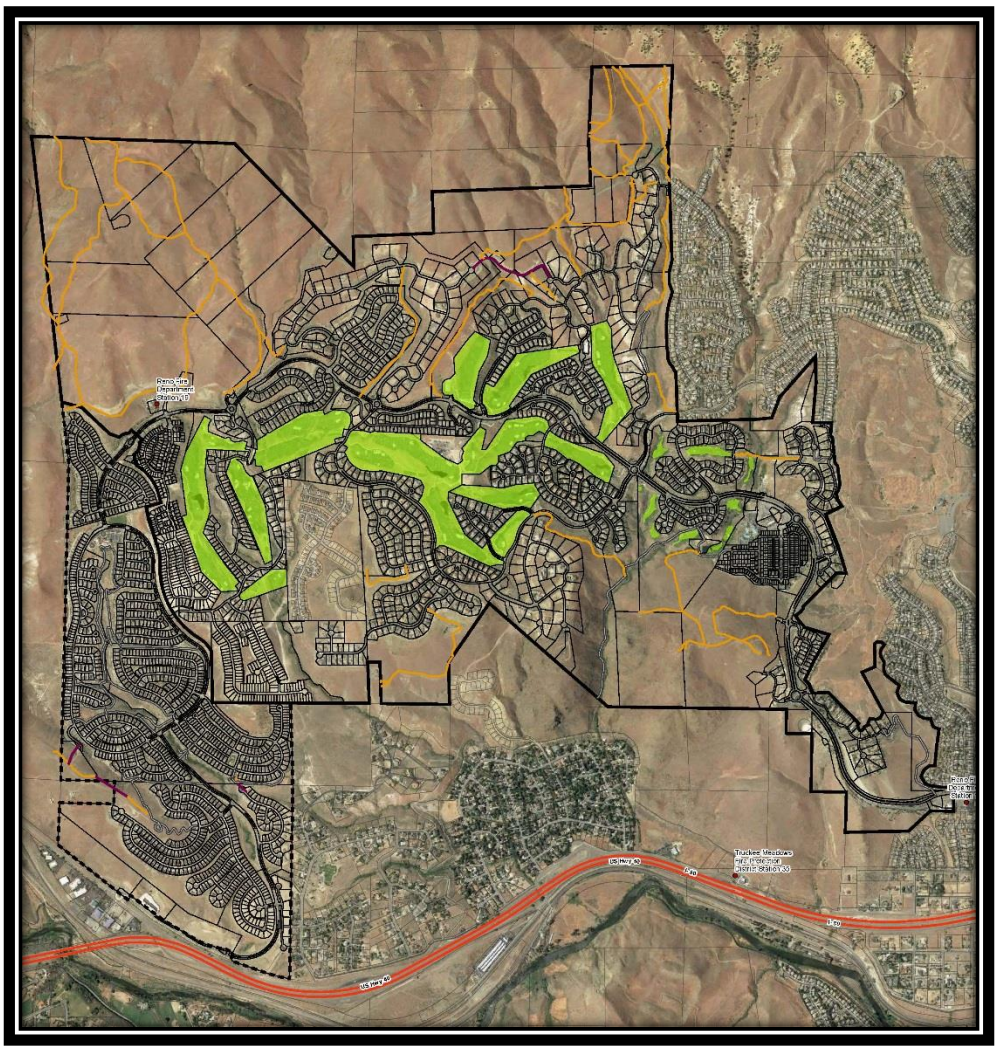
June 9, 2017

Wildfire Fuels Assessment & Community Wildfire Protection Plan (CWPP)

For the Communities

Somersett & Sierra Canyon
Reno, Nevada



Prepared For:

Somersett Owners' Assoc.
7650 Town Square Lane
Reno, Nevada 89523

Sierra Canyon
Homeowners Assoc.
1798 Del Webb Parkway West
Reno, Nevada 89523

Prepared By:

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Carson City, NV 89703

RCI
Resource Concepts Inc

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1.0 Introduction

Resource Concepts, Inc. (RCI) was retained by the Somersett and Sierra Canyon Homeowners Associations to evaluate the existing fuel hazards within their communities. Located in the City of Reno, the two adjacent planned communities include residential homes, commercial businesses, golf courses, utility infrastructure and extensive open spaces with trail systems. The combined area of Somersett and Sierra Canyon communities encompass approximately 2,747 acres on the south slopes of Peavine Mountain above the Truckee River.

The project area was included in the Washoe County – Nevada Community Wildfire Risk Hazard Assessment Project prepared by RCI in 2005 for the Nevada Fire Safe Council. The majority of Somersett and Sierra Canyon were not developed at that time. This plan is intended to be tiered from the earlier planning document and to provide a more detailed analysis for addressing current fire fuel hazards. The community involvement and review involved in the approval of the current document is expected to achieve the requirements for a Community Wildfire Protection Plan (CWPP).

The objective of this project is to update prior work and to focus on the wildfire hazards of current open space fuel types and planted landscapes in both communities. Field assessments were completed and treatment recommendations developed for implementation over a three to five year planning horizon.

Several key goals were identified during the development of this project and include the following.

- Protect lives and property from wildland fire;
- Increase resident and public understanding of living in a fire-adapted ecosystem;
- Raise community awareness of the issues of living in the wildland urban interface of western Nevada and the recommend measures to reduce wildfire risk;
- Identify and prioritize areas for hazardous fuels reduction treatments; and
- Implement a fuels maintenance program.

2.0 Community Descriptions & Natural Environment

2.1 Climatic Factors, Topography & Exposure

The annual average precipitation for Somersett and Sierra Canyon ranges from 8 to 12 inches. Average temperatures range from a high of 45°F and a low of 28°F in January to a high of 91°F and a low of 51°F in July. The majority of the precipitation received typically arrives in the form of snow during winter months, then transitions to rain in the early spring. Summer and fall months are relatively dry with isolated thunderstorms. Western Nevada commonly experiences "dry" lightning storms throughout spring and summer months often coupled with periods of drought. Nevada has experienced consecutive years of drought which stresses vegetative communities and limits water resources. It is important to realize that western Nevada has experienced warmer temperatures, increased precipitation in the form of rain, and a higher frequency of wildfire ignitions throughout the calendar year.

Mountain to valley wind patterns, particularly on the east side of the Sierras, strongly influences fire behavior. Local daily wind patterns down the east facing canyons and valleys are influenced by differential heating and cooling on east, west, and south facing slopes. According to the US National Weather Service, afternoon downslope winds and cross valley winds can frequently exceed 20 miles per hour.

Steep topography is a key component of the Somersett and Sierra Canyon communities providing expansive views of the Truckee Meadows, Truckee River Canyon and Carson Range. Located on the south facing slopes of Peavine Mountain, the area is bisected by perennial and ephemeral drainages, canyons and draws running north to south and terminating at the Truckee River. Slopes range from 0 to 75 percent and elevations range from 4,600 to 6,400 feet. Overall the communities have a southern exposure, but the numerous canyons and draws are characterized by both east and west exposures.

Fire intensity and spread rate depends on the fuel type and condition (i.e., live vs. dead fuels), the weather conditions prior and during an ignition, and the topography. Generally, the following relationships hold between the fire behavior and fuel, weather, and topography.

- Fine fuels ignite more easily and spread faster with higher intensities than coarser fuels. For a given fuel type, the more there is and the more continuous it is, the faster the fire spreads and the higher the intensities. Fine fuels take a shorter time to burn out than coarser fuels.
- The weather conditions affect the moisture content of the dead and live vegetative fuels. Dead fine fuel moisture content is highly dependent on the relative humidity and the degree of sun exposure. The lower the relative humidity and the greater the sun exposure, the lower the fuel moisture content. Lower fuel moistures produce higher spread rates and fire intensities.
- Wind speed significantly influences the rate of fire spread and fire intensity. The higher the wind speed, the greater the spread rate and intensity.
- Topography influences fire behavior principally by the steepness of the slope. However, topography and features of the terrain such as narrow draws, and saddles can influence fire spread and intensity. In general, the steeper the slope, the faster the fire spreads uphill and with greater intensity.

2.2 Home Ignition Zone

The Somersett and Sierra Canyon Village communities are located in a wildfire environment similar to most of Nevada and the Great Basin. It is not "if" a wildfire will occur, it's when, where, and the intensity of wildfire. This assessment addresses the wildfire-related characteristics of Somersett and Sierra Canyon Village, the ignition potential and the communities' exposure to wildfire. Focus is not on individual homes, rather neighborhoods, associated open space and the communities as a whole.

A house burns because of its interrelationship with the surrounding landscape, the house or structure construction, and its immediate physical surroundings, which is termed the "home ignition zone". To reduce the potential for a home ignition, a homeowner should mitigate wildfire's potential to consume the home. While there are no absolute guarantees, altering a wildfire's path and its intensity, through vegetation management and fuels reduction, the loss of a home can be minimized. Removal of flammable vegetation adjacent to the home and reducing the volume and density of the vegetation around a structure prevents direct flame contact. Observations of the Somersett and Sierra Canyon Village communities were made during this assessment to determine the existing ignition potential and opportunities to reduce the potential for ignition. Individual homeowners and the associated Home Owner Associations have the ability to take specific actions to protect their homes, neighborhoods and communities from wildfire.

2.3 Wildland Fire History & Characteristics

Western Nevada has experienced numerous, severe wildfires along the eastern slopes of the Carson Range, collectively referred to as the "Sierra Front", over the past fifty years. The combination and interaction of topography, weather, vegetation and periods of drought results in the potential for ignition, both human caused and lightning, has and will continue to result in large wildfire events that exhibit extreme fire behavior. Specifically, the southern slopes of Peavine Mountain and the Truckee River Canyon have experienced numerous wildfires over the years as evidenced by the multiple burn scars within and around Somersett and Sierra Canyon Village communities. The 2006 Verdi Fire burned within feet of new homes recently built in the Somersett community. Numerous homes were saved by emergency responders and a well-designed subdivision. A majority of these wildfires ignite when conditions are extreme; hot, dry, windy and the potential for lightning is high. Consequences are numerous, including loss of life, property loss and lowered property values, high fire suppression costs, economic losses, and lengthy and costly post-fire rehabilitation. Environmental impacts can also be extensive including increased soil erosion, flooding, water quality impacts, loss of wildlife habitat and aesthetics, and overall watershed degradation. Recent area wildfires in the general area are identified in Table 1.

Table 1. Recent Wildfires Along the Sierra Front in Western Nevada

Fire Year	Name of Wildfire	Location	Acres Burned
1996	Belli Ranch Fire	Truckee River Canyon	6,723
2000	Arrowcreek Fire	Southwest Reno	2,788
2004	Waterfall Fire	West Carson City	8,723
2006	Verdi Fire	Truckee River Canyon	5,841
2007	Hawken Fire	South Reno	2,700
2011	Caughlin Ranch Fire	West Reno	1,935
2016	Little Valley Fire	West Washoe Valley	2,291

2.4 Somersett Community

The Somersett Community encompasses approximately 2,247 acres that includes luxury custom homes, townhouses and patio homes, two golf courses, a Town Center with pools and fitness center, with hiking and biking trails through extensive open space. The planned unit development was designed to the existing hill topography and the steep drainage channels flowing through the community to the Truckee River. Currently the community is comprised of about 1,790 constructed homes and a population approaching 12,000 residents. Planned community buildout will include the construction of about 450 additional homes.

Residents enjoy the quality of life and aesthetics of the community spending time on golf courses, recreational facilities, or hiking the trail system. The community is privately owned and amenities are managed by the Somersett Owners' Association.

Both communities are surrounded by private lands but are located in close proximity to public lands managed by the Bureau of Land Management (BLM) and the US Forest Service. Emergency services are provided by the City of Reno Fire Department through two nearby career fire stations.

2.5 Sierra Canyon Community

Sierra Canyon represents a 500 acre Del Webb retirement community immediately adjacent to the Somersett Community. The community contains 1,212 homes and approximately 2,500 residents. The community offers a large clubhouse with tennis courts, pool, fitness center, and trail system through many landscaped open spaces. Similar to Somersett, the Sierra Canyon community was designed in conjunction with the topography of the area which provides a very scenic and enjoyable quality of life. Sierra Canyon is privately owned and managed by the Sierra Canyon Homeowner Association.

2.6 Community HOA Trails & Open Space

Somersett and Sierra Canyon residential neighborhoods are designed with approximately 1,050 acres of open space and trail systems that bring unique recreational opportunities to residents accessible from their homes. Undeveloped open space throughout the community and undeveloped lots are generally characterized by mountain shrub vegetation typical of the east slope foothills and irrigated planted landscaping. A large portion of the planned open spaces in both communities are associated with the numerous drainage channels that transect the properties or represent steeper hillside slopes that are not conducive to residential development.

The open space areas that are associated with natural drainage ways or channels represent a particular concern from a fire hazard perspective since these sites generally border or are lined by developed residential housing. Since these drainage ways are largely uninterrupted except at roadway crossings, they represent chimney ways where fires can either be introduced into the built community and/or conduct fire either upslope or downslope through the community based on the prevailing wind direction. The added water that seasonally flows through these drainages also produces riparian vegetation with high fuel loading levels. If these sites are left in a natural unmanaged condition, where fuel loading and continuity are allowed to increase and accumulate, then these open space drainage ways represent a high fire hazard introducing off-site fire ignitions into and through the developed residential communities.

The trail systems in many of these open areas are specifically developed to allow ready access by emergency fire suppression equipment. To the extent these trails can be developed to allow ready access by emergency fire suppression equipment to combat fire, then this approach has propensity to mitigate the high fire hazards represented by these contiguous drainages managed as designated open space.

2.7 Golf Course Open Space

The Somersett Community includes two golf courses, an 18-hole private Championship golf course and a smaller nine-hole public Executive Course. Together, both golf courses occupy approximately 200 acres. The irrigated and manicured tees, fairways and greens associated with the golf courses represent effective fuel breaks within the Somersett Community. These manicured, linear green-beltways have the ability to stop the advancement of fire through some interior portions of the community. Like roadways, they further serve to provide a defensive anchor points for fire suppression once fire has been introduced into the community.

Hazard and out-of-bound areas that are adjacent to and surround the irrigated golf links mostly consist of native mountain shrub vegetation and, where construction disturbance occurred, seeded adapted herbaceous understory species with volunteer native shrub species. Likely receiving supplemental irrigation, the sites bordering the irrigated golf links are highly productive in terms of plant growth and they pose a significant risk for wildfire when fuels are allowed to accumulate over time. Due to the fire ignition risk these areas represent, particularly from arrant cigarette butts from the golfing publics, these border sites should be treated like open space and periodically thinned for the removal of accumulated dead or flammable fuels.

2.8 Community Fuel Types

Basin Big Sagebrush/Bitterbrush

The two primary native vegetation types in the area include mountain big sagebrush/bitterbrush (*Artemisia tridentata* ssp. *vaseyana/Purshia tridentata*) and Wyoming basin sagebrush (*Artemisia tridentata wyomingensis*). The later vegetation type is located in lower elevation sites or south and west-facing slopes where lower levels of precipitation and soil moisture prevail. In wildland fire terminology, the diverse assemblage of native shrubs, grasses, and wildflowers found in these natural sagebrush communities compose the 'fuel' for wildland fires.

If left undisturbed for long periods of time (i.e., 30 to 50 years) without the occurrence of fire to remove or setback shrub density and canopy expanse, the elevated shrub canopy in these native plant communities will increase to the extent where the shrub component will readily carry fire under benign weather and wind conditions. Fuel loading levels occurring in over-mature sagebrush stands can become very high and result in extreme fire behavior when ignition occurs. Selective thinning, trimming and removal of dead woody biomass in these plant communities will help to mitigate wildfire risk over time.

The non-native invasive annual grasses, cheatgrass (*Bromus tectorum)* and medusahead (*Taeniatherum caput-medusae*) are present throughout the undisturbed shrublands. These highly flammable annual plants increase the wildland fuel hazard exponentially in a wet year with higher than normal precipitation. They also pose the risk of replacing the dominant native shrub vegetation with flashy annual grasses and weeds following a wildfire.

Landscape Seedings & Plantings

Planted and irrigated landscapes are comprised of adapted and ornamental plant materials, including a variety of conifers and deciduous trees, shrubs and bunch grasses. Planted landscapes blend into native vegetation along golf courses, behind homes and along trails and/or access roads. The combined vegetation does pose a significant risk for wildfire and it will increase overtime as the plant materials mature and shrub canopies increase. Much like the native sagebrush areas, selective thinning, trimming and removal of dead woody biomass will help to mitigate wildfire risk over time in these landscaped sites.

Burn Areas & Annual Grasses

Cheatgrass represents an invasive annual grass species that has not only occupies the native sagebrush habitats located in the Somersett and Sierra Canyon communities, but this invasive species is also found commonly throughout much of northern Nevada. In a native shrub setting, residual cheatgrass litter increases fuel continuity to allow fire to carry between widely spaced native shrub species. At the same time, cheatgrass builds a persistent seedbank in the surface soils which is readily posed to reoccupy and dominate burned sites when fire removes the competing shrub overstory. Representing a persistent and highly flammable fuel source, the natural fire return interval declines as cheatgrass becomes more prevalent. The reoccurring fire cycle often becomes so frequent that it effectively prevents the reestablishment of non-sprouting native shrubs in fire-affected sites and results in development of an annual grass monoculture.

The undeveloped areas in Somersett and Sierra Canyon communities affected by the 2006 Verdi fire and the abandoned North Ridge golf course, all reflect cheatgrass-dominated sites with a propensity for increased fire return frequencies. Representing the western border of the Sierra Canyon community and the north and east boundaries of the Somersett community, undeveloped internal sites and adjoining properties have little potential to recover toward perennial plant species unless the current fire return levels are reduced through either future development, the effective management of residual fuel levels, or steps are taken to chemically control cheatgrass germination for a period of time to allow the establishment of seeded perennial plant species that can biologically suppress cheatgrass growth.

Invasive Weeds – Medusahead Grass

The presence of cheatgrass dominant sites not only increases fire risk, but due to its frequent disturbance regime and unstable nature, these sites are also susceptible to invasion by even less desirable noxious weed species like medusahead grass and a variety of thistle and knapweed species. Under Nevada Revised Statute Chapter 555 (NRS 555), the Nevada Department of Agriculture requires that all state-listed noxious weeds must be effectively controlled by the landowner.

Similar to cheatgrass, Medusahead is also an annual invasive grass that produces a fine, flashy, and contiguous fuel source that easily ignites and readily carries fire. Due to its high silica content, Medusahead is not as palatable as cheatgrass as a feed source and is not generally consumed by wildlife or livestock if other more palatable species are present. This species is listed as a Class B noxious weed by the state which requires active exclusion where possible. Medusahead is known to be actively invading cheatgrass-affected areas in western Nevada and along the Sierra Front. This invasive species poses an expanding threat in soils with a high clay content and poor drainage which are commonly found in the Somersett and Sierra Canyon communities.

3.0 Community Wildfire Fuels Assessment

3.1 Assessment Methods

The Sierra Canyon Community was field assessed on March 1, 2017 by RCI fuels specialists, while the field assessment for the Somersett Community occurred on March 15-16. Survey goals included identification of existing vegetation types and fuel hazard conditions and identification of potential treatment projects to mitigate fuel hazards. Fuel hazards were based on vegetation type and density, topography and fuel bed configuration. The survey was conducted by vehicle, a UTV, and by foot along existing roadways, the golf courses, open space areas and trails. The areas of future development were also surveyed and included based upon current conditions.

Given the size and variety of the project area, aerial mapping was utilized to determine property ownership boundaries, topography, future development areas and ecological sites. Photographs were taken to document site development conditions, vegetation conditions and areas of concern. The gathered data and information was recorded and mapped. Based on currently observed site conditions and fire risk, professional judgement and expertise was utilized to determine the relative priority between the identified fuel treatments.

3.2 Assessment Findings

Community-Wide Findings

Fire protection in both communities was excellent with 500 gallons per minute (gpm) fire hydrants, career department fire stations and low risk utilities. Structures are well constructed with non-combustible roofing and siding, enclosed eves and good access to constructed dwellings. Landscaped road medians, community entrances, and developed residential lots all appeared to be well maintained from the perspective of regular maintenance of high fire fuel hazards and invasive weeds.

One of the more prolific and successful planted species seeded after construction disturbance was noted to be an improved variety of Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*). Due to site stability brought by a very successful post-construction site stabilization program, on both cut and fill slopes, native plants species are also invading and have begun reestablishing themselves within many of the previously disturbed and reclaimed sites. The success of the post-construction site stabilization applied in each community represents a significant and building fire fuel source at several locations from both the perspective of fire fuel loading and fuel continuity.

Somersett Community

Fuel hazards throughout Somersett Community vary significantly, ranging from low to extreme. Approximately one quarter of the northern portion of Somersett burned during the 2006 Verdi Fire and is characterized primarily by cheatgrass, medusahead (invasive weed), and a wide scattering of shrubs and seeded crested wheatgrass. This area is low hazard and slated for future development. The planted landscape of Somersett occupies areas adjacent to homes, trails, open space areas and is interspersed with the golf course ranging from medium to high hazard. The planted landscape is irrigated and comprised of a variety of tree species, native and adapted shrubs and grasses. The interface areas of integration of the planted landscape with native vegetation throughout the community, along roadways, adjacent to trails and the golf course are characterized as the highest fuel hazard.

Several specific areas of Somersett are of concern and are addressed in the Treatment Section of this report, but are worth mentioning here. There is a triangle of undeveloped property in the north eastern portion of Dakota Ridge with dense, continuous native vegetation rated extreme hazard bordered by homes from an adjacent subdivision with limited access (Figure 1). The area south of The Village; between The Boulders and River Side contains rocky hills and steep side slopes. This area, combined with the downstream Mogul Creek drainage (i.e., SOA I-1&2), varies from medium to high fire hazards, is scenic, popular with residents and contains high value native vegetation which should be protected from wildfire.

A total of fifteen (15) sites were determined to need treatment within the medium to extreme fuel hazard condition (Figure 1). Ongoing and expanded landscape maintenance is necessary to keep vegetation controlled and to reduce the threat of wildfire.

The design of the Somersett community incorporated good vehicle and foot access to many of the development areas. Well maintained landscaping along these corridors creates an effective fuel break and greatly improves the ability of emergency personnel to respond to fire emergencies. There are open spaces in the community that do not have trail and/or roadway access which increases hazards for wildfire. Due to the large extent of open space in the community, the developed access for fire equipment is not as extensive as was found in the corresponding open sites in the Sierra Canyon community. The wildland urban condition is considered "Occluded", where structures abut islands of wildland fuels (park or open space) typically with a clear line of demarcation between structures and vegetation along roads, back fences, etc.

Sierra Canyon Community

Fuel hazards within the Sierra Canyon range from low to high. A portion of the western property line burned in the 2006 Verdi Fire and is characterized primarily by cheatgrass and scattered shrubs with a low fuel hazard. The planted landscape of Sierra Canyon occupies areas adjacent to homes, trails and interspersed with the golf course and range from medium to high hazard. The planted landscape is irrigated and comprised of a variety of tree species, native and adapted shrubs and grasses. The areas of integration of the planted landscape with native vegetation throughout the community characterize the highest fuel hazard. The southern boundary of Sierra Canyon Village abuts Old Highway 40 (I-80 Business), and poses a higher potential for a human caused wildfire ignition than the balance of the community.

A total of seven (7) sites were determined to need treatment given the medium to high hazard condition. Ongoing landscape maintenance is necessary to keep vegetation controlled (Figure 1).

The design of the Sierra Canyon community incorporated superior vehicle and foot access in the larger designed open spaces with developed trails. Well maintained landscaping along these corridors creates an effective fuel break and greatly improves the ability of emergency personnel to respond quickly and effectively to wildfire. However, the same community design included numerous landscaped slopes between residential lots with no emergency fire equipment access or no apparent fuels maintenance within these confined spaces. The wildland urban condition is considered "Occluded", where structures abut islands of wildland fuels (park or open space) typically with a clear line of demarcation between structures and vegetation along roads, back fences, etc.

4.0 Recommended Treatments & Projects

The following recommended treatments and/or projects are appropriate for fuels reduction throughout both Somersett and Sierra Canyon communities. Implementation of these fuels reduction treatments will reduce the threat of wildfire, but not entirely eliminate the threats. Ongoing maintenance is required to maintain treatment effectiveness, as well as achieving "Fire Adapted Community" status.

Hand Thinning & Maintenance

Hand thinning involves the use of manual labor and hand tools, including shears, loppers, hoes, handsaws, weed-eaters, chainsaws, etc. to cut, trim and remove vegetation from a specific site. Typically, a treatment area is designated, vegetation is modified and the resulting biomass is hauled off site or piled and burned. Currently both Somersett and Sierra Canyon Village are utilizing hand thinning and ongoing maintenance to maintain common areas, roadway medians and entryways. Hand thinning as a treatment is typically used on slopes too steep for mechanized equipment; or areas too small, inaccessible, rocky or sensitive for other treatment types. Typically, shrubs and/or trees are selectively marked for trimming or removal to maintain aesthetics or ecosystem values while still reducing the threat of wildfire. Examples of treatment areas include pockets of vegetation around homes, steep slopes along roadways and trails and identified areas of the golf courses. Ongoing maintenance is required to ensure the effectiveness of any fuels treatment. A maintenance schedule should be developed in accordance with the vegetation type and desires of the community. Appendix A contains procedures and Best Management Practices (BMPs) for Hand Thinning methods.

Mechanical

There are a variety of mechanical treatments available for larger scale treatment areas or areas that lend themselves to equipment access. A trail corridor is an example where mechanical treatments could be used to create a shaded fuel break. A "brush mower" can be utilized in conjunction with a tractor for smaller areas or a "masticator" mounted on a track hoe are commonly used in western Nevada. There are numerous cutting heads for this equipment, customized for the vegetation type. There is no disposal of woody biomass, rather it is spread on site and serves as a mulch. Design of a treatment area includes clear marking of the grass, shrubs or trees to be removed while retaining healthier vegetation in a mosaic pattern which leaves "shrub islands". Utilizing mechanized equipment to reduce fuels and modifying vegetation allows the maintenance of a natural appearance on the landscape. Appendix A contains recommended BMPs for mechanical treatments.

Herbicide & Re-Seeding

A common problem throughout much of northern Nevada and Great Basin is the spread of annual grasses, particularly cheatgrass a highly invasive grass that becomes very flammable. Cheatgrass greens up early in the spring and dries early typically occupying sites that have been disturbed either through development or previous wildfire. A second challenge is noxious weed infestations which often follow cheatgrass or will invade disturbance areas. Impacts from noxious weeds are numerous, including hazardous to pets, livestock and wildlife; highly flammable; and can result in negative economic impacts. Noxious weeds are managed by the Nevada Department of Agriculture and several county weed districts. In an effort to control and manage both annual grasses and noxious weeds, the use of specific herbicides followed by re-seeding with native or "adapted" plant species, has become an effective treatment tool.

The goal overtime is to reduce the annual grass and noxious weed seedbank in a given area and replace with fire resistant species. Pre-emergent herbicides are effective when used properly, particularly in a community setting. Depending upon the extent of the infestation, treatment may require multiple applications over several years. Once re-seeded, the landscape will be returned to a productive, fire resistant condition. Chemical control of annual grasses and noxious weeds including safety procedures are contained in Appendix B, while recommended management practices for seeding disturbed sites are outlined in Appendix C.

Fuel Break Design & Maintenance

A fuel break may take many forms, but typically existing vegetation is reduced in a manner that slows and/or retards the spread of wildfire. In some cases, fire breaks are constructed where vegetation is completely removed down to bare ground, often tilled or disc along highway right of ways. While bare ground is an effective fuel break it is not always acceptable within a community. An effective alternative is a shaded fuel break that breaks up fuel continuity, increases spacing between plant species and will slow the spread of a wildfire. The design and location of a shaded fuel break should be incorporated into the topography of the treatment area, of sufficient width for the vegetation type, while maintaining access for maintenance. A fuel break can be designed for any scale from a property line boundary to a landscape level crossing multiple land ownerships. Ongoing maintenance of a fuel break is necessary and can be accomplished by mechanical treatment, livestock grazing or hand thinning.

Public Education & Signing

Achieving a “fire safe” or “fire adapted” community is more than just on the ground vegetation treatments and their associated maintenance. The residents of Somersett and Sierra Canyon Village live in a wildfire dependent environment. Most of the west has and will continue to have wildfires that burn hundreds of thousands of acres every year. Ensuring that residents understand the risk of wildfire and that during wildfire season and periods of drought, it is everyone’s responsibility to be respectful and cautious while using fire or heat producing equipment. Seasonal notifications in the HOA newsletter, holding a pre-season informational workshop surrounding wildfire and installing signs that warn of high fire danger areas are all important tools for the communities.

5.0 Recommendations & Priorities

The overall goal for both Somersett and Sierra Canyon communities is to create a sustainable balance that will allow both residents to live safely while maintaining environmental, quality of life and recreational opportunities in the Wildland Urban Interface setting. It is important for individual homeowners and the communities together, to balance fire protection measures against certain flammable components, primarily vegetation. These choices directly relate to the ignitability of their home ignition zones during a wildfire incident.

A collaborative approach beginning with the community Homeowner Associations (HOAs) that represents the involved landowners, and includes local and state fire officials, builds understanding and trust. Realizing that maintaining a Fire Adapted Community requires ongoing commitment and on the ground treatments, the HOA or similar Community Fire Board can ensure mitigation activities continue over time in a prioritized manner.

Overall recommendations for both Somersett and Sierra Canyon Village include:

- Establishment of a collaborative approach to maintaining a Fire Adapted Community through the respective HOAs and/or Community Fire Boards.
- Living vegetation and fuel conditions are continually changing depending upon annual moisture and growing conditions. The HOAs must make a long-term commitment to vegetation management, fuel reduction and public education. Management of native and planted vegetation throughout both communities is necessary to keep plants healthy and resilient to wildfire.
- Cheatgrass and annual fuels should be assessed annually and treated as necessary. Shrublands should be assessed on a three to five-year cycle depending upon annual growing conditions.
- Annual fine fuels (e.g. cheatgrass, mustard, pepperweed, etc.) are highly flammable and should be replaced over time with perennial bunchgrasses and wildflowers.
- Breaking up a continuous fuel bed by modifying the spatial arrangement of the dominant and/or mature shrubs to create openings or a “mosaic” landscape.
- Prioritized treatment projects should be managed by a qualified wildland fire specialist.

The Sierra Canyon community design provides excellent access for emergency fire suppression equipment through its developed trail system in designated open spaces. The Somersett community also uses its existing trail system to provide emergency vehicle access; however, there remains portions of open space that can only be accessed by limited-improved trails that are not accessible by fire suppression equipment. To the extent possible, the Somersett trail system should be critically reviewed to identify existing trails that can be upgraded to allow access by emergency fire equipment throughout the extent of the designated community open spaces. This recommended action will not only improve fire agency responses for controlling future wildfire within the community, but this added controlled-vehicle access will also have the indirect effect of reducing future fuels management costs through enhanced contractor access.

5.1 Community-Specific Treatment Recommendations & Priorities

Treatment recommendations for both Somersett and Sierra Canyon communities were identified through the field assessment surveys, researching the USDA Ecological Site Descriptions, discussions with wildfire officials and coordination with the community HOAs. Tables 2-5 summarize the prioritized treatments and they are illustrated in over-sized Figure 1 located in the back pocket of this report.

Generally, the most hazardous fuel conditions throughout Somersett and Sierra Canyon communities are within the steeper draws, drainage channels and areas along the property lines that have not historically burned or been modified for development. These areas act as "wicks" a continuous fuel bed that can carry a wildland fire into or out of the community. Within the "planted landscape" along roadways, behind homes and along trails, vegetation has matured overtime into a continuous fuel bed and are identified as a medium to high wildfire hazard. All of these high hazard areas are prioritized as "1" in the following Tables. Additional treatment projects are prioritized "2 – 3" based upon relative hazard ratings. Several areas of Medusahead grass, a listed noxious weed by the Nevada Department of Agriculture were located during the field assessment, as noted in Figure 1, and should be treated to prevent further infestation or expansion.

Table 2. Recommended Treatments in Somersett - Neighborhood "SOA I"

Priority	Treatment ID#	Treatment Descriptions
2	**SOA I - 1**	Village Bluff south of The Village and west of River Side is an area that has had small wildfires, but the majority remains covered in native vegetation. Portions of this area will incur future development. Install a shaded fuel break along the southern property line. Prior to installation of the planned fuel break, annually assess the south property line and install temporary fire breaks as needed. Existing trails, access roadways and past disturbance areas pose opportunities for replacing cheatgrass and access for emergency vehicles. Future development should incorporate fuel breaks and access for emergency fire equipment. Upon area buildout, remove cheatgrass and invasive annuals utilizing herbicide (Appendix B). Replant with fire resistant bunch grasses per Appendix C BMPs.
1	**SOA I - 2**	The Mogul Creek Canyon & Trail from The Village to the southern boundary of Somersett is comprised of native vegetation and irrigated planted landscape bordering the trail. Masticate and hand treat pockets of heavy fuels through shrub removal increasing spacing between shrubs two times the height of the remaining shrubs. Treatments should parallel the trail consistent with topography up to 30 feet laterally. During thinning of upland shrubs, it is recommended the treated areas are seeded per Appendix C BMPs either prior to or during the next fall period to discourage weed expansion. Increase frequency of planted landscape maintenance including trimming, thinning and removal of dead biomass annually. Utilize BMPs consistent with visual aesthetics and the riparian vegetation in the channel. Dead and down riparian vegetation should be removed. Install wildfire hazard signs and smoking material ash containers along the trail in pedestrian use areas.
1	**SOA I - 3**	The area bounded by Morgan Point and Willow Point below Somersett Pkwy. Along Mogul Creek is a high hazard area. Thin existing brush to create a mosaic landscape that reduces fuel loading and breaks up fuel continuity. Remove shrubs to increase spacing between shrubs two times the height of remaining shrubs. Per Appendix C BMPs, seed prior to treatment with fire resistant grass species, and/or seed interspaces in the fall following treatment.

Table 2. Recommended Treatments in Somersett - Neighborhood "SOA I" *(continued)*

Priority	Treatment ID#	Treatment Descriptions
2	**SOA I - 4**	The City of Reno owns and manages property, (abandoned Northridge Golf Course) along the eastern boundary of Somersett. As the City plans future uses for the site, Somersett should discuss incorporating a shaded fuel break or irrigated and mowed landscaping adjacent to the community. Current maintenance of irrigated landscape plantings behind homes and along access roads should be expanded, BMPs implemented and dead biomass removed annually. The Ridgeview area has experienced wildland fire and surface disturbance resulting in cheatgrass infestations. Remove cheatgrass and invasive annuals utilizing herbicide (Appendix B). Replant with fire resistant bunch grasses per Appendix C. Install wildfire hazard signs and smoking material ash containers along the trail in pedestrian use areas. Prior to the planned conversion of cheatgrass sites, annually assess these areas and mow, rake, and remove fine-fuels as needed per Appendix A BMPs. Future development and/or recreational access should incorporate fuel breaks and access for emergency vehicles.
1	**SOA I - 5**	In the northeast corner an ephemeral drainage between Copper Knolls and Dakota Ridge is heavily vegetated with limited access. Fuel continuity is continuous and is immediately adjacent to existing development. Thin native vegetation below homes and along drainage channel to create interspaces and break up the continuous fuel bed per Appendix A BMPs. Expand maintenance and ongoing thinning of planted landscape at the bottom of the drainage to improve plant health and reduce fuel loading. Remove dead biomass annually to the extent possible. Seed prior to brush treatment with fire resistant grass species, and/or seed interspaces in the fall following treatments per Appendix C BMPs Explore opportunities to improve access to the area including trail construction and/or vehicle access roadways.
3	**SOA I - 6**	Access roads, vehicle roadways and trails are bordered by irrigated landscape plantings. Tree and shrub densities increase overtime as they mature requiring trimming and thinning to maintain fuel loading. Regularly assess understory fuel loading levels and remove fine-fuels when continuity is high per Appendix A BMPs. Expand landscape maintenance utilizing BMPs particularly on slopes, within draws or drainages, and along Somersett Pkwy. Remove dead biomass annually.

Table 3. Recommended Treatments in Somersett - Neighborhood "SOA II"

Priority	Treatment ID#	Treatment Description
1	**SOA II - 1**	South facing slopes below Ventana, The Ledges and Wintercreek are a combination of planted landscapes and native vegetation. Design and construct a shaded fuel break utilizing mastication and hand treatment below homes. Thin existing vegetation to create a mosaic landscape to reduce fuel loading and continuity per Appendix A BMPs. Spacing between plants should be at least two times the height of remaining shrubs. Seed prior to treatment and/or seed interspaces in the fall following treatment per Appendix C BMPs. Increase frequency of planted landscape maintenance including trimming, thinning and removal of dead biomass annually. Explore opportunities for ongoing vegetation maintenance through annual short-term livestock grazing (e.g. sheep, goats).
2	**SOA II - 2**	Golf course open spaces represent a mix of native and irrigated landscape plantings. Selectively masticate and hand treat native vegetation to thin plant densities, reduce fuel loading and create interspaces (Appendix A BMPs). Seed prior to treatment and/or seed interspaces in the fall following treatment per Appendix C BMPs. Increase frequency of planted landscape maintenance, including trimming, thinning and removal of dead biomass annually. Utilized BMPs consistent with golf course operations and aesthetics.
2	**SOA II - 3**	Access roads, vehicle roadways and trails are bordered by irrigated landscape plantings. Tree and shrub densities increase overtime as they mature requiring trimming and thinning to maintain fuel loading. Regularly assess understory fuel loading levels and remove fine-fuels when continuity is high per Appendix A BMPs. Expand landscape maintenance utilizing BMPs particularly on slopes, within draws or drainages, and along Somersett Pkwy. Remove dead biomass annually.

Table 4. Recommended Treatments in Somersett - Neighborhood "SOA III"

Priority	Treatment ID#	Treatment Description
1	**SOA III - 1**	The northwest area of Somersett was burned in the 2006 Verdi fire and is comprised of annual grasses, primarily cheatgrass & Medusahead grass. Apply herbicide to eradicate cheatgrass (Appendix B BMPs) and re-seed with fire resistant species per Appendix C BMPs. A portion of this area will be developed into residential homes, roadways and trails. A fuel break should be designed and installed in conjunction with the new development along the western and northern boundaries. Emergency access by fire suppression equipment should also be considered during community development. Prior to fuel break construction, this area should be assessed annually and a temporary fire break installed, as needed, to reduce the risk for fire encroachment into community per Appendix A BMPs. Large areas of Medusahead grass were discovered in this area which can spread rapidly with surface disturbance. Apply herbicide to eradicate Medusahead grass and re-seed with fire resistant bunch grasses per Appendices B & C BMPs.
2	**SOA III - 2**	Open space along the northern property line of Somersett was burned in the 2006 Verdi fire and is comprised primarily of annual grasses including cheatgrass. Apply herbicide to eradicate cheatgrass (Appendix B BMPs) and re-seed with fire resistant species per Appendix C BMPs. The area is conducive for the design and implementation of a fuel break to prevent the spread of wildfire into the community and particularly down the Mogul Creek drainage. Existing trails and dirt roads should be consolidated and managed to reduce the threat of human ignitions. Prior to fuel break construction, this area should be assessed annually and a temporary fire break installed, as needed, to reduce the risk for fire encroachment into community per Appendix A BMPs.
1	**SOA III - 3**	The eastern property line along Mogul Creek is primarily native vegetation that requires thinning to reduce fuel loading and fuel continuity. Masticate and/or hand treat shrubs to create interspaces two times the height of remaining shrubs per Appendix A BMPs. Treatments should parallel the access road and trail consistent with topography up to 30 feet laterally. Seed prior to shrub thinning treatment with fire resistant grass species, and/or seed interspaces in the fall following treatments per Appendix A BMPs. Utilize BMPs consistent with visual aesthetics and the riparian vegetation in the channel. Dead and down riparian vegetation should be removed.

Table 4. Recommended Treatments in Somersett - Neighborhood "SOA III" *(continued)*

Priority	Treatment ID#	Treatment Description
1	**SOA III - 4**	The ephemeral drainage running from the cell towers at the end of Chalk Ridge Ct. south to the Driving Range is comprised of native vegetation forming a continuous fuel bed. Thin native vegetation below homes and along drainage channel to create interspaces and break up the continuous fuel bed per Appendix A BMPs. Expand maintenance and thinning of planted landscape below homes to improve tree and shrub health and reduce fuel loading. Remove dead biomass annually. Continue treatment down slope to Somersett Pkwy. Seed prior to treatment with fire resistant grass species, and/or seed interspaces in the fall following treatments per Appendix A. Utilize BMPs consistent with visual aesthetics, golf course operations and the riparian vegetation in the channel.
3	**SOA III - 5**	Hand treat the heavily vegetated planted landscape below Placerwood Trail homes down slope to Somersett Pkwy per Appendix A BMPs. Trim and remove shrubs to create interspaces two times the height of remaining shrubs to reduce fuel continuity. Utilize BMPs consistent with roadway aesthetics. Seed interspaces in the fall following treatments to stabilize slopes per Appendix C BMPs.
2	**SOA III - 6**	Access roads, vehicle roadways and trails are bordered by irrigated landscape plantings. Tree and shrub densities increase overtime as they mature requiring trimming and thinning to maintain fuel loading. Regularly assess understory fuel loading levels and remove fine-fuels when continuity is high per Appendix A BMPs. Expand landscape maintenance utilizing BMPs particularly on slopes, within draws or drainages, and along Somersett Pkwy. Remove dead biomass annually.

Table 5. Recommended Treatments in Sierra Canyon Community ("SC")

Priority	Treatment ID#	Treatment Description
1	**SC - 1**	Maintain landscape plantings to create a shaded fuel break through tree thinning and pruning. Reduce shrub densities to create interspaces and replace cheatgrass with perennial bunch grasses in the fall after herbicide treatment according to Appendices B & C BMPs. Maintain access corridors for emergency response vehicles. Initiate discussions with adjacent property owners to design, construct, and maintain a fuel break along western property line. During the interim, seek off-site landowner permission to install a temporary fire break, with a minimal width of 100 feet, per Appendix A BMPs.
1	**SC - 2**	The potential for a human caused wildfire is high along the I-80 Business corridor. Future development opportunities should be identified and a fuel break with emergency vehicle access incorporated into future projects. Protection of existing power lines, water system and homes on ridge line is a priority. Thin shrub species and seed fire resistant grass species to create a mosaic landscape along toe of the slope. Until such time as site flammability is reduced, assess fuel loading and continuity annually in this area and install a temporary fire break, with a minimal width of 100 feet, along the I-80 Business corridor as needed. BMPs for temporary fire break are found in Appendix A.
1	**SC - 3**	Protection of the existing communication towers through installation of a fuel break that ties to the western community boundary is recommended. Existing trails, access roadways and past disturbance areas pose opportunities for establishing a continuous fuel break and access for emergency vehicles. BMPs for constructing this fuel break are found in Appendices B & C. Reduce cheatgrass and invasive annuals competition utilizing herbicide per Appendix B BMPs. Replant threated sites with fire resistant bunch grasses per Appendix C BMPs, typically one year after herbicide application.
2	**SC - 4**	The eastern community boundary south of Somerset borders public lands managed by BLM. Initiate discussions with BLM to design and implement a shaded fuel break to protect homes and prevent wildfire from moving through the community. These discussions should include development of annual fire breaks along this property boundary until a permanent fuel break is constructed. Thin native vegetation below trail and along drainage channel to create interspaces and break up the continuous fuel bed (Appendix A BMPs). Seed prior to treatment and/or seed interspaces during fall months following treatment per Appendix C BMPs. Expand maintenance and thinning of planted landscape to improve tree health and reduce fuel loading. Remove dead biomass annually.
3	**SC - 5**	The hill and fill slope along the southern border of Somersett above Tarleton Way has a high density of annual grasses including cheatgrass. Apply herbicide to reduce cheatgrass competition (Appendix B BMPs) cheatgrass and re-seed with fire resistant species per Appendix C BMPs. Maintain fuel loading and shrub interspace by annual trimming and removing of dead biomass.

Table 5. Recommended Treatments in Sierra Canyon Community ("SC") *(continued)*

Priority	Treatment ID#	Treatment Description
2	**SC - 6**	Access roads, vehicle roadways and trails are bordered by irrigated landscape plantings. Tree and shrub densities increase overtime as they mature requiring trimming and thinning to maintain fuel loading. Regularly assess understory fuel loading levels and remove fine-fuels when continuity is high per Appendix A BMPs. Expand landscape maintenance utilizing BMPs particularly on slopes and within draws or drainages. Remove dead biomass annually.
1	**SC - 7**	Isolated populations of Medusahead grass was identified in two locations involving areas of past disturbance and/or fill slopes. Treat all areas of located noxious weeds aggressively with herbicide (Appendix B BMPs) and reseed per Appendix C BMPs. Multiple treatments and ongoing maintenance for these infestations may be necessary.

6.0 Cost Estimates

The cost of treating the various identified treatment areas is similar for both Somersett and Sierra Canyon communities. Generally speaking, fuel reduction costs are affected by several variables including fuel type, fuel density, slope, surface obstructions (rock) and access. Equipment and labor mobilization can be reduced by keeping the project areas connected and as large as possible. The following table provides treatment estimates based upon recently completed projects in western Nevada and the Lake Tahoe Basin, land management agencies conducting fuels treatment and US Forest Service research.

Table 6. Treatment Specific Cost Estimates within the Wildland Urban Interface

Fuel Reduction Treatment	Cost per Acre
Mechanical Thinning	$2,000 - $3,500
Hand Thinning	$500 - $2,500
Hand Pile & Burn	$300 - $700
Hand Removal	$300 - $500
Chipping (material stays in place)	$200 - $700
Mastication	$300 - $1,400
Prescribed Burning	$400 - $1,500

It is important to note that the above treatment costs are only the costs of actual treatment. Many projects particularly on public lands also have associated costs for planning, resource surveys, environmental analysis, administration and project management which may raise project costs 30 to 50 percent. Project site specific bids from at least three separate contractors is recommended given the variables of the planned Somersett and Sierra Canyon treatment areas. Table 7 contains a list of representative vegetation/fuels treatment contractors servicing the western Nevada area.

Table 7. Contractors and Agencies Specializing in Fire Fuels Reduction Projects

Vendor	Vendor Name	Contact Number
Bordges Timber Inc.	Tim Bordges	(530) 626-7930
Cross Check Services Inc.	David Mercer	(530) 581-4225
Healthy Trees	Tom Henderson	(775) 224-3827
North Tree Enterprises, Inc.	Michael Armstrong	(831) 582-3400
North Lake Tahoe FPD	Forest Schafer	(775) 831-0351
Nevada Division of Forestry	Eric Roussel	(775) 684-2500
Reno Green Landscaping	Carrie Owen	(775) 360-2133
Tahoe Douglas FPD	Mark Novak	(775) 588-3591

7.0 Conclusions

Somersett and Sierra Canyon communities are well designed providing excellent access through roadways, access roads, golf courses and trail systems. The communities have three career fire stations, two operated by the Reno Fire Department and one by the Truckee Meadows Fire Protection District within and in close proximity to the communities. Water storage and fire hydrants meet or exceed criteria for communities of their size and configuration. Structures are well constructed and utilize fire resistant building materials. Public facility, roadways and landscape maintenance is ongoing throughout the year and provides residents with a high quality of life both aesthetically and functionally. While there are never any guarantees, Somersett and Sierra Canyon communities from a wildfire protection and Fire Adapted Community perspective, are well structured for mitigating wildland fire risk.

The Truckee River Canyon west of Reno to the California State Line has seen multiple large wildland fires over the past 60 years and most certainly will experience wildland fire in the future. A worst-case wildland fire scenario in western Nevada includes high west to southwest winds, extremely low fuel moisture levels in sagebrush-bitterbrush plant communities that result in a rate of fire spread exceeding 30 mph. Firebrands and embers are picked up and spread up to a mile ahead of the actual flame front igniting spot fires where they land. Vegetated open spaces in developed residential communities become receptive fuel beds and can quickly spread wildfire throughout the development, threatening homes and infrastructure. Topography and prevailing westerly winds increase wildfire risks to Somersett and Sierra Canyon communities as both are bisected by south and southwesterly drainages terminating at the Truckee River.

Vegetation or “fuels” management is an effective action that communities can initiate to reduce the risk of wildfire ignitions and to reduce the intensity and spread of a wildfire should it occur. Effectiveness of any fuels management treatment is directly correlated to the ongoing maintenance of the fuels management treatment. All of the plant communities identified in this document will continue to grow and mature recreating fuel beds that over time become increasingly flammable and receptive to ignitions. Bottom line, an ongoing commitment by the property owners, the HOAs and the communities to manage their native vegetation open spaces and planted landscapes is imperative.

Annual grasses, including cheatgrass, are fine fuels and highly receptive to wildfire ignitions once dry in late spring. Annual grasses are common throughout much of the open spaces, along trails and in disturbed areas of both communities and play a key role in the overall fire hazard risk. Annual grasses require assessment annually and ongoing treatment/removal to reduce wildfire hazards. It is recommended that shrub communities and planted landscapes be reevaluated every five years with treatments planned and implemented on a regular basis.

Complete elimination of the risk of wildfire is not possible given the multitude of environmental conditions, but active vegetation management greatly reduces risk. The treatment recommendations developed in this assessment report should be considered a starting point for the communities to address the wildfire risk. **Long-term community safety from wildfire requires a permanent commitment to public education, the enforcement of fire safe guidelines, defensible space, and annual attention to fuels management.**

Appendix A

Hand & Mechanical Best Management Practices

Appendix A
Hand & Mechanical Best Management Practices

Hand Thin, Pile, and Haul

Shrub or Brush Reduction

Hand tools such as weed-eaters, Pulaski's, chainsaws, saws, etc. should be used to remove individual shrubs and reduce the fuel load by creating space between the remaining shrubs equal to approximately twice the remaining shrub height. Creating a mosaic of "shrub islands" and meandering interspaces will result in a natural appearance. Individual desirable shrubs to remain on site should be clearly marked by the Project Manager prior to initiation of work. Care should be taken to avoid cutting or any disturbance within flagged areas that are designated as desirable shrub islands to be retained.

Biomass generated from hand thinning shrubs should be moved to temporary pile locations approved by the Project Manager in preparation for chipping or grinding or removal from the community. Chipped or ground biomass should be immediately blown into chip vans and hauled to designated areas for disposal. Upon completion of chipping and hauling, all paved or concrete surfaces should be thoroughly cleaned to remove all remaining dirt and vegetative litter.

Broadcast seeding should occur either immediately before or following the shrub thinning treatment with the Somersett - Sierra Canyon Seed mix described in Appendix C.

Understory Fuels Reduction

There are two different scenarios pertaining to the management of building fire fuel loads and fuel continuity in the Somersett and Sierra Canyon communities. The first scenario relates to both communities which enjoy successful post-construction seeding and site stabilization at many sites. Due to the density of understory plant establishment and the subsequent accumulation of fine-fuels, some of these reclaimed sites currently represent an increased fire hazard.

The second scenario pertains to either previously burned sites that remain undeveloped or pockets where the post-construction reclamation did not take sufficiently to prevent subsequent weed invasion. Generally, these sites are now dominated by cheatgrass and other annual weed species. Medusahead grass, a listed noxious species, is also making strong end roads into invading and occupying many of these unstable sites. The ultimate goal for stabilizing these sites would be to convert them to stable perennial plant communities as specified in the BMPs offered in Appendices B and C. However, the specified plant conversion process can be costly, may involve several attempts before success is achieved, and will likely occur over an extended period of time. Due to widely varying climatic conditions that are inherit in western Nevada, vegetation conversion from weedy annuals to a reestablished perennial plant community represents a process, not necessarily a singular treatment project. The volunteer reintroduction of native perennial shrub species into these stabilized sites can take a decade or more.

During the interim, both herbaceous understory fuel scenarios can be effectively addressed by simply monitoring and tracking the resulting fuel loads and continuity on an annual basis and periodically removing the residual fine-fuels or plant litter when the fire risk becomes too great. Hand-held weed-eaters can be used to knock-down standing fine-fuels in small, steep or inaccessible sites, or on sites where a shrub component is to be retained. In these instances, the residual litter should be raked and hauled away to an off-site disposal area.

Due to the risk of spark ignition, extreme care should be taken when mechanical equipment is utilized to remove standing understory fuels. The optimal time to conduct this treatment would be after seed ripe for the targeted understory species and prior to low fuel moisture conditions which occur by mid-July. However, this window can be extended if adequate fire suppression measures are taken and fire suppression equipment is located nearby on a standby status.

Mechanical Treatments

Mastication

There are two basic types of masticators commonly used that are distinguished by their masticating heads (rotary head and horizontal drum) which are further differentiated by their base machines (integrated or boom-mounted). An integrated masticator is best for small areas with limited access while a boom-mounted masticator works well for larger acreages. Either type of masticator could be used to selectively remove individual shrubs and retain adequately spaced shrub islands. Areas considered for mastication treatment should be evaluated prior to treatment for safe operation of the masticator equipment. Individual desirable shrubs and shrub islands to remain on site should be clearly marked by the Project Manager prior to initiation of work. Care should be taken to avoid cutting or any disturbance within flagged areas that are to remain on site.

Mowing

In larger, gentle terrain sites, with little or no surface rock, and where either the native shrub component is not present or the existing shrubs are also identified for removal, tractor-mounted blade or frail mowers can be utilized to remove standing understory fuels. While permanent fuel breaks are being constructed, this equipment can also be used to establish a temporary fire breaks during periods of high weed production and fire risk. Temporary fire breaks should be a minimum of 100 feet in width and can be established either along access points to aid in fire suppression or at developed property lines to provide a defensible space for the purposes of assisting fire suppression measures.

Careful timing of mechanical treatments should include the following considerations.

- Mechanical vegetation treatments should not occur during fire season and should only be done when fuel moisture is high. Sparking can occur if rocks are hit by steel blades or with the masticator.
- Heavy equipment should not be operated under saturated soil conditions.
- Except for temporary fire-breaks, broadcast seeding should occur before and after the mechanical treatment with the Somersett-Sierra Canyon Seed mix described in Appendix C.

- Vegetative chips and debris following mechanical treatment typically remain on the ground. However, to the extent this debris can be raked and removed off-site, this added action represents a BPM for temporary fire breaks.

Appendix B

Herbicide Best Management Practices

Appendix B
Herbicide Best Management Practices

Current research indicates the only effective method today to stabilize and initiate the conversion process from cheatgrass-dominated sites to perennial plant species is to first apply a preemergent herbicide treatment that prevents the germination of cheatgrass or Medusahead grass for a period of 12 to 18 months. During this weed suppression period, the treated area is seeded to establish a competitive stand of adapted perennial grass species. Once the perennial bunchgrass community is established to a density where it can out-compete cheatgrass, the fire-return levels go down, and natural plant succession processes can again proceed to allow the voluntary reintroduction of native shrub species back into the post-treatment plant community.

Preemergent herbicides that have been tested and proven effective in preventing the germination of both cheatgrass and Medusahead grass for a 12 to 18 month period, includes: Plateau, Landmark XP, and Matrix SG manufactured by the BASF Corp., Bayer Corp Science LP, and DuPont, respectively. Other soil active preemergent herbicides made also be available that provides a similar level of cheatgrass control; however, these alternative herbicides have not been as thoroughly tested and reported in their ability to control cheatgrass and Medusahead germination in the environments located in western Nevada. Ongoing research by the USDA ARS Great Basin Rangeland Restoration Station located in Reno indicates that Landmark XP and Plateau products have slightly greater efficacy in controlling cheatgrass and Medusahead on loamy soil types that dominate the project area to south of Somersett Parkway. However, churning or high content clay soils are found to be prevalent in the Somersett community above or to the north of Somersett Parkway. The Matrix preemergent product has been found to be much more effective in soils with a high clay content.

Use of herbicide products must explicitly follow the Manufacturer's instructions as stated on the EPA registered label, including the specified product application rate. Herbicide application should be performed by a Certified (and bonded) Applicator authorized by the State of Nevada Department of Agriculture. The Contractor must strictly follow ALL recommendations, restrictions, conditions, procedures and precautionary measures as stated on the EPA registered label and the supplemental labeling that addresses use on pasture and rangelands. Applicators and handlers must wear protective clothing as stated on the herbicide label.

If the Manufacturer's label instructions are followed closely, these herbicide products are designed not to clause mortality to existing and established perennial plant species. Accordingly, these products can be applied in areas where preexisting perennial plants are desired to be maintained. Withstanding this flexibility, care should be exercised when using these products for unnecessarily spraying established perennial plants that are identified for retention due to the plant damage that can result under certain conditions.

Herbicide application should be carefully conducted during calm early morning hours under low wind conditions as specified in the Manufacturer's label. Extreme care must be taken to avoid spray drift to adjacent property or surface water. To achieve these restrictions RCI recommends the use of low volume and low pressure sprayers be utilized in this operation (e.g., backpack and boom herbicide sprayers). The

applied average spray droplet sizes should be medium to course and the spray nozzle height should be adjusted as close to the ground as possible while still achieving a uniform application coverage.

The application period should be carefully scheduled to occur in the fall, within six (6) weeks before the expected date when the soil freezes, and within two to three (2-3) weeks of normal predicted rainfall of a minimum of ½ inch. This application should not occur prior to October 1.

Since these herbicide products remain active in the soil and preventing new plant germination for a 12 to 18 month period following application, post-treatment seeding is delayed (and the treated ground in left fallow) of one complete year. Post-treatment seeding is instigated the following fall prior to frozen soil conditions. See Appendix C for further BMPs relating to seeding disturbed sites.

Appendix C

Seeding Best Management Practices

Appendix C
Seeding Best Management Practices

Two different seeding methods were identified to support fuel reduction or vegetation conversion projects in the Somersett and Sierra Canyon communities. The first scenario pertains to small, confined, or steep sites where shrub fuels are proposed to be selectively thinned or in more extensive areas of multiple shrub removals to achieve a mosaic pattern for reduced fuel loading and continuity. The planned shrub reduction will result in added soil disturbances and the treated sites should be broadcasted seeded and raked to incorporate beneficial seed into the soil surface either immediately before the operation or the next fall period.

Broadcast seeding and raking to incorporate the Somersett-Sierra Canyon seed mix into the soil surface can also be utilized in planned vegetation conversion projects where, due to either size confinement or slope steepness, access by mechanical drill seeding is either not economically-feasible or safe. Drill seeding and subsequent mulching is recommended in more extensive treatment sites, like during the construction of permanent fuel breaks, where terrain is gentle and retention of existing shrub cover is not planned.

The most important aspect of seeding is to assure good seed/soil contact and seed placement at the appropriate depth. Hydroseeding represents a popular and commonly used method to plant seed material. However, since this method does not assure the incorporation of the planted seed into the soil surface, RCI strongly recommends against using this seeding method because of its added risk for reduced seed germination and establishment.

Seedbed Preparation

The ideal soil firmness for seeding is when a person stands on one foot and leaves a shoe indentation approximating one-quarter inch in depth. In compacted soil conditions where this simple test is not achieved, the seedbed should be loosened prior to seeding to a depth of approximately 2-4 inches. This is usually accomplished by light, shallow disking, harrowing, or hand-hoeing and shovels.

When broadcast seeding is used, the seedbed should be left in a loose and roughened condition to increase the opportunities for proper seed/soil placement. Seed application should occur immediately upon completion of seedbed preparation.

Seed Application

It is very important to assure good mixing of seeds prior to seeding. Smaller size seeds tend to sift to the bottom of the seed bags. Thorough mixing of the seed prior to application will assure even distribution of all selected species. Seed agitation during the seeding operation is also needed as seed of different sizes and weights will separate by mechanical vibration.

Broadcast Seeding

Broadcast seeding should be done with hand-held rotary seed spreaders and should not be done under windy conditions that would allow seed to drift off-site or does not otherwise allow uniform seed application within the treatment site.

Immediately following broadcast seed applications, the seeded areas shall be raked by hand, harrowed, or dragged to cover seed with 1/4 - 1/2 inches of soil. This is a very shallow covering, but very critical for germination and emergence of seedlings.

Drill Seeding

As long as there is sufficient operational area and a limited shrub cover to be retained, drill seeding represents a standard practice for assuring good seed/soil contact and a precisely planting depth of 1/2 – 3/4 inch depth. This method is well-suited for establishing fire-resistant species in permanent linear fuel breaks. The distance between seeding disks should range between 12 – 18 inches. The direction for drill seeding shall be as close to the slope contour as possible.

Prior to seeding, the drill seeder must be tested and calibrated to meet the seed application rate specified in the Somersett-Sierra Canyon mix. Due to equipment vibration and seed separation during operation, single seedbox drill seeders must have continuous mechanical agitation. For dual seedbox seeders, large or small sized seed as noted in the recommended seed mixture, shall be placed in a separate seedbox and the operational application rate from each independent seedbox must conform to the specified seed application rate listed below.

Timing of Seeding

The fall, prior to frozen soil conditions, represents the opportune time to seed disturbed sites as the seed will lay dormant during the winter period and seed germination and establishment will benefit from the added soil moisture that is received during the winter and early spring periods. However, for smaller sites that are solely incurring shrub thinning, broadcast seeding prior to the operation and incorporating seed into the soil surface through the site disturbance brought by the project implementation, represents a sound practice.

Recommended Somersett & Sierra Canyon Seed Mix

Existing site reclamation and landscaping in the Somersett and Sierra Canyon communities has largely been successful to the point where several reclaimed sites now require fuels reduction to reduce existing fire risks. To the extent these previous reclamation plans can be located and applied to the site disturbances or vegetation conversions proposed in this plan, RCI recommends this step be taken.

Lacking this previous information, RCI recommends use of the following seed mixture to reclaim site disturbances caused by the fuel reduction and/or vegetation conversion projects included in this initial plan. Because this plan recommends both broadcast and drill seeding methods, conditioned on the actual site conditions that are present, application rates of this recommended seed mix is specified by both seeding methods.

One seeded species that was noted to be particularly successful in previous site reclamation is an improved but unknown variety of Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*). Due to the proven success of this species within these communities, an improved variety of this grass species called 'Anatone' has added to the recommended seeding mix.

Somersett & Sierra Canyon Recommended Seed Mix

Scientific Name Common Name	Seed Size	Seeding Rate (PLS* Pounds per acre)	
		Broadcast Seeding	Drill Seeding
Agropyron desertorum *'Hycrest' Standard crested wheatgrass*	Large	2.0	1.0
Agropyron fragile *'Vavilov' Siberian wheatgrass*	Large	3.0	2.0
Elymus lanceolatus ssp. psammophilus 'Sodar' Streambank wheatgrass	Large	3.0	1.5
Pascopyrum smithii 'Arriba' Western wheatgrass	Large	2.0	1.0
Pseudoroegneria spicatum spp. spicatum 'Anatone' Bluebunch wheatgrass	Large	2.0	1.25
Bromus marginatus 'Garnet' Mountain brome	Large	1.0	1.0
Poa secunda ssp. *ampla* 'Sherman' big bluegrass	Small	2.0	0.25
Lupinus serviceus Silky Lupine	Large	1.0	0.5
Achillea millefolium White yarrow	Small	0.25	0.25
Eriogonum umbellatum Sulfur flower buckwheat	Large	1.0	0.5
Castilleja chromosa Indian paintbrush	Small	0.25	0.25
Penstemon eatonii Firecracker penstemon	Small	0.5	0.25
Penstemon palmeri Palmer penstemon	Small	0.5	0.25
Total PLS* Pounds Per Acre		**18.5**	**10.0**

*Pure Live Seed (PLS)

Mulching

Following seeding, disturbed areas exceeding either a 1/2 acre in size or having a width greater than 200 feet, should be mulched to reduce site erosion, dust, and wind-shear damage during the seedling establishment phase. Mulching seeded sites can also aid in soil moisture retention during the seedling establishment period.

The selected mulching treatment will depend on conditions of the individual project site, including soil texture and slope or gradient. Popular mulching methods adapted to conditions in the Somersett and Sierra Canyon communities are discussed below. Some sites may require an integration of alternative soil mulching methods to obtain site stability. All small-grain straw used onsite as mulch must be certified as weed-free by the originating state.

Small-Grain, Weed-Free Straw Crimping

On flat or gentle terrain with soil textures that allow successful crimping to a depth of 2 – 4 inches, the broadcast of small-grain, certified weed free straw represents a preferred mulching treatment where the method is suited. The straw is loosely blown on the seeded site at a uniform application rate of two dry tons per acre. After straw application, either a slotted disk or regular disk plow (adjusted to a near-vertical disk position) is utilized to crimp or punch the straw into the ground to an effective anchoring depth of 2 to 4 inches. The goal of this mulching treatment is to have 4 to 6 inches of straw stubble vertically protruding from the soil surface. The distance between plow disks, or the crimped straw much rows, should be no greater than 6 to 8 inches. The direction of straw crimping shall be as close to the slope contour as possible.

Hydromulching

Hydromulching represents a commonly used mulching method on flat or gentle terrain with slopes less than 20 percent. This method involves spraying a mixture of reclaimed water, fiber mulch, and tackifier over previously seeded sites. Often a green dye is added to the fiber mix to assist in assuring uniform coverage of the mulch fiber. Application rates in the range of 2,000 to 3,000 pounds of wood fiber and 75 pounds to 100 pounds of tackifier per acre are typical. However, the Manufacturer's installation instructions for the fiber mulch and tackifier must be followed closely to assure proper installation. When this mulching method is used, care should be exercised to not unnecessarily spray and cover existing shrubs and grasses identified for retention with the fiber and tackifier solution.

Weed-Free Straw Plus Netting

An application of small grain, weed-free certified straw, applied at a rate of two dry tons per acre, can be loosely blown on moderate slopes of less than 45 percent and temporary secured in place by commercially available biodegradable netting. Installation and securing of this temporary mulch treatment should closely follow the Manufacturer's recommendations for the selected netting product.

Erosion Control Blank and/or Wattling Products

Temporary soil stabilization of seeded slopes greater than 45 percent require engineered and designed products of which there are many commercial sources. The Manufacturer's specifications should be used to select the engineered mulch product and the Manufacturer's instructions should be relied on to install the selected product.

Appendix D

Glossary of Selected Wildfire Management Terms

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Annual Grass Treatment: The purpose of this treatment is to reduce the volume of flashy fuels associated with annual grass growth (e.g., cheatgrass and Medusahead grass). Fuel reduction can be accomplished by hand or mechanical treatment of plant biomass or herbicide treatment. Preemergent herbicides can be applied near residential areas at the proper rates and following all label instructions to inhibit seed germination. After plants have started growth, mowing or weed-eating and removal of annual grasses before seed maturity reduces the amount of fine-fuels during the summer fire season, limits seed production, and reduces the potential for annual grass germination in the following year.

Defensible Space: Defensible space is defined as a minimum of a 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 wildfire.

Extreme Fire Behavior: 'Extreme' implies a level of fire behavior that ordinarily precludes methods of direct control action. One or more of the following factors are usually involved: high fuel loading, high rate of spread, prolific crowning and/or spotting, presence of fire whirls, and/or strong convection column. Predictability is difficult because such fires often exercise influence on their environment and behave erratically and dangerously.

Fine-Fuels: Fast-drying fuels, generally with a comparatively high surface area to volume ratio, which are less than ¼ inch in diameter and have a time lag of one hour or less. These fuels ignite readily and are rapidly consumed by fire when dry.

Fire Behavior: The manner in which a fire reacts to the influences of fuels, weather, and topography.

Firebrands: Pieces of burning material carried on the wind ahead of an advancing wildfire that, in extreme cases, can ignite spot fires up to a mile removed from the flame front.

Fire Break: A strip of land cleared of brush, trees, and fine-fuels down to the mineral soil.

Fire Frequency: The number of times that fires occur within a defined area and time.

Fire Hazard: Vegetative factors that can affect the intensity and rate a fire spreads 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 recurrence and intensity of fire relative to a specific plant community.

Fire Return Interval (or fire interval): The time period between fires in a defined area, usually at the scale of a plant stand or a small landscape area.

Fire Risk: Potential ignition sources and factors that facilitate ignition of wildfires.

Flashy Fuels: Fuels such as grass, weeds, leaves, pine needles, duff and litter. Flashy or flash fuels ignite readily and are consumed rapidly when dry. Also called fine-fuels.

Fuel Bed: The array and composition of fuels in terms of fuel loading, depth, and particle size in a natural setting.

Fuel Break: Fuel breaks are constructed in strategic locations where a cover of dense, heavy, or flammable vegetation has been permanently modified to a lower fuel volume or reduced flammability. Fuel break construction may include removing, controlling, and replacing highly flammable vegetation with more fire-resistant species. Locating fuels breaks require strategic planning and regular maintenance is required to maintain their effectiveness over the long-term.

Fuel Loading: The amount of fuels present expressed quantitatively in terms of weight per unit area.

Fuel Reduction Treatment: This treatment involves strategically locating blocks of land near or within communities where flammable vegetation has been permanently modified to a lower fuel volume or reduced flammability.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Home Ignition Zone: Coined by Jack Cohen, US Forest Service Fire Scientist, the home ignition zone concept represents the area surrounding a home that rarely exceeds 200 feet in radius distance. The construction and flammability of structures and vegetative fuels within this radial distance largely determines whether a constructed home will survive a wildfire event or not.

Occluded Interface: This condition is usually within communities or 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.

Shaded Fuel Break: A shaded fuel break is created by altering surface fuels, and increasing the height of the base of the live crown, and opening the canopy by removing a portion of the woody plants in the treatment area. This type of fuel break spans a wide range of understory and overstory prescriptions. Construction methods include thinning, mechanical biomass removal, and the potential use of prescribed fires.

Wildland-Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.