn at higher intensities.

The lower elevations of the Lake Tahoe Basin contain forest stands with highly altered fire regimes. The loggers of the 1860's that worked in the region to satisfy the timber demands of the Comstock mines uniformly cut the native forests, originally characterized by uneven tree ages, wide spacings between trees in mature stands, and small openings created by other mortality. The forest that regenerated after this period of intensive logging activity developed into a uniform even-aged, closed canopy stand.

Gruell (2001) effectively illustrates this phenomenon in his book, *Fire in Sierra Nevada Forests, A photographic interpretation of the ecological change since 1849.* An example of paired photos taken from the same vantage point in Slaughterhouse Canyon north of Glenbrook, Nevada is shown below. The 1873 photo of an uncut forest clearly shows the forest floor and individual trees in the distance visible through the open canopy. The 1993 photo taken from the same alignment shows that the forest density is so high that individual trees can only be discerned at the forest edge. The current conditions, with a dense, almost continuous canopy and ladder fuels that reach to the forest floor are more reminiscent of high elevation forests that were naturally characterized by infrequent, high-intensity stand-replacing crown fires.



Slaughterhouse Canyon 1873



Slaughterhouse Canyon 1993

Today, most commercial and residential developments in the Tahoe Basin, i.e. those areas most needing protection from catastrophic wildfires, are concentrated in areas well below the 8,000-foot elevation where the fires would have been frequent, low-intensity, light-fuel clearing ground fires.

The recommendations in subsequent sections of this report outline tree densities and forest structures consistent with the forests seen in the historic photographs and are consistent with US Forest Service and Tahoe Regional Planning Agency management objectives to return Tahoe Basin forests to pre-European conditions.

3.5 NATURAL RESOURCES AND OTHER FEATURES POTENTIALLY AT RISK

The area served by the NLTFPD contains several natural and cultural resource features that could potentially be at risk during a wildland fire. These resources are described below and selected resource locations are illustrated by Figure 3-1.

3.5.1 Forest Health and the Lake Tahoe Watershed

The threat to watersheds is important to consider in the overall risk to Lake Tahoe. As the fire severity risk increases in the watershed, there is a greater risk of soil erosion damage in addition to a reduction in groundwater recharge.

The ability of a watershed to receive, store and transmit water is related to the geology, vegetation, and soil that characterizes the watershed. Fire has the potential to significantly alter vegetation and soil properties in a watershed, impacting critical hydrological functions such as interception, evapotranspiration, infiltration, soil moisture storage, and snow accumulation and melt. Impacts from alteration include increases in stream runoff, decrease in groundwater recharge, increase in erosion and sedimentation, and water quality degradation (Zwolinski 2000).

Removal of vegetative foliage, by fire, contributes to increased runoff, degradation of water quality, and decreased groundwater recharge. Vegetation plays an important role in rain and snow interception. A low severity fire that does not change the vegetation interception characteristics will have minimal impact on water yield. Fires that remove canopy foliage and litter material can result in considerable increases in runoff and soil erosion. Removal of vegetation canopy and duff allows more precipitation to reach the barren soil surface, resulting in increased soil surface erosion and degradation of water quality.

Infiltration can be reduced as heating from severe fires alters soil chemistry and can create hydrophobic layers (DeBano, 1981). Groundwater aquifer recharge can be hindered by these hydrophobic soil crust formations. Runoff and erosion are directly related to decreased infiltration and raindrop splash. The amount of sediment carried downstream, as a result, is dependent on soil properties and watershed geomorphology.

In the Lake Tahoe Basin, there are many areas with potentially threatening conditions in the forest. Tree density has increased consistently to the point where a wildfire occurring under a worst case scenario would potentially clear the watershed of trees and other vegetative cover. Such an event would likely render the watershed susceptible to severe flooding events and soil erosion of enormous magnitude.

3.5.2 Flora and Fauna

The Nevada Natural Heritage Program lists nine species within the Incline Village and Crystal Bay urban interface that are identified as threatened or endangered and protected by federal or state law. These species are listed in Table 3-2.

Table 3-2. Federally Listed and State Protected Species Within the North Lake Tahoe Fire Protection District

SPECIES NAME	COMMON NAME	STATUS
Onchorhynchus clarki henshawi	Lahontan cutthroat trout	ESA
Accipiter gentilis	Northern goshawk	SP
Aplodontia rufa californica	Mono Basin mountain beaver	SP
Glaucomys sabrinus	Northern flying squirrel	SP
Lepus americanus tahoensis	Sierra Nevada snowshoe hare	SP
Martes americana	American marten	SP
Pinus washoensis	Washoe pine	CY
Rorippa subumbellata	Tahoe yellowcress	CE
Strix occidentalis occidentalis	California spotted owl	SP

CE = Listed as Critically Endangered by the state of Nevada
CY = Protected as cactus, yucca or Christmas tree
SP = State protected under NRS 501

3.5.3 Historical Sites

The effects of fire on cultural and historical resources depend upon factors which vary from place to place such as fuels, terrain, site type, and cultural or historical materials present. The Cal-Vada Lodge Hotel located at the junction of Stateline Road and State Route 28 in Crystal Bay is the only site listed on the National Register of Historical Places in the North Lake Tahoe Fire Protection District.

3.6 PREVIOUS FIRE HAZARD REDUCTION PROJECTS

Currently there are two fire safe councils in the district: Incline Village and Tyrolian Village. These chapters have been active in developing solutions for wildfire hazard mitigation projects within their community.

The North Lake Tahoe Fire Protection District has a long and successful fuels treatment program. In the early 1990s the district began to identify areas at extreme risk to life, property and safety from wildfire. With the help of professional foresters, they developed fuel treatment projects around community neighborhoods to lower the wildfire threat. Specifically, they treated large open areas between neighborhoods, creating greenbelts so that resultant fires would be of a lower, and likely controllable, intensity as they entered the community. Further, the reduction of fuels allowed better access to ignitions in these areas and slowed the rate of spread, making initial attack resources more effective in controlling fires.

Treatments were designed to create a halo around the community within which the probability of ignition was reduced and the probability of quick control was increased. Open space between neighborhoods, where a wind driven fire could spread uphill quickly, were given priority. These areas were treated with a variety of methods, including cut-pile-burn, and prescribed broadcast burns. Figure 3-2 shows the previous mitigation projects.

The US Forest Service and the State of Nevada have also completed fuels reduction treatments on some of the lots they own in Incline Village. Through its Urban Lots Program, the USFS has used the cut-pile-burn method to reduce fuels within communities.

Like any fire prevention activity, success can only be measured by the absence of a disaster. It is impossible to quantify the effectiveness of these treatments; however the lack of any large fires in the recent fire history indicates that the treatments have been effective. The removal of fuels and reintroduction of fire onto the landscape is consistent with the desired future condition and fire regime discussed in the fire ecology section above.

3.7 Environmental Regulations Related to Vegetation Removal in the Lake Tahoe Basin

The TRPA and NLTFPD have entered into a Memorandum of Understanding (MOU) to streamline the process for homeowners seeking to create defensible space and eliminate fire hazards. Pursuant to NRS 474.160, the NLTFPD has the authority and responsibility to remove fire hazards on private or public premises within the district. Through the MOU, the TRPA has delegated to the NLTFPD the authority to issue tree removal permits within 30 feet of structures within the district. A copy of the MOU is provided in Appendix C.

To help facilitate public education regarding the identification and removal of fire hazard trees, the NLTFPD has developed a property evaluation checklist. The explanation provided with the checklist describes the general requirements to comply with state and local fire safety ordinances. A copy of the checklist and explanation is provided in Appendix D.

3.7.1 Projects on Private Land

Tree and vegetation removal on private land in the Lake Tahoe Basin is regulated by the TRPA Code of Ordinances.

1. All live trees over 6" dbh need TRPA approval prior to removal unless they are dead or it is a fire suppression emergency.
2. Trees over 24" dbh cannot be cut unless:
   - The tree is in the urban interface areas (within 1,250 feet of a TRPA residential, commercial, or public service plan area boundary) and the TRPA determines that the tree would hinder defense from fire in an urbanized area;
   - The TRPA agrees that the trees are severely insect-infested;
   - Removal is for ecosystem management pending review by an interdisciplinary team and public review; or
   - Removal of large snags is necessary to reduce extreme fuel loading.

3. A Tree Removal Plan is required for the following circumstances:
    - If a project calls for cutting more than 100 trees over 10" dbh AND it covers greater than 20 acres; OR
    - If a project calls for cutting more than 100 trees over 10" dbh on land capability classes 1a, 1b, 1c, 2 or 3.
    - A Tree Removal Plan will require, among other things, NEPA compliance.
4. For projects not requiring a Tree Removal Plan, the TRPA requires a report from a qualified forester to cut any tree over 6" dbh.

3.7.2 Federal Projects

Projects that involve funding from a federal source or that are on land managed by a federal agency must comply with the National Environmental Policy Act (NEPA) and the Land and Resource Management Plan (Lake Tahoe Basin Management Unit, 1988) as amended by the Sierra Nevada Forest Plan Amendment, 2004, in addition to the TRPA Code of Ordinances described above. The National Environmental Policy Act enacted in 1969 requires Federal agencies to evaluate and disclose the effects of proposed actions on the human environment in a written statement that addresses:

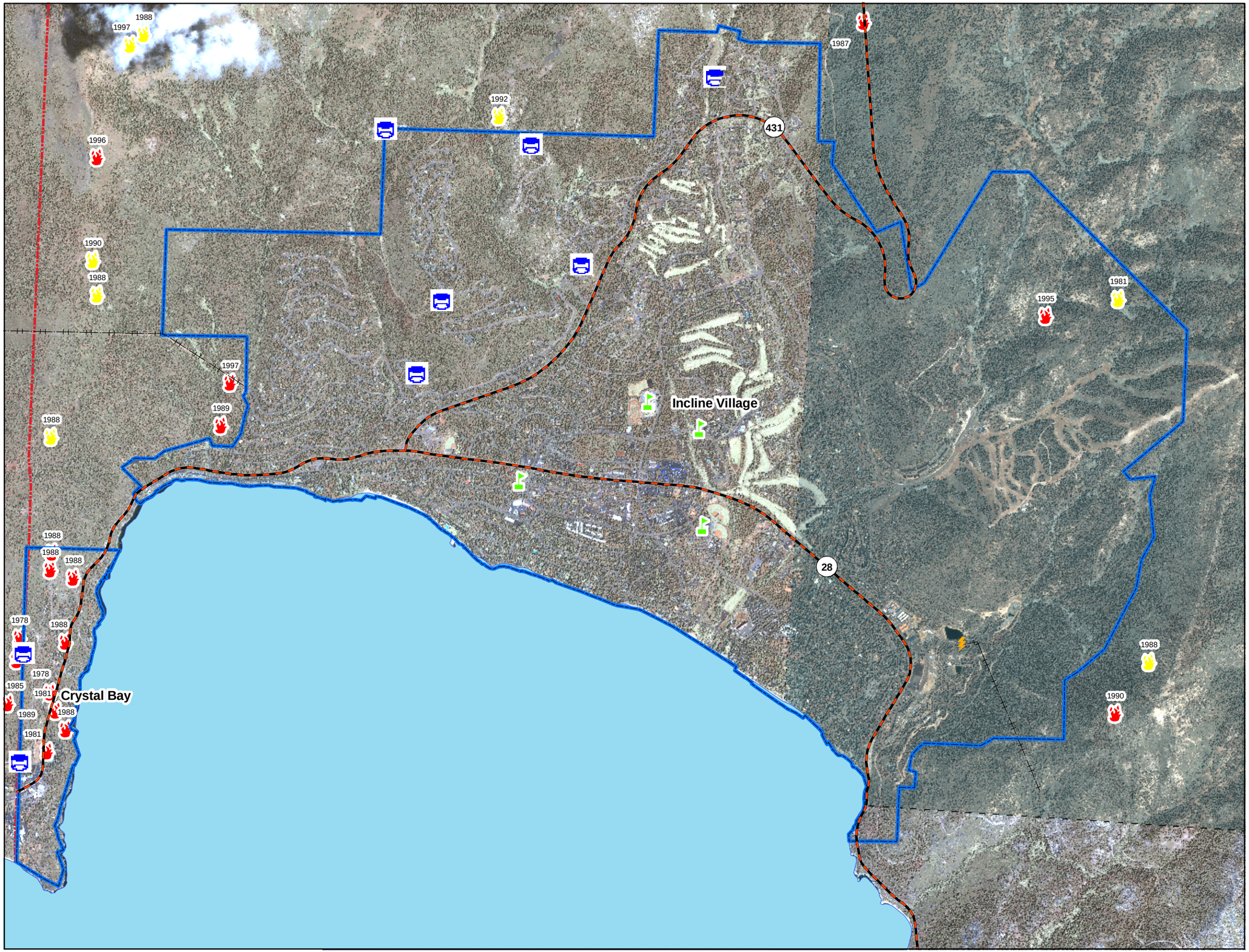
- The environmental impact of the proposed action;
- Any unavoidable adverse environmental effects that may occur upon the implementation of the proposed action;
- Alternatives to the proposed action;
- The relationship between short-term uses of the human environment versus the maintenance and enhancement of long-term productivity; and
- Any irreversible and irretrievable commitments of resources that would be involved if the proposed action is put into effect.

Compliance with NEPA regulations begins with an internal screening process. If a preliminary review determines that the proposed action will not have any significant effect on the quality of the human environment, either individually or cumulatively, and that therefore neither an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) is required (40 CFR 1508.4), then a categorical exclusion may exist, and no further environmental documentation is necessary or required. Some actions covered in an existing EA or EIS prepared by a Federal agency may not require analysis in a completely new document. Actions which are neither categorically excluded, already covered in an existing document, nor normally subject to EIS requirements, must be analyzed in an EA to determine if an EIS is in fact necessary or required.

An EA is a brief public document that discusses the need for, and alternatives to, a proposed action. The document provides sufficient evidence and analysis to support either a determination of no significant impacts, or a determination to prepare an EIS. If the EA confirms that the impacts of the proposed action are not significant, then a Finding of No Significant Impact (FONSI) is issued, and the NEPA review process is complete. If the EA reveals a significant impact, the proposed action cannot be approved unless it is either analyzed in an EIS, or modified to avoid significant impacts.

An EIS is a detailed document that requires extensive public involvement, facilitates interagency coordination, and provides the basis for permit approvals and other legal clearances that may be required for the proposed action. There are several mandatory steps in the EIS process, including public scoping meetings, publication of a notice of intent in the Federal Register, preparation and circulation of draft and final versions of the document, formal public hearings, and inclusion of public comments and responses to those comments in the final EIS.

It is anticipated that the fuel hazard mitigation projects proposed in this assessment (described in Chapter 7.0) will fall under a categorical exclusion or an EA. The US Forest Service LTBMU is currently following the Forest Service Handbook Interim Directive 1909.15-2003-1 and 1909.15-2003-2 (published in the Federal Register June 5, 2003). The Interim Directive contains several categorical exclusions that could apply to the proposed fuel hazard mitigation projects. Projects may be categorically excluded from an EA or EIS only if there are no extraordinary circumstances related to the project, including, but not limited to, threatened or endangered species, wetlands, archaeological sites or historic properties.



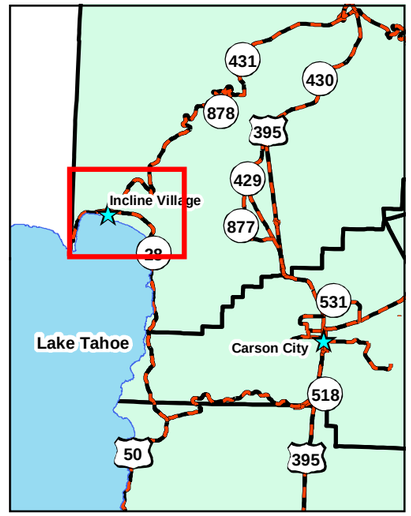


Figure 3-1. Fire History and Potentially At-Risk Resources North Lake Tahoe Fire Protection District

Legend

Community Boundary

Fire Ignition

Cause

Human

Natural

Fire Perimeter

Critical Values

School

Power Station

Sewer Treatment

Tank

Hospital

Transmission Line

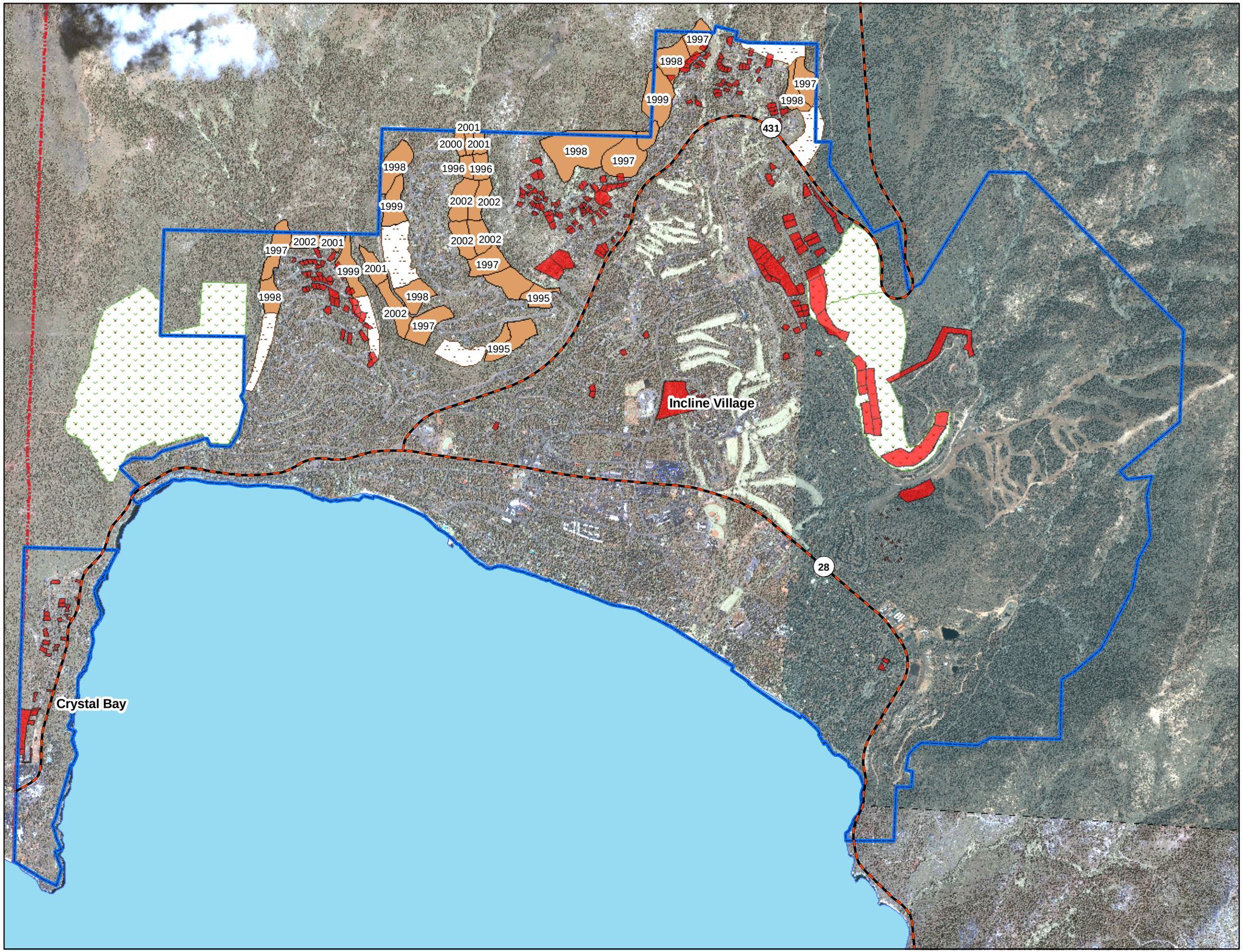
N
W E
S

0 0.25 0.5 1
Miles

Nevada Community Wildfire Risk/Hazard Assessment

Resource Concepts, Inc. has made every effort to accurately compile the information depicted on this map, but can not warrant the reliability or completeness of the source data.

Resource Concepts, Inc.
340 N. Minnesota St.
Carson City, NV 89703
(775)-883-1600



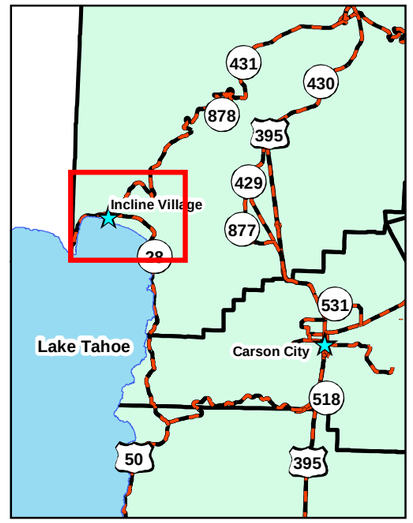


Figure 3-2. Previous Wildfire Mitigation Projects, North Lake Tahoe Fire Protection District

Legend

- Community Boundary
- USFS Treated Lot
- USFS Treatment

NLTFPD Treated Areas

- Pile Burn
- Understory Burn

N
W E
S

0 0.25 0.5 1
Miles

Nevada Community Wildfire Risk/Hazard Assessment

Resource Concepts, Inc. has made every effort to accurately compile the information depicted on this map, but can not warrant the reliability or completeness of the source data.

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4.0 DISTRICT-WIDE ASSESSMENT RESULTS

4.1 DISTRICT-WIDE ASSESSMENT RESULTS

Field evaluations, interviews, fuel measurements and community assessments were conducted between May 2 and June 11, 2004. The overall results of the Risk/Hazard Assessments conducted in the North Lake Tahoe Fire Protection District are summarized in Table 1-1. Hazard mapping for the North Lake Tahoe Fire Protection District is illustrated by on Figure 4-1.

4.1.1 Wildfire Protection Resources

Wildland firefighting suppression resources in North Lake Tahoe Fire Protection District include the following agencies:

- North Lake Tahoe Fire Protection District
- Tahoe-Douglas Fire District Fire Department
- South Lake City Fire Department
- Carson City Fire Department
- Lake Valley Fire Department
- Lake Tahoe Regional Fire Chiefs Association Mutual Aid Agreement
- US Forest Service Lake Tahoe Basin Management Unit (LTBMU)
- Nevada Division of Forestry (NDF)
- East Fork Fire and Paramedic Districts

The NLTFPD is the primary agency that responds to wildfires for the majority of the rural communities described in this plan. The NLTFPD is described in detail in this section to eliminate repetition of the information throughout this document.

The North Lake Tahoe Fire Protection District is a career fire district located on the northeast shore of Lake Tahoe. NLTFPD employs 46 career firefighters, ten volunteer firefighters, and 30 additional firefighters during the fire season. The NLTFPD protects and serves the Washoe County, Nevada portion of Lake Tahoe, covering 16 square miles. The fire district is governed by a three member board of directors. The Board of Directors generally meet once a month. Wildfire resources at any given time may be supplied from any one or more of the district's three fire stations. A variety of equipment resources are available for fighting wildfires. Table 4-1 lists the typical equipment available from a NLTFPD station and typical response times.

Table 4-1. Typical Wildfire Resources for a First Alarm

Response Time	Type of Equipment	Amount of Equipment	Cooperating Partner (Resource Location)
10 to 30 minutes	Type I Engine Type III Engine Command Officer Type II Crew Type I Engine Type III Engine	3 2 2 1 4 1	NLTFPD
	Strike Team/Task Force	3	Regional Chiefs
	Type III Engine Type II Helicopter Air Attack Command Officer	2 1 1 1	USFS
1 to 2 hours	Strike Team/Task Force Air Tankers	1 Varies	Regional USFS through Redding California
2+ hours	Structure Protection Strike Teams Resources as requested by the USFS		Regional Chiefs

Source: Personal Communication with Fire Chief Jim Linardos, North Lake Tahoe Fire Protection District 5-2004.

Water Sources and Infrastructure in the District

There are numerous water storage tanks situated throughout the district. Fire hydrants are spaced within a minimum of 500 feet of structures. The water sources are either gravity fed or powered by pumps with emergency back-up generators. Water source information was obtained from the NLTFPD *Wildland Pre-Incident Survey, 2003*.

Fire Protection Personnel Qualifications

All of the NLTFPD firefighters have a minimum of NFPA Firefighter I and II training and wildland firefighting training (NWCG 310-1), and are trained to BLM Red Card certification. Red Card certification is part of a fire qualifications management system used by many state and all federal wildland fire management agencies that indicates an individual is qualified to fight wildland fires.

NLTFPD Detection and Communication

Fires are reported in the NLTPFD through the dispatch facility in Incline Village, Nevada and through 911 calls. The NLTFPD has access to the state mutual aid frequencies. Fires are communicated to fire response personnel through the use of radios and pagers. The radio system is compatible with neighboring agencies and there are no known gaps in radio coverage. There are no fire lookouts, patrols, or reconnaissance flights.

Prior to 1999, the US Forest Service Lake Tahoe Basin Management Unit used the dispatch service in Minden, Nevada. The Minden Dispatch fills resource orders through the Western Great Basin Coordination Center located in Reno, Nevada.

In 1999 the dispatch service for the US Forest Service Lake Tahoe Basin Management Unit were moved from the Minden Interagency Dispatch in Minden,

Nevada to the Camino Interagency Dispatch in Camino, California. Currently, all resources ordered anywhere in the Lake Tahoe Basin by the US Forest Service must go through the Camino Dispatch. The Camino Dispatch fills resource orders through the North Zone Coordinating Center located in Redding, California. Orders that cannot be filled are then sent to the National Interagency Fire Center in Boise, Idaho which dispatches resources throughout the U.S. The communication system is diagramed in Figure 4-2. This process is not effective in obtaining needed resources in the Lake Tahoe basin in a timely manner as was demonstrated by the 2002 Gondola Fire.

The 2002 Gondola Fire at South Lake Tahoe illustrated the problems with the current dispatch system. Air tankers were available at the Minden Air Tanker Base but were not ordered by Camino Dispatch because Minden is located outside of California. Although the Minden tankers were the closest resource, California tankers from bases farther away were used. In addition, local Nevada fire resources were not ordered. At one point, California fire engines were responding past Nevada fire stations there were closer to the fire. The Tahoe-Douglas Fire Protection District ordered resources under the Lake Tahoe Regional Chiefs Mutual Aid Agreement. Because of the confusing dispatch system, the California Office of Emergency Services assigned request numbers to the mutual aid engines, and the Tahoe-Douglas FPD was billed for the mutual aid engines that should have responded for no charge.

Work Load

In 2003, NLTFPD responded to 1,800 calls, of which 15 were fires.

Financial Support

The NLTFPD was established under NRS 474 and financial support comes from the *ad valorem* tax rate and state sales tax revenues (CTX, formerly SCCRT).

Community Preparedness

The NLTFPD has several pertinent plans, all of which are updated annually:

- Emergency Plan for hazardous materials
- Pre-attack Plan for response to incidents with the district
- All-risk Plan
- Burn Plan and Community Fire Plan
- Emergency Evacuation Plan

The district does not have a brush clearance program. The district reviews development plans to ensure compliance with the 1997 Uniform Fire Code.

4.2 NORTH LAKE TAHOE FIRE PROTECTION DISTRICT RISK REDUCTION RECOMMENDATIONS, ROLES AND RESPONSIBILITIES

The responsibility to keep a community fire safe falls on residents as well as the local fire protection agency and public agencies. The following general recommendations focus primarily on fuel reduction and defensible space efforts that residents, fire departments and public agencies can follow to increase fire safety. Recommendations also include public

education and community coordination efforts. The most important consideration for successful implementation of the recommendations in this report may be for agency and landowner cooperation and coordination to ensure that the necessary fuel reduction treatments are implemented, completed, and maintained.

Defensible space treatments are an essential first line of defense for residential structures. Significantly reducing or removing vegetation within a prescribed distance from structures (typically 30 feet) reduces fire intensity and improves firefighter and homeowner chances for successfully defending a structure against oncoming wildfire. The recommendations in this report follow the TRPA approved Tahoe Fire Protection District Defensible Space Checklist and Explanation included in Appendix D.

Fuels reduction treatments are applied on a larger scale than defensible space treatments. By permanently changing the fuel structure over large blocks of land to one of lower volume or reduced flammability with a fuel reduction treatment, the expected result in the event of a catastrophic wildfire would be one of reduced capacity for uncontrolled spread through the treated area.

Fuelbreaks are necessary to slow the advance of a fire and protect resources or structures from a fire. The fuelbreaks discussed in this recommendation will aid in keeping access roads open and protect power lines. Because there are limited access points to the community, it is imperative that these be maintained to allow fire suppression equipment into the community and to provide an evacuation route if the need arises.

These fuelbreaks will also help to protect utility lines in the area. Properly maintained vegetation within power line corridors greatly reduces potential hazards, and the risk of additional ignitions, along those easements. It is important to keep power line corridors clear of flammable vegetation, especially around power poles and beneath transformers, as fires have been known to start from arcing power lines during windy conditions.

Coordination among local, state and federal fire suppression agencies is important in the day-to-day fire prevention activities and becomes critical in the event of a wildland fire. During a fire event, firefighters from other communities and states may be dispatched to areas they have never been before. This is particularly true in areas that have limited fire suppression resources and will most likely be dependent on an outside agency in the event of a catastrophic wildland fire.

Public education on making communities more fire safe is critical. Informed community members will take the initiative to lead efforts in effectively reducing the threat that wildland fires present to the entire interface community.

4.2.1 Property Owner Responsibilities

General guidelines for improving defensible space around residences and structures in the district are provided below.

Defensible Space

- Remove, reduce, and replace vegetation around homes according to the checklist and explanation provided in Appendix D. This area should be kept:

Lean – There are only small amounts of flammable vegetation,

Clean – There is no accumulation of dead vegetation or other flammable debris,

Green – Existing plants are healthy and green during the fire season.

- Immediately dispose of cleared vegetation when implementing defensible space treatments. The material dries quickly and poses a fire risk if left on site.
- Maintain this defensible space as needed to keep the space lean, clean, and green.
- Remove all dead and dying vegetation, debris, and scrap lumber within 30 to 100 feet of any structure according to the checklist and explanation in Appendix D.
- Clear all vegetation and combustible materials around propane tanks for a minimum distance of 10 feet.
- Native shrubs, such as bitterbrush, should be thinned to a spacing of twice their height. Short, green well-maintained groundcovers do not need to be thinned.
- Store firewood a minimum distance of 30 feet from structures.
- Spark arresting screens should be installed on chimneys.
- If possible, enclose or screen areas under wood decks and porches to prevent entry by flying embers. If not possible, then maintain the areas to be free of weeds and other flammable debris. Screen all house vents and eaves.
- Pine needles, leaves, and debris should be removed from roofs and rain gutters.
- Live native trees within the defensible space zone should be thinned to 80 square feet basal area per acre to open up the crown canopy and provide room for the crowns to expand. The TRPA and the fire district can help the homeowner make this determination. Closed tree canopies trap heat from ground fire and can lead to a crown fire.
- For trees remaining within the defensible space zone, homeowners should limb branches a minimum of 6 feet from the ground, preferably up to 15 feet, or not more than 1/3 of the tree height to reduce ladder fuels.
- All dead and diseased branches, duff and native shrubs should be removed from beneath remaining trees.
- Prune trees so that the branches are at least 10 feet away from chimneys and or structures.
- Irrigate all trees and large shrubs in close proximity to structures to increase their fire resiliency. This is especially important during drought conditions.

Construction Materials

- Replace wood shake roofs with Class A non-combustible material such as tile, metal, or composition.

Fuel Reduction Treatments

- Thin and remove native trees and brush for a distance of 10 feet from the road edge along both sides of private driveways longer than 200 feet. Flammable fuels should be replaced with fire-resistant species or a TRPA-approved pre-suppression seed mix.
- Maintain proper clearances beneath powerlines to the home.

Community Coordination

- Form a local chapter of the Nevada Fire Safe Council. The Nevada Fire Safe Council proposes to work with Nevada's communities to develop solutions that reduce the risk of loss of lives and property from wildfires. Through the establishment of a local Chapter, communities become part of a large information-sharing network that receives notifications of programs and funding opportunities for fire mitigation projects such as those listed in this report. The Nevada Fire Safe Council will accept and manage grants and contracts on the Chapter's behalf through its non-profit status. The Nevada Fire Safe Council provides assistance and support to communities to complete fire safe plans, set priorities, educate and train community members and promote success stories of its members. For more information on forming a chapter, contact:

  The Nevada Fire Safe Council
  1187 Charles Drive
  Reno, Nevada 89509
  (775) 322-2413.

- Make sure residential addresses are visible from the road. Residential address characters should be at least six inches high and commercial addresses 12 inches high and fire resistant. Improving visibility of addresses will make it easier for those unfamiliar with the area to navigate an area during a wildland fire.

4.2.2 North Lake Tahoe FPD Responsibilities

Coordination among local, state and federal fire suppression agencies is important in the day-to-day fire prevention activities and becomes critical in the event of a wildland fire.

Fuel Reduction Treatments

- Continue photographic monitoring of fuel hazard reduction project areas.

Community Coordination

- The district should be available for inspections of home defensible space measures.
- Enforce the prompt removal of standing dead and dead down vegetation.

Public Education

- Distribute copies of the NLTFPD brochure "Wildfire in Your Backyard" to all property owners.
- Distribute copies of the publication "Living with Fire" to all property owners. This publication is free of charge. Copies can be requested from the University of Nevada Cooperative Extension, (775) 784-4848.
- Hold an annual 'Fire and Safety Awareness' event.

4.2.3 USFS / State of Nevada Responsibilities

Fuel Reduction Treatments

- Thin trees and remove brush from individual lots according to Fuel Reduction guidelines in Chapter 7.0.

- Thin brush and trees in the urban lots to tie in with treatments on adjacent lots.
- Cooperate with the NLTFPD to implement the fuel reduction recommendations in this document.
- Develop an agreement between Camino Interagency Dispatch Center and Minden Dispatch Center for wildfire ignitions that occur on National Forest lands that directs Camino Dispatch to provide Initial Attack Services and to transfer dispatch authority to Minden Dispatch for Expanded Dispatch Services for fires that are located on the Nevada portion of the Lake Tahoe Basin to initiate faster response from suppression resources in closer proximity to the fire.

4.2.4 Sierra Pacific Power Company Responsibilities

Fuel Reduction Treatments

- Remove rather than prune trees in the power line right-of-way. Topping trees severely weakens them and predisposes them to attack by bark beetle infestation and disease.
- Reduce vegetation to maintain a minimum distance of 15 feet from all utility poles.
- Clear all vegetation and maintain a minimum distance of 30 feet from the fence around all electrical transfer stations.

4.2.5 IVGID Responsibilities

Community Coordination

- Cooperate with the NLTFPD to maintain the greenbelts by thinning trees and removing brush according to Fuel Reduction guidelines in Chapter 7.0.

4.2.6 TRPA Responsibilities

Fuel Reduction Treatments

- Consider allowing or permitting yarding of material with cable systems as described in Chapter 7.0 of this document. Aerial yarding systems allow for material to be lifted from the ground before being transported to a landing. This reduces the amount of soil disturbance in biomass removal operations.
- Consider allowing or permitting whole tree skidding to remove trees from an area. This method allows the tree processing to be conducted at a landing site rather than leaving chipping and spreading the chips in the forest. Heavy layers of chips inhibit grasses and forbs from emerging.
- Consider revising the Code of Ordinances to that a tree density of 80 to 100 square feet of basal area per acre is attainable (see Chapter 7.0).
- Cooperate with Washoe County to require that all roads be at least 22-feet wide and have turning radius of at least 45 degrees. Existing roads and turn-arounds should be widened. Long single-lane roads should have turn-outs of at least 35 feet, placed every 700 feet when possible.

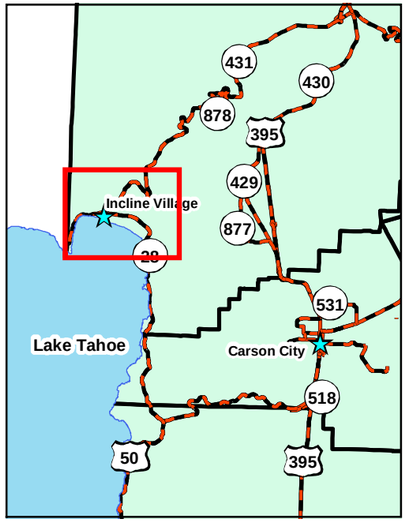

Figure 4-1. Wildfire Hazard Classifications, North Lake Tahoe Fire Protection District

Incline Village

Crystal Bay

431

28

Legend

Community Boundary

Wildfire Hazard (Sierra Front)

Medium

High

Extreme

N

W E

S

0 0.25 0.5 1

Miles

Nevada Community Wildfire Risk/Hazard Assessment

Resource Concepts, Inc. has made every effort to accurately compile the information depicted on this map, but can not warrant the reliability or completeness of the source data.

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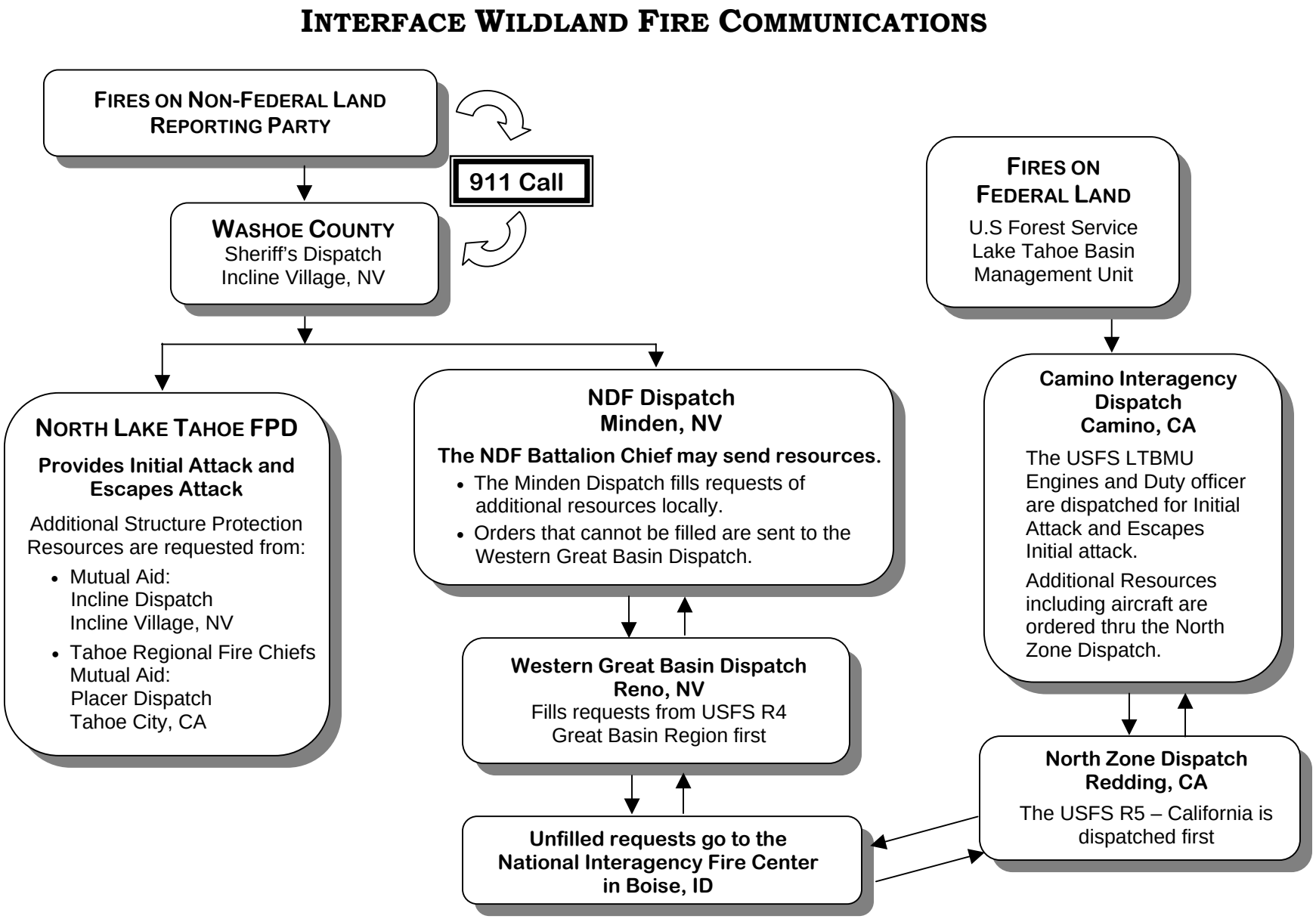
Figure 4-2 Communication Diagram for Wildfire Suppression, North Lake Tahoe Fire Protection District



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5.0 INCLINE VILLAGE

5.1 INCLINE VILLAGE HAZARD AND RISK ASSESSMENT SUMMARY

Incline Village is in the northeastern corner of the Lake Tahoe Basin (Figure 5-1). The community is situated in terrain that ranges from gently sloping near the lakeshore to very steep near the higher elevations. The risk assessment resulted in classifying Incline Village, as a whole, in the **Extreme Hazard** category (76 points). This score is attributed primarily to inadequate defensible space, combustible building materials, heavy fuels, and steep slopes.

Incline Village was divided into six different "neighborhood" areas and assessed based on the neighborhood boundaries. This type of boundary definition was chosen because Incline Village is composed of areas of varying topography, access, residential structure composition, and other factors that affect the hazard rating. However, certain other assessment factors are the same throughout all of Incline Village. Physical conditions, fire behavior factors, worst-case scenarios, defensible space, and the majority of recommendations, were similar for all areas of Incline Village. Those factors will be addressed here, and the recommendations summarized; factors and recommendations that differ neighborhood-by-neighborhood are addressed in the specific neighborhood sections.

The Incline Village neighborhoods are:

- Allison / Jennifer
- Champagne / Burgundy
- Rocky Point
- Saddlehorn / Tumbleweed
- Tyrolian Village
- Upper Tyner
- Incline Village Interior

5.1.1 Community Design

The urban interface condition surrounding Incline Village and all of the neighborhoods within Incline Village is classified as an intermix condition. Structures are scattered throughout the wildland area. There is no clear line of demarcation between structures and wildland fuels along roads or back fences.

Roads: State Route 431 and 28 are the primary access to Incline Village.

Signage: Adequate street signs are present for almost all of the roads in the community. Likewise, homes have visible addresses. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are all underground in the newer developments and both above and below ground in the older neighborhoods. In many areas, powerlines do not have proper vegetation clearances.

5.1.2 Construction Materials

Many of the homes do not have non-combustible roofs and/or non-combustible siding materials. The majority of the homes in the community have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and rapidly spread fire to the home.

5.1.3 Defensible Space

Of the hundreds of homes in Incline Village, only 20 homes observed during the assessment meet the defensible space landscape requirement to minimize damage to the home, and/or loss during a wildfire. The terrain is generally steep, with heavy tree and shrub vegetation. The TRPA and NLTFPD MOU recommends a defensible space zone extending out from structures for a minimum of 30 to 100 feet. Appendix D describes defensible space requirements to be in compliance with state and local fire safety ordinances.

5.1.4 Physical Conditions

The topography in Incline Village consists of steep slopes that are generally greater than 30 percent, canyons, and drainages that, in concert with strong winds could create a chimney effect during a wildfire, drawing fire through the canyons and drainages and into communities. The dominant vegetation layer in Incline Village is a tree overstory of Jeffrey pine and white fir, with some incense cedar, sugar pine; and willow, aspen, and alder in the stream zones. The tree canopy is closed. The shrub layer includes manzanita, snowbrush, bitterbrush, huckleberry oak, bitter cherry, chinkapin, currant, and whitethorn. Shrubs are typically four to 10 feet tall. Ground fuels consist of pine needles, pine cones, annuals, and grasses. Greenbelt areas currently have high volumes of dead and down fuels. Fuels in the community are heavy, estimated at six to 12 tons per acre. The area may experience strong downslope winds during thunderstorms. There are continuous fuels in close proximity to structures. The composition of the fuels is conducive to crown fires or high intensity surface fires. The steep slopes, southern aspects, dense fuels, heavy duff, prevailing wind exposure and ladder fuels may reduce fire suppression effectiveness.

5.1.5 Worst-Case Scenario

There are two general worst-case scenarios for Incline Village. An ignition that begins downslope of the community could be driven up canyons and drainages by strong winds, fueled by the dense ground and understory fuels, eventually becoming a crown fire. Homes in thick tree stands or with trees and vegetation overhanging roofs and decks are at severe risk of structure damage or loss, especially those with wood shake roofs and unenclosed architectural features with brush underneath. Such structural composition invites sparks and smoldering embers, and eventual ignition of the home. The steep slopes and thick tree canopy would allow quick spread of the fire and extreme flame lengths. Several areas can be accessed by only one road. Limited access is a safety hazard for both the firefighters and the public. During a major wildfire event, visibility would be reduced. Residents trying to leave the area, and fire fighters trying to enter, may have difficulties in two-vehicle passage with the reduced visibility. Ignitions upslope driven by downslope winds is a similar version of this first worst-case scenario.

The second worst-case scenario is a structure fire that spreads into wildland fuels adjacent to the home. Home spacing is a risk factor in Incline Village in that radiant heat from one

house fire can ignite homes in close proximity. Combustible roofs, unenclosed structural features, and inadequate defensible space all contribute to the hazard in this type of scenario.

5.1.6 Risk Assessment

Incline Village has a high potential for ignition, as well as structure loss in the event of a wildfire. The primary risks are lightning; escaped fire from auto accidents on the highway; and the possibility of a fire starting from unextinguished cigarettes thrown out of car windows. In many areas power lines are an ignition risk because the rights-of-way have not been properly maintained.

5.2 INCLINE VILLAGE RISK AND HAZARD REDUCTION RECOMMENDATIONS, ROLES AND RESPONSIBILITIES

The responsibility to keep a community fire safe falls not only on the local fire department but also on the residents of the community, businesses, and local governments. General recommendations related to defensible space, fuel reduction, community preparedness, and public education, are included in Chapter 4.0, *District-wide Assessment Results*.

There are six fuel reduction treatments recommended for the Incline Village Community. These treatments are described in detail in Chapter 7.0, *Recommended Hazard Mitigation Projects* and briefly summarized below.

Incline Village Unit 1 – Thinning and Brush Removal; Fuelbreak
Create a fuel break 600 feet wide from Highway 28 to Mill Creek. This unit is on the eastern boundary of the Incline Village Interior Neighborhood

Incline Village Unit 2 – Thinning and Brush Removal; Fuelbreak
Create a fuel break 300 feet wide along the north slope of the prescription area that borders the road to the Diamond Peak Ski Resort. This unit is on the eastern boundary of the Incline Village Interior neighborhood and the southern end of the Tyrolian Village neighborhood.

Incline Village Unit 3 – Thinning and Brush Removal; Shaded Fuelbreak
Create a shaded fuel break 400 feet wide on the east side of Tyrolian Village and along the north side of the Diamond Peak Ski Resort.

Incline Village Unit 4 – Thinning and Brush Removal
Thin trees and remove brush along the Apollo Court are along the outer edges of the Allison/Jennifer and Champagne/Burgundy neighborhoods.

Incline Village Unit 5 – Thinning and Brush Removal
Thin trees and remove brush in the open space / stream zone area between the Allison/Jennifer and Upper Tyner neighborhoods.

Incline Village Unit 6 – Second Creek Thinning and Brush Removal
Thin trees and remove brush in the Second Creek drainage between the Upper Tyner and the Saddlehorn/Tumbleweed neighborhoods.

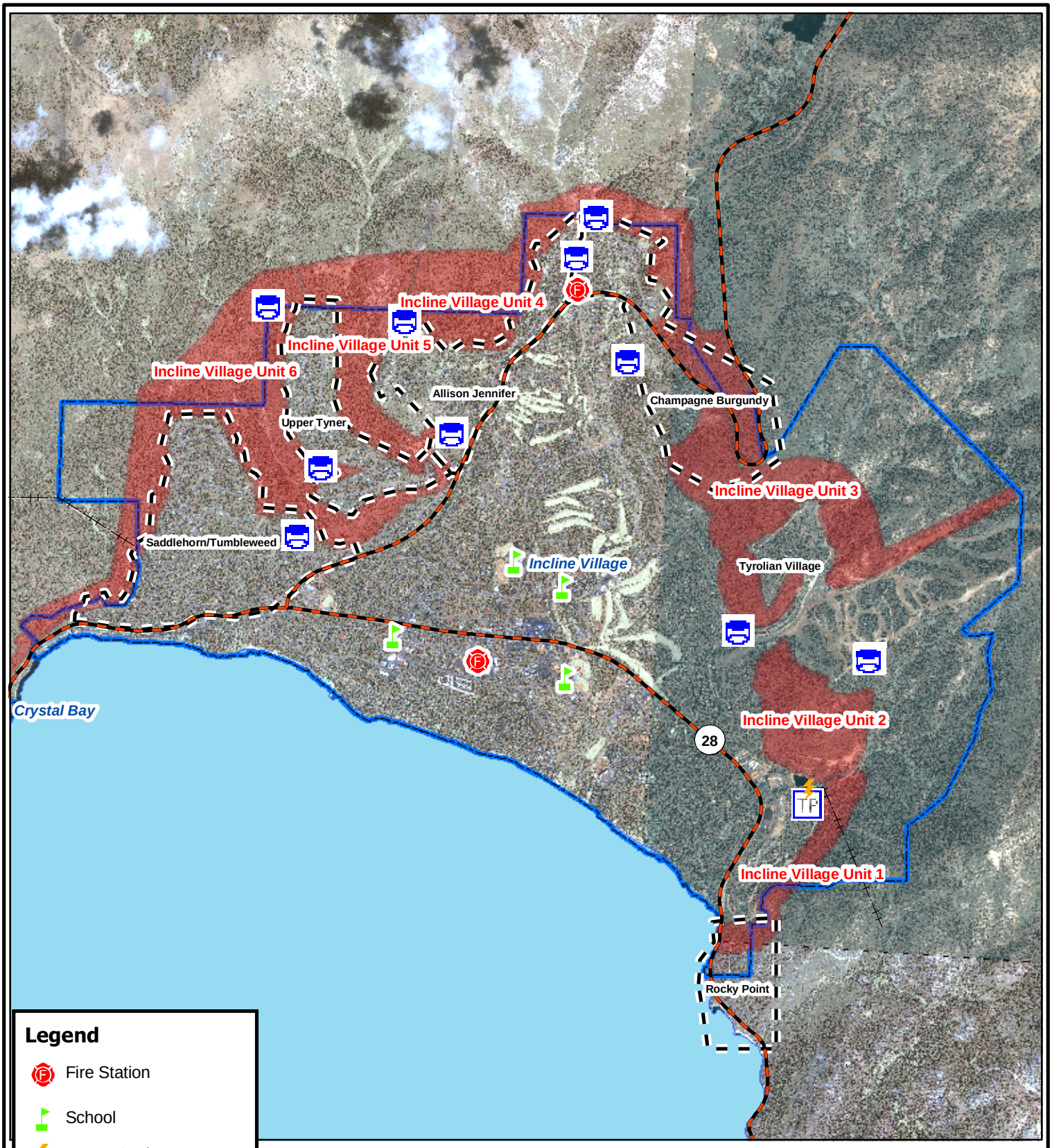

Figure 5-1. Community of Incline Village

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5.3 ALLISON/JENNIFER

Allison/Jennifer is located in the northern-most portion of Incline Village (Figure 5-2). The area surrounding the neighborhood is forested by Jeffery pine and white fir. The developed portion of the neighborhood is adjacent to IVGID-developed green belts to the north, west and south. The greenbelt areas were cleared or thinned in 1991 through a helicopter logging operation and a pile burning plan spanning several years. The risk assessment resulted in classifying Allison/Jennifer in the **Extreme Hazard** category (82 points). This score is attributed primarily to close spacing of homes within heavy tree stands without adequate defensible space; some homes with combustible roofing material; a high number of homes with unenclosed decks or porches; and the potential for extreme fire behavior. The neighborhood assessment rating sheet is provided as Table 5-1.

5.3.1 Community Design

There were 280 single-family residences observed in the assessment. There are numerous undeveloped lots in the neighborhood, and three greenbelts located above SR 431 (NLTFPD, 2003). The majority of the lot sizes are less than one acre.

Roads: State Route 431 is the primary access to the neighborhood. There are two secondary roads that connect with SR 431, one in the upper and one in the lower portion of the neighborhood. The majority of roads have a grade of less than five percent, have adequate width and turnaround space for two-vehicle passage or fire suppression equipment to maneuver, but have sharp turns that might interfere with visibility.

Signage: Street signs and residential addresses are present on all of the roads in the neighborhood. There were 27 residential roads observed in the assessment area. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are all underground in this neighborhood and do not pose an ignition risk.

5.3.2 Construction Materials

One hundred and eleven (60%) of the residences have fire resistant roof materials such as composition roofing, metal, or tile. Two hundred seventy eight (99%) of the residences have fire resistant siding materials.

Nearly all of the homes (94%) in the neighborhood have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and rapidly spread fire to the home.

Table 5-1 Allison/Jennifer Wildfire Hazard Rating Summary

A. Urban Interface Condition	***2***	
B. Community Design		
1. Ingress / Egress	1	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	1	/5
5. Street Signs	1	/5
6. Address Signs	1	/5
C. Defensible Space		
1. Lot Size	5	/5
2. Defensible Space	15	/15
D. Fire Behavior		
1. Fuels	5	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10
E. Fire Protection		
1. Water Source	1	/10
2. Department	1	/10
F. Existing Building Materials		
1. Roofs	10	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5
G. Utilities		
1. Utilities	3	/5

TALLIES

280 Total Houses **12 Residential Streets**

B5. Street Signs

0	not visible	12	visible	100%	visible

B6. Address Signs

0	not visible	280	visible	100%	visible

C1. Lot Sizes

280	<1ac	0	>1ac <10ac	0	>10ac

C2. Defensible Space

280	not adequat	0	adequate	0%	adequate

F1. Roofs

111	combust	169	not combust	60%	not combust

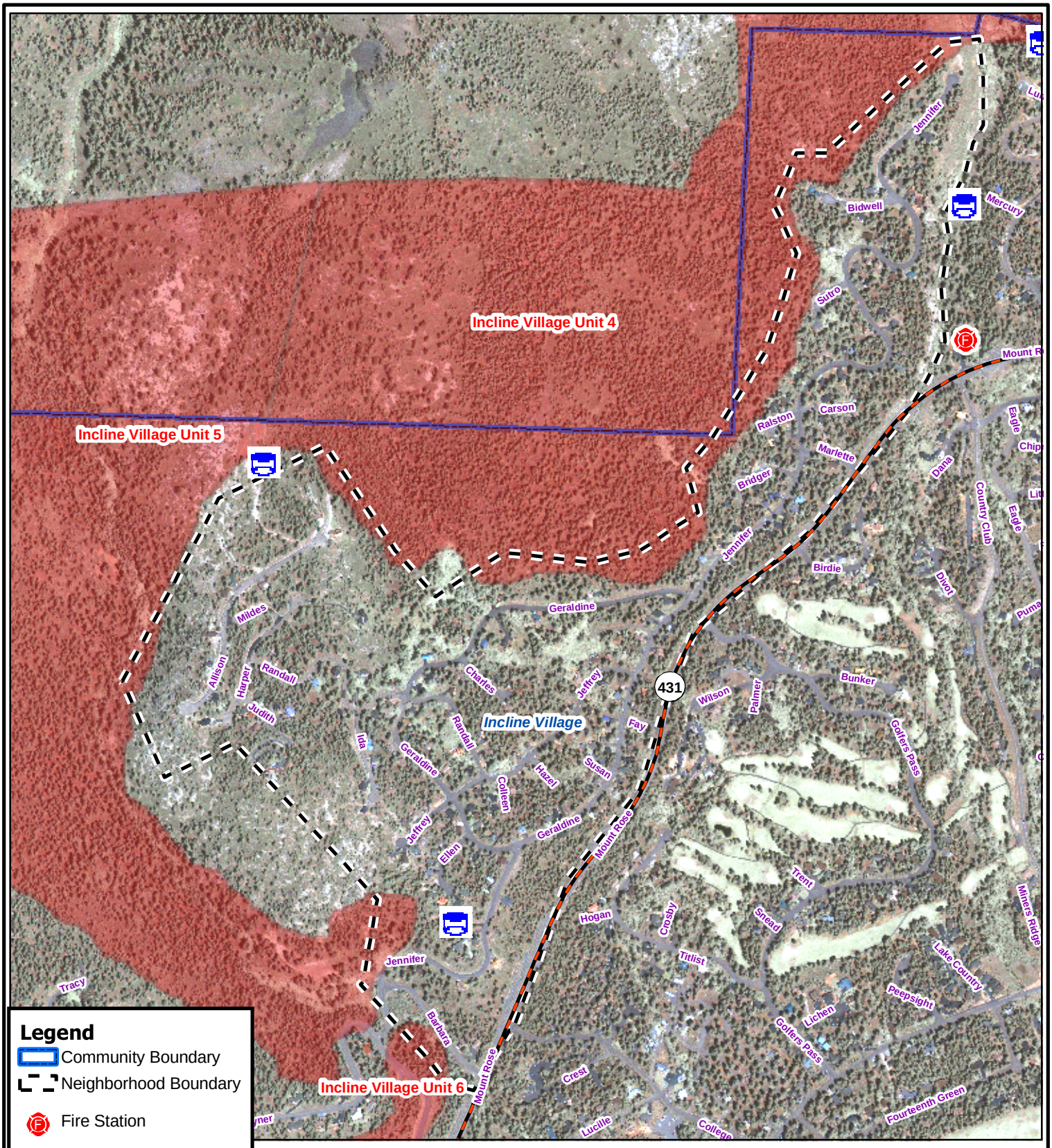
F2. Siding

2	combust	278	not combust	99%	not combust

F3. Unenclosed Structures on Lot

262	not enclosed	18	enclosed	94%	not enclosed

Score **82** /128



Legend

- Community Boundary
- Neighborhood Boundary
- Fire Station
- School
- Power Station
- Sewer Treatment
- Water Tank
- Transmission Line
- Prescription Area

Figure 5-2. Incline Village
Allison/Jennifer Neighborhood

N
W E
S

0 0.05 0.1 0.2
Miles

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5.4 CHAMPAGNE/BURGUNDY

Champagne/Burgundy is located in the northeastern portion of Incline Village (Figure 5-3). The area surrounding the neighborhood is located on a steep south-facing slope. Vegetation consists of a dominant tree layer composed of Jeffrey pine and white fir, with some lodgepole pine, incense cedar, and red fir. The risk assessment resulted in classifying Champagne/Burgundy in the **High Hazard** category (75 points). This score is attributed primarily to inadequate defensible space, a high number of unenclosed decks and porches, steep topography and heavy fuel loading. The neighborhood assessment rating sheet is included as Table 5-2.

5.4.1 Community Design

There were 130 single-family residences observed in the assessment area, located on both sides of SR 431. Many of the homes in the area are in excess of 10,000 square feet and are on lots between 1 and 10 acres.

Roads: State Route 431 is the primary access to the neighborhood. There are five secondary roads that access SR431. The majority of roads have a road grade of more than 5 percent. Many of the residential streets do not have adequate space to maneuver fire suppression equipment or for two-vehicle passage.

Signage: Street signs are present and visible on all but one of the residential streets in the assessment area. Residential addresses are visible on all of the homes. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are both above and below ground. Overhead power lines pose an ignition risk due to the lack of right-of-way maintenance. Some residences have propane tanks and many do not have the minimum fuel clearance of 10 feet.

5.4.2 Construction Materials

One hundred twelve (86%) of the residences in the assessment area have fire resistant roof materials such as composition roofing, metal, or tile. One hundred twenty six (97%) of the residences have fire resistant siding materials.

Nearly all of the homes (92 percent) in the neighborhood have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and rapidly spread to the home.

Table 5-2 Champagne/Burgundy Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	1	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	1	/5
5. Street Signs	1	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	3	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	5	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10

E. Fire Protection

1. Water Source	1	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	5	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	3	/5

Score **75** /128

TALLIES

130 Total Houses **12 Residential Streets**

B5. Street Signs

1	not visible	11	visible	92%	visible

B6. Address Signs

0	not visible	130	visible	100%	visible

C1. Lot Sizes

0	<1ac	130	>1ac <10ac	0	>10ac

C2. Defensible Space

130	not adequat	0	adequate	0%	adequate

F1. Roofs

18	combust	112	not combust	86%	not combust

F2. Siding

4	combust	126	not combust	97%	not combust

F3. Unenclosed Structures on Lot

120	not enclosed	10	enclosed	92%	not enclosed

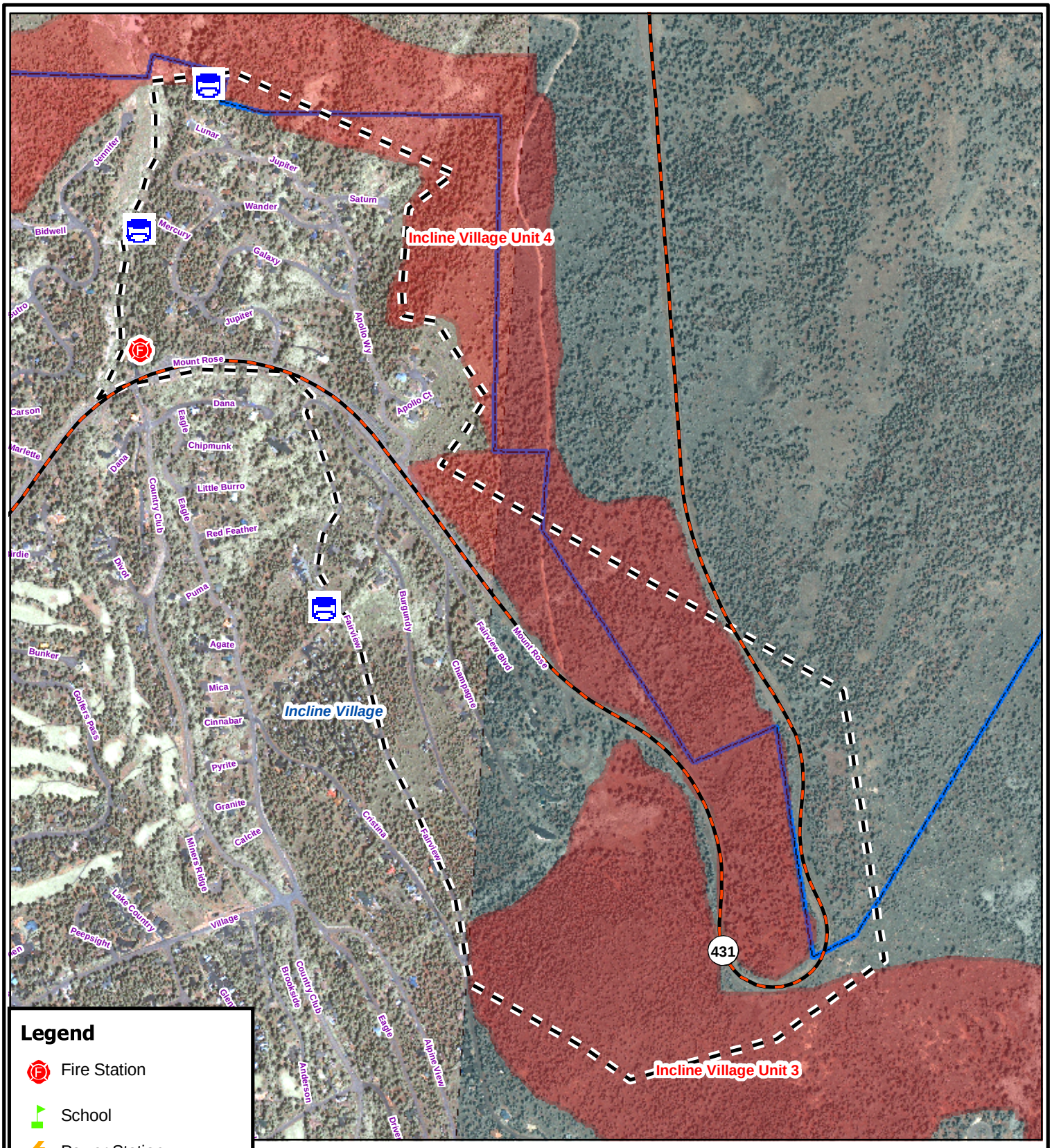

Figure 5-3. Incline Village
Champagne/Burgundy Neighborhood

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5.5 ROCKY POINT

Rocky Point is located in the southeastern area of Incline Village (Figure 5-4). The risk assessment resulted in classifying Rocky Point in the **Extreme Hazard** category (91 points). This score is attributed primarily to inadequate defensible space, heavy fuels, steep west facing slopes, a lack of water sources for fire suppression, and unenclosed architectural features on nearly all of the homes. The neighborhood assessment rating sheet is provided in Table 5-3.

5.5.1 Community Design

All of the seven homes in the neighborhood are on lots of less than one acre.

Roads: State Route 28 is the primary access road through Rocky Point. There is one secondary residential road leading into the neighborhood from SR 28. The roads have less than five percent grades and provide adequate space to maneuver fire engines or for two-vehicle passage.

Signage: Street signs and residential addresses were considered Not Applicable in Rocky Point because there is only one secondary road leading into the neighborhood and only seven homes.

Utilities: The majority of the utilities in the Rocky Point area are above ground. Overhead power lines pose an ignition risk because in several areas the utility rights-of-way are not properly maintained. Most residences have propane tanks and many do not have the minimum fuel clearance of 10 feet.

5.5.2 Construction Materials

Four of the seven homes (57%) have non-combustible roofing materials such as tile, metal, or composition, and six of the seven homes (86%) have non-combustible siding materials. Six homes (86%) have unenclosed balconies, porches, decks or other architectural features that can create drafts and provide areas where sparks and embers can smolder and spread fire to the home.

Table 5-3 Rocky Point Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	3	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	1	/5
5. Street Signs	0	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	5	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	5	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	7	/10

E. Fire Protection

1. Water Source	10	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	10	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	3	/5

TALLIES

7 Total Houses **NA Residential Streets**

B5. Street Signs

B6. Address Signs

0 not visible | 7 visible | 100% visible

C1. Lot Sizes

7 <1ac | 0 >1ac <10ac | 0 >10ac

C2. Defensible Space

7 not adequat | 0 adequate | 0% adequate

F1. Roofs

3 combust | 4 not combust | 57% not combust

F2. Siding

1 combust | 6 not combust | 86% not combust

F3. Unenclosed Structures on Lot

6 not enclosed | 1 enclosed | 86% not enclosed

Score **89** /128

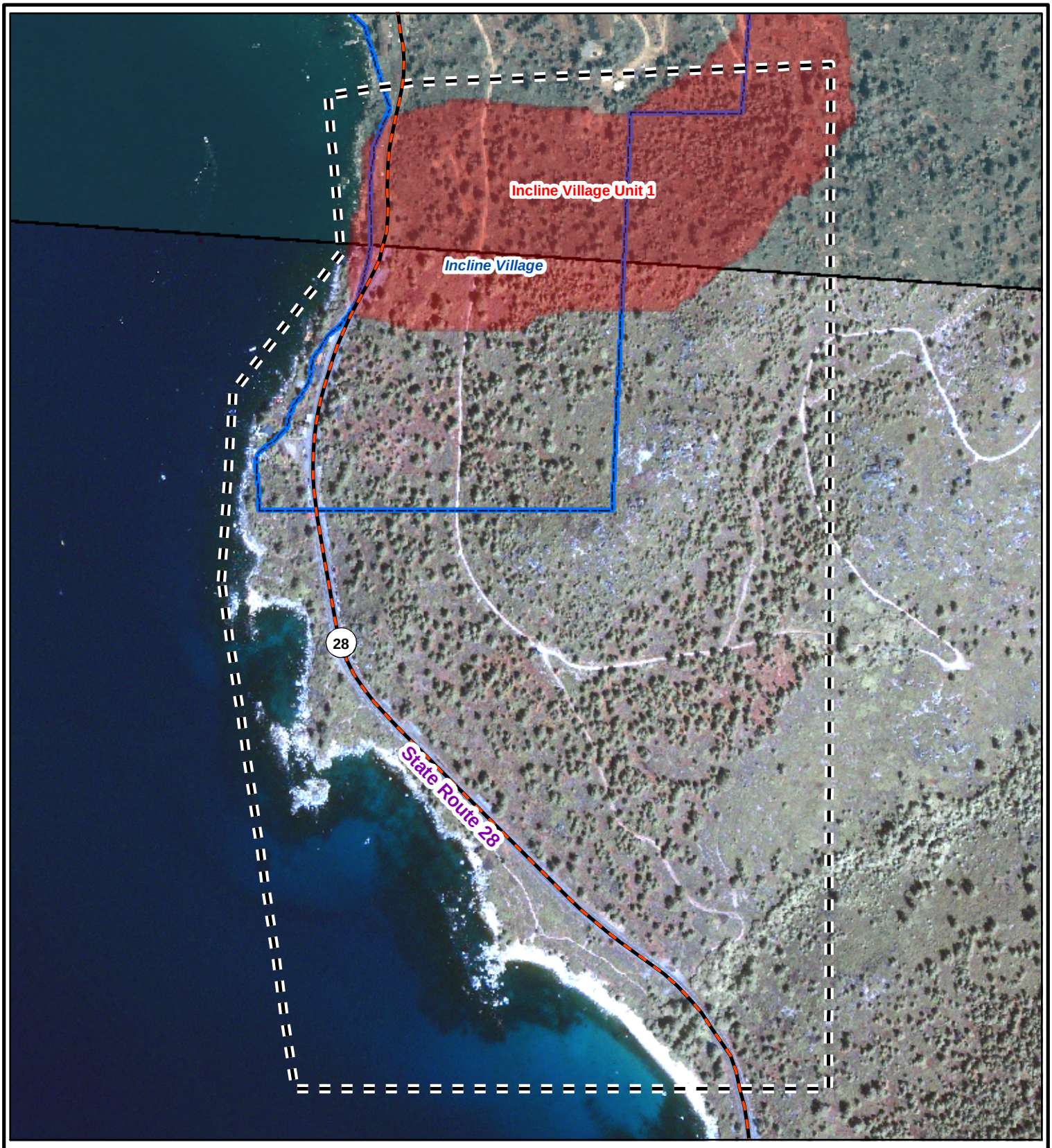

Figure 5-4. Incline Village
Rocky Point Neighborhood

N
W E
S

Legend
- Community Boundary
- Neighborhood Boundary
- Prescription Area

0 0.025 0.05 0.1
Miles

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5.6 SADDLEHORN/TUMBLEWEED

Saddlehorn/Tumbleweed is located in the southwestern portion of Incline Village (Figure 5-5). The area surrounding the neighborhood is located on steep southwest and east facing slopes. Vegetation cover includes pine, fir, and cedar intermixed with manzanita and bitterbrush. The risk assessment resulted in classifying Saddlehorn/Tumbleweed, in the **Extreme Hazard** category (80 points). The score is attributed primarily to inadequate defensible space, a high number of unenclosed porches or decks, steep terrain and heavy fuel loads. In addition, about one-quarter of the homes are constructed with combustible roofing materials. The community assessment rating sheet is provided as Table 5-4.

5.6.1 Community Design

The urban interface condition surrounding Saddlehorn/Tumbleweed is classified as an intermix condition. Structures are scattered throughout the wildland area. There is no clear line of demarcation between structures and wildland fuels along roads or back fences. There were 642 single-family residences observed in the assessment area. The majority of the homes are situated on lots of less than one acre in size.

Roads: State Route 431 and Tahoe Blvd. (SR 28) are the primary access roads to the neighborhood. There were 42 residential secondary roads that lead from the primary roads into the neighborhood. The majority of the roads have greater than five percent grade. Many of the streets are narrow and winding, and do not have adequate space to maneuver fire suppression equipment or for two-vehicle passage.

Signage: Street signs are present and visible on all of the streets in the area, and residential addresses were visible on all of the homes. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are located both above and below ground. Overhead power lines pose an ignition risk because in several areas the utility right-of-way is not properly maintained. Some residences have propane tanks and many do not have the minimum fuel clearance of 10 feet.

5.6.2 Construction Materials

One half of the residences (50%) have fire resistant roof materials such as composition roofing, metal, or tile. Nearly all of the residences (97%) have fire resistant siding materials.

Well over three quarters of the homes in the community (82%) have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and rapidly spread fire to the home.

Table 5-4 Saddlehorn/Tumbleweed Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	1	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	1	/5
5. Street Signs	1	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	5	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	3	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10

E. Fire Protection

1. Water Source	1	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	10	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	3	/5

Score **80** /128

TALLIES

642 Total Houses **42 Residential Streets**

B5. Street Signs

0 not visible | 42 visible | 100% visible

B6. Address Signs

0 not visible | 642 visible | 100% visible

C1. Lot Sizes

642 <1ac | 0 >1ac <10ac | 0 >10ac

C2. Defensible Space

642 not adequat | 0 adequate | 0% adequate

F1. Roofs

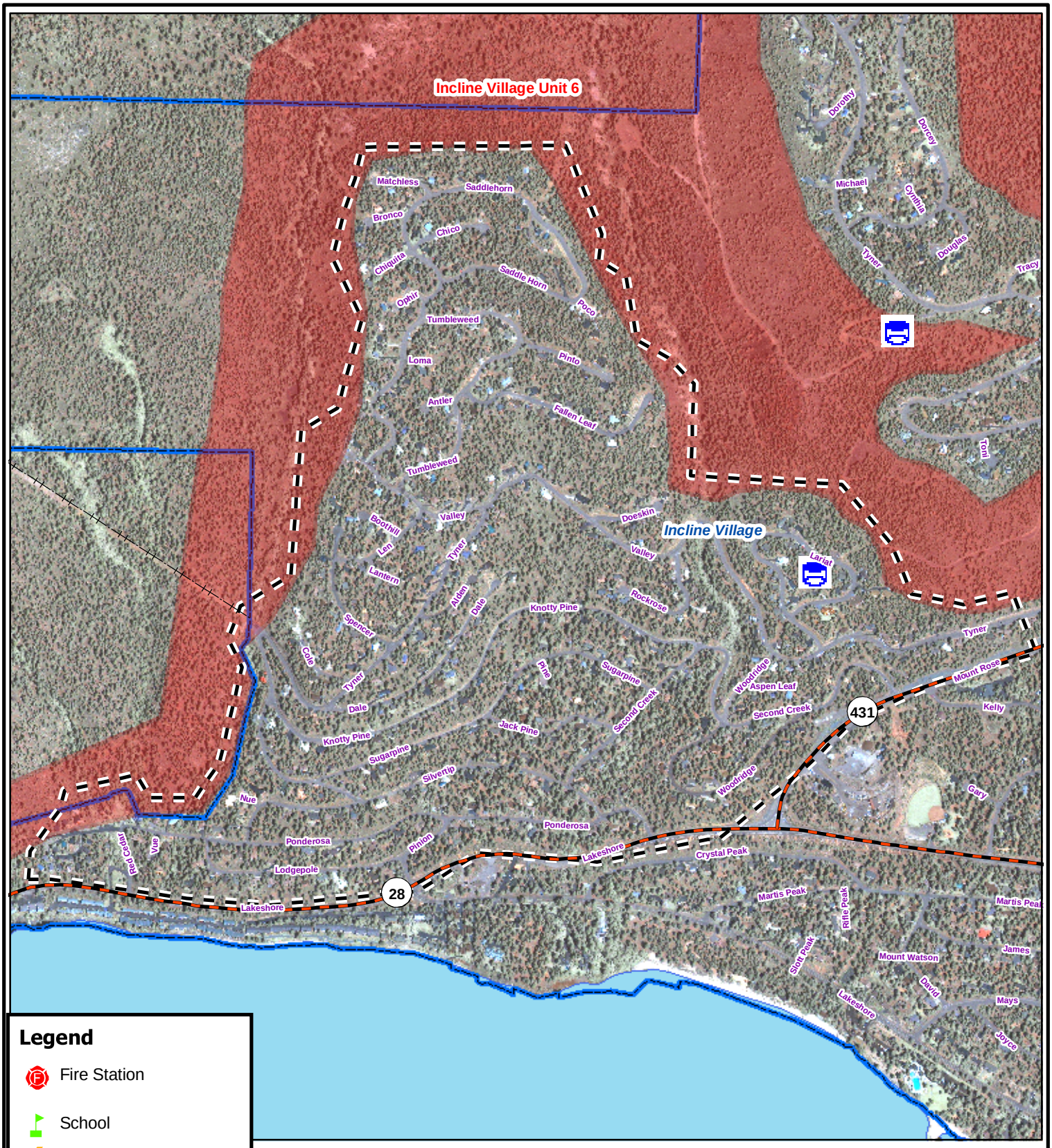
321 combust | 321 not combust | 50% not combust

F2. Siding

17 combust | 625 not combust | 97% not combust

F3. Unenclosed Structures on Lot

527 not enclosed | 115 enclosed | 82% not enclosed



Legend

- Fire Station
- School
- Power Station
- Sewer Treatment
- Water Tank
- Transmission Line
- Community Boundary
- Neighborhood Boundary
- Prescription Area

Figure 5-5. Incline Village
Saddlehorn/Tumbleweed Neighborhood

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5.7 TYROLIAN VILLAGE

Tyrolian Village is located in the northeastern portion of Incline Village (Figure 5-6). The area is on the western side of the Incline Creek drainage across from Diamond Peak Ski Resort, which is on the eastern side of the drainage. The risk assessment resulted in classifying Tyrolian Village in the **Extreme Hazard** category (85 points). This score is attributed primarily to close home spacing, limited access, inadequate defensible space, a high number of unenclosed structures, steep slopes, and heavy fuel loading. The community assessment rating sheet is provided as Table 5-5.

5.7.1 Community Design

There were 222 single-family residences observed in the assessment area. All of the lot sizes are less than one acre.

Roads: Tyrol Drive is the only access into and out of the upper portion, and Bitterbrush Drive is the only access into and out of the lower portion of the neighborhood. The majority of roads have a greater than five percent grade, are narrow, have sharp bends and/or are dead-end streets. Many streets do not have adequate space to maneuver fire suppression equipment or for two vehicle passage.

Signage: Street signs and residential address are present and clearly visible on all of the streets and homes in the neighborhood. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are located below ground and do not pose an ignition risk.

5.7.2 Construction Materials

Over three-quarters (80%) of the residences have fire resistant roof materials such as composition roofing, metal, or tile. Nearly all (99%) of the residences have fire resistant siding materials.

All of the homes in the community have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and spread fire to the home.

Table 5-5 Tyrolian Village Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	3	/5
2. Width of Road	1	/5
3. Accessibility	3	/3
4. Secondary Road	5	/5
5. Street Signs	1	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	5	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	5	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10

E. Fire Protection

1. Water Source	1	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	5	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	3	/5

Score **85** /128

TALLIES

205 Total Houses **14 Residential Streets**

B5. Street Signs

0 not visible | 14 visible | 100% visible

B6. Address Signs

0 not visible | 205 visible | 100% visible

C1. Lot Sizes

205 <1ac | 0 >1ac <10ac | 0 >10ac

C2. Defensible Space

205 not adequat | 0 adequate | 0% adequate

F1. Roofs

41 combust | 164 not combust | 80% not combust

F2. Siding

2 combust | 203 not combust | 99% not combust

F3. Unenclosed Structures on Lot

205 not enclosed | 0 enclosed | 100% not enclosed

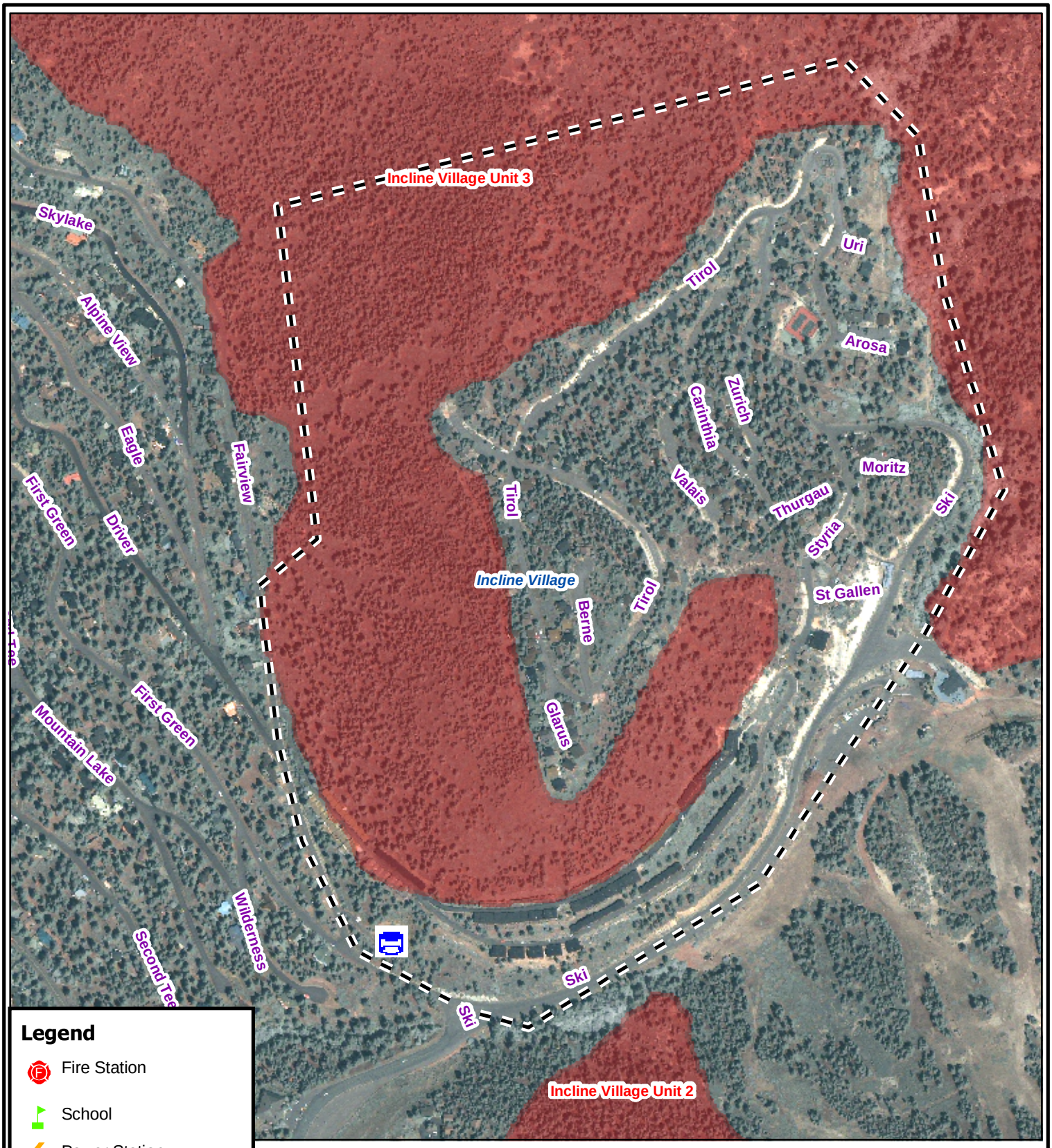

Figure 5-6. Incline Village
Tyrolian Village Neighborhood

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5.8 UPPER TYNER

Upper Tyner is located in the northwestern portion of Incline Village (Figure 5-7). The neighborhood lies along both sides of a ridge between Wood Creek and Second Creek. The area surrounding the neighborhood is located on steep southwest and eastern facing slopes. Vegetation includes pine and fir intermixed with manzanita. The risk assessment resulted in classifying Upper Tyner in the **Extreme Hazard** category (77 points). This score is attributed primarily to inadequate defensible space, a high number of unenclosed structural features, close home spacing, steep slopes, and heavy fuel loading. The community assessment rating sheet is provided as Table 5-6.

5.8.1 Community Design

There were 245 single-family residences observed in the assessment area. All of the homes are on lots of one acre or less.

Roads: Tyner Way is the only paved access into and out of this long, narrow neighborhood. The primary and secondary roads have a grade more than five percent, are narrow, and have sharp bends and/or are dead-end streets. Many streets do not have adequate space to maneuver fire engines or for two-vehicle passage.

Signage: Street signs and residential addresses are present and clearly visible on all streets and residences in the neighborhood. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are located below ground and do not pose an ignition risk.

5.8.2 Construction Materials

Over three-quarters of the residences (82%) have fire resistant roof materials such as composition roofing, metal, or tile while the remainder are wood shake. Nearly all (98%) of the homes have fire-resistant siding.

Nearly all of the homes in the community (95%) have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and spread fire to the home.

Table 5-6 Upper Tyner Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	3	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	1	/5
5. Street Signs	1	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	5	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	3	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10

E. Fire Protection

1. Water Source	1	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	5	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	3	/5

Score **77** /128

TALLIES

245 Total Houses **14 Residential Streets**

B5. Street Signs

0 not visible | 14 visible | 100% visible

B6. Address Signs

0 not visible | 245 visible | 100% visible

C1. Lot Sizes

245 <1ac | 0 >1ac <10ac | 0 >10ac

C2. Defensible Space

245 not adequat | 0 adequate | 0% adequate

F1. Roofs

43 combust | 202 not combust | 82% not combust

F2. Siding

5 combust | 240 not combust | 98% not combust

F3. Unenclosed Structures on Lot

233 not enclosed | 12 enclosed | 95% not enclosed

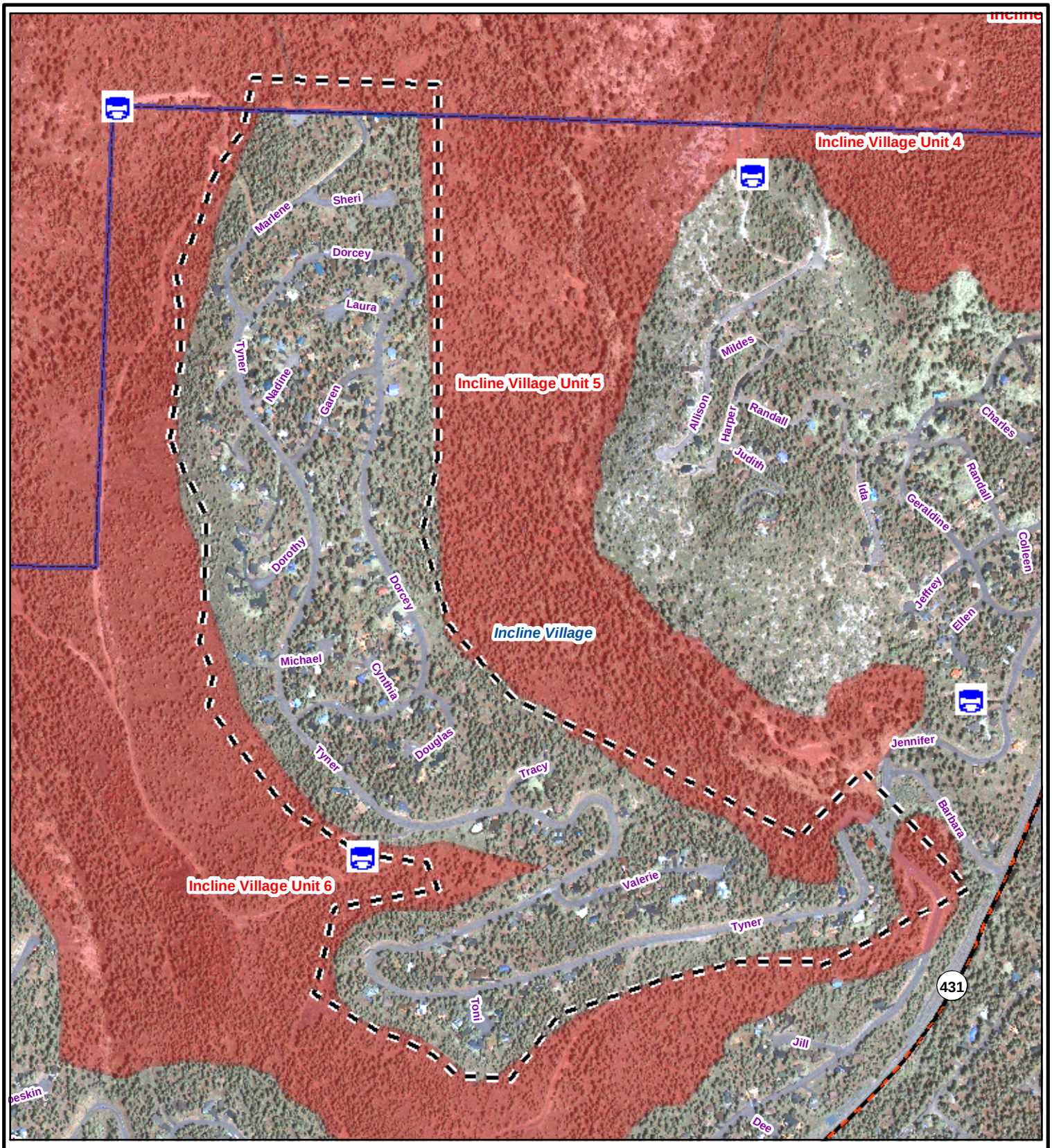

Figure 5-7. Incline Village
Upper Tyner Neighborhood

Legend

- Water Tank
- Community Boundary
- Neighborhood Boundary
- Prescription Area

N
W E
S

0 0.05 0.1 0.2
Miles

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5.9 INCLINE VILLAGE INTERIOR

The Incline Village interior neighborhoods are in the central portion of Incline Village (Figure 5-1). The area is located in a second-growth stand dominated by Jeffrey pine with some white fir, incense cedar, and sugar pine. Undeveloped lots in the neighborhood have a heavy understory of brush consisting of manzanita, bitterbrush, snowbrush, white thorn, and huckleberry oak. The Hazard Assessment resulted in classifying the Incline Village Interior in the **Extreme Hazard** category (85 points). The primary risk factors for the area were inadequate defensible space, a high number of residences with wood shake roofs and unenclosed structures, and heavy fuel loadings. The Wildfire Hazard rating sheets are included as Table 5-7.

5.9.1 Community Design

There were 2980 single-family residences observed in the assessment area. The majority of the residences are on lots of less than one acre; 20 of the homes are on lots of between one and 10 acres.

Roads: State Route 28, Tahoe Blvd., and SR 341 (Mount Rose Highway) are the primary roads leading into/out of the neighborhood. The primary and secondary roads are generally less than five percent grade. Most of the residential streets have adequate space to maneuver fire suppression equipment or for two-vehicle passage.

Signage: Street signs are present on 98 percent of the secondary residential streets in the neighborhood. Residential addresses are clearly visible on 99 percent of the homes. Clear and visible signage assists fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: Utilities are located below ground and do not pose an ignition risk.

5.9.2 Construction Materials

Only 67 percent of the residences observed in the assessment area have fire resistant roof materials such as composition roofing, metal, or tile and the remainder are wood shake. The majority of the residences (96%) have fire resistant siding materials.

Just over half of the homes in the community (54%) have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and spread fire to the home.

Table 5-7 Incline Village Interior Wildfire Hazard Rating Summary

A. Urban Interface Condition	***2***	
B. Community Design		
1. Ingress / Egress	1	/5
2. Width of Road	3	/5
3. Accessibility	3	/3
4. Secondary Road	3	/5
5. Street Signs	1	/5
6. Address Signs	1	/5
C. Defensible Space		
1. Lot Size	5	/5
2. Defensible Space	15	/15
D. Fire Behavior		
1. Fuels	3	/5
2. Fire Behavior	10	/10
3. Slope	7	/10
4. Aspect	10	/10
E. Fire Protection		
1. Water Source	1	/10
2. Department	1	/10
F. Existing Building Materials		
1. Roofs	10	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5
G. Utilities		
1. Utilities	5	/5
Score	**85**	/128

TALLIES

2980 Total Houses **151 Residential Streets**

B5. Street Signs

3 not visible | 148 visible | 98% visible

B6. Address Signs

42 not visible | 2938 visible | 99% visible

C1. Lot Sizes

2960 <1ac | 20 >1ac <10ac | 0 >10ac

C2. Defensible Space

2949 not adequat | 31 adequate | 1% adequate

F1. Roofs

987 combust | 1993 not combust | 67% not combust

F2. Siding

122 combust | 2858 not combust | 96% not combust

F3. Unenclosed Structures on Lot

1597 not enclosed | 1383 enclosed | 54% not enclosed

6.0 CRYSTAL BAY

6.1 CRYSTAL BAY HAZARD AND RISK ASSESSMENT

Crystal Bay is located at the northern tip of Lake Tahoe on the California/Nevada state line (Figure 6-1). The community is situated on east to southeast facing slopes and surrounded by a mix of old and second growth Jeffery Pine and white fir. Topography varies from steep to very steep. The risk assessment resulted in classifying Crystal Bay, as a whole, in the **Extreme Hazard** category (78 points). This score is attributed primarily to inadequate defensible space, heavy fuels, steep south facing slopes, combustible roof materials, and a high number of unenclosed architectural features. The community Hazard assessment rating sheet is provided as Table 6-1.

6.1.1 Community Design

The urban interface condition surrounding Crystal Bay is classified as an intermix condition. Structures are scattered throughout the wildland area. There is no clear line of demarcation between structures and wildland fuels along roads or back fences. There were 157 single-family dwellings observed in the assessment area. All of the homes are on lots of less than one acre in size.

Roads: Tahoe Blvd. is the primary access road, passing through the center of the community. There are numerous secondary roads. Many of the roads are steep, narrow, have sharp bends and/or are dead-end streets. Many streets do not have adequate space to maneuver fire engines or for two-vehicle passage.

Signage: Street signs are clearly visible on all of the residential streets, and residential addresses are present and clearly visible on all of the homes. The clear and visible signage will assist fire suppression personnel in locating residences during poor visibility conditions that may exist during a wildland fire.

Utilities: The majority of the utilities in the Crystal Bay area are above ground. Overhead power lines pose an ignition risk because in several areas the utility rights-of-way are not properly maintained. Most residences have propane tanks and many do not have the minimum fuel clearance of 10 feet.

6.1.2 Construction Materials

Eighty-one percent of the residences have fire resistant roof materials such as composition roofing, metal, or tile. Roughly 85 percent of the residences have fire resistant siding materials.

Nearly three quarters of the homes in the community (70%) have unenclosed balconies, porches, decks or other architectural features that create drafts and provide areas where sparks and embers can smolder and spread fire to the home.

6.1.3 Defensible Space

The homes within the Crystal Bay area do not meet the defensible space landscape requirement to minimize damage to the home or loss during a wildfire. The terrain is generally steep, with heavy tree and shrub vegetation. In areas with topography and

vegetation such as that in Crystal Bay, the recommend defensible space is at least 100 feet, and preferably 200 feet, of clearance. See Appendix D for defensible space details.

6.1.4 Factors that Affect Fire Behavior

Fuels in the Crystal Bay area are heavy. The tree layer is dominated by Jeffery pine with an understory shrub layer of manzanita, bitterbrush, whitethorn, and huckleberry oak. In some areas the huckleberry oak is 12 feet high and shrubs are closely spaced. In the higher elevations there are large stands of dead fir trees and many of the larger, older trees in the lower elevations are showing signs of decay in the trunks. Ground fuels consist of pine needles, squaw carpet, annuals, and grasses. Duff and needles are three inches deep in some areas. At the very northern edge of the community there is an old burn that has light shrub regrowth. This area is prone to avalanches and erosion in the winter, due to the lack of ground cover to hold soil and snow in place. Slopes in this area are about 60 percent, while overall slopes in Crystal Bay range from 10 to 70 percent. The aspects are eastern to southern.

The area may experience strong downslope winds during thunderstorms. Similarly, large fires in the basin during the fall may move downslope in the afternoon because of typical west to southwest winds. ***There are continuous fuels in close proximity and intermixed with structures.*** The composition of the fuels is conducive to crown fires or high intensity surface fires. The steep slopes, southern aspects, dense fuels, heavy duff, prevailing wind exposure and ladder fuels may reduce fire suppression effectiveness.

6.1.5 Worst Case Fire Behavior

There are two worst-case scenarios for the Crystal Bay area, equally hazardous. The first begins with a wildland fire in the Kings Beach (west of Crystal Bay) area during the summer months in the late afternoon. Prevailing winds could push a fire up and over the ridge down into the Crystal Bay community. Heavy fuels and steep slopes can quickly spread a fire. Narrow winding streets west of State Route 28 limit fire engine access. Several dead-end streets create a safety issue for suppression forces. There are several areas where structures are extremely close together where there will be an increased probability of structure ignition. There is a very high potential for crown fires and flame lengths could reach 5 to 10 feet in the understory. The rate of spread could reach 460 to 990 feet per hour.

In the second worst-case scenario, a fire started along the west side of SR 28 in the late afternoon in the summer could spread quickly uphill along the steep slopes to the west. The steep slopes and topography in concert with strong winds could create a chimney effect, drawing the fire up narrow drainages and streets through the community.

6.1.6 Risk Assessment

Crystal Bay is viewed as having a high risk of fire occurrence. The risk of ignition to the community is high and the risk of structure loss is extreme due to heavy vegetation, steep slopes, narrow steep roads; numerous unenclosed structures and shake roofs where embers can smolder and spread fire to the home; and poorly maintained utility lines and clearance around propane tanks. The fire history map indicates a large number of fire starts in the area. King's Beach poses a hazard to Crystal Bay because of the potential for recreational fires that spark into adjacent wildland fuels.

6.2 CRYSTAL BAY RISK REDUCTION RECOMMENDATIONS, ROLES AND RESPONSIBILITIES

The responsibility to keep a community fire safe falls not only on the local fire department but also on the residents of the community, businesses, and local governments. General recommendations related to defensible space, fuel reduction, community preparedness, and public education, are included in Chapter 4.0, *District-wide Assessment Results*.

Fuel reduction treatments in the Crystal Bay area are the highest priority for the NLTFPD. The fuel reduction treatment is described in detail in Chapter 7.0, *Recommended Hazard Mitigation Projects* and briefly summarized below.

Crystal Bay Unit 1 – Thinning and Brush Removal

Establish a shaded fuel break within the wildland urban interface. The fuel break should be situated upslope to the west and north of private land in Crystal Bay for a width of one-quarter mile.

Table 6-1 Crystal Bay Wildfire Hazard Rating Summary

A. Urban Interface Condition ***2***

B. Community Design

1. Ingress / Egress	1	/5
2. Width of Road	1	/5
3. Accessibility	1	/3
4. Secondary Road	3	/5
5. Street Signs	1	/5
6. Address Signs	1	/5

C. Defensible Space

1. Lot Size	5	/5
2. Defensible Space	15	/15

D. Fire Behavior

1. Fuels	5	/5
2. Fire Behavior	10	/10
3. Slope	10	/10
4. Aspect	10	/10

E. Fire Protection

1. Water Source	1	/10
2. Department	1	/10

F. Existing Building Materials

1. Roofs	5	/10
2. Siding	1	/5
3. Unenclosed Structures	5	/5

G. Utilities

1. Utilities	0	/5

Score **76** /128

TALLIES

157 Total Houses **210 Residential Streets**

B5. Street Signs

0	not visible	210	visible	100%	visible

B6. Address Signs

0	not visible	157	visible	100%	visible

C1. Lot Sizes

157	<1ac	0	>1ac <10ac	0	>10ac

C2. Defensible Space

157	not adequat	0	adequate	0%	adequate

F1. Roofs

30	combust	127	not combust	81%	not combust

F2. Siding

23	combust	134	not combust	85%	not combust

F3. Unenclosed Structures on Lot

110	not enclosed	47	enclosed	70%	not enclosed

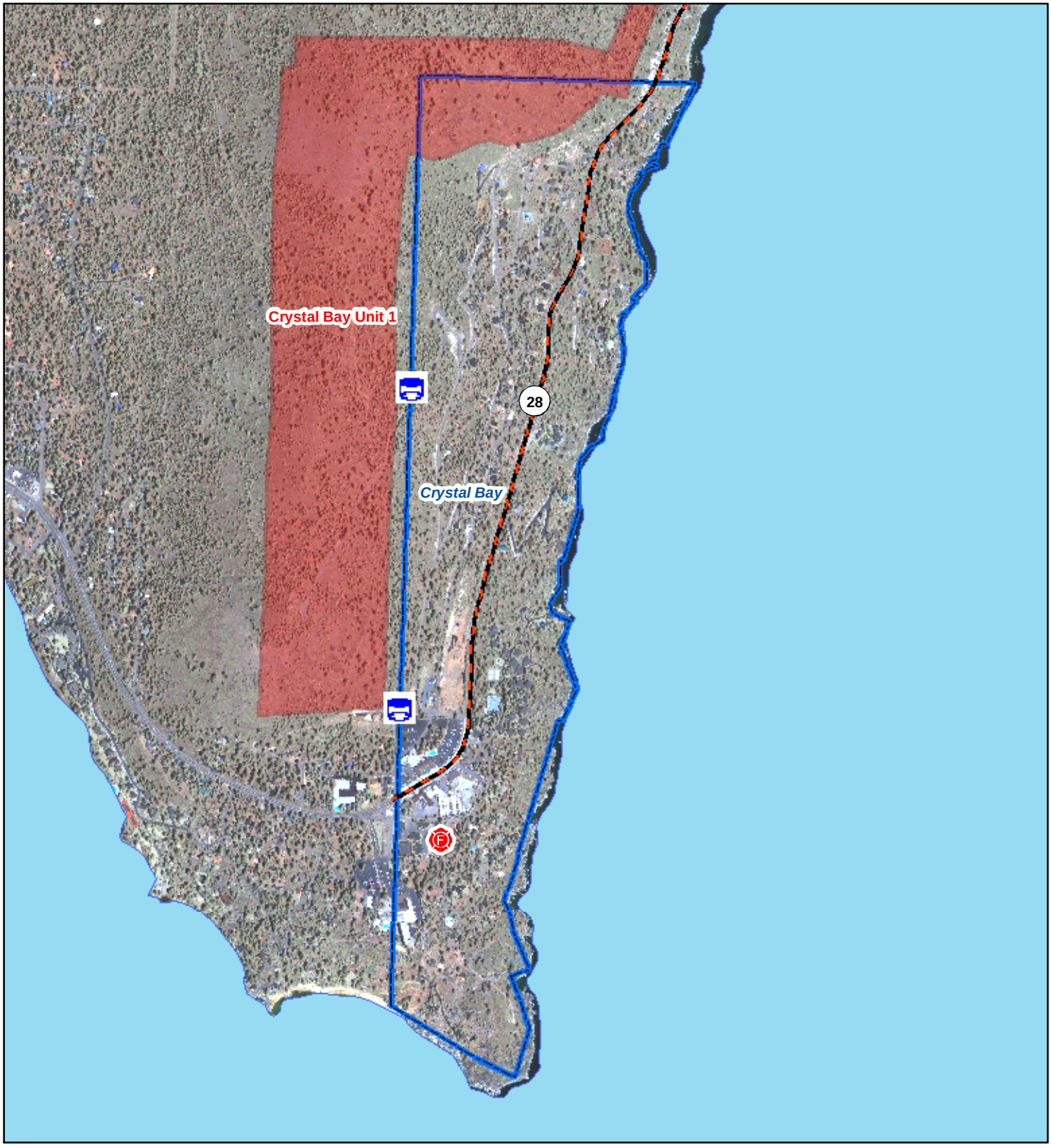

Figure 6-1. Community of Crystal Bay

Legend

- Fire Station
- Water Tank
- Prescription Area
- Community Boundary

N
W E
S

0 0.1 0.2 0.4
Miles

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7.0 RECOMMENDED HAZARD MITIGATION PROJECTS

7.1 HAZARD MITIGATION TREATMENTS

Effective wildfire mitigation measures involve the reduction or removal of fuels, or vegetation. A number of methods, both traditional and new, are available to modify the vegetation structure on the landscape. A few key techniques are described below as they occur throughout the project recommendation sheets. The successful mitigation of wildfire hazards in the Lake Tahoe Basin will likely include a combination of treatment methods, as no single method alone is the solution.

7.1.1 Prescribed fire

Fire is part of the natural condition, as described in our Fire Ecology Section 3.4. Current and historic activities have removed fire from the ecosystem. Uncontrolled fires in our communities are not desired, however, prescribed fire is an effective treatment method to reduce fuel loading in our forest.

Fuel loadings are currently unnatural (Fire Ecology Section 3.4) and some vegetative treatment that removes material (thinning, brushing, mastication) must be implemented prior to using prescribed fire. Current fuel loadings are too high to safely use fire as a management tool.

Implementing prescribed fire is a complicated process. Treatment areas are subject to the same environmental compliance measures as any other type of treatment. Containment measures must be taken so that fire burns in a controlled and prescribed manner. Fire control lines must be constructed around the perimeter of the area to be burned, and extra suppression resources available must be made available during the burning operation. In addition, a contingency plan should be developed prior to burning to account for all possible emergencies.

Burning must be limited so acceptable levels of air quality are not exceeded. For air quality and fire control, the burning season is relatively short, and unpredictable, each year, occurring usually just before or just after winter. At this time of the year, temperatures and moisture are at levels to allow enough burning to effectively consume fuels, but not allow the fire to spread uncontrollably.

The North Lake Tahoe Fire Protection District developed a *Prescribed Burn Plan* (August 2003), addressing most of these issues. It should be used as a model to develop future planning efforts in both Nevada fire districts. The plan should be reviewed annually to update projects completed the previous year and validate the environmental compliance and contingency resources available for operations.

The most important element of a prescribed fire treatment project is the public education component. For almost 100 years, federal agencies and the fire service have convinced the public that fire is the enemy and must be excluded from the wildland. Public education messages are already changing, however, it is important to stress the prescribed fire management tool to neighbors before implementing it in their backyard.

7.1.2 Yarding Systems

The biggest challenge to implementing treatments that require the removal of fuels, particularly trees, is transportation from the forest to a landing, or staging area. TRPA BMPs restrict the ability to disturb soils and in many cases the topography precludes use of traditional mechanical equipment such as skidders, loaders, and forwarders. Helicopters have been used in the past to remove trees from the forest without dragging them on the ground. Another alternative is aerial yarding systems.

Cable yarding is a traditional transport method for timber harvests. Suited for working on steep slopes, yarding is a system of cables and pulleys that can transport material thousands of feet to a central landing. Typically a long cable line is stretched into the forest, on which sits a carriage that moves up and down the line. The carriage has cables that reach to the ground. Logs, slash, or brush can be attached to the cables, and the carriage can move the material up or downhill depending on the equipment and cable configuration. Aerial yarding systems allow for the material to be lifted from the ground before being transported to a landing. This reduces the amount of soil disturbance in biomass removal operations.

These systems take some time to setup, however experienced crews should be able to complete setups in these districts within two hours. With various carriage configurations, cables can reach a few hundred feet from the mainline, allowing a large area to be treated from a single skyline. Though they require more human labor than a helicopter logging operation, the yarding solutions may be more costs effective over time. While initially yarding may be more expensive than hand cut pile and burning, it represents a revolutionary approach to land management implementation in the Tahoe Basin. The ability to transport material out of an area and bring rehabilitation materials in to an area will be critical to the long-term success of land management objectives. The fire districts, the TRPA, and the Forest Service should seek to immediately establish demonstration projects using this type of technology to help both short and long-term costs associated with its use.

7.1.3 Mastication

Changing the structure of the fuel bed but leaving the material out in the treatment area is the result of mastication. Like a big mulching lawnmower, masticators have large cutting heads mounted on a tractor to break up stands of tall brush and small trees. The biomass material is reduced to a layer of chips and sticks on the ground. Though it will still burn, flame lengths from a few inches of chipped material are much more controllable than flame lengths from brush that is 8 feet tall. The objective is not to remove the fuels but to change the structure of the fuel bed.

Mastication is a mechanical treatment, so it is limited by the slopes on which tractor type equipment can function. Tractors are typically low impact, either on a track excavator mounted undercarriage or on a low pressure three or four rubber tire carriage. Cutting heads can be raised and lowered or articulated on the end of an excavator. A trailer can be pulled behind a masticator to haul the chips from an area.

7.1.4 Hand Cut, Pile, and Burn

Hand cut, pile, and burn is currently the most economical fuel reduction method allowed on slopes greater than 30 percent in the Tahoe Basin. Helicopter logging has been used but is extremely expensive, currently requiring roughly $7,000 per hour and while cable yarding has been proposed, the TRPA has not accepted this method of biomass removal. Using the hand cut method, chainsaws or axes are used to cut the trees and brush which are then placed in a pile. The pile is allowed to dry, usually requiring one year or more, and then is burned.

While the hand cut, pile and burn method is relatively inexpensive (less than $2,000 per acre), it is extremely labor intensive and requires a minimum of two years to complete because the piles need to dry before they can be burned. The hand cut pile and burn method has been the favorite treatment to date however, this method cannot be continued into the future because we will not be able to thin areas fast enough due to the amount of labor required to accomplish the work and air quality concerns with burning large numbers of piles. This is a quick solution, but not a sustainable solution for the Lake Tahoe Basin.

7.2 FUELBREAKS AND FUEL REDUCTION TREATMENTS

Recommended fuel breaks are described in the following *Risk/Hazard Identification and Mitigation Project Worksheets*. In all recommended fuelbreak areas, the fuel reduction treatments call for thinning the trees and removing brush.

The recommended stocking level for the fire break areas is 80 to 100 square feet of basal area per acre. This stocking rate should be achieved by thinning from below, or removing the smaller trees and leaving the larger ones to achieve the desired stocking rate. The lower limbs of the remaining trees should be pruned to a height of 15 feet but no more than 1/3 of the tree height. This stocking level should provide adequate space between trees to limit the spread of a crown fire in the treatment area. In addition, thinning the trees will allow more soil moisture to be available to the remaining trees and thus be more resistant to infestation by bark beetles. I

Basal area of a tree is defined as the cross–sectional area at breast height (4.5 feet above the ground) and is expressed in square feet. To determine the spacing between trees, the tree diameter at breast height (in inches) is multiplied by 1.7 (to achieve 80 square feet of basal area per acre or by 1.5 to achieve 100 square feet of basal area per acre. The resulting product is the spacing in feet (stem to stem) there should be between two trees of the same size. A guide for the spacing needed for 80 square feet and 100 square feet is provided in Table 7-1. The table also lists the resulting number of trees per acre

Table 7-1. Thinning Guide for Achieving 80 and 100 Square Feet of Basal Area per Acre.

Tree Diameter (dbh in inches)	80 sq. ft. Basal Area per Acre		100 sq. ft. Basal Area per Acre	
	Tree Spacing (feet)	# Trees / Acre	Tree Spacing (feet)	# Trees / Acre
10	17	147	15	183
12	21	101	18	127
14	24	74	22	93
16	28	57	25	71
18	31	45	28	56
20	34	36	31	45
22	38	30	34	37
24	41	25	37	31
26	45	21	40	27
28	48	18	43	23
30	52	16	46	20

The understory fuels should be reduced by either removing shrubs and dead and down material or using mastication techniques to change the fuel structure. Spacing between brush should be two to three times the height of the brush.

7.2.1 Biomass Removal and Disposal

There are currently three locations that will accept biomass: Bently Agrowdynamics (compost), Full Circle Compost, and the Carson City Land Fill. There is a tipping fee to dump the material or they will come pick up the material.

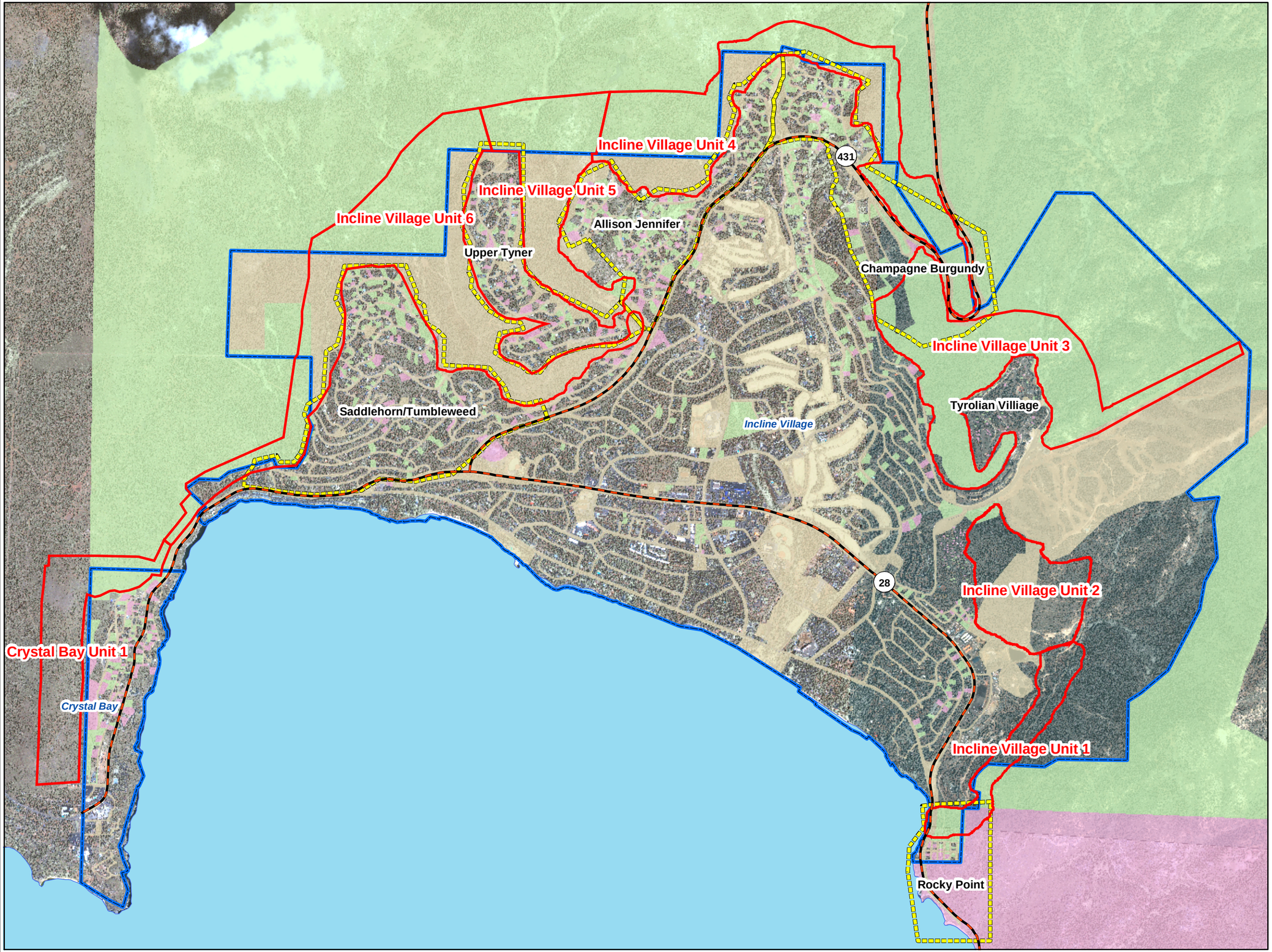
An electric cogeneration plant is located in Loyalton, but it is currently closed. When in operation, they paid roughly $28 / ton for “bone dry” material. Based on rough trucking costs, that could pay for the transportation costs from Incline Village.

Establishment of biomass utilization solutions closer to the Tahoe Basin is important. There is a biomass plant proposed in Carson City, although construction of the plant is currently behind schedule.

Biomass disposal is very dynamic. The amount of material available on the Sierra Front and in the Tahoe Basin is enticing some folks to look at putting processing plants in the area. Moreover, the technology is continuing to evolve. This means any recommendation could be out of date within six months. As of the writing of this document, the best options are to haul to a cogeneration plant or to the composters, but the districts in Lake Tahoe should actively pursue biomass utilization solutions near the Tahoe Basin.

7.3 PROJECT WORKSHEETS

This section contains detailed descriptions and a map of each of the proposed fuelbreak/fuel treatment areas. Each project is prioritized based on threats to private property, fuel loading, comments from the public, and review by the fire district. In general, the top four projects stood out from the rest as needing attention first. Figure 7-1 provides an overview of the project locations and extent.



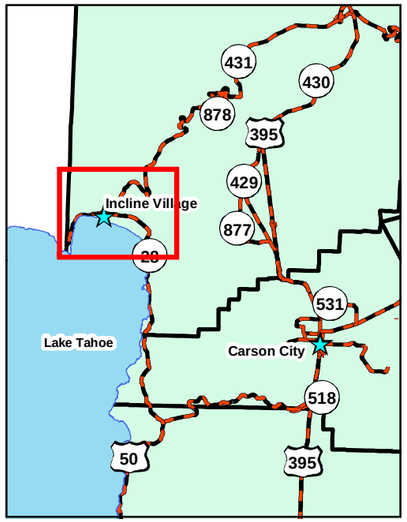


Figure 7-1. Wildfire Mitigation Projects within the North Lake Tahoe Fire Protection District

Legend

- Community Boundary
- Neighborhood Boundary
- Prescription Area

Land Ownership

- FEDERAL
- LOCAL
- STATE

N
W E
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0 0.25 0.5 1
Miles

Nevada Community Wildfire Risk/Hazard Assessment

Resource Concepts, Inc. has made every effort to accurately compile the information depicted on this map, but can not warrant the reliability or completeness of the source data.

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Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 1 – Thinning and Brush Removal; Fuelbreak**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Incline Village Unit 1 is characterized by a dense second growth stand of Jeffery pine and white fir, with some incense cedar and sugar pine, estimated at 200 square feet of basal area per acre. The brush understory is also dense on slopes 30-60% with a west-northwest aspect. The area has very high fuel loadings on steep slopes.*

Worst Case Scenario / Hazard: *Fire behavior would be most extreme with a human-caused ignition along the road or within the Ponderosa Ranch area and burning uphill. There are no structures uphill, so while the fire would be uncontrollable, it would not threaten structures. Property and lives would be threatened by a fire on the ridge pushed by downslope winds towards the Ponderosa Ranch. Topography would work in favor of fire suppression resources.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

Worst case scenario fires would start below the community and burn uphill. Since there are no structures above the projects, the priority is the lowest(#7) for the NLTFPD. This project would protect these structures in downslope wind conditions.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

Behind and uphill of the Ponderosa Ranch and sewer treatment plant. See Figure 7-2

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

Remove or thin brush understory to decrease fire intensity and reduce ladder fuels. Remove dead and down material. Spacing between remaining bushes should be 2-3 times the height of brush. A brush masticator could not be used on this project as the slopes are all above 30%. Aerial systems or other steep slope methods should be explored. Hand cut, pile, and burn. Use of herbicide could reduce sprouting of some species.

Create a fuel break 600 feet wide from Hwy 28 to Mill Creek. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre.

> **Prescribed fire could be used to reduce the brush understory, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control within five years of pile burning.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

Treatment in this area will help contain human-caused ignitions below the project area, keeping fire from spreading uphill and becoming uncontrollable. It will also protect the private and commercial structures from a downslope fire event. Implementation of the prescribed treatments will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will reduce the amount of accumulated dead and down material contributing to the fuel loadings on the forest floor.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

April – December each year: Burning should occur during a period of cooler temperatures and moderate moisture (late fall) to allow for the best fuel consumption versus fire controllability ratio. Thinning and hand work could occur anytime conditions are dry enough to minimize soil disturbance, but preferably outside of extreme fire condition season. The south slope can be burned in late fall to achieve the desired results. The north slope could be thinned in two months. A cable yarder could remove most of material, or slash could be burned in the fall.

Estimated time required to complete project:
Depending on available resources the project could be completed in a 12 month time frame (one fall to the next).

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components, present an estimated cost for each.
Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 88 acres*	
Prescribed fire within 5 years	*$1,600 / acre X 88 acres*	
	Total Cost	***$ 281,600***

Biomass to be removed is approximately 44 tons / acre.

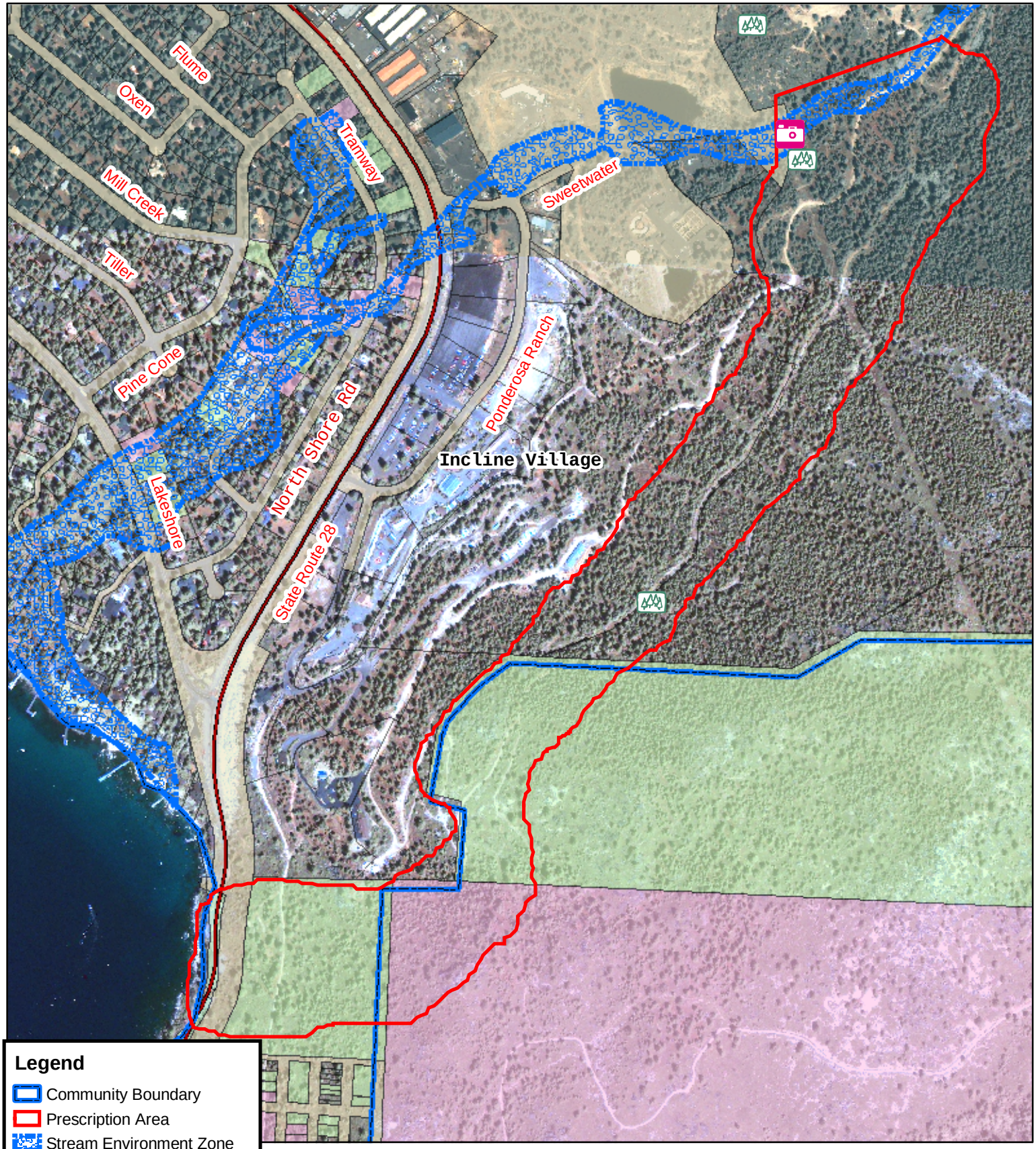
Project Maintenance Requirements:
Brush species will re-sprout readily, requiring frequent treatment every five years. Use of herbicide (Roundup painted on brush stumps) will prevent many of the shrubs from resprouting. Prescribed fire would be the preferred maintenance method every five to ten years.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

The NLTFPD should conduct a public education campaign to inform residents and businesses in the area of proposed actions and desired effects.

TRPA - Permit
NDF – Harvest Permit (N. slope)
Air Quality Permit (Washoe County)
NDF – Prescribed burn permit.

Typical vegetation condition in prescription area.



Legend

- Community Boundary
- Prescription Area
- Stream Environment Zone

Land Ownership

- FEDERAL
- LOCAL
- PRIVATE
- STATE
- Sample Plot w/ Photo Point
- Photo Point

Figure 7-2. Incline Village Unit 1

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340 N. Minnesota St.
Carson City, NV 89703
(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 2 - Thinning and Brush Removal; Fuelbreak**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Incline Village Unit 2 is characterized by an open stand of Jeffery pine with a heavy brush (up to 5' tall) understory. The brush is dense and forms a continuous fuel bed across a S-SW facing slope. The north slope is a dense mixed conifer stand of Jeffery pine, white fir, and incense cedar stocked at an estimated 120 square feet of basal area per acre and up.*

Worst Case Scenario / Hazard*: With the wind blowing upslope off of the lake, a human-caused ignition from the road or the development to the south would quickly spread into this area. This wind-driven fire would develop a large flame front threatening residences from County Club Drive to the ski resort. Should suppression fail at the ski resort, the flame front would move directly to Tyrolian Village. Burning embers from the flame front in this proposed treatment would easily reach Tyrolian Village under worst case conditions. Fire behavior would be extreme and uncontrollable.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

This project ranks as the #3 priority to reduce risk/hazard potential in the NLTFPD. Potential fire behavior is extreme, with a wind driven fire moving uphill in dense fuels towards commercial properties and residential structures. The project can be broken into two phases, the perimeter touching the community and the interior. The perimeter element would be a high priority, the interior could be a moderate priority. Should the interior remain untreated, the treatment around the perimeter would have to be more aggressive to be effective.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

West side of Incline Village, just south of Diamond Peak Ski Area. See Figure 7-3.

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

Remove or thin brush understory to decrease the fire intensity and reduce ladder fuels. Spacing between remaining bushes should be 2-3 times the height of brush. A brush masticator could be used where slopes are 30% or less, though few areas have slopes less than 30% in this prescription area. Grind the brush and leave as mulch, or hand cut, pile, and burn. Use of herbicide could reduce sprouting of some species.

Create a fuel break 300 feet wide along the north slope of the prescription area that borders the road to the ski resort. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre.

> **Prescribed fire could be used to reduce the brush understory, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control within five years of pile burning.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

This will help prevent a wildfire from moving into the SE part of Incline Village.
Treatment in this area will help contain human-caused ignitions below the project area, keeping fire from spreading uphill towards Lower Tyroiean Village and becoming uncontrollable. It will also protect the private and commercial structures from a downslope fire event. Implementation of the prescription will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will decrease the accumulation of dead and down material contributing to the fuel loadings on the forest floor.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Estimated Timeline:

Desirable time of year to complete:
April – December: Burning should occur during a period of cooler temperatures and moderate moisture (late fall) to allow for the best fuel consumption versus fire controllability ratio. Thinning and hand work could occur anytime conditions are dry enough to minimize soil disturbance, but preferably outside of extreme fire condition season. The south slope can be burned in late fall to achieve the desired results. The north slope could be thinned in two months. A cable yarder could remove most of material, or slash could be burned in the fall.

Estimated time required to complete project:
Depending on available resources the project could be completed in a 12-month timeframe (one fall to the next)

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

The NLTFPD should conduct a public education campaign to inform residents and businesses in the area of proposed actions and desired effects.

TRPA - Permit
NDF – Harvest Permit (N. slope)
NDF – Prescribed burn permit
Air Quality Permit (Washoe County)

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.
Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

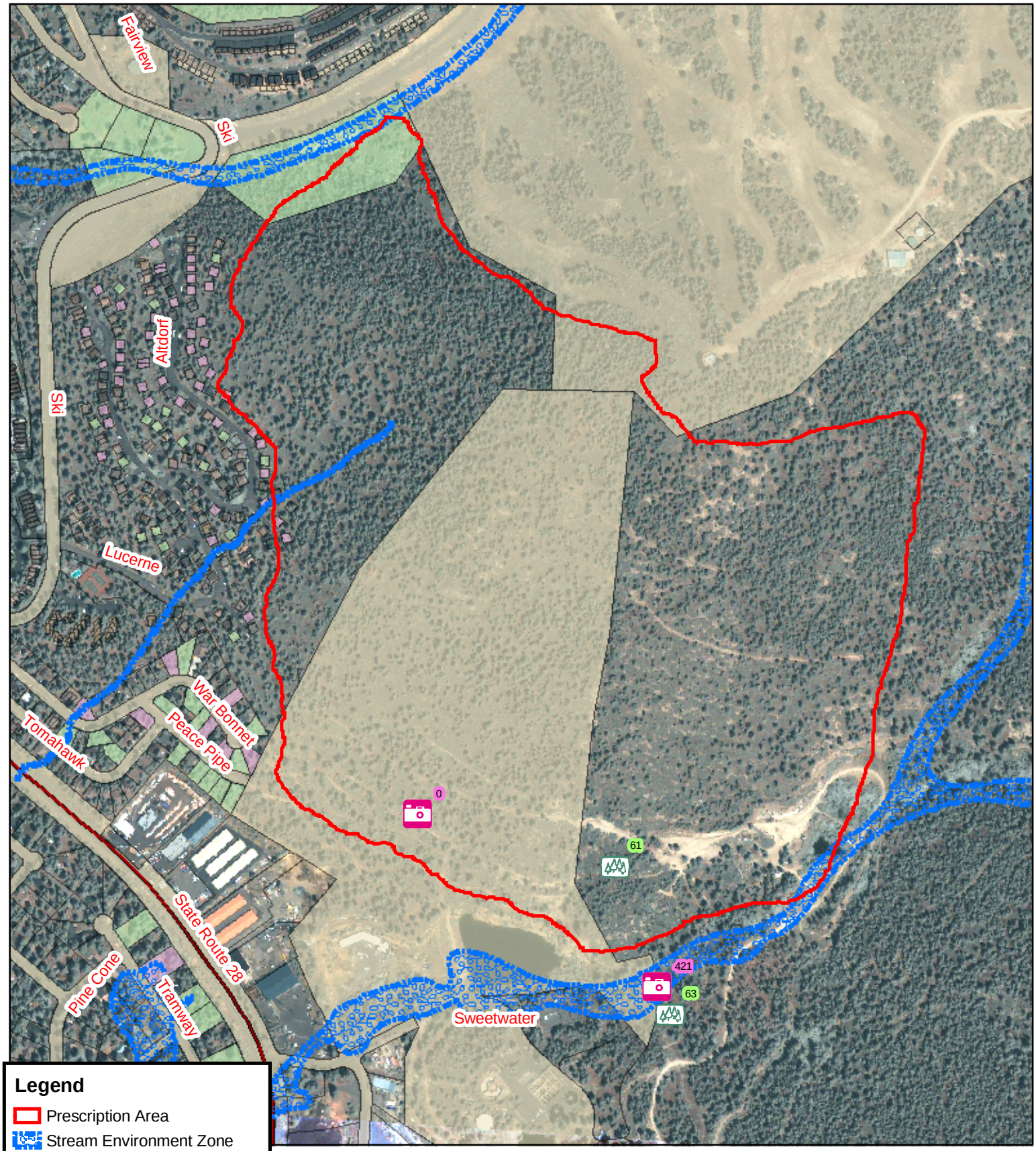
Hand cut, pile, and burn	*$2,000 / acre X 161 acres*	
	Total Cost	***$ 322,000***

Prescribed burn planned for Fall 2004, no biomass estimate with burning..

Project Maintenance Requirements:

Brush species will re-sprout readily, requiring frequent treatment every 5 years. Use of herbicide (Roundup painted on brush stumps) will prevent many of the shrubs from resprouting. Prescribed fire would be the preferred maintenance method every 10 years.

Typical vegetation condition in prescription area.



Legend

- Prescription Area
- Stream Environment Zone

Land Ownership

- FEDERAL
- LOCAL
- PRIVATE
- STATE
- Sample Plots w/ Photo Point
- Photo Point

Figure 7-3. Incline Village Unit 2

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(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 3 – Thinning and Brush Removal; Shaded Fuelbreak**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Incline Village Unit 3 is characterized by Jeffery pine and white fir stands with BA/AC ranging from 100-200+ ft^2. Slopes are west facing and 50-55% slope. The understory is brush, primarily bitterbrush and manzanita. A fire in this area could threaten Tyrolian Village and the developed area of Champagne/Burgundy. The area has received some thinning treatment; however, tree mortality is increasing the amount of dead and down fuels.*

Worst Case Scenario / Hazard: *With the wind blowing off of the lake upslope, a human-caused ignition from the road or the development to the south would quickly spread into this area. Wind-driven, the fire would develop a large flame front moving up towards Tyrolian Village at the top of the ridge. Burning embers from the flame front in this proposed treatment would easily reach Tyrolian Village and further under worst case conditions.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

Given the threat to structures, the prescription area downhill of Tyrolian Village and the Mt. Rose Highway is the #2 priority for the NLTFPD. The area above the community to the west would be a moderate priority.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

Around the Tyrolian Village neighborhood and the lookout curve on the Mt. Rose Highway.
See Figure 7-4.

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

Remove or thin brush understory to decrease the fire intensity and reduce ladder fuels. Remove dead and down material. Spacing between remaining bushes should be 2-3 times the height of brush. A brush masticator could be not be used on this project as the slopes are all above 30%. Aerial systems or other steep slope methods should be explored. Hand cut, pile, and burn. Use of herbicide could reduce sprouting of some species.

The entire prescription area needs to be thinned to reduce fuel loadings and increase forest health. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre. Construct a shaded fuel break 400 feet wide on east side of Tyrolean Village and along the north side of ski area. Hand cut, pile & burn.

> **Prescribed fire could be used to reduce the brush understory, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control within five years of pile burning.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

This prescription will reduce the chance of an uncontrollable fire burning into the Tyrolian Village neighborhood and the developed area of Champagne/Burgundy. It would protect the Mt. Rose Highway and the neighborhoods from a downslope fire. The shaded fuel break along the north side of the ski area would protect the ski area facilities from a fire moving up the drainage to the west or from across the drainage to the south. Implementation of the prescription will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will reduce the amount of accumulated dead and down material contributing to the fuel loadings on the forest floor.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

Desirable time of year to complete:
Burning should occur during a period of cooler temperatures and moderate moisture (late fall) to allow for the best fuel consumption versus fire controllability ratio. Thinning and hand work could occur anytime conditions are dry enough to minimize soil disturbance, but preferably outside of extreme fire condition season.

Estimated time required to complete project:
Depending on available resources the project could be completed in a 12-month timeframe (one fall to the next)

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.

Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 388 acres*	
Prescribed fire within 5 years	*$2,000 / acre X 388 acres*	
	Total Cost	***$ 1,552,000***

Biomass to be removed is approximately 30 tons / acre

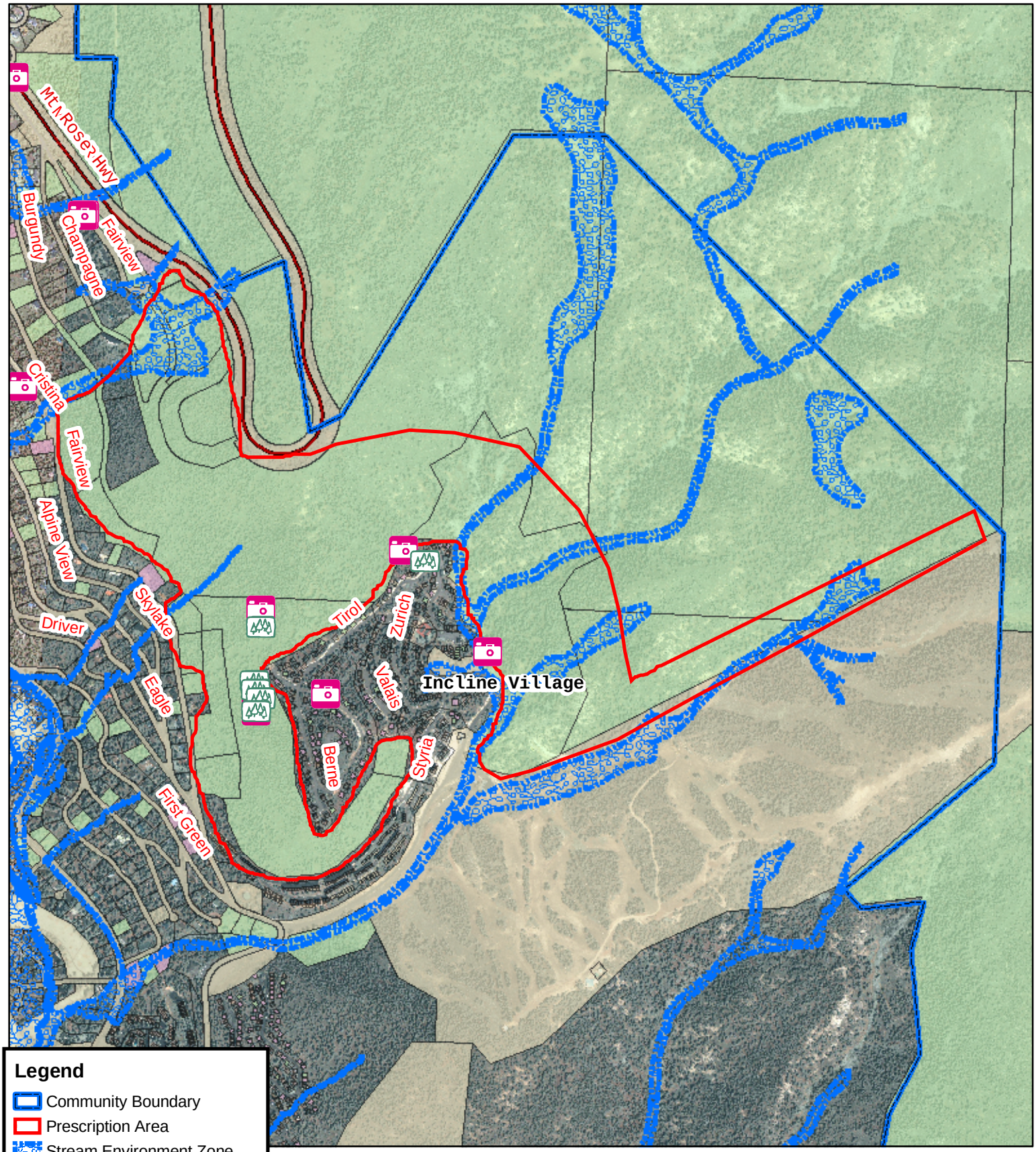
Project Maintenance Requirements:

Re-burn or thin every 10 years.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

USFS - Approval
TRPA – Approval
Air Quality – Washoe County permit.

Typical vegetation condition in prescription area.



Legend

- Community Boundary
- Prescription Area
- Stream Environment Zone

Land Ownership

- FEDERAL
- LOCAL
- PRIVATE
- STATE
- Sample Plots w/ Photo Point
- Photo Point

Figure 7-4. Incline Village Unit 3

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340 N. Minnesota St.
Carson City, NV 89703
(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 4 – Thinning and Brush Removal**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Incline Village Unit 4 is characterized by an overstocked, dense forest stand dominated by Jeffery pine and white fir. Stocking levels are very high, estimated at 200 square feet of basal area per acre. The area inside of State Highway 431 has dense brush (bitter cherry 5-6') with a tree component of Jeffery pine and white fir. Many trees are up to 85 feet in height. Slopes are southwest facing and steep, most all over 30%.*

The portion of the unit managed by Incline Village General Improvement District (IVGID) was treated by NLTFPD with prescribed fire, which effectively removed brush and some of litter. Dense forest stands increase competition for limited moisture and nutrients, especially during drought years resulting in bark beetles invasion in this area, increasing mortality in the last 10 years. There is a large amount of dead and down material on IVGID and U.S. Forest Service (USFS) land in this area.

Worst Case Scenario / Hazard *- This project area surrounds the Apollo Ct. area on three sides. A fire in these dense fuels would be very difficult to suppress and would threaten the neighborhood. The fuels are mostly uphill of the neighborhood, but in swirling or downslope winds a fire would be difficult to keep from the neighborhood.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

Given the proximity to the subdivision, and the completion of recent fuels mitigation work in the prescription area, the whole area ranks as the #6 priority for the NLTFPD. It is critical to maintain the previous fuel treatment projects, not only for community safety but also for cost effectiveness of the project.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

This project area surrounds the Apollo Court area on three sides. See Figure 7-5.

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

Remove or thin brush understory to decrease the fire intensity and reduce ladder fuels. Remove dead and down material. Spacing between remaining bushes should be 2-3 times the height of brush. A brush masticator could not be used on this project as the slopes are all above 30%. Aerial systems or other steep slope methods should be explored. Hand cut, pile, and burn. Use of herbicide could reduce sprouting of some species.

The entire prescription area needs to be thinned to reduce fuel loadings and increase forest health. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre. Steep slopes require work be completed by hand or aerial systems. A cable yarder could be effective in treating part of this area. Remove or burn slash from the thinning operation.

> **Prescribed fire could be used to maintain the effects of the previous treatment, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

Treating this area will enhance effects of the previous treatments. Not only will this treatment protect the community from fires moving downhill towards the neighborhoods, it will reduce the fire intensity immediately adjacent to the neighborhood. It may also help prevent a fire from escaping the neighborhood, reducing its rate of spread and aiding access during suppression efforts. Implementation of the prescription will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will reduce the amount of accumulated dead and down material contributing to the fuel loadings on the forest floor. Thinning will also increase the spacing between residual trees, allowing heat from a ground fire to escape through the canopy, lowering fire intensity and decreasing the ability of the stand to carry a crown fire.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

Desirable time of year to complete:
Hand work: May – December.
Burning: October - December.

Estimated time required to complete project:

24 months (working two seasons)

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.

Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 389 acres*	
Prescribed fire within 5 years	*$1,200 / acre X 389 acres*	
	Total Cost	***$ 1,244,800***

Biomass to be removed is approximately 56 tons / acre

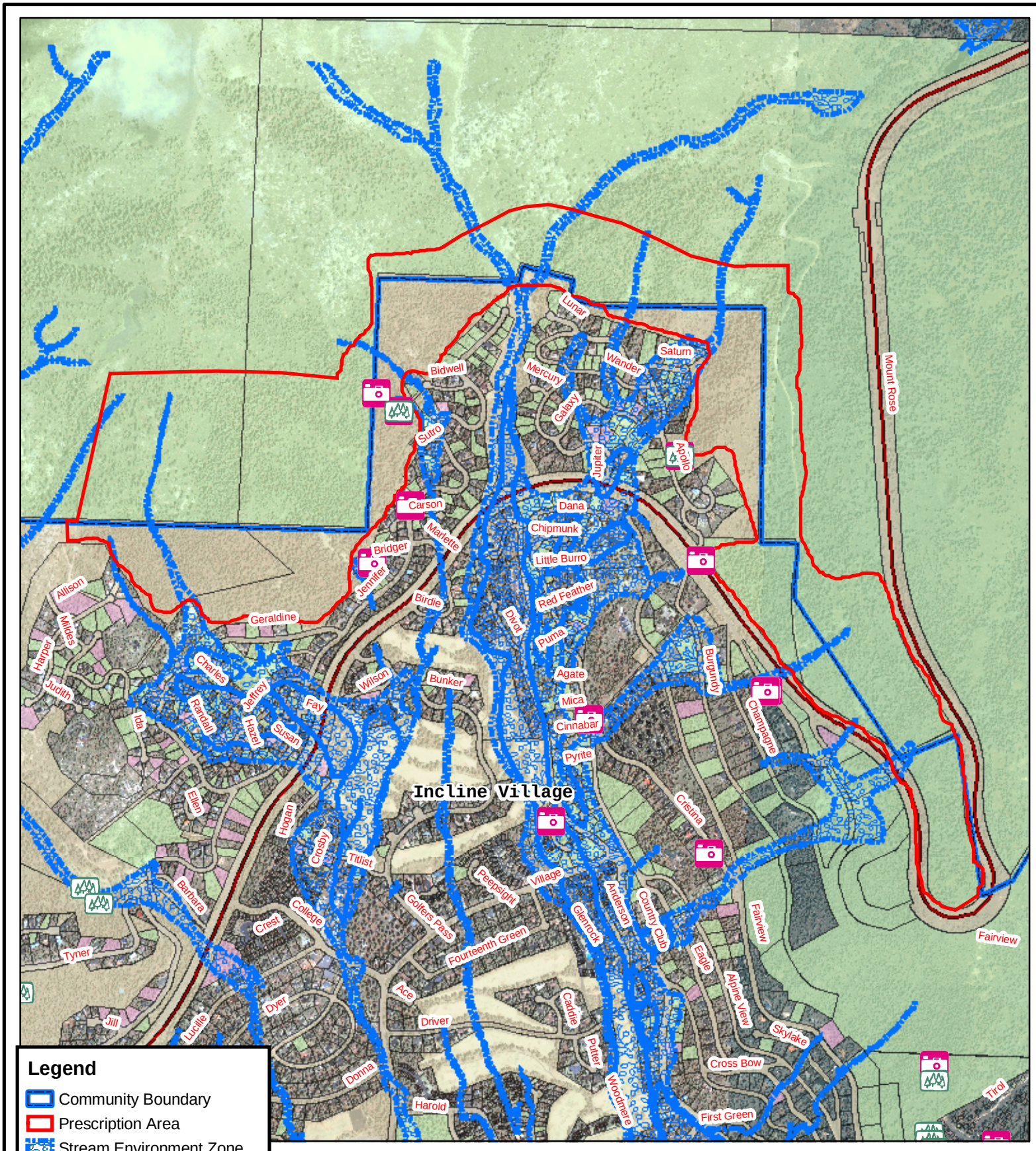
Project Maintenance Requirements:

After pile burning, a prescribed burn should be run through the area to reduce additional ground fuels and brush within five years of burning piles. Prescribed burn every 10 years after initial burn.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

TRPA Tree Removal plan.
USFS Approval on USFS land.
State (NDF) Timber Harvest Permit
State (NDF) Stream Zone Permit
Air Quality Permit (Washoe Co.)

Typical vegetation condition in prescription area.



Legend

- Community Boundary
- Prescription Area
- Stream Environment Zone

Washoe County Parcels

- FEDERAL
- LOCAL
- PRIVATE
- STATE

- Sample Plot w/ Photo Point
- Photo Point

Figure 7-5. Incline Village Unit 4

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340 N. Minnesota St.
Carson City, NV 89703
(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 5 – Thinning and Brush Removal**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Incline Village Unit 5 is characterized by a dense second growth stand of Jeffery pine and white fir. The forest stand is overstocked. East–west facing slopes are steep down into the bottom of the drainage. Most of the unit has been treated with prescribed fire to reduce ground fuels, shrubs and ladder fuels. Forest health has declined, with tree mortality from insect infestation creating more dead and down fuels that could carry a fire into the tree crowns.*

Worst Case Scenario / Hazard *– A wind driven crown fire ignited in the bottom of the drainage would burn upslope through the treatment area into the neighborhoods on the top of the ridge.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

With the work that has already been accomplished in the prescription area to remove ground and ladder fuels, the proposed treatment to open up the canopy would be very effective in reducing the overall fire hazard. There are numerous homes with moderate access are directly uphill of the prescription area. This project is the #5 priority for the NLTFPD.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

The open space/stream zone area between Upper Tyner and Allison Jennifer neighborhoods.
See Figure 7-6.

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

The entire prescription area needs to be thinned to reduce fuel loadings and increase forest health. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre. Steep slopes require work be completed by hand or aerial systems. A cable yarder could be effective in treating part of this area, however, cable systems are listed as a ground based system by TRPA. Slash from the thinning operation would have to be removed or burned. The objective is to thin the stand to open the tree canopy, and allow the heat of a ground fire to vent through the crowns, lowering fire intensity and preventing a crown fire.

> **Prescribed fire could be used to maintain the effects of the previous treatment, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

Treating this area will enhance effects of the previous treatments. Not only will this treatment protect the community from fires moving downhill towards the neighborhoods, it will reduce the fire intensity immediately adjacent to the neighborhood. It may also help prevent a fire from escaping the neighborhood, reducing its rate of spread and aiding access during suppression efforts. Implementation of the prescription will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will decrease the accumulation of dead and down material contributing to the fuel loadings on the forest floor. Thinning will also increase the spacing between residual trees, allowing heat from a ground fire to escape through the canopy, lowering fire intensity and decreasing the ability of the stand to carry a crown fire.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

Desirable time of year to complete:
May – December, though some aerial systems could function at all times of the year. The limitation would be getting the trees above the snow.

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Estimated time required to complete project:
Two operational seasons by hand. One season with aerial systems.

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.
Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 208 acres*	
Prescribed fire within 5 years	*$1,200 / acre X 208 acres*	
	Total Cost	***$ 665,600***

Biomass to be removed is approximately 35 tons / acre

Project Maintenance Requirements:

Thin again in 15-20 years. Re-burn area within 10 years of slash disposal.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

TRPA Tree Removal Permit.
State (NDF) Timber Harvest Permit
State (NDF) Stream Zone Permit
Air Quality Permit (Washoe Co.)

Typical vegetation condition in prescription area.

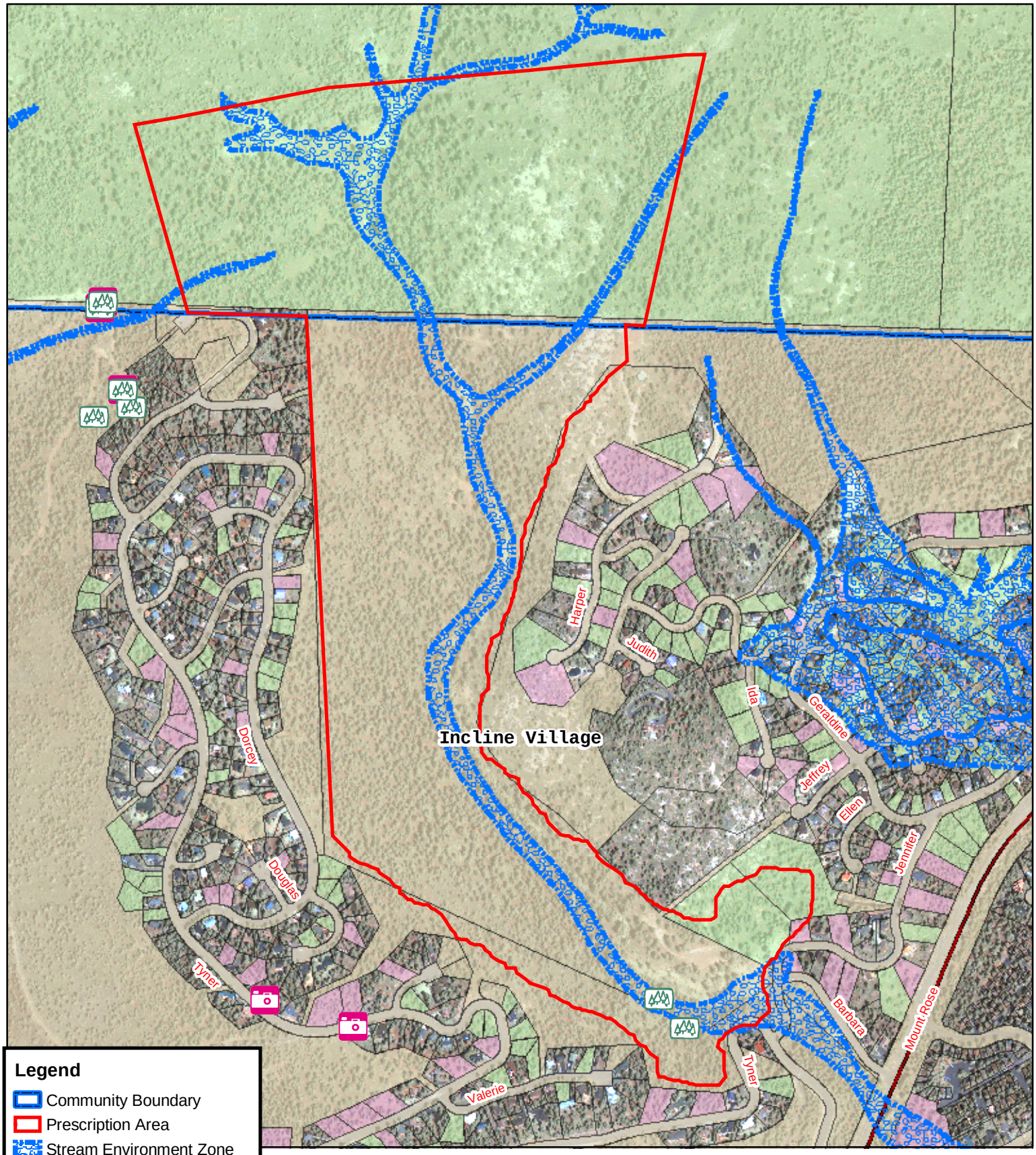

Figure 7-6. Incline Village Unit 5

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340 N. Minnesota St.
Carson City, NV 89703
(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **INCLINE VILLAGE** Date: July, 2004
Project Title: **Incline Village Unit 6 Second Creek – Thinning and Brush Removal**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel: *The Incline Village Unit 6 is characterized by a dense second growth stand of Jeffery pine and white fir in the Second Creek drainage between the Upper Tyner and Saddlehorn/Tumbleweed neighborhoods and the First Creek drainage. The existing stand density is overstocked with 190 square feet of basal area per acre. Slopes are steep, over 30%, throughout the prescription area. Most of the unit has been treated with prescribed fire to reduce ground fuels, shrubs and ladder fuels. Forest health has declined, with tree mortality from insect infestation creating more dead and down fuels that could carry a fire into the tree crowns.*

Worst Case Scenario: *A wind driven fire that starts in either the First or Second Creek drainages and moves upslope to the Saddlehorn/Tumbleweed neighborhood. Fire behavior in this fuel type with winds and topography would be extreme and uncontrollable.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

With the work that has already been accomplished in the prescription area to remove ground and ladder fuels, the proposed treatment to open up the canopy would be very effective in reducing the overall fire hazard. Numerous homes with moderate access are directly uphill of the prescription area. This project is the #4 priority.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

In the Second Creek drainage between the Upper Tyner and the Saddlehorn/Tumbleweed neighborhoods. See Figure 7-7.

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

The entire prescription area needs to be thinned to reduce fuel loadings and increase forest health. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre. Steep slopes require the work to be completed by hand or aerial systems. A cable yarder could be effective in treating part of this area, however, cable systems are listed as a ground based system by TRPA. Remove or burn slash from the thinning operation. The objective is to thin the stand to open the tree canopy, and allow the heat of a ground fire to vent through the crowns, lowering fire intensity and preventing a crown fire.

**Prescribed fire could be used to maintain the effects of the previous treatment, and desired where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control.*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

Treating this area will enhance effects of the previous treatments. Not only will this treatment protect the community from fires moving downhill towards the neighborhoods, it will reduce the fire intensity immediately adjacent to the neighborhood. It may also help prevent a fire from escaping the neighborhood, reducing its rate of spread and aiding access during suppression efforts. Implementation of the prescription will reduce the competition among residual trees, increasing forest health and decreasing tree mortality. This will reduce the amount of accumulated dead and down material contributing to the fuel loadings on the forest floor. Thinning will also increase the spacing between residual trees, allowing heat from a ground fire to escape through the canopy, lowering fire intensity and decreasing the ability of the stand to carry a crown fire.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Incline area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

Desirable time of year to complete:
May – December.

Estimated time required to complete project:
Possibly 3 operational seasons for hand treatment. One season for aerial systems.

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.

Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 524 acres*	
Prescribed fire within 5 years	*$1,200 / acre X 524 acres*	
	Total Cost	***$ 1,676,800***

Biomass to be removed is approximately 47 tons / acre

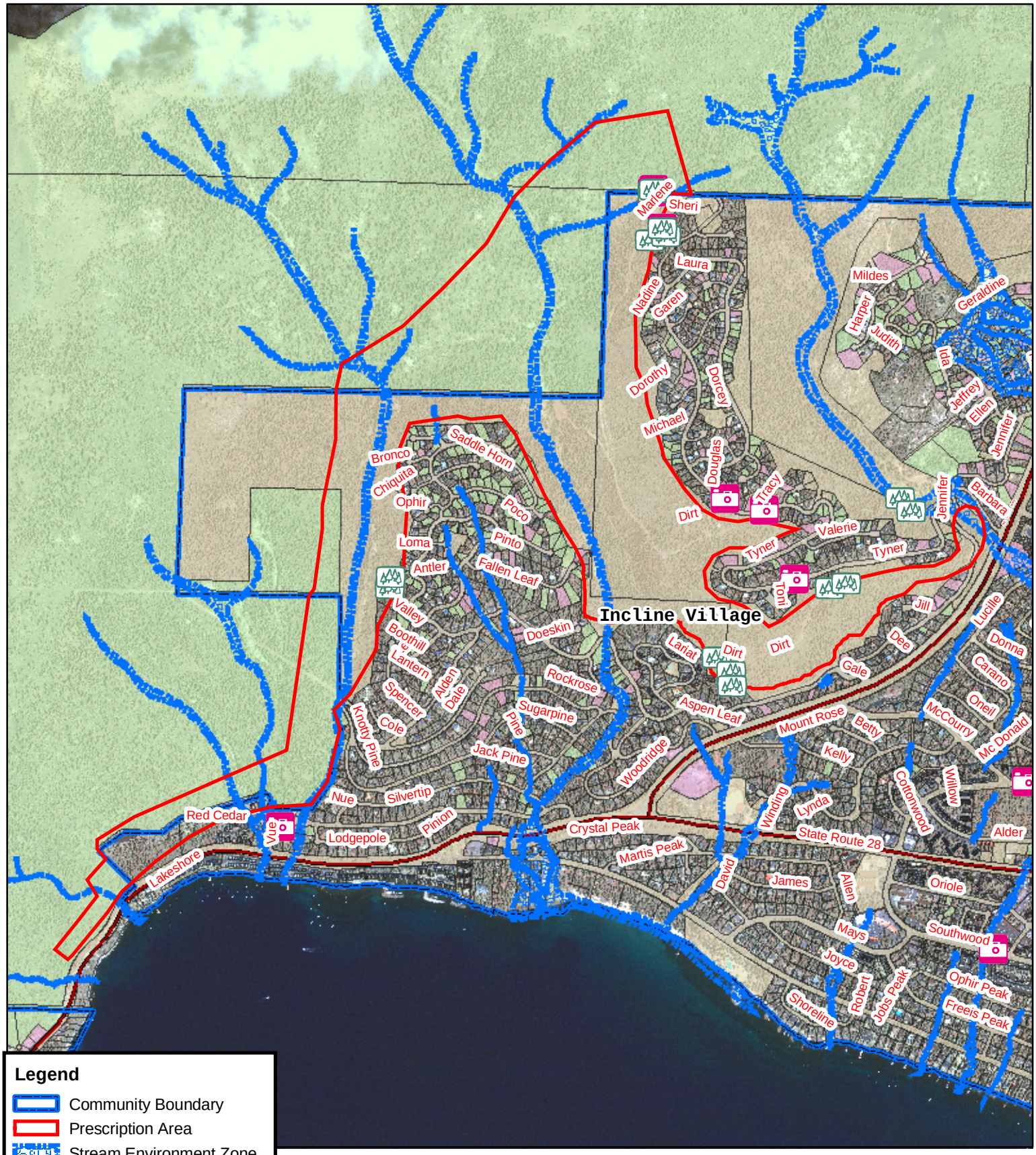
Project Maintenance Requirements:

Re-thin in 15 – 20 years.
Re-burn at 10 yr. Intervals.

Other Considerations: Describe any other considerations that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

TRPA Tree Removal Permit.
State (NDF) Timber Harvest Permit
State (NDF) Stream Zone Variance
Air Quality Permit (Washoe Co.)

Typical vegetation condition in prescription area.



Legend

- Community Boundary
- Prescription Area
- Stream Environment Zone

Land Ownership

- FEDERAL
- LOCAL
- PRIVATE
- STATE
- Sample Plot w/ Photo Point
- Photo Point

Figure 7-7. Incline Village Unit 6

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Miles

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Carson City, NV 89703
(775)-883-1600

Nevada Community Wildfire Risk/Hazard Assessment Project

Risk/Hazard Identification and Mitigation Project Worksheet
(Complete one worksheet for each mitigation project proposed)

Name of Community: **CRYSTAL BAY** Date: July 2004
Project Title: **Crystal Bay Unit 1 – Thinning and Brush Removal**

Description of Risk/Hazard: Describe in detail the risk or hazard that poses a threat to the community.

Vegetative Fuel and Topography: *The Crystal Bay Unit 1 is characterized by a dense forest stand of Jeffery pine and white fir. There is an abundance of dead and down woody material and steep slopes above the homes in the Crystal Bay area. A heavy brush understory exists in, around, and above homes.*

Worst Case Scenario: *A fire that starts on the California side of the Nevada/California state line could spread into the homes in Crystal Bay, driven by the wind and topography, and fueled by dense understory vegetation. The fire would eventually ladder into the tree crown.*

Priority Ranking: What is the priority ranking of this risk/hazard in relation to all others identified?

The dense, untreated fuel loadings and wind driven fire behavior scenarios make this project the #1 priority for the NLTFPD.

Location: Describe or attach a map with sufficient detail to allow accurate ground location.

Above the Crystal Bay community, illustrated on Figure 7-8

Recommended Mitigation Measures and Scope of Work: Present prescription and work specifications in sufficient detail to facilitate procurement of bids and quotes. For hazardous fuel removal projects include estimated volumes (tons/acre) of fuel removed and disposal plan.

Remove or thin brush understory to decrease the fire intensity and reduce ladder fuels. Spacing between remaining bushes should be 2-3 times the height of brush. A brush masticator could be used where slopes are 30% or less, though few areas are less than 30% slopes in this prescription area. Grind the brush and leave as mulch, or hand cut, pile, and burn. Use of herbicide could reduce sprouting of some species.

Establish a shaded fuel break within the Wildland Urban interface (WUI). The fuel break would be situated upslope and west of private land in Crystal Bay for ¼ mile. Thin from below, removing smaller trees and leaving larger ones to achieve the desired stocking rate of 80 to 100 square feet of basal area per acre.

> **Prescribed fire could be used to reduce the brush understory, and is the desired treatment where feasible to return fire to the landscape. It should only be applied in areas after thinning and slash pile burning are complete to maintain fire control*

Evaluation of the Extent to Which Completion of This Project Will Reduce the Fire Threat:

Thinning trees and opening the tree canopy while removing understory shrubs and small trees (ladder fuels) will reduce the threat of an uncontrolled crown fire burning into the homes of Crystal Bay and threatening SW Incline Village. Treatment in this area will help contain human-caused ignitions below the project area, keeping them from spreading uphill and becoming uncontrollable fire events.

If all of the recommendations in this report are implemented, there is still no guarantee that a devastating wildfire will not occur in the Crystal Bay area. However, community awareness and individual attention to fuels management on private property and fuel reduction on state, federal, and county property will help to achieve the highest level of wildfire safety possible.

Identification of Protected Species or Other Critical Resources: Describe any measures that must be taken to protect critical wildlife habitat, historic or culturally sensitive sites, artifacts or other resources, and plant and animal species protected by statute.

Environmental compliance measures must be implemented before project initiation. Stream Environment Zones are located in the project area and must be protected, employing appropriate TRPA mitigation measures.

Some threatened and endangered species exist in the Tahoe Basin. Appropriate avoidance and mitigation measures should be employed during project implementation.

Compliance with cultural resource protection may also be necessary. Check with TRPA and the NVSHPO to ensure cultural resources are protected.

Post-project Rehabilitation: Present scope of work in sufficient detail to facilitate procurement of bids and quotes.

Rehabilitate any fire control lines, landings or disturbed areas. Rehabilitation will be minimal if only hand methods are used. Where soil has been disturbed, TRPA rehabilitation measures and Best Management Practices would apply. This could include reseeding or mulching areas if necessary.

Estimated Timeline:

Desirable time of year to complete:
May - December

Estimated time required to complete project:
Two operational seasons.

Estimated Cost: Present an estimate of the total cost of project completion and the basis for the estimate presented. If the project can be subdivided into phases or various components present an estimated cost for each.
Cable yarding is recommended, however, no costs for cable yarding were available.
The costs below are a minimum based on currently accepted methods in the Tahoe Basin.

Hand cut, pile, and burn	*$2,000 / acre X 161 acres*	
Prescribed fire within 5 years	*$1,200 / acre X 161 acres*	
	Total Cost	***$ 531,200***

Project Maintenance Requirements:

Re-thin in 15-20 years. Re-burn at ten-year intervals or less.
Prescribed burn within five years after cut, pile, and burn.

Other Considerations: Describe any other consideration that must be taken into account to successfully complete this project such as permits, clearances, approvals, etc.

TRPA tree removal permit
State (NDF) Tree Harvest Plan.
State (NDF) streamzone variance
Air Quality Permit (Washoe County)
NEPA Compliance (LTBMU)

Typical vegetation condition in prescription area.

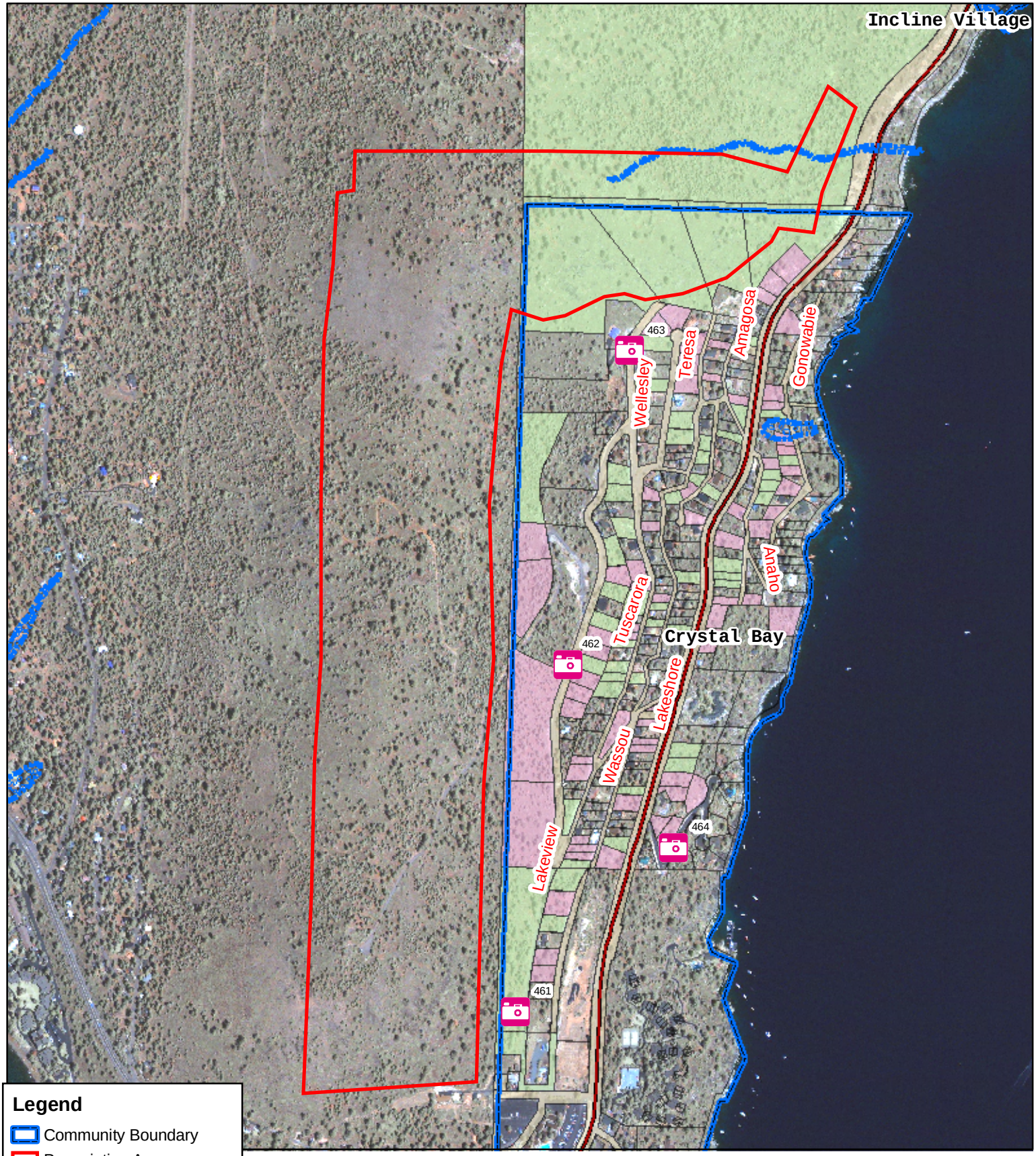

Figure 7-8. Crystal Bay Unit 1

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Nevada Community Wildfire Risk/Hazard Assessment Project

8.0 CONCLUSIONS

The communities of Incline Village and Crystal Bay both have a high potential ignition risks and extreme fire hazard ratings. These ratings are primarily attributed to inadequate defensible space, combustible building materials, heavy fuels, and steep southwest facing slopes. The following table summarizes the communities and the risk and hazard assessment results for each community.

Table 8-1. Community Risk and Hazard Assessment Results Summary

COMMUNITY	INTERFACE CONDITION	OVERALL FUEL DENSITY	POTENTIAL IGNITION RISK	FIRE HAZARD RATING
Incline Village	Intermix	High	High	Extreme
Crystal Bay	Intermix	High	High	Extreme

Each of the following efforts must be undertaken immediately and simultaneously to reduce the risks and hazards in the Lake Tahoe Basin. Each are of equal priority:

- Homeowners must immediately implement defensible space in accordance with existing ordinances;
- The US Forest Service, fire districts, and other landowners must finalize detailed implementation plans and permitting for the priority treatment areas.
- The TRPA, US Forest Service, and Fire Districts must explore alternative treatment methods for steep slopes such as cable yarding.
- Funding needs to be secured as soon as possible to implement the proposed wildfire hazard mitigation projects identified in this report.

To be most effective, fire safe practices need to be implemented on a community-wide basis. There is no way to completely eliminate the threat that wildfires present to communities at the wildland interface. However, the recommendations in this report are intended to increase public awareness and encourage concerned community members to make proactive efforts to effectively reduce the risk of wildfire ignitions near their communities. Implementing defensible space and fuel reduction projects, and public education programs, will help to mitigate the hazards inherent in wildland interface areas.

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APPENDICES

Appendix A

List of Persons Contacted
List of Public Meetings

Appendix A

List of Persons Contacted

Fire Chief Bruce Van Cleemput	*Tahoe-Douglas Fire Protection District*	*May 11, 2004*
Fire Chief Jim Linardos	*North Lake Tahoe Fire Protection District*	*May 21, 2004*
Dave Marlow	*USFS Lake Tahoe Basin Management Unit*	*June 15, 2004*

Public Meetings and Input

Public Meetings were held as follows:

July 8th, 2004
at the North Lake Tahoe Fire Protection District Fire Station

July 19th, 2004
at the Tahoe-Douglas Fire Protection District Fire Station

The public review draft was circulated from July 12th, 2004 through July 22nd , 2004 at the TRPA office, the fire protection district offices, and libraries.

Representatives from the League to Save Lake Tahoe and the Tahoe Regional Planning Agency were a part of the review process.

Comments were received via e-mail and were incorporated into this final document.

Written comments were received from the following:

North Lake Tahoe Fire Protection District
Tahoe Douglas Fire Protection District
Lake Tahoe Basin Management Unit
League to Save Lake Tahoe
The Nevada Fire Safe Council
Cindy Neisess
Peter King
Richard Trossen
Bill and Barbara Dohrmann

Appendix B

Glossary of Terms Used in Wildfire Management

Appendix B
Glossary of Terms used in Wildfire Management

Ad valorem: according to the current value, e.g. an *ad valorem* tax on goods.

Annual grass treatment: This treatment involves either chemical or mechanical methods for reducing flashy fuels associated with annual grass infestations (cheatgrass). Casarone® or other pre-emergent herbicides can be applied at the proper rates near residential areas to reduce the fuel load from annual grasses. Mowing the annual grasses once they dry-out in the spring, preferably before going to seed, reduces the amount fine fuels during the summer fire season. Repeated mowing over several years should reduce the density of the annual grass as long as mowing occurs before seed set.

Basal Area: The area of the cross section of a tree at a height of 4.5 feet above the ground. The basal area of all trees in a given land area describes the degree to which an area is occupied by trees and is generally expressed in square feet per acre (ft2/acre)

Biomass Utilization and Disposal: Biomass utilization is an alternative to open pile burning or landfill disposal. It would result in the use of the natural resource for beneficial purposes such as firewood, wood chips, compost, and other products. If residents cannot find an alternative to burning, then proper burning procedures should be followed.

Classic Interface: Structures abut native vegetation with a clear line of separation between structures and the wildland vegetation along roads and fences. The fuels do not extend into the developed areas.

Defensible space: Defensible space is defined as a *minimum 30-foot area* around houses and other structures where vegetation has been significantly modified or removed. The purpose of creating defensible space is to reduce the risk of losing homes and other property improvements to a wildfire (Smith and Adams, 1991). Defensible space is especially important in communities with structures directly adjacent to wildland vegetation, as in the intermix or rural interface conditions, where wildfires can spread quickly through the wildland fuels, threatening homes and lives.

Fire hazard: As used in this report, vegetative factors that affect the intensity and rate of spread of a fire as well as urban factors that can facilitate or inhibit public safety and the containment of a fire in an interface area.

Fire regime: A term used by fire ecologists to describe the periodicity and intensity of fire as specific to a plant community.

Fire risk: As used in this report, potential ignition sources and factors that facilitate ignition of wildfires in or near interface areas.

Fuelbreaks: A fuelbreak is a strip of land, strategically placed, on which a cover of dense, heavy, or flammable vegetation has been permanently changed to one of lower fuel volume or reduced flammability. Primary fuelbreaks flank ridge tops and valley bottoms and are used to control large fires. The recommended minimum width is 300 feet. Secondary fuelbreaks are used to break down large forested areas along roads, drainage ridges, communities and other valuable resources to support fires suppression into areas of less than 1,000 acres. Fuelbreak construction may include removing, controlling and possible replacing highly flammable vegetation with more fire resistant species. Ridge top fuelbreaks should have continuous length and width, which requires long-range planning. Fuels are reduced, ladder fuel is removed, and the canopy closure is reduced in fuelbreak treatments.

Fuel Reduction Treatment: This treatment involves strategically locating blocks of land near communities where flammable vegetation has been permanently changed to one of lower fuel volume or reduced flammability. Fuel reduction treatments may also involve replacement of highly flammable vegetation with less flammable or more fire resistant species.

Fuel Loading: An ocular estimate of the tons per acre (t/ac) of combustible fuels present on a site. Parameters for this assessment are less than 1 t/ac for "light fuels," 1-4 t/ac for "medium fuels," and >4 t/ac for "heavy fuels."

Greenstrips: Greenstrips are irrigated or usually non-irrigated bands of open space on private or public land (at least a minimum of 300 feet wide) that serve as a buffer zone between wildlands and adjacent urban development to promote safer environments. These areas are usually seeded to establish vegetation that is relatively fire resistant or burns slowly and with shortened flame lengths. Seedings also decrease soil erosion and prevent invasion of noxious weeds and other aggressive plants such as cheatgrass and Russian knapweed.

High Hazard Day: Also known as a "red flag day", a combination of conditions such as low humidity (less than 15%), high winds (>25 mph), and low fuel moisture create a high probability of ignition and subsequent increased fire intensity. Various agencies have different trigger points to establish a "high hazard day".

Interface Condition. Describes the density and distribution of structures with respect to the surrounding wildland environment. The four Interface Conditions are Rural, Intermixed, Occluded, and Classic.

Intermix Interface: Structures are scattered throughout the wildland, with no clear boundary between the wildland vegetation and the community.

Occluded Interface: This condition is usually within towns and cities where there are small islands of wildland fuels such as parks or open space. There is a clear boundary between the community and the wildland vegetation.

Red Card Certification: A fire qualifications management system used by many state and all federal wildland fire management agencies to ensure that individuals are qualified to fight wildland fires.

Rural Interface: Clusters of structures such as ranches or summer homes are widely spaced, sometimes more than a mile apart. The rural homes are surrounded by the wildland vegetation, with no clear line of separation between the fuels and homes.

Shaded fuelbreaks: A shaded fuelbreak is created by altering surface fuels and increasing the height of the base of the live crown and opening the canopy by removing trees. This type of fuelbreak spans a wide range of understory and overstory prescriptions and methods of creation through manual, mechanical and the use of prescribed fires. A fuelbreak network system could be used to protect critical watersheds while more remote areas might have narrower fuelbreaks that might serve as anchor points for prescribed fires. A fuelbreak strategy can be effective even if fuelbreaks are not connected.

Thermal belt: Heat absorbed by the soil during the day radiates from the soil surface of the mountain at night and rises into the free air. The radiation of heat makes the air closest to the soil surface colder than the free air. The cold air near the ground then moves downward into the valley. This movement of cold air to the valley forces the warm air in the valley upward. During the night there is a continuous interchange of cold air from the mountain surface and warmer free air from the valley. This condition creates a 'belt' of warm air, low humidity, and higher wind speed, leading to a higher risk of ignition in the belt area than elsewhere on the mountain.

Appendix C

TRPA/NLTFPD Memorandum of Understanding

TAHOE REGIONAL PLANNING AGENCY

MEMORANDUM OF UNDERSTANDING BETWEEN THE TAHOE REGIONAL PLANNING AGENCY AND THE NORTH LAKE TAHOE FIRE PROTECTION DISTRICT

This memorandum of understanding is entered into this 26th day of May, 2004 between the Tahoe Regional Planning Agency ("TRPA"), a bi-state agency created under the Tahoe Regional Planning Compact and the North Lake Tahoe Fire Protection District ("District"), a political subdivision of the State of Nevada.

Recitals

A. Pursuant to the authority of the Lake Tahoe Regional Planning Compact ("Compact"), P.L. 96-551, the TRPA issues permits for activities that may affect the natural resources of the Lake Tahoe Basin. Pursuant to TRPA Code of Ordinance Sections 71.5C and/or 75.3, the TRPA can issue permits to land owners who want to remove trees on their property that have been reported to be a fire hazard by a qualified forester or, as determined by local, state or federal fire agencies, within areas of significant fire hazard, flammable or other combustable vegetation may be removed, thinned, or manipulated up to 30 feet from any structure to prevent the spread of wildfire.

B. The District, created by N.R.S. 474.010 to 474.450, has statutory responsibility for protecting life and property from fire in the unincorporated area of Incline Village and Crystal Bay Nevada. Pursuant to N.R.S. 474.160, the District has the authority and duty to eliminate and remove fire hazards within the district wherever practicable and possible, whether on private or public premises, and to that end the board may clear the public highways and private lands of dry grass, stubble, brush, rubbish or other inflammable material in its judgment constituting a fire hazard. Pursuant to N.R.S. 474.580, any owner of lands within the District shall eliminate and remove a fire hazard on his/her/its property when directed to do so by the District.

C. TRPA generally seeks to defer its authority to eliminate fire hazards to local jurisdictions where feasible. Under TRPA Code of Ordinances Section 71.1.A, TRPA may delegate its tree removal permitting authority for the prevention of fire to qualified agencies.

D. The District employs a qualified forester, able to issue tree removal permits consistent with Chapter 71 pertaining to elimination of fire hazards, inclusive, and Code section 75.3, of the TRPA Code of Ordinances.

E. The TRPA and the District are collaborating on a plan to protect Lake Tahoe and its residents from catastrophic wildfire. Educating and assisting private property owners in achieving defensible space is a key component in the plan to restore the forest to healthy conditions. In an effort to encourage public participation, this MOU is intended to streamline the process for homeowners seeking defensible space and tree removal permits.

F. The TRPA and District acknowledge that neither party waives any legal or jurisdictional authority that they may presently have with regard to the issuance of tree removal permits for creation of defensible spaces and the elimination of fire hazards.

G. The procedures outlined in this MOU will ensure that tree removal permits issued by the District will be for the purpose of eliminating any and all fire hazards within the District.

NOW THEREFORE, IT IS UNDERSTOOD BY THE TRPA AND THE DISTRICT:

1. TRPA hereby delegates to the District the authority held by it to issue permits for the removal or treatment of trees and other vegetation within 30 feet of structures on all lands within the unincorporated areas of Incline Village and Crystal Bay, excluding state and federal lands.

2. The Fire Chief of the District, based upon a report from a qualified forester under his/her supervision, shall issue tree removal permits in accordance with the provisions of this MOU and all applicable standards of the TRPA Code of Ordinances that pertain to the elimination of fire hazards and do not conflict with the District's applicable fire code. In those instances where there is a conflict, the homeowner shall apply to TRPA for a tree removal permit.

3. This MOU shall be effective when signed by both of the parties hereto and may be terminated at any time by either party with 30 days prior written notice to the other party.

4. The District shall provide all material necessary for the administration of this MOU including, but not limited to, marking paint, and application and permit forms. The District shall obtain TRPA's consent to the application and permit forms used to administer this MOU. The TRPA's consent will not be unreasonably withheld.

5. The District shall coordinate with TRPA to determine whether there are prior or pending TRPA actions with regard to any particular property under review and the effect of the proposed tree removal on TRPA's prior or pending action, if any.

6. The TRPA shall provide guidance, training and protocol to District personnel to help determine whether any particular tree removal would raise concerns regarding TRPA's environmental threshold carry capacities ("thresholds"), including, but not limited to concerns about water quality impacts, treatment of SEZ vegetation, or scenic impacts. If threshold concerns arise, TRPA shall provide the District with the appropriate mitigation measure prior to District issuance of the permit. The District shall incorporate the mitigation measures into the District's tree removal permit so long as the mitigation measures do not interfere with the District's enforcement of its applicable fire codes. If the mitigation measures interfere with the District fire code enforcement, the District will bring the measure to TRPA's attention for alternative mitigation.

7. The District shall provide to TRPA on a weekly basis copies of all tree removal permits issued during that week.

8. Any appeals from tree removal permits related to TRPA's delegated authority shall be filed with TRPA.

9. The District may perform compliance inspections to ensure compliance with the conditions of approval of tree removal permits issued under the MOU. The District shall report immediately to TRPA all violations of permit conditions or other applicable regulations.

10. None of the authorities, duties or responsibilities set forth in this MOU shall be assigned, transferred or subcontracted by the District without the prior written consent of TRPA.

In witness whereof, the parties have entered into this Memorandum of Understanding.

Date:

6-9-2004

TAHOE REGIONAL PLANNING AGENCY

By: JOHN O. SINGLAUB
Executive Director

Date:

NORTH LAKE TAHOE FIRE PROTECTION DISTRICT

By: JIM LINARDOS
Fire Chief

Appendix D

Fire Protection District Residential Defensible Space Checklist and Explanation

Your local fire district conducted a defensible space fire safety evaluation of your property. The purpose of the evaluation was to help your home survive in the event of a wildland fire, and help your property comply with state and local fire safety ordinances. If your property was found to be "not in compliance" your property may be re-evaluated within 30 days. If you have any questions about the results of this evaluation, or need further information on actions you should take, please call your local fire district.

CHECKLIST EXPLANATIONS

1. **Flying embers landing on combustible roof materials are the #1 cause of homes destroyed by wildfire.** A Class A roof kept clear of branches, pine needles, etc. is your best protection against flying embers. Replace wood shake roofs with a Class A metal, composite, or tile roof with capped ends.

2. **Houses are often destroyed by flames that ignite combustible materials under or adjacent to decks and stairways and overhangs.** Overhangs, because of their angle, can catch and trap hot embers and fire brands. To avoid this threat, you should not store combustible materials under decks and stairs and overhanging eaves should be enclosed. Keep areas under and adjacent to decks and stairways free of pine needles, leaves, or other debris. A thin layer of gravel, rock, or aggregate should be applied under decks and stairways.

3. Fire spreads from the wildland to homes and other buildings by traveling along the fuel bed (plants, trees, brush) until it is close enough to ignite the structure. **Regulations require the removal of all dead and dying vegetation within 30 to 100 feet of any structure** depending on the slope of surrounding terrain.

   In the Lake Tahoe Basin we will allow for thinning of vegetation. If you decide to allow some flammable brush to remain such as manzanita, scrub oak, white thorn, etc., then it must be thinned. A good rule of thumb is a space between shrubs 2 times the height of the shrub. For example, if you have a shrub 3 feet high, then the space before the next shrub should be 6 feet across. Root systems and duff layer should be left intact for erosion control and soil stabilization.

   The above does not apply to short, green, well-maintained groundcovers, which do not need to be thinned. Please ensure that all dry weeds and grasses are cut to a height of no more than 6 inches within 30 feet of your structure. Fire travels extremely fast in tall grass or weeds. Cutting them to 6 inches or less helps to reduce that threat. Also, do not rake to bare dirt, unless within five feet of a structure. (See #5) Regarding clearance distances, if your lot is flat, then a distance of 30 feet from the structure may be sufficient. If your lot is on a steep slope, the distance may need to be increased up to 100 feet below, or on the downhill side. If the property line is closer than the required distance, you must only clear to the property line.

4. **When removing debris, rake to bare dirt within 5 feet of structures and apply a thin layer of gravel, rock, or aggregate.** Beyond 5 feet, DO NOT rake to bare dirt. A layer of pine needles, small twigs, or wood chips 1-2" in depth is needed to prevent erosion. Well maintained turf is an exception to this guideline.

5. **Please remove ALL combustible debris including branches and scrap lumber from your yard** within 30 feet of your structure. This will help reduce the chance of fire spreading from the wildland to your buildings.

6. **Limbs should be removed from green trees** to a height of at least 6 feet from the ground. No more than one third of the live green limbs should be removed from any tree. Taking more than this amount can weaken the tree and make it susceptible to bark beetle attack.

7. **Please remove all tree limbs, whether live or dead, within 10 feet of any chimney.** In Nevada, a spark arresting screen with no greater than ½ inch mesh is required on all chimneys (Section 605; IUWIC, 2003 Ed.). This helps to prevent sparks, embers or flames from a chimney fire spreading to the wildland. Screens are encouraged on all vents to prevent flying embers from entering crawl spaces and attics, igniting the structure.

8. **Limbs hanging over or leaning against a structure can also contribute to the fire threat.** Remove limbs within 10 feet of the structure.

9. **Please remove all dry, flammable vegetation within 10 feet of any propane tank.** In the event of a fire, this will help reduce the amount of heat that the tank is exposed to by preventing fire from traveling through a fuel bed right up to the tank.

10. **Dead trees** are hazardous because they will fall, in time, and could damage property, or injure or kill a person. In addition, the dry wood of a dead tree is a tremendous fire hazard. The Tahoe Regional Planning Agency does not require a Tree Removal Permit to remove a DEAD tree unless they are larger than 24 inches dbh and in a Stream Environment Zone. Please call TRPA at (775) 588-4547, Ext. 266 regarding removal of trees greater than 24 inches dbh located in a Stream Environment Zone.

11. **Routinely remove pine needles, leaves, and litter from roof and gutters.** Airborne fire brands account for the majority of homes burned by wildfire. You can help minimize this problem by keeping the roof and rain gutters free of debris.

12. **Firewood, lumber, or other large woody material should not be stacked within 30 feet** of any structure on your property. They can act as a fuel source to spread fire to the structure. In addition, green firewood should be covered with 6 millimeter CLEAR plastic sheeting to prevent breeding of bark beetles. Lumber and other large woody material can be covered with any material that is durable enough to withstand sun and wind and would prevent embers and burning brands from becoming lodged in the wood, igniting the pile.

13. **The proper address to your property should be displayed so that the numbers can be easily read from the street, both day and night.** This assists firefighters in locating your property during all types of emergencies including medical aid calls. Houses that do not have appropriate address identification are in violation of county and district codes (Ordinance 00-4, Section 901.4.4.1: 6 inch residential; 12 inch commercial of a highly contrasting color with the background).

14. **If excessively dense tree cover removed is checked "NO"** you should call your local fire protection districts (for trees are within 30 feet of structure) or the Tahoe Regional Planning Agency (for trees more than 30 feet from structure) to schedule an appointment with their forester. To contact the Tahoe Regional Planning Agency, call (775) 588-4547 ext. 266. The forester will inspect your trees and issue a Tree Removal Permit if necessary. If your trees are less than 6 inches in diameter at breast height, then no permit is required. Excessive tree cover is not only hazardous to your home, but also to the health of the trees.

LOCAL FIRE DISTRICTS

No. Lake Tahoe Fire Protection Dist. (775) 831-0351 x118 Tahoe Douglas Fire Protection Dist. (775) 588-3591

RESIDENTIAL DEFENSIBLE SPACE EVALUATION
TAHOE BASIN--NEVADA

Evaluation # 0078

The key to improving the odds of your house surviving
a wildfire is the defensibility of the entire property.

NLTFPD Residential Evaluations require owner or authorized agent to be present at evaluation.

Homeowner's Name: _____ Homeowner's contact #: _____

Homeowner's Address: _____

E-mail address: _____ APN #: _____

Signature: _____ ☐ Homeowner ☐ Authorized Agent

CHECKLIST

(SEE BACK FOR EXPLANATION ON EACH CHECKLIST ITEM)

		YES	NO
1	Class A roof installed?	☐	☐
2	All combustible materials removed from beneath decks, stairways, and overhangs?	☐	☐
3	All dry, flammable vegetation within 30 to 100 feet of structure removed? Brush height and continuity reduced 30 feet from structure?	☐	☐
4	Vegetation cleared 5 feet from house?	☐	☐
5	All branches and scrap lumber removed 30 feet from structure?	☐	☐
6	All green trees limbed six feet from the ground or 1/3 total tree height?	☐	☐
7	Spark arrester in place? All vents to crawl space and attic screened?	☐	☐
8	Limbs within 10 feet of structure removed?	☐	☐
9	All dry, flammable vegetation within ten feet of propane tank removed?	☐	☐
10	All dead trees removed?	☐	☐
11	All leaves and pine needles removed from roof and gutter?	☐	☐
12	Firewood, lumber, and large woody materials removed 30 feet from structures?	☐	☐
13	Is your address clearly visible to emergency response personnel?	☐	☐
14	Excessively dense tree cover removed? (Live trees over 6" DBH require permit. Contact local Fire District or TRPA.)	☐	☐

COMMENTS: _____

Evaluated by: _____ Date: _____

* Nevada Tahoe Conservation District (NTCD) works in cooperation with the Nevada Fire Protection Districts in an advisory role, providing recommendations to Nevada Lake Tahoe residents for creating defensible space around their homes. While the creation of defensible space does not guarantee protection, it can greatly increase the probability of structural survivability in the event of a wildfire. Contact your local fire district for more information.

White: Owners Copy Yellow: NLTFPD File Copy Pink: Field Copy

Appendix E

North Lake Tahoe FPD Sample Burn Permit

North Lake Tahoe Fire Protection Fire District
866 Oriole Way
Incline Village ,NV 89451-9439

Permit # 0163

In accordance with Section 040.035 of the Air Pollution Control Regulations for Washoe County, this permit is issued under the following conditions:

_____**PINE NEEDLES ONLY** (Issued without inspection.)
_____**SLASH PILE** (Must be inspected before permit is valid.)

1. Burn only at address listed above and those materials authorized.
2. Permittee shall call dispatch @ **831-0587** each time before burning to ascertain if it is a **Burn Day** or a **No Burn Day**, and agrees to abide by that decision.
3. Burning shall commence no earlier than **8:00 a.m.**, and the fires must be extinguished by **3:00 p.m.**
4. Permittee will have sufficient equipment at the site to control the burning at all times (rake, shovel and water supplied by a charged garden hose.)
5. Permittee will have someone in attendance **at all times** while burning.
6. Permittee must have permit in possession while burning.
7. **Pine needle piles** shall be no larger than **3 feet high and 4 feet in diameter.**
8. **Slash piles** shall be no larger than **5 feet high and 5 feet in diameter.**
9. Burn piles shall be no less than 10" away from other combustibles.
10. Burn piles shall be clear of tree canopies, structures, and other combustibles.
11. Size of the forest products to be burned shall not exceed **3 inches in diameter.**
12. Permit is **Void** in case of winds.

ADDITIONAL SLASH PILE SAFETY GUIDELINES:

1. Rake a line around the burn pile to soil, **12 to 14 inches wide**. The larger the pile the wider the line.
2. If there is no snow on the ground in the burn area, wet the area in the direction that sparks will blow.
3. When lighting burn pile, ignite top of pile not bottom. This allows more control of the burning.
4. Burn one pile at a time, and always attend the pile with a charged garden hose.
5. Anticipate the flame lengths of the burn pile to be generally **2 to 3 times higher than the pile height.**

WINTER WARMING FIRE (Construction sites only-no inspection needed.)

1. Fire must be contained in a metal container.
2. Only clean wood may be burned. This is for warmth, not waste disposal.
3. Fire must be extinguished at the end of each day.
4. Fire must be kept small and maintained 10' away from combustible material.

Permit issued from_____**to**_____
I understand and agree to comply with the provisions of this permit. I certify that I have read the above requirements and recognize that I will be liable for all costs (suppression and/or response) which may occur as a result of my negligence. Any deviation from these requirements may result in revocation of permit.

The North Lake Tahoe Fire Protection District issues this burn permit to:

Name:_____Date:_____

Address:_____Phone #_____

Permittee Signature:_____

Issued by:_____Title:_____

Inspected by:_____Date:_____

FD 107 (Rev 11/2000)

Appendix F

Sample Application for Tree Removal Permit

APN#_____ Permit# 00001

North Lake Tahoe Fire Protection District
866 Oriole Way, Incline Village, NV 89451
(775) 831-0351 ext. 118

APPLICATION FOR AND TREE REMOVAL PERMIT

REASON FOR REMOVAL (CIRCLE)

(DEFENSIBLE SPACE) (DISEASE) (INSECT) (HAZARD) (FOREST HEALTH)

SPECIES/NO: PP_____ JP_____ WF_____ RF_____ IC_____ SP_____ Other_____ TOTAL: _____

OWNER(S) OF RECORD: _____ TELEPHONE: _____

AUTHORIZED AGENT: _____ TELEPHONE: _____

MAILING ADDRESS: _____

LOCATION OF PROPERTY: _____

Only those trees approved by a NLTFPD Forester may be cut, and the following Standard Conditions shall be met during tree removal operations:

- Work must be completed within 12 months of issuance of permit.
- Owner must be present (or an authorized agent verified in writing by owner) when inspection is performed.
- Permit must be signed by owner or authorized agent to be valid.
- Permit must be available on site during work.
- Stump heights shall be 6" or less.
- Tops of live pine & fir stumps shall be covered with powdered borax immediately after felling to retard the spread of root disease.
- Cover and seal green wood with 6 mil clear plastic, or split and scatter 30 feet from structure in a sunny spot until dry.
- Slash shall be chipped or removed within 15 days.
- Burn piles must obtain Fire District permits and be disposed of under their terms and conditions.
- Areas 30' or more from a structure shall require a TRPA permit for tree removal.
- Property owner shall be responsible for delineating proper parcel boundaries; NLTFPD will not mark trees on adjacent lots without those owners' presence or valid authorization from same.

STUMP EXCAVATION OR THE USE OF HEAVY EQUIPMENT IS NOT PART OF THIS APPROVAL
SPECIAL CONDITIONS AND DIRECTION:

_____

_____

_____

_____

_____

The Permittee, for him/her/itself, his/her/its contractors, and employees, agrees to save, indemnify, and hold harmless the NLTFPD or its representatives from all liabilities and claims for damages by reason of injury or death to any person or persons, or damage to property from any cause whatsoever while in, upon, or in any way connected with the work covered by this tree cutting permit, and does further agree to defend the NLTFPD in any claim arising out of or as a result of the work done under this permit.

I hereby acknowledge that I have read this application and state that the above is correct and agree to comply with all ordinances and state laws, and regulations of the Department of Industrial Relations and Industrial Accident Commission, relating to the character of work, equipment, and labor personnel involved in the project. I also certify that trees being removed are on the property as described as above.

Pictures Taken: _____

Owner's/Agent's Signature: _____ **Date:** _____

Forester's Authorization: _____ **Date:** _____