



Bringing in the Community: Announcing the WUI Virtual Handbook, 2nd Edition

August 19, 2025

1

Webinar and WUI Virtual Handbook
made possible by Fiscal Year 2022
Fire Prevention & Safety Grant



FEMA

2

Agenda



Welcome and Introduction of Speakers



SFPE Foundation's WUI Efforts



WUI Virtual Handbook for Fire Risk Assessment & Mitigation



Engineering Risk Analysis of WUI Virtual Handbook



Wrap-up and Q&A

3

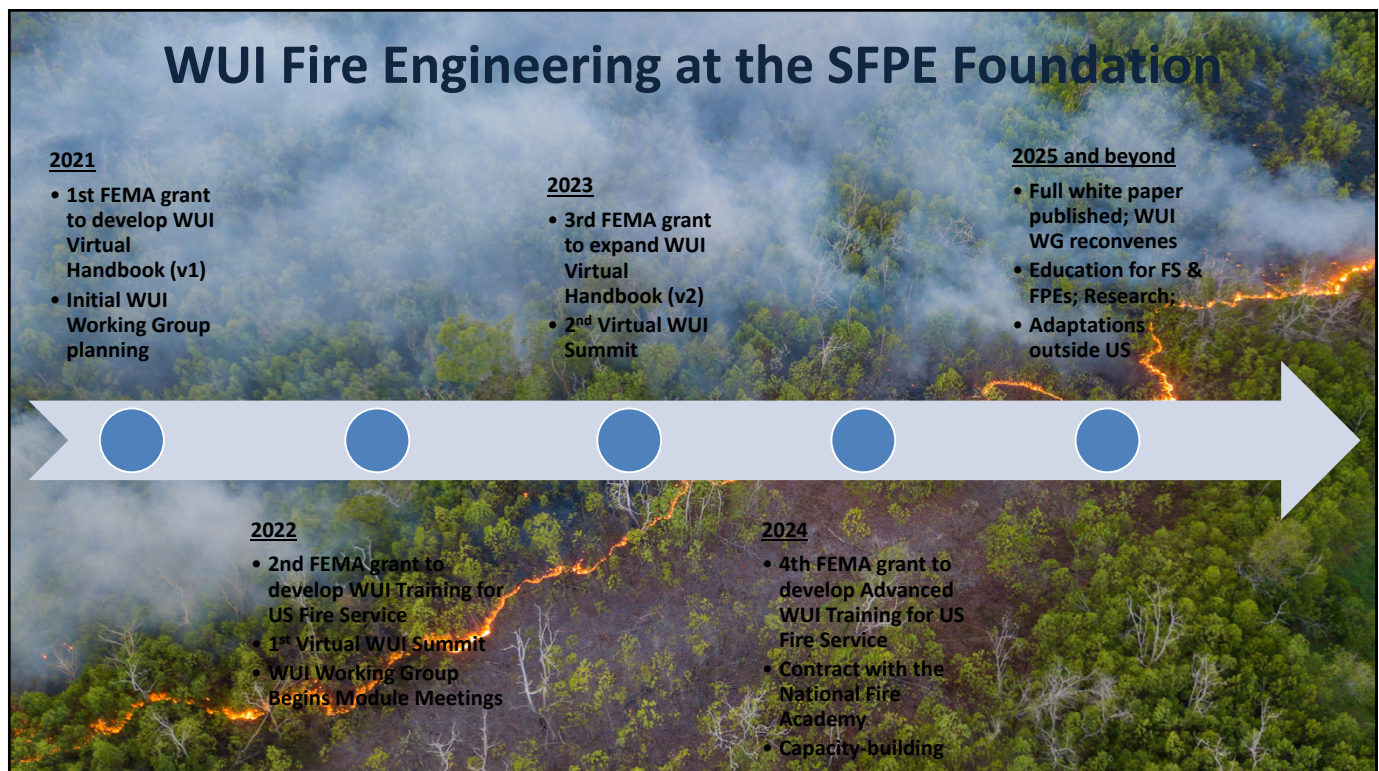
Speakers

- Leslie Marshall, SFPE Foundation
- Chief Eriks Gabliks, U.S. Fire Administration
- WUI Virtual Handbook
 - Darlene Rini, Jensen Hughes
 - Molly Mowery, Wildfire Planning International
 - Hubert Biteau, Code Red Consultants

4

SFPE FOUNDATION WUI EFFORTS

5



6

Advanced Engineering Curriculum Virtual Pilot

- Soliciting for Fire Service members to attend virtual training and provide feedback on curriculum
 - WUI Fire Dynamics
 - WUI Fire Modeling
 - Human Behavior in WUI Fire
- Attendees with previous WUI experience preferred
- Virtual training
 - Volunteer by completing form using the QR Code by September 5th
 - September 23, 25, & 30 12-4pm ET
 - Will also be offered virtually in early 2026



7

SAVE THE DATE!

2026 WUI Fire Engineering Summit

Co-hosted by **SFPE Foundation** and
the **University of Maryland**

August 10-12, 2026

8

WUI VIRTUAL HANDBOOK FOR FIRE RISK ASSESSMENT & MITIGATION, 2ND EDITION

9

Thank You Volunteers

- Thank you SFPE Fire Service Subcommittee for co-hosting this webinar with the SFPE Foundation.
- Thank you to the volunteers across the U.S. (and around the world) who provided feedback on the first and second editions of the Handbook.
- Thank you to the fire departments who hosted pilots to evaluate the WUI Virtual Handbook in the classroom and in the field.

10

Thank You Advisory Panel

• Project Advisory Panel Members

- Brad Cronin, CFPS - Assistant Fire Chief Avon (MA) Fire Department and Chair, SFPE Fire Service Subcommittee
- Brian Meurer - Asst. Chief & Fire Marshal, Louisville (KY) Fire Department, and Member, SFPE Fire Service Subcommittee
- Brett Lacey - Retired, Fire Marshal, Colorado Springs (CO) Fire Department
- Kris Cooper - Fire Marshal, Colorado Springs (CO) Fire Department
- Ashley Whitworth - Program Administrator, Wildfire Mitigation Section, Colorado Springs (CO) Fire Department
- Jerry McAdams, CWMS - Owner, MC Fire LLC and Retired Boise (ID) Fire Department
- Daniel Gorham, PE - Research Engineer, Fire Safety Research Institute, UL Research Institutes
- Steve Quarles, PhD - Retired, University of California Cooperative Extension Advisor Emeritus and Insurance Institute for Business & Home Safety (IBHS)
- Peter Senez, PhD - Principal & President, Senez Consulting, and Chair, SFPE Foundation Board

11

Thank You Project Team

• SFPE & SFPE Foundation:

- Leslie Marshall, PhD
- Amanda Tarbet, MSLS
- Lisa VanBuskirk, PE
- Austin Guerrazzi

• Web Developer & Creative Consultant:

- Engineered Fire Systems
 - Daniel Price, PE
 - Santiago Correa
- Bareknuckle Branding
 - Bill West
 - Courtney O'Neill

• Engineering Technical Consultants:

- Jensen Hughes
 - Darlene Rini, PE
 - Amelia Pludow, PhD
 - Julia Cuendet
 - Kristina Fauss
 - Walker Donuji, PE
- Wildfire Planning International
 - Molly Mowery, AICP

• Engineering Risk Consultants:

- Code Red Consultants, LLC
 - Hubert Biteau, PhD, PE
 - Jennifer Hoyt, PE
 - Jeremy Souza, PE, CFPS



12



Chief Eriks Gabliks Acting Deputy U.S. Fire Administrator & Superintendent, National Fire Academy

13

Outline

1. Accessing and Navigating the Handbook
2. Part I: Structural Hardening + Part II: Defensible Space
3. Part III: Community Wildfire Planning



JENSEN HUGHES

14

1. Navigating the New Handbook

- Accessing the Handbook
- Navigating and Using Key Technical Features
- Using Other Supporting Resources

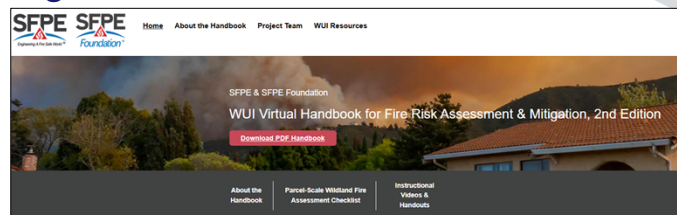
15

Navigating the Handbook

WUI Virtual Handbook Home Page

Landing page provides various links:

- (1) Download a PDF of the Handbook
- (2) About the Handbook
- (3) Project Team
- (4) WUI Resources
- (5) Supporting Resources (flyers, videos, checklist)



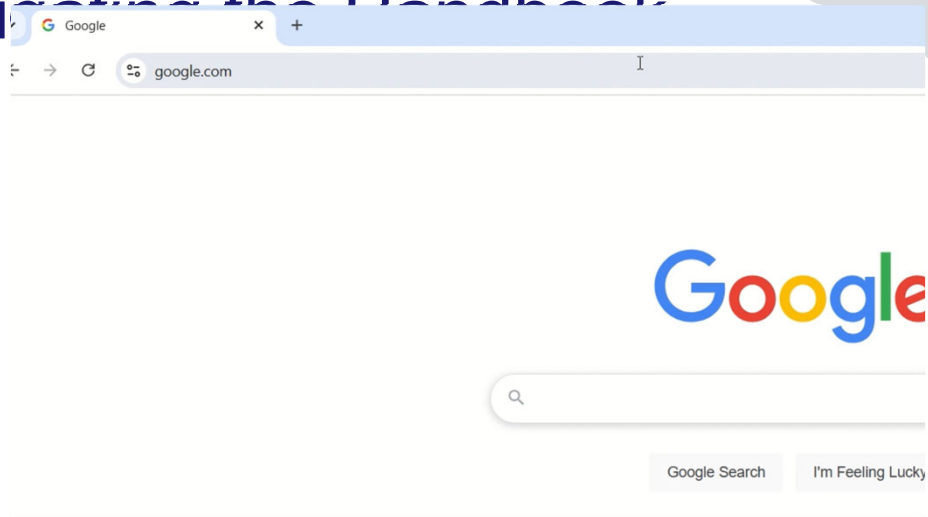
Handbook Website

<https://www.sfpe.org/wuihandbook>



16

Navigating the Handbook



17

2. Key Updates: Parts I and II

- Part I – Structural Hardening
- Part II – Defensible Space



18

Handbook v2 Overview

Wildfire Resiliency at Scales

- Part I – Structural Hardening

- Roof Systems
- Roof-to-Exterior Wall
- Wall Systems
- Bottom-of-Wall to Foundation
- Attachments
- Suppression Systems



NEW

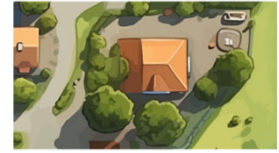
- Part III – Neighborhood/ Community

- Hazard and Risk Assessment
- Residential Development & Safety
- Firefighting Infrastructure
- Vegetation Management
- Critical Infrastructure
- Other Topics

- Part II – Defensible Space

- Plant/Tree Types and Selection
- Zones, Spacing and Landscape Design

Individual Lot Size Scale



Neighborhood Scale



Community Scale

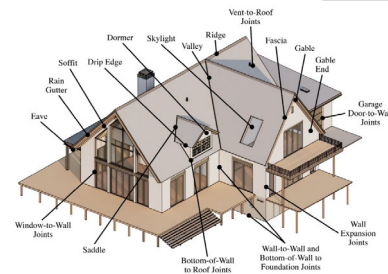


19

Part I – Structural Hardening

1. New Introduction Section

- Overview
- Key Considerations
 - Systems Concept
 - Critical Items (for Retrofits)
 - Fire Resistance Assembly (How to Inspect)
 - Site Constraints
 - Fire Flow Pathways
- Overview of Key Gaps in Knowledge
- Cost Considerations



Images courtesy of Headwaters Economics and Insurance Institute for Home & Business Safety.

20

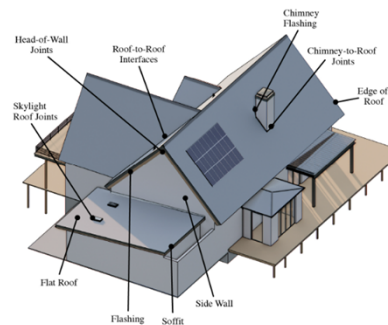
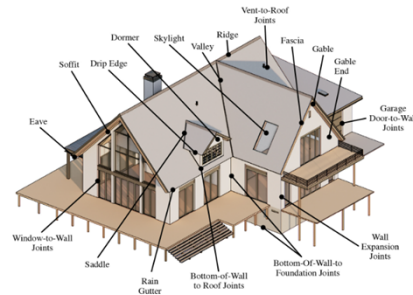
General Organization

Part I – Structural Hardening

Organization – Top of Structure Down

- Section 1.1 – Roof Systems
- Section 1.2 – Roof-to-Exterior Wall
- Section 1.3 – Wall Systems
- Section 1.4 – Bottom-of-Wall to Foundation
- Section 1.5 – Attachments
- Section 1.6 – Sprinkler Systems

Note: Each section contains several component(s)



21

General Organization

Section 1.1 – Roof Systems

Included Components:

- Roof construction and coverings*
- Chimneys and roof vents
- Skylights
- Solar panels
- Roof joints (e.g., valleys, expansion joint)
- Roof edge
- Gutters

***Importance of “Assembly”**

22

General Organization

Section 1 – Roof Systems > Roof Construction

Headings
for each
component

- Main Concerns
- Key Terminology
- Fire Classification and Ratings
- Fire Test Standards
- Referenced Codes and Standards
- Other Codes and Standards
- Typical Design, Vulnerability and Mitigation Considerations
- General Mitigation Strategies
- Training Programs
- Gaps in Knowledge
- Other References



Images courtesy
of Jensen
Hughes / FEMA.



Wood Shake

Hexagonal Asphalt



Metal Standing Seam

Clay Tile



Asphalt Composition Tile

Polymer Roofing



Adapted from image by macrovector official.

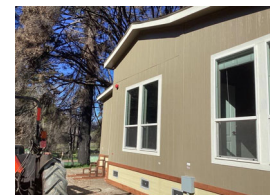
23

Part I – Structural Hardening

Key Updates

- New photos & figures (in-field examples and clarification)
- New references and experiment-supported reasoning
 - “One such study, by Maranghides and Johnsson, reported that flames jetting out of a window ignited a mock wall assembly from 6 feet away in 80 seconds, in a test performed with no wind”
- Additional definitions

Exterior wall assemblies: A system of wall components, including wall covering materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.



Images courtesy of Jensen Hughes / FEMA.

24

Part I – Structural Hardening

Example Section – Exterior Wall Construction & Cladding

New Table: Exterior Wall Cladding Types (Example)

Exterior Wall Cladding Type	Vulnerability and Mitigation Considerations
Concrete, Fiber-Cement Panels or Siding, Exterior Fire-Retardant Treated Wood (FRTW) Siding or Panels, Stucco, Masonry, and Metal	These cladding materials are considered ignition resistant and, in some cases, inherently fire resistant (e.g., concrete). These materials will, generally, not melt or burn when used as exterior wall covering materials
Non-FRTW Siding, Vinyl Siding, Metal Siding Susceptible to Warping (e.g., Aluminum or Sheet Metal Siding), and an Exterior Insulation Finish System	These materials are more likely to melt or burn when used as exterior wall covering materials. This would allow the fire to reach underlying wall components and penetrate the interior of the building.

25

Part I – Structural Hardening

Example Section – Exterior Wall Construction & Cladding

New Mitigation Strategies (Examples)

- New strategies to reflect new/updated guidance
 - “Use ignition-resistant fiberglass batt insulation inside wall cavities and/or provide flashing and fire-resistant caulk at all gaps, joints and interfaces in exterior walls”
 - “Regularly inspect exterior siding for gaps and fissures. Where gaps or fissures are present, use fire resistant caulk to completely seal the opening”

26

Part II - Defensible Space



27

General Organization

Part II: Defensible Space

Section 2.1 – Plant/Tree Types and Selection

Section 2.2 – Zones, Spacing and Landscaping Design

- Zone 0 (0 – 5 ft)
- Zone 1 (5 – 30 ft)
- Zone 2 (30 – 100ft), >100 feet

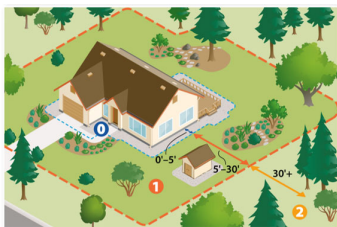


Image courtesy of UC ANR Publication 8695, CC BY-NC-ND 4.0.



Images courtesy of Fire Safe Marin.
<https://firesafemarin.org/create-a-fire-smart-yard/plants/fire-hazardous-plants/>

28

Part II – Defensible Space

Part II – Defensible Space Updates – General

1. Minor Changes

- New figures & photos
- New content and recommendations (e.g., FEMA, NIST studies)
- Updated “Codes and Standards” references

2. Major Reorganization

- Section 1 – Plant and Tree Types and Selection
- Section 2 – Zones, Spacing, and Landscape Design (not covered in presentation)



Image courtesy of UC ANR Publication 8695, CC BY-NC-ND 4.0.

29

Part II – Defensible Space

1. New Introduction Section

Includes discussion on the following issues:

- Factors affecting fire performance
- Native vs. non-native
- Fire adapted vs. fire resistant
- Fire resistant (“approved”) and hazardous (“prohibited”) plant lists
- Ability of plants to resist ignition
- Burning under extreme fire conditions
- Other fuels in the built environment

30

Part II – Defensible Space

Example – (NEW) Plant and Tree Types and Selection Section

Sample Changes – New and Improved Definitions

- Examples:
 - **Fire regime:** The concept of fire regime is used to capture the expected patterns of wildfire for a given ecosystem during a given period. This can include fire frequency, intensity, seasonality, extent (final size) and other metrics, as well as observed feedbacks or dependencies between vegetation and fire.
 - **Plant Flammability:** A description of how a plant burns, including how easily it catches fire, how intensely it burns, and how well it sustains combustion. Plants with high flammability generally ignite easily, burn with high intensity and sustain flaming combustion; however, aspects of flammability are not necessarily related – plants that ignite easily (like grass) do not typically burn with high intensity, although some do. Flammability is dependent on several characteristics of the plant, including the type of leaves, moisture content, etc.

31

Part II – Defensible Space

Example – (NEW) Plant and Tree Types and Selection Section

Sample Changes – Plant Designation Table

Typical Designations	Vulnerability and Mitigation Considerations (excerpts)
<i>Prohibited Plant List</i>	Many wildfire prone areas will have a list of common plants that are prohibited or considered hazardous. These lists can be anecdotal and so should be evaluated for local relevance and from a holistic and scientific perspective. While plants on the prohibited list may present increased risk, they do not necessarily require removal. A key component of wildfire risk mitigation is the proper placement and maintenance of plants around the home
<i>“Approved” or “Fire-Resistant” Plant List</i>	Approved plant lists are developed to meet local residents’ requests for plant selection guidance and/or regulatory agencies’ permitting and enforcement needs, however, it can be more difficult to locate approved plant lists than prohibited or hazardous plant lists. Where necessary, refer to local lists of “approved” or “fire-resistant” plants.

32

Part II – Defensible Space

(NEW) Plant and Tree Types and Selection Section



Examples of common “fire-resistant” plants

Images courtesy of Western Fire Chiefs Association.
<https://wfca.com/wildfire-articles/fire-resistant-plants/>



Common hazardous plants

Images courtesy of Fire Safe Marin.
<https://firesafemarin.org/create-a-fire-smart-yard/plants/fire-hazardous-plants/>

33

Part II – Defensible Space

Example – (NEW) Plant and Tree Types and Selection Section

Sample Changes – New General Mitigations

- Plant and Tree Selection:
 - Use the right plants in the right places, keeping fire, climate, and irrigation needs in mind.
 - Create separated plant islands that have similar sun, nutrient, and water needs to limit fuels continuity and maximize plant health.
- Maintenance
 - Keep landscaping free of dry and dead wood, dry grasses and leaf litter, especially near structures.
 - Prune plants to provide horizontal and vertical space throughout and to eliminate ladder fuel conditions. A grass fire can move up into shrubs and then into trees.
 - Hydrate plants with a water-wise irrigation system. All plants will burn if not well maintained or hydrated.

34

Part II – Defensible Space

Example – (NEW) Plant and Tree Types and Selection Section

Sample Changes – New Gaps in Knowledge

- Currently, there are no standardized methods for determining plant flammability, heat release rates, or criteria for landscaping plant recommendations.
- Understanding of fire ecology, fire hazards, and risks of all vegetation types is still developing.
- Comprehensive lists of fire-resistant vegetation and hazardous plant lists do not currently exist for all biomes, regions, and weather conditions. Most information is developed at the local level and can be anecdotal and possibly misleading.

35

Part I and II – Key Limitations

- Primarily addresses common residential construction (e.g., single family homes, duplexes, townhomes)
- Variations in building design features, practices and conditions, as well as various property elements are not exhaustively addressed or covered
- Specific guidance on hazardous vegetation will vary by region and require additional expertise at the local level
- Costs of mitigations or retrofits are not explicitly addressed, though references are provided
- This is not a code or standard, but a compilation of best practices, engineering and practical guidance, and references

36

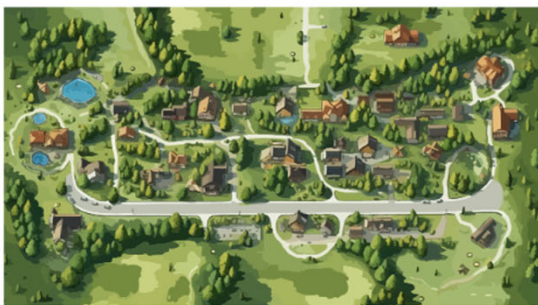
3. Part III - Neighborhood and Community Scale



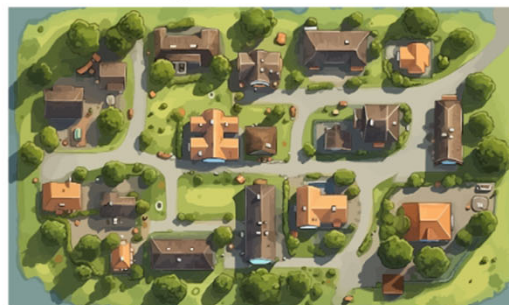
37

Part III – Neighborhood and Community Scale

Community Scale



Neighborhood Scale



38

Part III - Overview

Introduction

- 3.1 – Hazard and Risk Assessment
- 3.2 – Residential Development & Safety
- 3.3 – Firefighting Infrastructure
- 3.4 – Landscape-Scale Vegetation Management
- 3.5 – Critical Infrastructure & Lifeline Facilities
- 3.6 – Other Topics
- 3.7 – Examples of Neighborhood & Community-Scale Programs

39

Part III – Neighborhood and Community Scale

Introduction

- Chapter Organization
- Key Definitions
- Considerations for Neighborhood and Community Mitigation Tools

40

Part III – Neighborhood and Community Scale

§ 3.1 – Hazard and Risk Assessment

- Recognizes differences in key terminology
- Discusses current assessment types, application, limitations
- Provides examples of federal and state-level assessments and resources
- Describes wildfire behavior models and wildfire planning documents

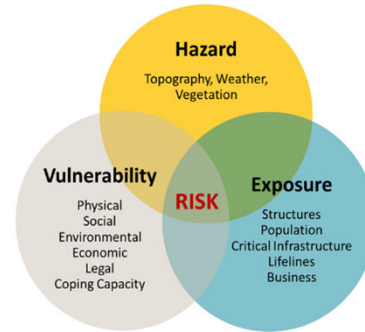


Image courtesy of D. Rini

41

Part III – Neighborhood and Community Scale

Organization of Sections

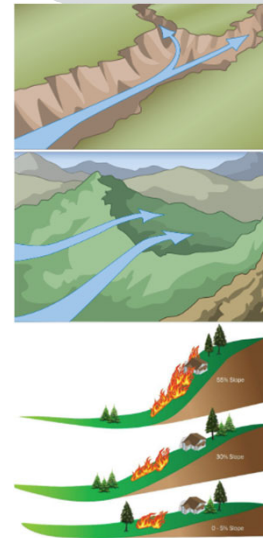
- Main Concern(s)
- Key Terminology
- Fire Test Standards
- Referenced Codes and Standards
- Typical Challenges, Vulnerability, and Mitigation Considerations
- General Mitigation Strategies
- Training Programs
- Gaps in Knowledge
- Other References

42

Part III – Neighborhood and Community Scale

§ 3.2 – Residential Development and Safety

- Development Siting
- Subdivision Spatial Design
- Means of Egress and Evacuation Planning
- Common Areas
- Entitlement and Construction Phases



Images adapted from Home Builder's Guide to Construction in Wildfire Zones, FEMA, 2008. <https://www.fema.gov/> (top)
Image adapted from FEMA Marshall Fire MAT, Best Practices for Wildfire Resilient Subdivision Planning, FEMA, 2023. <https://www.fema.gov/> (bottom)

43

Part III – Neighborhood and Community Scale

§ 3.3 – Firefighting Infrastructure

- Fire Department Access
- Firefighting Water Supplies

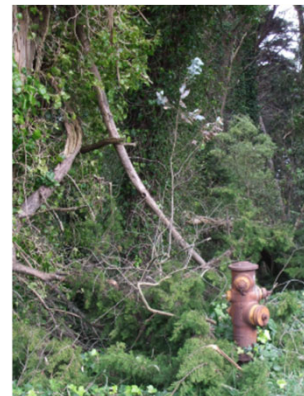
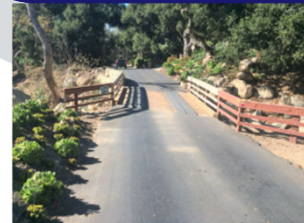


Image courtesy of Jensen Hughes / FEMA.

44

Part III – Neighborhood and Community Scale

§ 3.4 – Vegetation Management

- Large Uninterrupted Open Spaces or Wildlands
- Greenways
- Greenbelts, Large Parks and Recreational Areas
- Agriculture Landscapes and Rangelands



Images courtesy of Jensen Hughes / FEMA.

45

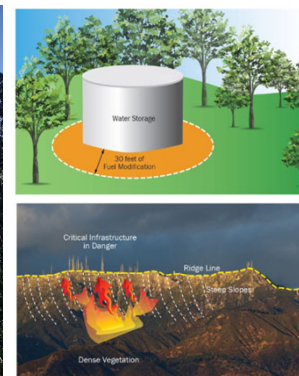
Part III – Neighborhood and Community Scale

§ 3.5 – Other Critical Infrastructure

- Electric Utilities
- Non-Emergency Water and Wastewater Infrastructure
- Public Emergency Communication



Image courtesy of Jensen Hughes / Tuolumne County



Images adapted from FEMA Marshall Fire MAT, Best Practices for Wildfire Resilient Subdivision Planning, FEMA, 2023. <https://www.fema.gov/>

46

Part III – Neighborhood and Community Scale

§ 3.6 – Other Topics

- Multi-Hazard Considerations
- Industrial and Hazardous Land Uses
- Vulnerable and Temporary Land Uses

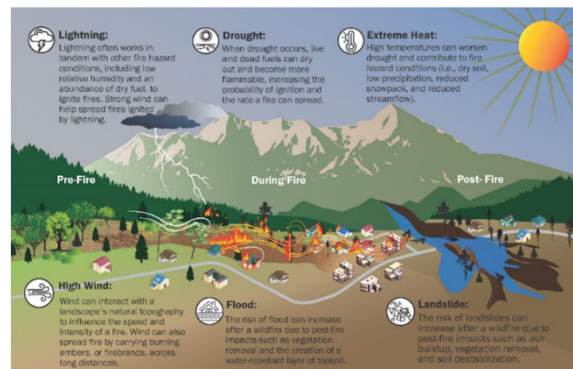


Image adapted from FEMA Marshall Fire MAT, Best Practices for Wildfire Resilient Subdivision Planning, FEMA, 2023. <https://www.fema.gov/>

47

Part III – Neighborhood and Community Scale

§ 3.7 – Examples of Neighborhood and Community-Scale Programs

- National and State Programs
- Local Community Programs
- Research Organizations

48



PILOT TRAINING

49

Pilot Training

1. Objective

- Present new content, organization, and tools
- Evaluate the use of the Handbook

2. Locations

- Boise, ID
- Colorado Springs, CO
- Frankfort, KY
- Plymouth, MA

Images courtesy of Code Red Consultants, LLC.



50

Pilot Training

1. Introduction of revised SFPE WUI Virtual Handbook
2. Feedback/discussion with participants
3. On-Site Property Fire-Risk Assessments with the 2nd Edition of the SFPE WUI Virtual Handbook

Images courtesy of Code Red Consultants, LLC.



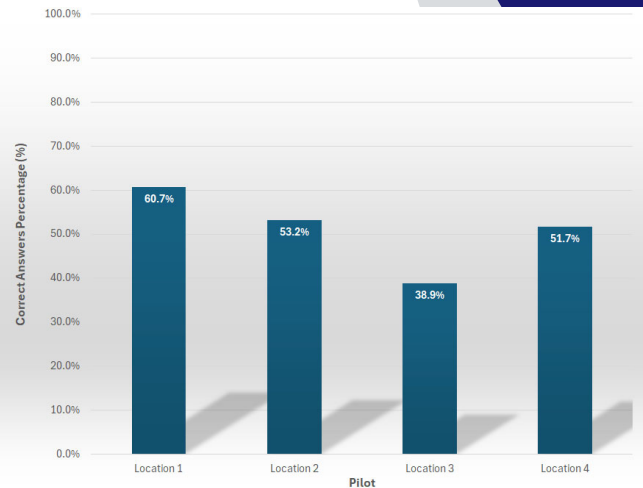
51

EVALUATION

52

Pilot Characteristics

- Based on 4 Pilot Locations
- Total of 39 Participants
- Groups between 3 and 14 participants
- 15 (38.5%) used the 1st Edition of the SFPE WUI Virtual Handbook
- 2 groups with prior WUI expertise
- Various services (Wildfire mitigation, fire prevention, building enforcement,...)



53

Evaluation Plan

Objective: Assess Handbook Potential Impact

1. Pre-Pilot WUI Expertise Assessment
 - Exposure to WUI policies
2. Pre-Pilot Survey
 - Confidence in developing strategies
 - Support Needed
3. Handbook Hands-On Feedback
 - When/How/ Why
4. Post-Pilot Survey
 - Benefits/Limitations of Handbook

SFPE WUI Virtual Handbook, Second Edition - Pre-Pilot WUI Expertise Assessment

** Indicates required question

Part 1 - Structural Handbooks

Select the correct answer(s) to the following questions:

1. What roof classification provides the highest "fire resistance" performance? *

☐ Class A
☐ Class B
☐ Class C
☐ 3-hour fire rated

2. What proposed mitigation strategies do you believe would minimize fire ignition in gutters? Select all that apply.

☐ Use of non-combustible materials.
☐ Regular cleaning.
☐ Install non-combustible gutter guards.
☐ Leave at least 6 feet between lower canopy top.

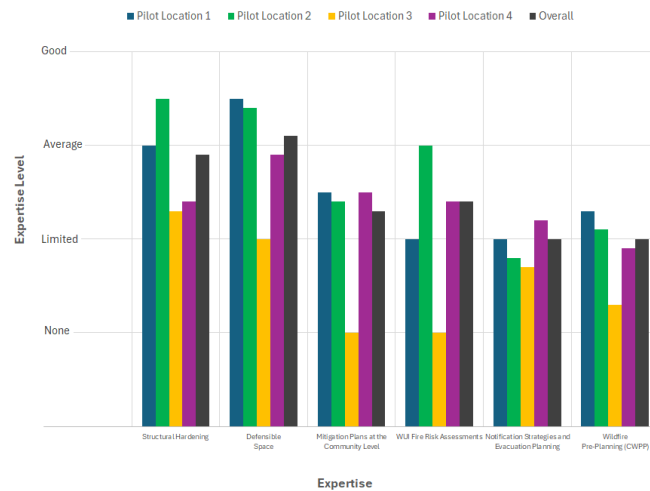
3. Which of the followings is an applicable standard to evaluate the fire performance of roof or soffit vents? *

☐ ASTM E84.
☐ ASTM E289.
☐ ASTM E108.
☐ NFPA 1140.

54

Pilots WUI Expertise

- Pilots with More WUI Expertise
 - Support on Needed Community level actions (notification strategies, evacuation planning, CWPP)
- Pilot with Less WUI Expertise
 - Support needed on all topics
- Lack of provisions/guidance on Community level
- Part III of Handbook



55

Participants Support Feedback

- Support/Content welcomed by all Pilots
- Specificities based on WUI expertise

FD With WUI Expertise

- Added Technical Information to supplement current process
- Support stakeholder interaction
- Added Community Level Technical Content/Tools.

Knowledge Support

FD With Limited WUI Expertise

- Provide Technical Knowledge
- Support WUI Policy development
- Provide/Support FRA methodology
- Support stakeholder interaction

Knowledge + Methodology Support

56

Handbook Checklist Insights

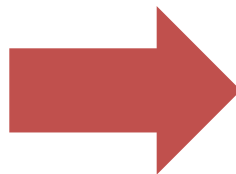
- Pilots **Consensus** on importance of Checklist in Handbook adoption
 - Emphasis on local jurisdictions with no WUI policies in place
- Adoption of Handbook could be promoted by **Advanced Checklist**.
 - Objectives will drive functionalities
 - Facilitate communication with homeowners, other stakeholders
 - Further integrate Vegetation Management/Community Level Review
 - Suggested Customization

Checklist Customization		
Content Summary	Illustrations Sharing	Mitigation Suggestions
Risk Reduction/Cost Ranking	Multiple answers	Development for Fire Services

57

The Handbook as An Essential Resource

Benefits
Free Access
User-Friendly
Multi-Platform
Information in One Place and Ease of Navigation
Technical and Comprehensive Content (*for user with WUI expertise)
Educational Illustrations
Supports Communication with Stakeholders
Helps identify WUI Policy Gaps



Support Provided
Address Fire Services WUI Challenges
Identify Fire Hazards, Vulnerabilities
Provide FRA, Mitigation Strategies Framework
Provide Suitable Technical/Training/Reference Content
Identify Suitable Engineering Tools
Promote Knowledge Sharing/Communication with Other Stakeholders
WUI Policy Development
Provide most current WUI Code Provisions

58

What Could Come Next

Feedback

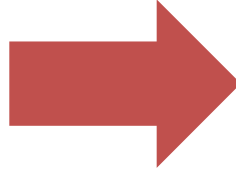
Handbook is not a Standard/Code but must remain current

Technical and possibly Overwhelming Content (*for user/stakeholder with limited to no WUI expertise)

Needs Guidance on how to Best Use Handbook

Additional Content on Specific Topics

Checklist lacks functionalities (risk reduction/cost ranking,...)



Suggestions for Next Revision

Revision will integrate most current Code/Standards Updates

Adapted Knowledge sharing with stakeholders

WUI Training, Community Level FRA, Mitigation Guidance

Regional Vegetation Management Solutions, Evacuation Planning Guidance, Past-Fire Lessons Learnt Content.

Further customization of Checklist

59

FINAL REMARKS

60

Handbook Path to Adoption & Use

Fire Services With WUI Expertise	Fire Services with Limited to No WUI Expertise
Reference document – <i>One location for WUI Fire Technical content</i>	Foundation document for WUI process development but still need to address local specificities <i>*Requires Training such as SFPE WUI Curriculum Training</i>
Communication with stakeholders	Accessible content
Identify WUI policy gaps	Implementation of FRA tools (Use of Checklist)
Insights on Existing/New Guidance	Communication with Stakeholders
Proactively <u>Educate Communities</u> with the Identification of Existing/Future Fire Hazards to be better Prepared. Develop & Promote “National” Guidance at the <u>Community Level</u> <u>Checklist</u> as an initial FRA & Mitigation Tool	

61



"This handbook is the culmination of years of effort and significant technical expertise. The intent is to provide fire service professionals and practitioners as well as engaged neighborhood champions with relevant and technical information to understand more accurately the threat of wildfire and the ways it can be mitigated around structures and neighborhoods, in addition to fostering ongoing collaboration with various agencies."

Brett T. Lacey, CSP, PE
Fire Marshal - Retired
Colorado Springs Fire Department

62



SFPE
Foundation

Questions? Thank You

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Gaithersburg, MD