

FireNest

An Innovative Solution to Urban
Planning in WUIs



MEET THE TEAM

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She/Her

Major: Biomedical
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PROBLEM DEFINTION AND ANALYSIS



WHAT ARE WILDFIRES?

Wildfires, as defined by National Geographic, are uncontrolled fires that sweep through wildland vegetation, primarily in rural areas. Despite the negative stigma often associated with them and the perception of pure destructiveness, it's essential to recognize their vital role, especially in forested regions where they are frequently unavoidable. For instance, evergreen forests depend on the extreme heat of wildfires for propagation.

THE PROBLEM

Human activities and urban development have significantly altered the impact of these fires. According to Sierra Hellstrom, Deputy Fire Cooperative Specialist at the Forest Service, when wildfires ignite, they are often exacerbated by non-fire-safe houses in these Wildland-Urban Interface (WUI) or forested areas. These structures can intensify fires beyond what they should be, putting numerous people at risk. To mitigate this risk in urban areas, communities are advised to adopt firewise practices, such as creating defensible spaces.

WILDFIRES AND HOME LOSS

According to the National Large Incident Year-to-Date Report, the United States has incurred a staggering \$1.5 billion in fire suppression costs in 2023 alone, resulting from nearly 3 million acres burned and the destruction of 4.4 thousand structures.

These concerning statistics emphasize the urgency of taking proactive measures to combat wildfires and protect our communities. Investing in wildfire prevention and mitigation strategies is not only necessary but also a responsible choice for our nation's well-being. Together, we can minimize the devastating impacts of wildfires on our communities and natural landscapes in the future.



<https://www.usfa.fema.gov/img/photos/wildfire-california-woolsey.600x400.jpg>

WHY NOT HAVE A BETTER EVACUATION STRATEGY IN WUIS?

- I. Limited Documentation in Rural Areas
- II. Poor Road Infrastructure
- III. Limited Effective State, Local, Tribal and Territorial (SLTT) Communication with The Federal Government

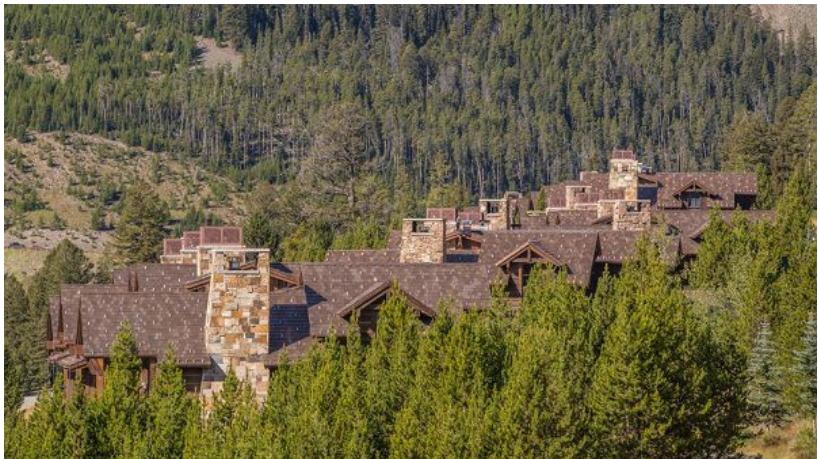
WILDLIFE-URBAN INTERFACE (WUI)

WUIs are areas where there's a transition between human development and wildland. These areas tend to have the highest risks of wildfires; yet, more homes kept getting built in these areas.

From 2002-2026, over 3,000 buildings and structures were lost from fires located in WUIs, and the area of WUIs keep increasing every year.



<https://wwwplib.org/staging/wp-content/uploads/2020/06/wui-1-1024x683.jpg>



<https://www.davinciroofscapes.com/wp-content/uploads/2020/01/MWSHTahoeMT0047.retouch-600x338.jpg>

Development Factors with Wildfire Risk

Since the 1990s, the number of homes inside perimeters of wildfires have doubled. This is explained by 2 factors: one is that wildfires are now more common and intense than they used to be. Another is that the increased residential development in WUI areas.

WUIs and Wildfires

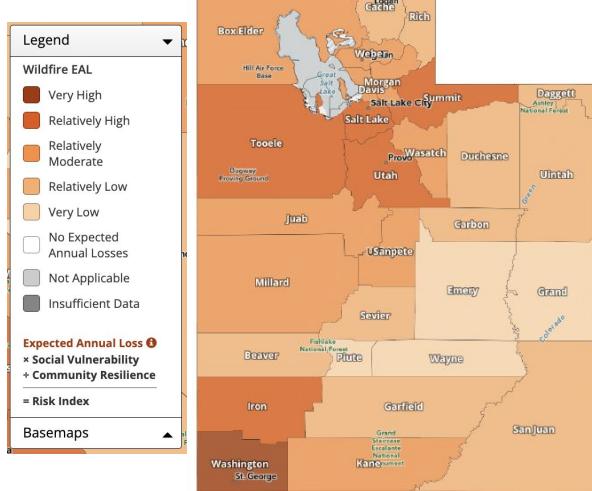
WUI communities often have clustered homes, which pose a dangerous risk when a wildfire occurs. Each home's close proximity to each other increases the risk that flames spread easily from one to another.



<https://www.davinciroofscapes.com/wp-content/uploads/2020/01/MWSHTahoeMT0047.retouch-600x338.jpg>

Factors of Risk to WildFires

In the maps below, it is evident that the areas with high risk of wildfire also correlate with the areas that are in Wildland Urban Interfaces.



Symbology

Utah Urban Interface Areas



Images Screenshoted from The National Risk Index Interactive map

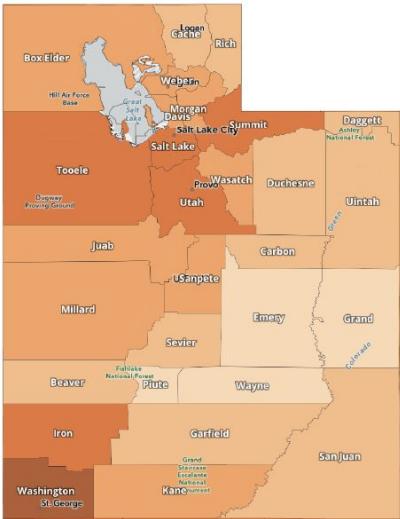
<https://hazards.fema.gov/nri/map#>

Images Screenshoted from the Wildland Urban Interface Location Project originated by the Utah Division of Forestry

<https://www.arcgis.com/home/item.html?id=75fc277292c34760900bb27d8a8152fb>

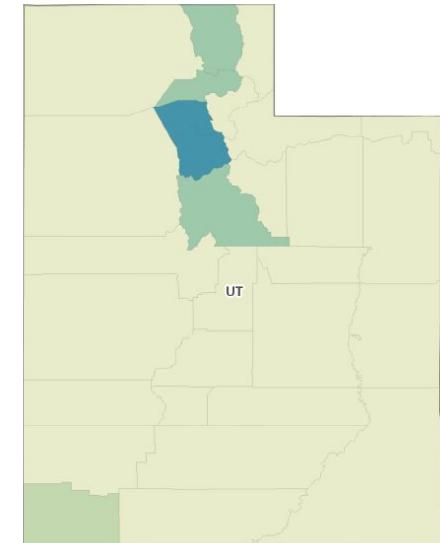
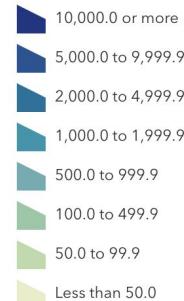
Factors of Risk to WildFires

By looking at the correlation between population density and wildfire risk, we understand how critical it is for people in such areas to have fire-resilient homes.



Legend

Persons per square mile by county (or county equivalent)



Images Screenshoted from The National Risk Index Interactive map

<https://hazards.fema.gov/nri/map#>

Images Screenshoted from 2020 Census Demographic Data Map Viewer

<https://maps.geo.census.gov/ddmv/map.html>



<https://www.gardeningknowhow.com/wp-content/uploads/2019/03/moss.jpg>

WET VEGETATION

- Has higher moisture content, making it less susceptible to ignition.
- Slows down the spread of wildfires as it doesn't readily catch fire.
- Acts as a natural firebreak in some cases.
- Typically found in regions with abundant rainfall or near water bodies.

DRY VEGETATION

- Highly flammable when moisture content is low.
- Prone to rapid ignition and spreading of wildfires.
- Provides ample fuel for wildfires to grow and intensify.
- Commonly found in arid and drought-prone regions.

<https://images.fineartamerica.com/images/artworkimages/mediumlarge/3/dry-vegetation-at-arches-national-park-in-the-desert-of-utah-erik-lattwein.jpg>



The background image shows a dense forest with tall, thin trees. A dirt path leads into the center of the forest, surrounded by green undergrowth and fallen leaves. The lighting suggests a bright day with sunlight filtering through the canopy.

UNIQUENESS AND INNOVATION



<https://i.pinimg.com/originals/9b/15/ad/9b15ad2a90034ad5ff52248c891cd82r.jpg>

WHY AREN'T CURRENT FIRE-SAFE BUILDING SOLUTIONS EFFECTIVE?

1. CURRENT BUILDING CODES AND REGULATIONS



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<https://alquilercastilloshinchables.info/wp-content/uploads/2020/06/SB-Digs--%C2%BB-DMHA-Architecture-Designs-Fire-Resistant-Homes.jpg>

OUR SOLUTION: Expanding state-sponsored home hardening initiatives addresses climate justice for underprivileged communities. High implementation costs burden homeowners with limited resources, particularly low-income individuals who often live in riskier, but more affordable housing. In California, legislation like AB-38 offers financial aid for fire-resistant home upgrades.

Building codes are often developed at the local or regional level, taking into account the specific risks and challenges of the area. In regions with lower fire risks, there may be less stringent requirements for fire-resistant construction, as other hazards may take precedence.

The California government's current approach to addressing wildfire threats on housing emphasizes coniferous forest management over home hardening measures. In the 2023-2024 Wildfire and Forest Resilience Plan, \$12 million is allocated for home hardening, \$5 million for defensible space initiatives, and \$192 million for coniferous forest wildfire fuel breaks.

Despite the severity of recent wildfires in the United States, especially in fire-prone areas like the West, existing laws are limited and/or do not require property owners to use fire-resistant materials when rebuilding after fire damage. This contributes to an ongoing cycle of wildfires and puts individuals at risk.

Construction teams are failing to take innovation opportunities even when they are blatantly presenting themselves-- "It does feel very much like a missed opportunity when it's right there," says research engineer Daniel Gorham with the Insurance Institute for Building and Home Safety.

2. COST

Fire-resistant construction typically involves the use of more expensive materials and additional labor, which can significantly increase the cost of building or renovating a home.

The Insurance Institute for Business and Home Safety (IBHS) had deemed installing wildfire safety measures to a home will increase the cost of construction anywhere from 2%-13%, which, granted, is not a ridiculous amount, but has an impact on lower income home-buyers.

Homeowners may prioritize other aspects of their homes, such as aesthetics or size, over fire resistance due to budget constraints.

OUR SOLUTION: Our company specializes in providing long-term, sustainable solutions. We are building homes to survive natural disasters. Any additional cost incurred by the higher-quality materials and construction we employ is greatly offset by the fact that they will not need to be replaced, even in the face of wildfires.

In addition, our designs are created to maximize safety and minimize cost. For example, many of our materials are sourced from within the region, decreasing delivery costs and quantity of damaged parts. The prospective figures for the West Valley Development show a decrease in cost by 2% when compared to developments of similar size. This number is in agreement with similar figures from a study done by HeadWaters Economics.

Our houses are fully customizable; if the homeowner desires a specific aesthetic, the design consultant will do their utmost to ensure it happens. For example, we stock a variety of flame-retardant paints, which allow us to transform any exterior feature from a safety hazard to a fire-resistive style point.

3. LACK OF AWARENESS



https://www.zillow.com/homedetails/497-W-Yarrow-Ct-Brian-Head-UT-84719/229641681_zpid/

Some homeowners and builders may not fully understand the potential fire risks of their home's structural situation or may underestimate the probability of a fire occurring.

In the midst of a wildfire, it's not the towering inferno of flames that poses the greatest risk to most homes. Instead, they often source from smoldering embers transported by the wind. These fiery fragments can touch down on residential structures, setting fire to commonly used home-building materials such as wooden shingles, accumulations of leaves nestled in gutters, or even infiltrating attics through ventilation openings.

OUR SOLUTION: FireNest is highly specialized. It's our mission to ensure that crises, such as the 2020 Wildfires, never occur again. We hire experts to design our buildings and are constantly in contact with consultants to test our products.

4. EXISTING STRUCTURES

https://www.zillow.com/homedetails/497-W-Yarrow-Ct-Brian-Head-UT-84719/229641681_zpid/

Older homes often lack modern fire-resistant features, such as fire-resistant roofing, siding, or insulation. Retrofitting these homes to meet current fire safety standards can be challenging and expensive.

Many people feel as if the financial cost isn't outweighed by the protections that fire-safe housing provides, and don't know where to reach out to get installations on their housing.

OUR SOLUTION: In addition to community development, FireNest will also focus on providing specialized services for enhancing fire safety in existing homes, in the case established property owners cannot commit to an entirely new home. This includes replacing roofs, reinforcing exterior walls with materials like Faswall, covering vulnerable gaps, installing vent covers, and incorporating heat transfer rods, among other measures.



5. AVAILABILITY OF MATERIALS AND EXPERTISE

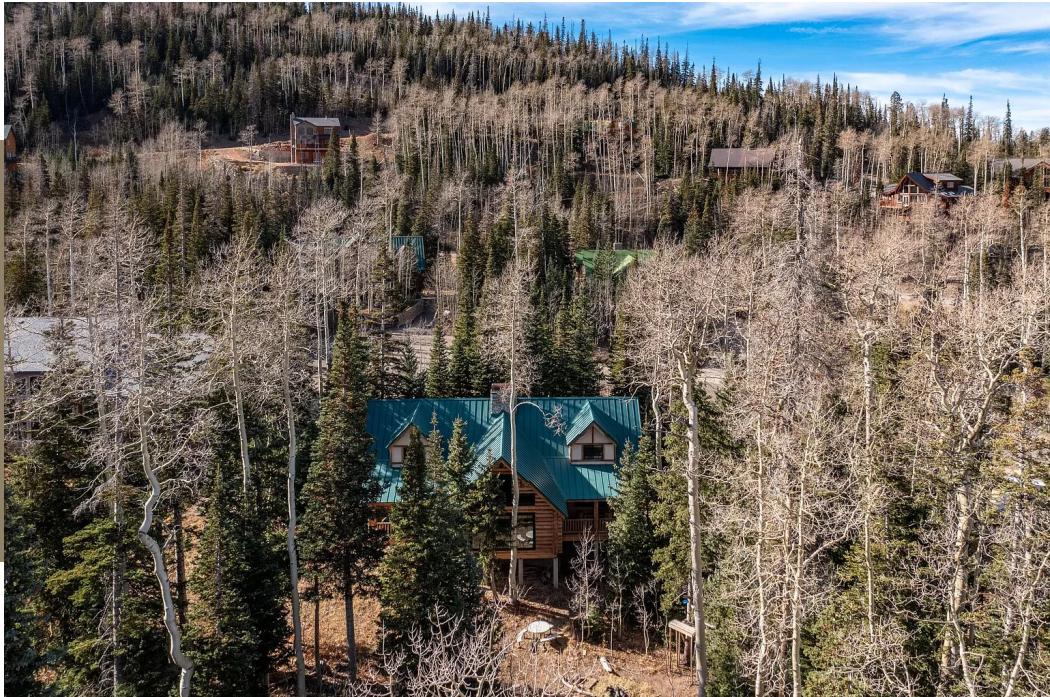
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OUR SOLUTION: We are a countywide developing company! While we are based in Utah and therefore are hiring construction and maintenance crews within the region, we need experts to design and test. We have employees and consultants across the country and are continuously hiring more.

Our design process is different from many larger companies; since we are recently established, rather than importing cheap materials from far away, we design our products using local resources. For example, we constantly contact and consult the multitude of natural resource companies within our region to utilize what our location has to offer.

ISSUES WITH CURRENT HOMES



Issues with the cabin:

- Address is not clearly visible from the road
- Close to neighboring homes
 - The fire will quickly travel from one house to the other
 - In addition, this home is downhill from its neighbors, so the fire will travel even faster

https://www.zillow.com/homedetails/497-W-Yarrow-Ct-Brian-Head-UT-84719/229641681_zpid/



OUR SOLUTION: FIRENEST

FireNest

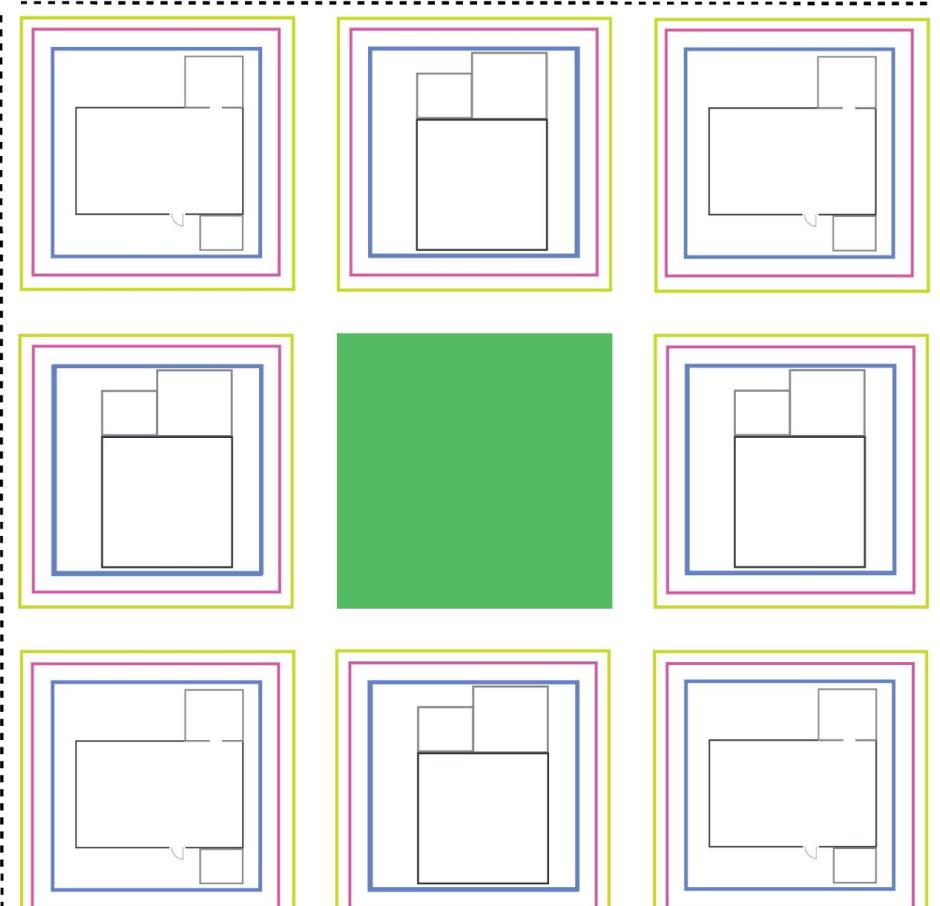
"Innovating for a Fire-Safe Future"

FireNest is a forward-thinking and innovative company dedicated to designing and developing fire safe communities with a strong commitment to environmental sustainability. Our mission is to provide accessible and cost-effective solutions to mitigate the ever-growing challenges posed by fire danger and its related impacts on our communities.

At FireNest, we recognize the pressing need to address the increasing threat of uncontrolled wildfires and their lasting consequences on homes, lives, and the environment. Our team of expert architects, urban planners, and environmental specialists work tirelessly to create safe, resilient, and eco-friendly communities that prioritize fire safety without breaking the bank.



COMMUNITY LAYOUT



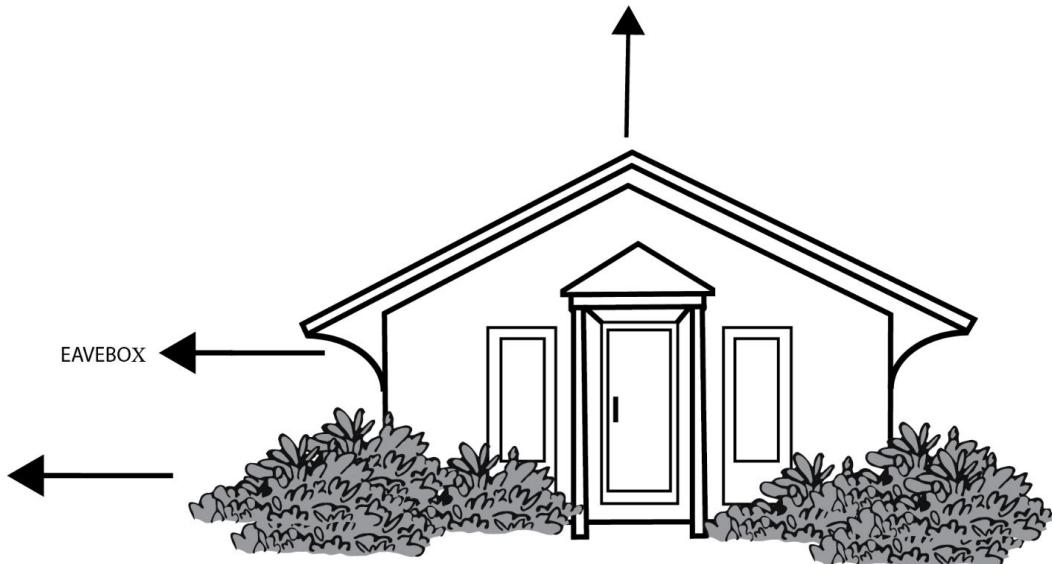
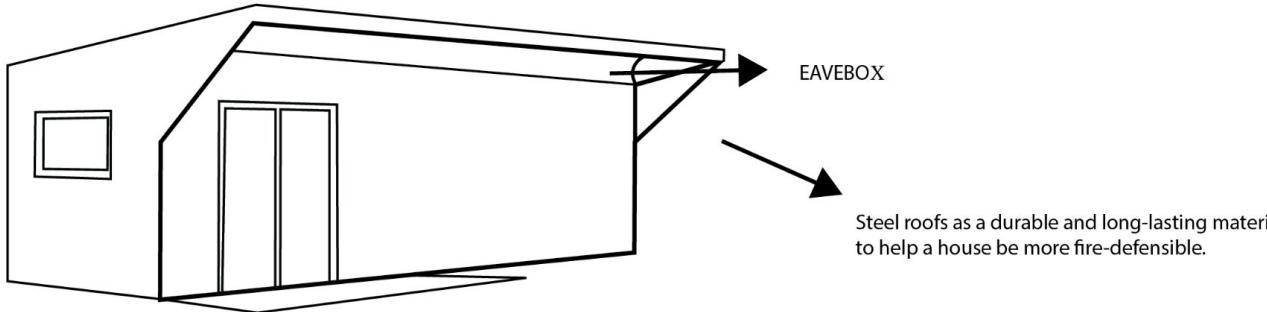
Legend

- Perimeter Park Strip (3' wide)
 - Perimeter of Sidewalk (4' wide)
 - Perimeter of Residential Lots (50' x 50')
 - Preserved Green Space (50' x 50')
- Centerline of 2 Lane Roads (Each lane is 10' wide)

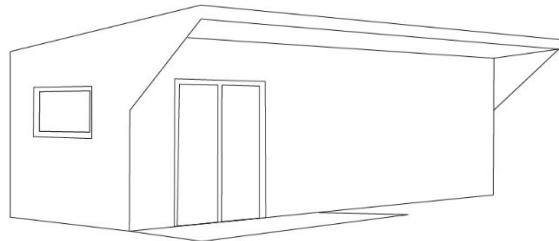
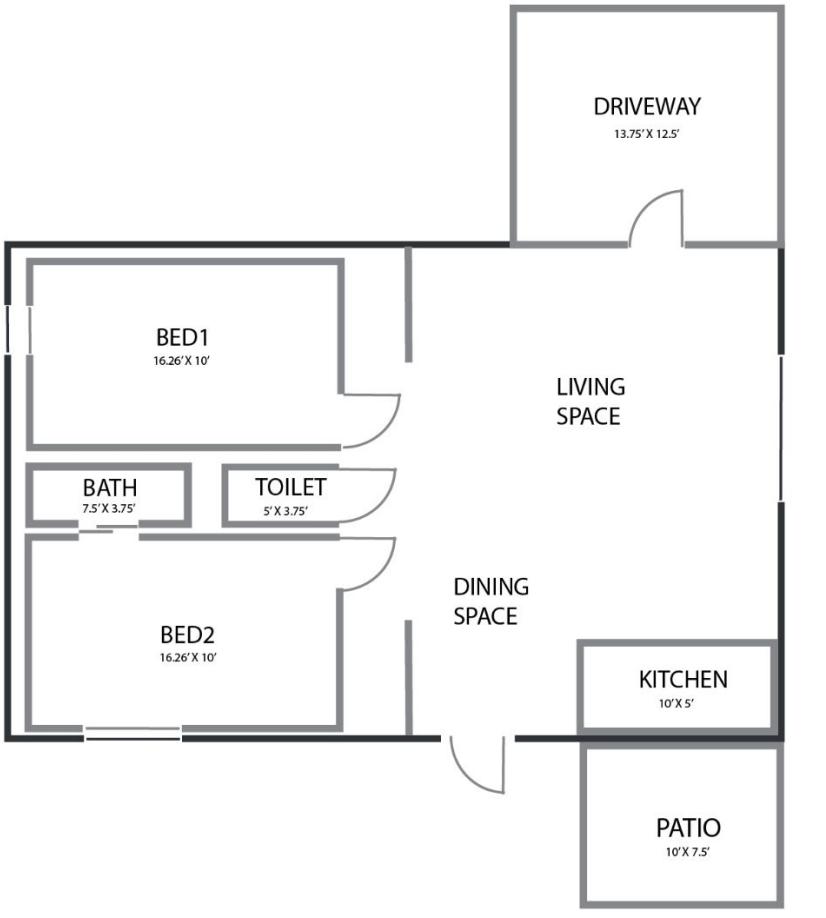
The drawing on the left illustrates how a community of these resident blocks would reside together. Each block is surrounded by sidewalks and park strips as well as wide lanes for easy access for emergency vehicles.

All of the park strips, sidewalks, and green spaces serve as firebreaks in order to prevent rapid spreading of wildfires.

HOUSING EXTERIOR



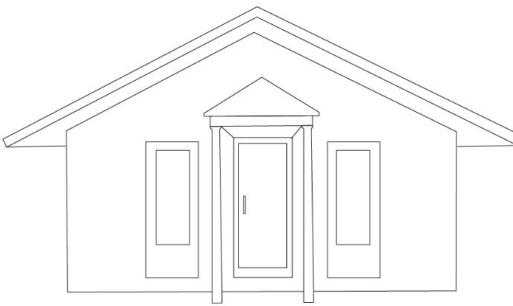
HOUSING STYLE 1



Legend

- 50' X 50' Residential Lot
- 42' X 25' Resident House Perimeter

HOUSING STYLE 2



Legend

- 50' X 50' Residential Lot
- 42' X 25' Resident House

WHAT WE OFFER

ROOFING

We use high quality stainless steel roofing to ensure that the roof is flame resistant and structurally strong.

VENT PROTECTION

We design and install vent covers and protective screening to obstruct firebrands from entering vulnerable passageways.

DRYWALL

We use fire-rated drywall in our exterior walls as a final barrier against the walls collapsing due to heat.

EAVES

Our one of a kind eave design, EAVEBOX reduces vulnerability to flying embers while conforming to the homeowner's design aesthetic.

SIDING

All of our siding packages are fire-resistant and have a rating of 4 hour of burn time or above.

XERISCAPING

We also implement landscape design with fire-resistant plants that have high moisture retention and can slow the spread of fires if one were to occur.

ROOFING

We install Stainless Steel roofing on all of our homes

- This material choice is ideal for this application as its melting and warping points are significantly higher than the max temperature wildfires burn at, giving us a safety margin of 1.13 which is ideal for an endeavor of this size
- The roofing should not need to be replaced within the next 60 years, even if there is a forest fire

Metal roofing is more expensive; however, it should not have to be replaced for the foreseeable future. We deem this cost increase to be fair as renovating a roof can cost upwards of 30k, while our stainless steel plates will cost around 11k.

Cost per year is around \$183.

VENT PROTECTION

Vents are a significant vulnerability in house design; not only are they a crevice where firebrands get caught, they are direct access for those ember to reach into a home and start a blaze.

- We have designed a series of vent covers and screens to cover these vulnerable entrances

These covers are small, unobtrusive and cost-efficient.

SIDING

We offer multiple brick and stone siding packages

- Both of these material types increase the fire rating of the exteriors to 4 hours of burn time
- This is four times higher of a rating compared to other common exterior materials, such as vinyl siding and veneers
- We use this type of siding to give homeowners peace of mind that, even in such a fire-prone location

Each pallet of material varies in cost from \$400 to \$1200 where: common red brick is the cheapest option, while the varieties of stone we stock are on the more expensive end of the spectrum. We expect to use 5 pallets per home

In addition, we coat all exterior design features in a layer of fire-resistant paint. This does not include the brick, unless specifically requested.

We use Fire-rated Drywall in all of our exterior walls

- Most other construction companies skip this step as it is stigmatized as “impractical”
- However, in the regions we operate in, this final step is imperative to bring the buildings up to FireNest’s Code

This addition incurs an additional 75 cents per sheet of drywall; however, since we only use this specialized material in exterior walls, this cost is minimized.

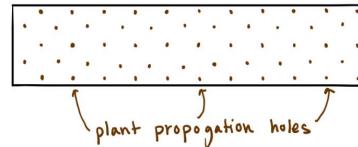
DRYWALL

EAVEBOX is our Patent Pending design to allow homes to have the aesthetics of an eave without the increased fire risk

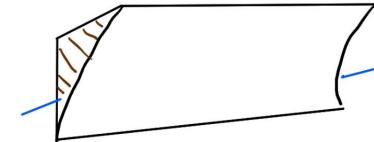
- EAVEBOX is a flower box that spans the gap between the soffit and the exterior wall.
- This location is a common fire-start location, so this addition helps prevent fires from spreading using moisture holding plants.
- In addition to the safety aspect, EAVEBOX also acts as a flower box.
 - There is an irrigation line built into EAVEBOX, and the homeowner can pick the vegetation to grow in the box.
 - This, in addition to our Xeriscaping effort, helps ensure the natural fire resistant landscaping of the location is preserved.

EAVEBOX

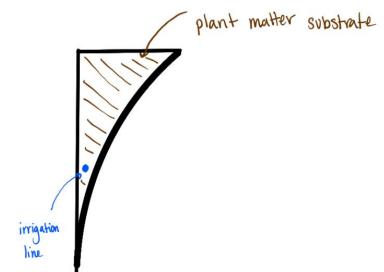
front view:



isometric view:



side view:



Pictured:

Irrigation Line, Plant Propagation Holes & Interfaces with the House

Importance of Fire-Resistant Vegetation

The duration and severity of a wildfire depends on 3 elements: fuel, oxygen, and heat. If the fuel in the area has high moisture content, fires become more difficult to ignite and burn poorly, drastically shortening the lifetime of a wildfire. On the flip side, if the fuel has low moisture content, fires have a higher chance of igniting, and other factors (such as weather) can cause intense fire spread

Characteristics of Fire-Safe Plants

1. Leaves that have high water-content
2. Watery sap with little to no odor
3. Plants that have decent space between branches
4. If applicable, thick bark that does not peel from the plant base

XERISCAPING

Groundcovers



Creeping Phlox

Kinnikinnick

Sedum/Stonecrops

Snow-In Summer

Yellow Ice Plant

Trees



Hackberry Tree

Crabapple Tree

Western Catalpa Tree

XERISCAPING

Shrubs



Lilac Bush



Sumac Bush



Vine Maple
Bush

SCALABILITY

Our Designs can be scaled to Fireproof existing homes



ROOFING

We replace existing roofs with our high quality stainless steel panels to increase safety factor.



VENT PROTECTION

Our vent covers and protective screens can be adjusted to fit standard vent sizes.



EAVES

Our Patent Pending Design, EAVEBOX_r, is adaptable to most eaves. Our consulting team will measure and fit EAVEBOX to any existing eave.



XERISCAPING

We landscape existing lawns and homes, removing any fire prone vegetation and then replant with more fire-resistant varieties.

IS FIRE-RESISTANT MATERIAL WORTH IT?

Statistics from the National Fire Protection Association has shown that in 2020, the average cost of fire-related damage per household was \$23,562 in 2020, in contrast to \$12,214 in 1980.

From 2018 through 2020, there were more than \$7.55 billion in property losses.

In 2023, as reported by the NFPA, house fires were responsible for approximately \$10.5 billion in financial losses in the United States.

Fire-resistant housing has the potential to greatly reduce, if not almost completely eliminate, this cost, ultimately saving taxpayers from increased expenses.

Year	Property Damage (2023 Adj.)
2016	\$8.64 billion
2017	\$9.05 billion
2018	\$9.15 billion
2019	\$8.70 billion
2020	\$9.41 billion
2021	\$10.00 billion

BUSINESS MODEL



FIRENEST
DEVELOPERS

REAL ESTATE DEVELOPMENT

As the developer, we'll design and plan out home builds, covering the materials, and land acquisition. Once the home is built, we'll sell to potential homeowners who show an interest in fire-safe housing while still being able to live and exist in nature.

Alongside building homes, we'll also offer to sell our designs and renovate older homes to make them wildfire-resistant. This can include partial renovations, such as replacing roofing, exterior walls, and xeriscaping, vent covers, etc.

<https://imageio.forbes.com/specials-images/imageserve/620eaf4fcebbf71279629454/0x0.jpg?format=jpg&height=900&width=1600&fit=bounds>



https://media.licdn.com/dms/image/C4D12AQHkFXkSILObaw/article-cover_image-shrink_600_2000/0/1520055837538?e=2147483647&v=&beta&I=aJi_X5bxNISgb4C-EjDkP2qv6IBTp6Wj62luw2W7Pw

BUSINESS MODEL



FIRENEST
DEVELOPERS

HOMEOWNER ASSOCIATION (HOA)

After developing our first neighborhood, we plan on implementing a homeowner association (HOA). HOAs serve the purpose of creating an organized community that follows specific rules and guidelines. As we are a part of this HOA for the foreseeable future, it'll give us the opportunity to keep up with the maintenance of the homes, ensuring that they stay fire safe.

We plan on charging each household \$150 a month, which will cover lawn maintenance and landscaping, ensuring that grass and plants don't dry up and increase the risk of fires. It'll also cover other water fees, garbage disposal, and green space maintenance.



<https://cdn.corporatefinanceinstitute.com/assets/homeowners-association.jpeg>

OUR NUMBERS

330,000

PRICE OF SALE

17,500

PROFIT MARGIN PER HOUSE
(for the first two phases)

-2%

PERCENT DIFFERENCE
(similar development, without safety measures)

PUBLIC-PRIVATE PARTNERSHIPS (PPP)

PPPs are a financing option that involve both a government agency and private company in order to build and operate projects. With our technology and designs, we would partner with the US Department of Agriculture Forest Service to finance the building of firewise homes. Considering USDA's involvement in financing grants for other fire-resistant homes, we could pitch the idea of a neighborhood in a fire-prone area that focuses on fire safety and involving the community in protecting against wildfires.

The USDA offers “\$10 million for associated wildfire resilience projects”, which can help start up our community development by paying for the land, allocate funds to the contractors, and buy our supplies. Given the 5 year deadline, we can continue with the first phase of our project, building 18 houses to start off in our neighborhood.

FINANCING



REAL ESTATE INVESTMENT TRUSTS (REIT)

By getting funding from an REIT, we can have multiple investors contributing to our company. REITs are companies that finance real estate, with multiple investors coming together, allowing smaller investors to contribute and earn from larger projects.

We would see out a mortgage REIT, which would hold a mortgage on our properties. This would be paid off as the homeowner pays off the cost of the house and from additional HOA fees. It gives another option compared to bank loans, often giving larger amounts than a bank would.

FINANCING

IMPACT INVESTORS

Impact investors with the goal of creating a positive impact on society and environment, alongside getting a financial return. We can reach out to organizations like Blue Forest Conservation, which has invested 4 million dollars in order to prevent forest fires, or Yuba Water Agency, which invested 1.5 million dollars. With funding from impact investors, we can make a positive impact on our community as we fight against the damages caused by forest fires.

We'll partner with organizations like FireWise. Firewise Communities, established by the National Fire Protection Association's (NFPA), create a community plan, educate communities, and collaborate with fire agencies. Firewise Communities take a comprehensive and proactive approach to reduce the risk of wildfire damage. While the current initiatives undertaken by Firewise are commendable, there is room for improvement in their effectiveness. Ideally, collaborating with this company would enhance both the scope and efficacy of wildfire prevention measures, reducing the risk of uncontrolled wildfire spread.

FINANCING

PARTNERSHIPS

OUTSOURCING CONSTRUCTION AND MAINTENANCE

Due to our commitment to support the community, we plan on outsourcing our construction with a focus on hiring lower-income and underrepresented groups. Companies like NOVO Construction help empower underrepresented groups in construction, with a large amount of women in their leadership team. With our partner, FireWise, and our team of specialists, all groups will work to collaborate and build fire-resistant housing.

We also plan on hiring a maintenance crew after the neighborhood is built, who will focus on greenscaping and maintaining the facilities.

MULTIPHASE PROJECT



STAGE 1

Starting with a small community of 16 houses, development and construction will take place in 5 years with funding from investors and PPPs.

STAGE 2

After initial success and sales, results will be analyzed to see impacts of firewise housing and to show future investors the benefits of the neighborhood. After securing a second round of investments, we plan on doubling the neighborhood size and looking into new plots of land to expand the business into, focusing on low-income areas that are prone to fires.



STAGE 3

After another successful stage of development and analyzing the homes safety, the third stage will focus on expanding the business out of state and helping other states, such as California and Texas, that are wildfire prone and also have housing crises.

IMPACTS



SOCIAL IMPACTS: HOUSING CRISIS



<https://shopify-migrated-assets.s3.amazonaws.com/images/000010/268/housing-crisis-4875b8368c2d3cf93e77e29267a510.jpg>

In the years leading up to 2022, Utah has grappled with a pressing housing crisis marked by several distinct challenges.

The drastic increase in home prices, exemplified by Utah's median home sales price rising nearly 50% between 2020 and 2022, underscores the pressing affordability challenges facing residents. This trend, revealed by data from the Kem C. Gardner Policy Institute, has particularly impacted lower and moderate-income households, exacerbating the housing crisis.

Creating fire-safe communities in high-risk areas is crucial not only for safeguarding lives and property but also for alleviating the financial strain imposed by skyrocketing housing costs and the potential devastation caused by wildfires.

Such preventive measures can help mitigate annual losses of hundreds of thousands of dollars, providing much-needed relief to communities grappling with affordability disparities and housing affordability issues.

<https://mynorthwest.com/wp-content/uploads/2022/09/RantzBlog914RESIZE.jpg>

SOCIAL IMPACTS:

HOMELESSNESS AND DISPLACEMENT POST-FIRE

Major wildfires, for example the Campfire (2018) and the Dixie Fire (2021) in California forced tens of thousands of residents to evacuate and seek shelter elsewhere.

In 2021, the Parley's Canyon Wildfire in Utah forced over 8,000 individuals to evacuate during peak fire status.

The Bald Mountain and Pole Creek Fires, located directly south of Provo, UT, were responsible for “triggering mandatory evacuations” for hundreds of people in 2019.

Prioritizing wildfire prevention in communities is essential to reduce the displacement of residents during major wildfires. These measures help protect lives, property, and reduce the need for large-scale evacuations, maintaining community stability and preserving homes.

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<https://www.discountsignsaustralia.com.au/wp-content/uploads/2019/11/EXIT-SIGN-EVACUATION-ROUTE-ARROW-RIGHT.jpg>

SOCIAL IMPACTS: LOW-INCOME AREAS

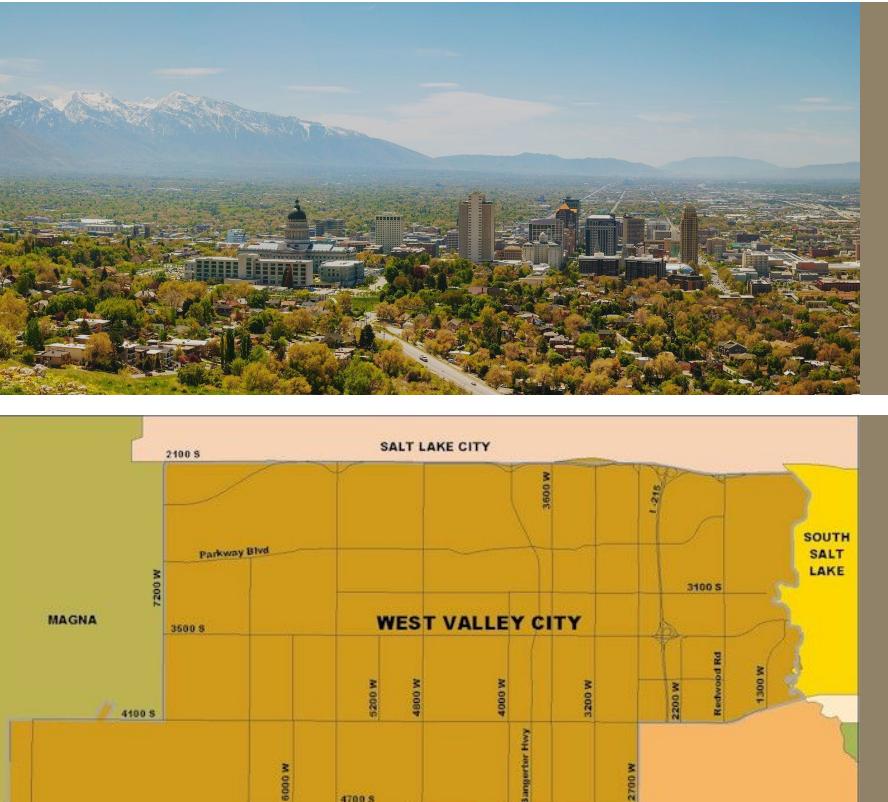
The housing crisis has exacerbated housing inequality, with vulnerable populations, such as low-income families, minorities, and those with disabilities, facing the most significant challenges in securing safe and affordable housing.

EXAMPLE: WEST VALLEY

According to the 2022 ACS census report for West Valley City, the city's average per capita income stands at \$26,542 per person, approximately three-fifths of the amount in the Salt Lake Metropolitan Area, which is \$41,933. The report also highlights that only 16.2% of individuals in West Valley City hold a bachelor's degree or higher, representing roughly two-fifths of the rate observed in the Salt Lake Metropolitan Area.

Cities like West Valley, Utah, may face significant challenges in recovering from fires. However, as Deputy Fire Cooperative Specialist Sierra Hellstorm emphasizes, these cities would greatly benefit from properly maintained green spaces, like the ones our company designs. Such measures could potentially prevent an National Risk Index predicted annual loss of over \$255,176 and risk value cost of \$375,966 from a widespread fire.

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SOCIAL IMPACTS: HEALTH IMPACTS



As noted on Utah's National History Museum's wildfire F.A.Q. page, wildfire smoke contains heightened levels of carbon monoxide, an odorless, colorless gas that can induce symptoms like headaches and dizziness, and in more severe cases, can lead to diminished mental functioning.

According to asthma.utahgov, about 9.7% (250,949) of Utah adults have asthma. As mentioned on the Utah's National History Museum wildfire FAQ page, inhaling wildfire smoke's toxic gas particles can significantly impact those with asthma or respiratory diseases.

Reducing wildfires through our company's initiatives would be immensely helpful in safeguarding public health and minimizing the impact on vulnerable populations, particularly those with respiratory conditions.

FINANCIAL IMPACTS: INSURANCE

In areas with high-risk of wildfires, insurance companies often charge higher premiums for the risk of property loss, sometimes not even offering home insurance policies. In California, State Farm and Allstate have stopped offering new home insurance policies since homes are at high risk of burning.

To combat this insurance crisis, homes can become firewise, which can give them a discount. According to the FAIR Plan, 10% reductions in cost can be achieved. This not only offers homeowners protection for their homes, but also makes owning a home more cost-affordable, allowing lower-income families the opportunity to home ownership.

FINANCIAL IMPACTS: TRANSPORTATION

As Sierra Hellstrom, a Deputy Fire Cooperative Specialist, explained, the 2018 Dollar Ridge Fire was one of the largest fires that burned in Utah that year. It had led to the closing of I-84 for multiple days, which diverted traffic around the highway. This led to issues with shipping, as semi-trucks filled with goods were delayed, causing negative impacts on the businesses in Salt Lake City.

The biggest issue with this fire was the amount of infrastructure burning. Since many houses were caught in flames, it diverted firefighters away from suppressing the fire and instead attempting to mitigate the housing impact. With our solution, we can decrease the amount of firefighters who need to focus on protecting infrastructure, so they can work on suppressing the main wildfire. In the case of another fire, transportation and economic impacts will lessen, as there will be a more controlled fire to deal with.

[Fire-resistant Construction Materials](#), Federal Emergency Management Agency

[Class A, B, and C Roof Ratings](#), UL Enterprise

[Wildfires: Interesting Facts and F.A.Q.](#), Natural History Museum of Utah

[What Do You Need to Know About Fire-Resistant Roofing Materials?](#), Alta Roofing and Waterproofing

[Understanding Class A Fire Ratings For Roofs | DaVinci Roofscapes](#), DaVinci Roofscapes

[This Old House](#), This Old House

[New Roof Cost in Utah \[What You Should Know\]](#), ReRoofIt

[23 Different Types of Roofing Shingles: Pros, Cons and Costs of Each Option](#), Home Stratosphere

[Fireproof Insulation And Other Fire-Resistant Materials | U Value](#), U Value Insulation

[Fire Resistance of Brick Masonry](#), The Brick Industry Association

[The 2022-23 Budget: Wildfire and Forest Resilience Package](#), The California Legislature's Nonpartisan Fiscal and Policy Advisor,

[Rebuilding After A Wildfire? Most States Don't Require Fire-Resistant Materials](#), KNOW NPR Network, Lauren Sommer

[Housing market: Utah home prices went down. How low will they go? - Deseret News](#), Deseret News, Katie McKellar

[Risky \(housing\) business: Distorted and destabilized housing markets are pushing households into climate-risky, low-opportunity communities | Brookings](#), Brookings, Christopher Coes et. al.

[Construction Costs for a Wildfire Resistant Home, California Edition](#), Headwaters Economics

[Fireproofing your home isn't very expensive – but few states require it](#), NPR, Lauren Sommer

Citations

Citations

[Monolithic Dome Institute](#), Monolithic Dome Institute

[Deltec Homes](#), Deltec Homes

[Lindal Cedar Homes](#), Lindal Cedar Homes

[Our Custom Homes and Cabin Kits](#), Pan Abode Cedar Homes

[Timberpeg](#), Timberpeg

[Firewise USA](#), NFPA, Firewise USA

[Firewise Communities | Oregon](#), My Southern Oregon Woodlands, Firewise Communities

[Communities at Risk | Utah DNR – FFSL \(Forestry, Fire and State Lands\)](#), Utah Division of Forestry, Fire & State Lands

[What is the WUI?](#), U.S. Fire Administration,

[Wildfires Threaten More Homes and People in the U.S. Than Ever Before | Scientific American](#),

Pappas, Stephanie

[Wildland Urban Interface: A Look at Issues and Resolutions](#), FEMA, U.S. Fire Administration

[11. Weather and Fuel Moisture | NWCG](#), National Wildfire Coordinating Group

[List of the Most Fire Resistant Plants | WFCA](#), Western Fire Chiefs Association,

[Challenges in Real Estate Development](#), Jean Folger

[What Is a Homeowners Association \(HOA\) and How Does It Work?](#), James Chen

[Public-Private Partnerships \(PPPs\): Definition, How They Work, and Examples](#), The Investopedia Team

[Real Estate Investment Trust \(REIT\): How They Work and How to Invest](#), James Chen

[Palladium - Impact Investors are Fighting California Wildfires](#), Jennifer Prillaman

[Impact Investing | The GIIN](#), The Global Investing Impact Network

[Firewise USA](#), National Fire Protection Association

[Laying the Foundation for Inclusivity in Construction](#), Jim Fowler

[Do You Need Wildfire Insurance?](#), Kara McGinley and Heidi Gollub

[Insurance crisis spurs Paradise neighborhoods to become ‘Firewise’ | NSPR](#), Jamie Jiang

Extra Citations for Xeriscaping

<https://extension.usu.edu/botanicalcenter/images/pink-creeping-thyme.png>

https://extension.usu.edu/ecorestore/images/species-photos/arctostaphylos_uva_ursi.jpg

https://openherbarium.org/imglib/openmuseum/eol/201809/ICS-Sedum-album-64819_1535892676_web.jpg

<https://conservationgardenpark.org/file/f0139e04-db3d-405a-8610-5f3e695c8ab7/Cerastium-tomentosum---Snow-in-Summer-3.jpg>

[https://www.thespruce.com/thmb/1exmtxVURzdfjKPX6YrRYIUJW_w=/1500x0/filters:no_upscale\(\):max_bytes\(150000\):strip_icc\(\)/purple-ice-plant-2132553_15-46f571aa8164469fb9e031838128365a.jpg](https://www.thespruce.com/thmb/1exmtxVURzdfjKPX6YrRYIUJW_w=/1500x0/filters:no_upscale():max_bytes(150000):strip_icc()/purple-ice-plant-2132553_15-46f571aa8164469fb9e031838128365a.jpg)

https://www.waysidegardens.com/media/catalog/product/v/2/v2569.jpg?optimize=medium&bg_color=255,255,255&fit=bounds&height=740&width=740&canvas=740:740

https://facilities.utah.edu/_resources/images/tree-tour/03-staghorn-sumac.jpg

https://www.monrovia.com/media/catalog/product/cache/e04ab064d507a8311b0c9a903817e129/r/e/rest_7_2_7273.jpeg

<https://extension.usu.edu/treebrowser/images-thumbnails/hackberry-common.jpg>

https://www.greenthumbsgarden.com/cdn/shop/products/SargentCrabapple3_1400x.jpg?v=1623341761

https://extension.usu.edu/ldp/galleries/.private_ldp/a329859/production/master/9e188e5e-e754-495d-b128-9dbob892974b.jpg

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THANK YOU

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