

ET Summit 2024

Presented by



Parcel and Structure Assessment for Wildfire Hardening

Best Practices



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Objectives

- Help homeowners assess and mitigate their property.

Objectives

- How do we do this?
- Are there any energy efficiency benefits?

Objectives

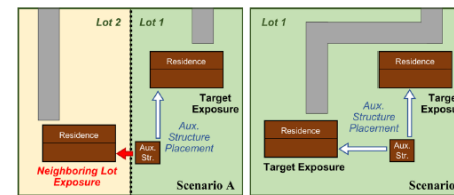
- Introducing the Parcel Assessment for Wildfire Hardening (PAWH) form.
- Includes:
 - California code references pertaining to wildfire hardening.
 - Housing density types defined by structure separation distances (SSD).
 - Defensible space requirements.
 - Which type of building materials and assemblies to use.
 - Energy Efficiency symbol **EE**, next to certain hardening requirements.

What is our PAWH form based on?

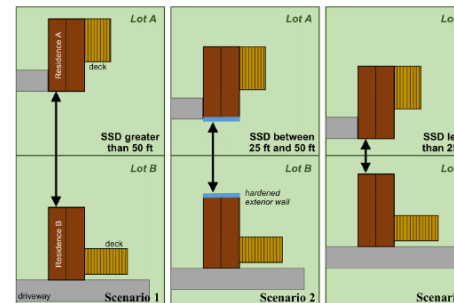
1. National Institute of Standards & Technology – Technical Note 2205

NIST Technical Note 2205

WUI Structure/Parcel/Community Fire Hazard Mitigation Methodology



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This publication is available free of charge from:
<https://doi.org/10.6028/NIST.TN.2205>



What is our PAWH form based on?

2. Based on a high density burn test & forensic study performed by the K&A Building Science team.

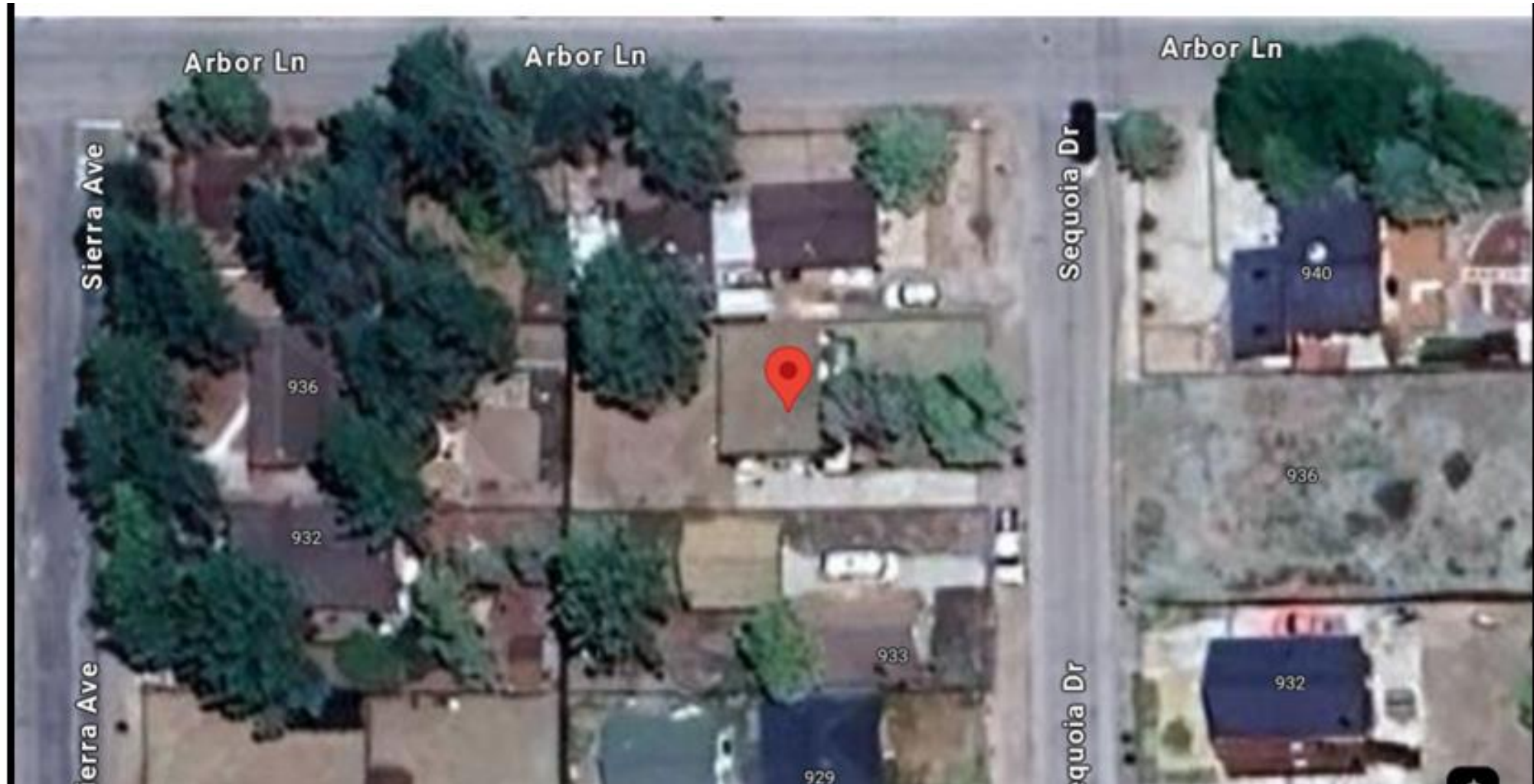
Section 1: Parcel Information

Parcel Assessment for Wildfire Hardening (PAWH) Parcel Information

1)

Assessor: K&A Building Science Team		Date: 8/13/2024
Property Address: 937 Sequoia Drive Big Bear, CA 92314		
Property Owners:		
Phone #:	Email:	
FHSZ: High - SRA	Housing Density Type: Type 2 Interface-Interior	
CFSC:	FireWise Community:	<input type="checkbox"/> Yes <input type="checkbox"/> No

Section 2: Parcel Image Overview (16:9 ratio)



Section 3: Parcel Images (1:1 ratio)

✓ 3)

Parcel Images (1:1 ratio)

Take a picture of the residence from each corner of the parcel. There should be no less than 4 images.

NW



NE



Section 3: Parcel Images (1:1 ratio)


SW



SE

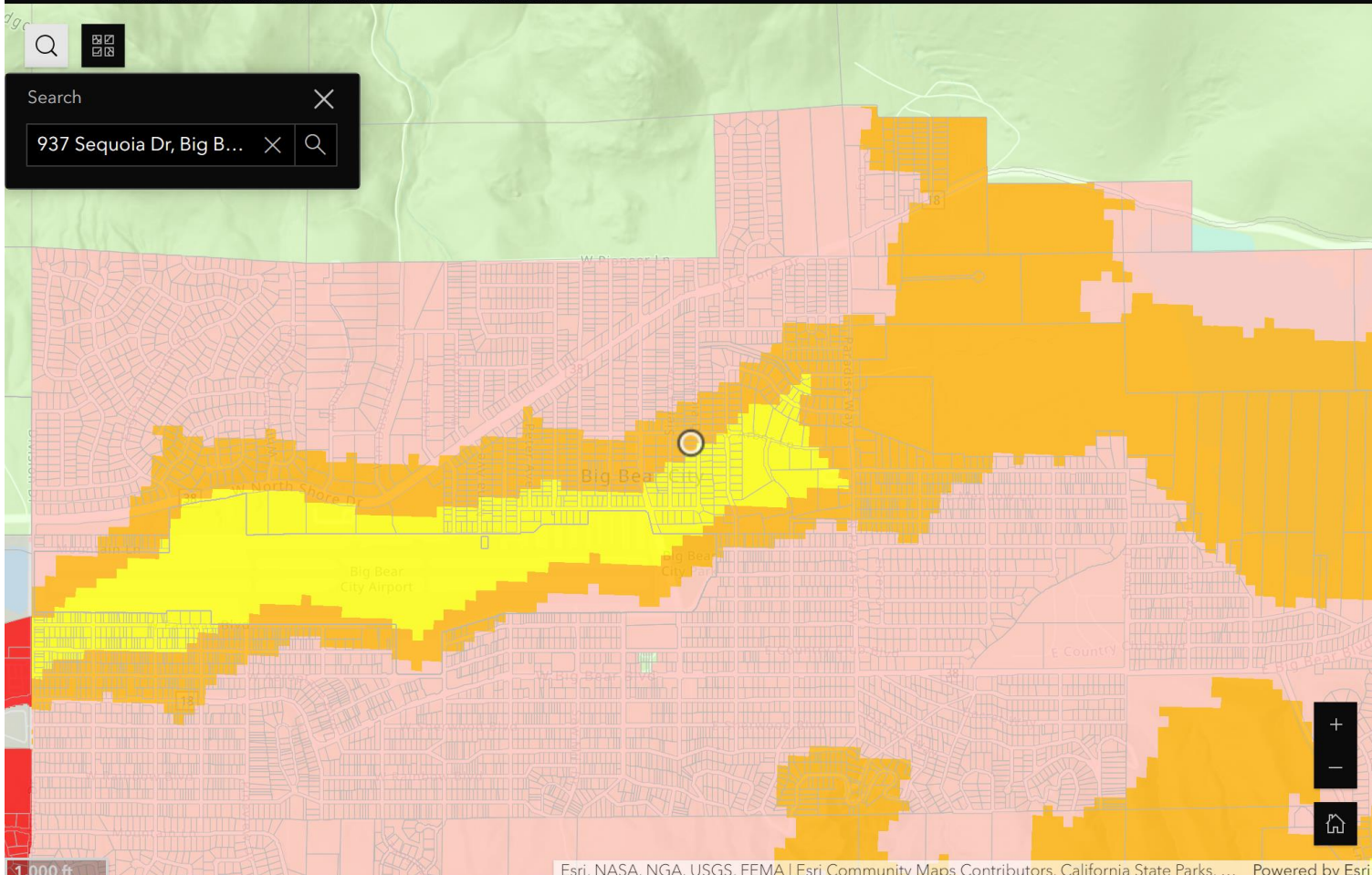


Section 4: Fire Hazard Severity Zone Viewer Image



Fire Hazard Severity Zone Viewer

FHSZ in State Responsibility Area effective April 1, 2024
 FHSZ in reclassified LRA, adopted as SRA 2007
 FHSZ in Local Responsibility Area as recommended 2007-2011



About this Map

This map displays adopted Fire Hazard Severity Zones (FHSZ) in the State Responsibility Area (SRA), effective April 1st 2024. It also displays recommended FHSZ in the Local Responsibility Area (LRA) from 2007-2011.

Due to regulatory processes, there are lands that are no longer classified as SRA and have become classified as LRA yet had a FHSZ designation from the 2007 SRA FHSZ map adoption. These areas are shown on the map with hatched symbology.

To verify your Fire Hazard Severity Zone in LRA, please

Legend	Map Layers
Fire Hazard Severity Zones	
FHSZ in SRA - Effective April 1, 2024	
 Very High	
 High	
 Moderate	
FHSZ in LRA - Reclassified from SRA	
 Very High	
 High	
 Moderate	

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Section 5: Housing Density - Select the Structure Separation Distance (SSD)

5)

Housing Density - Select the Structure Separation Distance (SSD)

5.1

Low Density - SSD > 100 ft



5.2

Medium Density - SSD 30 ft - 100 ft



5.3

High Density - SSD 6 ft - 30 ft



Section 6: ADU/Shed/Detached Garage - Structure Separation Distance (SSD)

6)

ADU/Shed/Detached Garage - Structure Separation Distance (SSD)

Select the option below and notate the type of structure.

6.1

Low Density - SSD > 100 ft

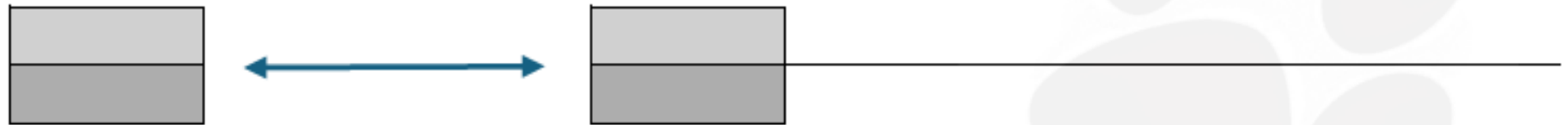
What type of structure & how many?



6.2

Medium Density - SSD 30 ft - 100 ft

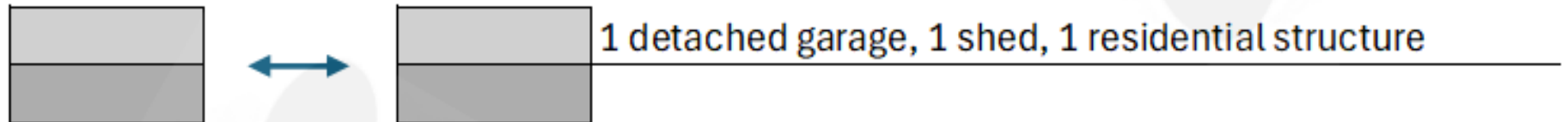
What type of structure & how many?



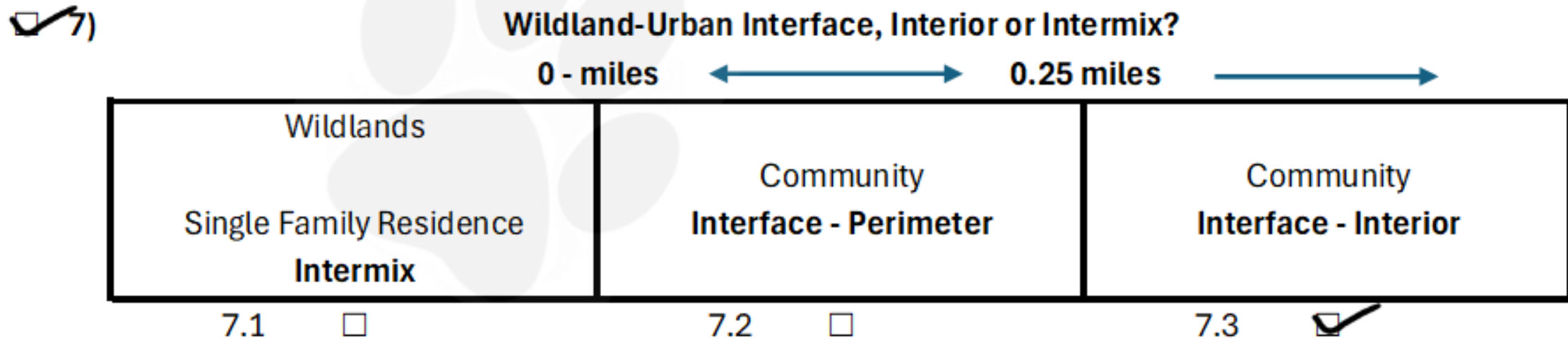
6.3

High Density - SSD 6 ft - 30 ft

What type of structure & how many?



Section 7: Wildland-Urban Interface, Interior or Intermix?



Section 8: Housing Density Type (Enter in Section 1)

8)

Housing Density Type (Record in section 1)

Table 2. WUI Types classified by structure separation distance (SSD) and typical parcel size.

Type #	WUI Type Name	SSD (ft)	Typical Parcel Size (ac)	Typical Housing Density (struct/ac)
1	High Density Interface – Perimeter	6 ^a to 30	< 0.5	2 to 8 +
2	High Density Interface – Interior ^b	6 ^a to 30	< 0.5	2 to 8 +
3	Medium Density Interface – Perimeter	30 to 100	0.5 to 1+	< 2
4	Medium Density Interface – Interior ^b	30 to 100	0.5 to 1+	< 2
5	Medium Density Intermix	30 to 100	0.5 to 1+	< 2
6	Low Density Interface	100+	1+	< 1
7	Low Density Intermix	100+	1+	< 1

For SI: 1 ft = 0.305 m, 1 ac = 0.4 ha
^a representative of parcels with a 3 ft setback (common for new construction of sprinklered residences)
^b interior of community defined as > 0.25 mi (400 m) from wildlands

Section 9: California Fire Code Chapter 49 Section 4906 – Vegetation Management

9)	C.F.C. Chapter 49 Section 4906 - Vegetation Management	Mitigate?	
9.1	Is there an existing landscape plan? (If yes, include it at the end of this assessment)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
9.2	Shrubs shall not exceed 6 ft in height. If yes, describe below. Notes: Remove dead shrubs in the front yard, east side, near the wood handrail.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
9.3	Groupings of shrubs are limited to aggregate diameter of 10 ft. Notes: The diameter of the shrubs on the east side are greater than 10ft. Reduce or remove.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
9.4	Shrub groupings shall be separated from other groupings a minimum of 15 ft. Notes:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Section 9: California Fire Code Chapter 49 Section 4906 – Vegetation Management

9.5 Shrub groupings shall be separated from structures a minimum of 30 ft. Yes No

Notes: Remove dead shrubs on the east side, near the wood handrail. Plant flower bed >5ft, Zone 1.

9.6 Where shrubs are located below or within a tree's drip line, the lowest tree branch shall be a minimum of 3x the height of the understory shrubs or 10 ft, whichever is greater. Yes No

Notes: Remove shrubs and the tree on the east side, near the wood handrail.

9.7 New trees that are fire resistant shall be planted and maintained so that the tree's drip line at maturity is a minimum of 10 ft from any structure. Yes No

Notes:

Section 9: California Fire Code Chapter 49 Section 4906 – Vegetation Management

9.8 The horizontal distance between crowns of new trees and crowns of adjacent trees shall not be less than 10 ft. Yes No

Notes: See 9.6, recommended removal of the tree near the wood handrail on the east side.

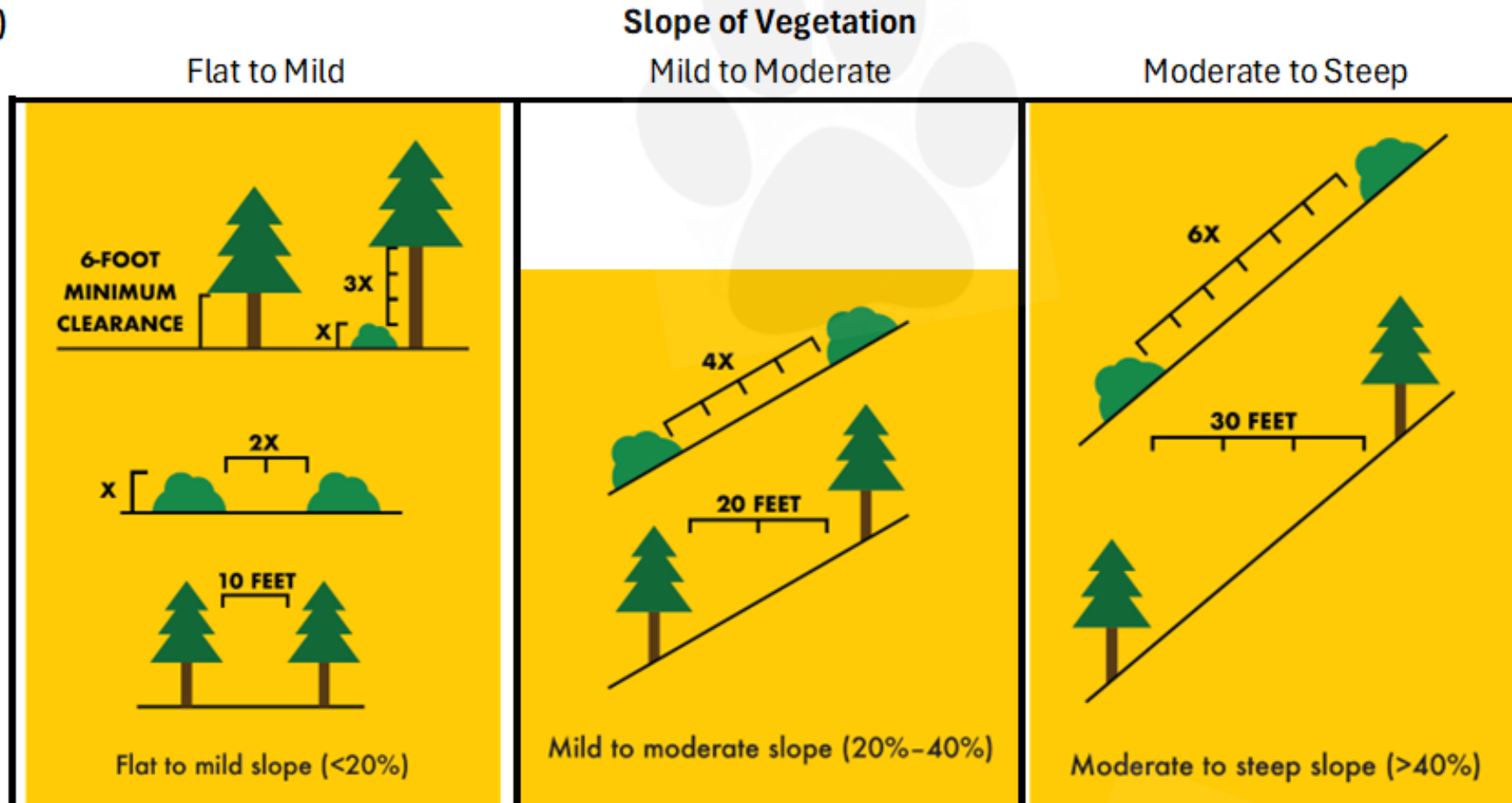
9.9 Existing trees shall be trimmed to provide a minimum separation of 10 ft away from chimney and stovepipe outlets. Yes No

Notes: See 9.8, recommended removal of the tree near the wood handrail on the east side.

****Note: New trees not classified as fire-resistant vegetation, such as conifers, palms, pepper trees and eucalyptus species, shall be permitted provided the tree is planted and maintained so that the tree's drip line at maturity is a minimum 30 ft from any structure.***

Section 10: Slope of Vegetation

✓ 10)



Section 10: Slope of Vegetation

10.1 Select which slopes are found on this parcel. <20 deg. 20 - 40 deg. >40 deg.

10.2 Select which slopes are found adjacent to this parcel. <20 deg. 20 - 40 deg. >40 deg.

10.3 Minimum Fuel Separation Distance if slope of concern is between wildland fuels & structures.

(Applies to **Perimeter** and **Intermix** settings. See "Housing Density Type" chart in section 8.)

- Flat to mild slope (<20 degrees) = **100ft**
- Mild to moderate slope (20 - 40 degrees) = **150ft**
- Moderate to steep slope (>40 degrees) = **200ft**
- Does not apply.

Notes:

Section 11: Defensible Space

✓ 11)

Defensible Space

11.1

Zone 0: 0 - 5 ft from structures (include supporting images).

****No stacked firewood, vegetation, vehicles, wood fences, or any other combustible fuels.***

Items assessed:

Northside: Metal fence & dirt walk way

Westside: Combustible fuels against the residence & weeds.

Southside: Motorcycle & trash cans.

Eastside: Wood handrails attached to the residence, balcony & flammable furniture.

Mitigation recommendations:

Install gravel bed, metal privacy slats & remove weeds.

Relocate combustible fuels to Zone 1 & remove weeds.

Relocate motorcycle & trash cans to Zone 1. Do not create a fire ladder or fuel agglomeration.

Remove or replace wood handrails with noncombustible materials. Store flammable cushions indoors.

Relocate flammable furniture with noncombustible furniture.

Section 11: Defensible Space

11.2

Zone 1: 5 ft - 30 ft from structure (include supporting images)

5ft-10ft: Small vegetation, propane tanks up to 125 gallons per C.F.C. Chapter 61 Section 6104.3.

10ft-25ft: Propane tanks between 126 - 500 gallons per C.F.C Chapter 61 Section 6104.3, existing trees trimmed at least 10ft away from chimney and stovepipe outlets and new trees that are fire-resistant and when the trees drip line at maturity is at least 10ft away.

25ft-30ft: Propane tanks between 501 - 2,000 gallons per C.F.C Chapter 61 Section 6104.3.

*** Combustible fuels such as firewood, RV's, boats, sheds, gazebos, or shrub groupings, shall be relocated into Zone 2. If the following combustible fuels cannot be relocated in Zone 2, than removal or structure hardening is required. See section 13 for details.**

Items assessed:	Mitigation recommendations:
Eastside: Shrubs next to wood handrail.	Replace the shrubs with a flower bed. Replace wood handrail with non-combustible material.
Northside: Neighbors shed & residence.	Both are within 50ft. Harden the structure on the northside, westside & southside.
Westside: Tree branches & weeds.	Trim/remove the lower branches on the south tree above the roof line & at least 10ft away. Remove north tree & weeds.
Southside: Neighbors detached garage, planters along south fence & weeds.	Remove weeds & harden the west & southside of the structure as the neighbors detached garage is within 50ft.

Section 11: Defensible Space

11.3	<p>Zone 2: 30 ft - 100 ft from structure if applicable (include supporting images).</p> <p>30ft-50ft: Firewood, shrub groupings, and new trees not fire resistant; dripline at maturity.</p> <p>50ft-100ft: ADU's, sheds, structures, RV's, boats, gazebo, propane tanks between 2,001 - 30,000 gallon per C.F.C. Chapter 61 Section 6104.3.</p> <p><i>* If the above combustible fuels cannot be relocated into Zone 2, removal or structure hardening is required. See section 13 for details.</i></p> <table border="1"> <tr> <td> <p>Items assessed:</p> <p>Eastside: Weeds & dead shrubs.</p> <p>Westside: Weeds.</p> <p>Northside: Neighboring parcel.</p> <p>Sourthside: Neighboring parcel.</p> </td> <td> <p>Mitigation recommendations:</p> <p>Remove weeds & dead shrubs.</p> <p>Remove weeds.</p> <p>Collaborate with your neighbor.</p> <p>Encourage ember & fire hardening.</p> <p>Collaborate with your neighbor.</p> <p>Encourage ember & fire hardening.</p> </td> </tr> </table>	<p>Items assessed:</p> <p>Eastside: Weeds & dead shrubs.</p> <p>Westside: Weeds.</p> <p>Northside: Neighboring parcel.</p> <p>Sourthside: Neighboring parcel.</p>	<p>Mitigation recommendations:</p> <p>Remove weeds & dead shrubs.</p> <p>Remove weeds.</p> <p>Collaborate with your neighbor.</p> <p>Encourage ember & fire hardening.</p> <p>Collaborate with your neighbor.</p> <p>Encourage ember & fire hardening.</p>
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Section 12: 100% Ember Hardening Required

- | ✓ 12) | 100% Ember Hardening Compliance Required (Start top down) | Mitigate? |
|---|---|---|
| State Fire Marshal resource: https://calfire.govmotus.org/BMLSearch/Index | | |
| EE12.1 Roof Covering: For existing structures, replace Class B or C roof coverings with a Class A roof when needed, repair damages, plug openings with non-combustible material. Install a thermal barrier such as insulation, fiber cement, and/or FR sheathing. | Notes: Several damaged roof shingles, exposed wood on fascia, needs metal flashing from roof to fascia. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| 12.2 Roof Skylights: Install tempered glass outer pane, install metal screen if the skylight opens, metal flashing, no exposed wood. | Notes: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| EE12.3 Solar Panels: Prevent debris accumulation under panels, don't impact PV cooling | Notes: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| 12.4 All vents: Ember & FR vents, openings 1/16 - 1/8 inches, intumescent option. | Notes: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

Section 12: 100% Ember Hardening Required

-
- 12.5 **Gutters:** Install metal gutters, metal gutter guards, flashing over fascia, seal gaps. Yes No
Notes:
-
- 12.6 **Eaves:** Enclose eaves using non-combustible material, ember and FR vents with openings from 1/16 - 1/8 inch, seal gaps with fire caulking. Yes No
Notes: Enclose eave with non-combustible material. If metal, add a thermal barrier. Use fire caulking on gaps.
-
- EE12.7 **Exterior Wall Siding:** Use non-combustible siding within 2 ft of ground, add metal flashing to protect bottom edge of sheathing, ensure 6 inches vertical clearance from ground, **seal gaps**, install a **thermal barrier** such as insulation, fiber cement and/or FR sheathing. Yes No
Notes: Ensure 6 inches of clearance from the ground, replace combustible siding. seal gap on SW side.
-
- EE12.8 **Windows:** Replace wood frames with non-combustible frame and double pane tempered glass window, install metal screens if operable windows, install a **thermal barrier** such as fiber cement between the window and the wood framing. Yes No
Notes: Install metal screens on operable windows.
-

Section 12: 100% Ember Hardening Required

- | | |
|---|---|
| <p>EE12.9 Exterior Doors: Install metal or 60-minute FR door min., metal door jamb kit, metal threshold, thermal barrier such as fiber cement board between metal door jamb kit & wood framing, seal gaps, & ember rated weather striping.</p> <p>Notes: Install ember rated weather striping, replace wood under threshold w/noncombustible material.</p> | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <p>12.10 Exterior Screen Doors: Replace wood screen doors with metal screen door.</p> <p>Notes: Replace vinyl screen with metal screen material.</p> | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <p>12.11 Garage Doors: If garage door is not metal, install 6 inch metal flashing around the bottom of the door inside and out, within 1/4 inch of the ground, add FR-gasketing around the garage door.</p> <p>Notes:</p> | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <p>12.12 Skirting: Install non-combustible skirting on all sides of mobile homes, elevated decks, or spaces under structures.</p> <p>Notes:</p> | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

Section 12: 100% Ember Hardening Required

-
- 12.13 **Decks, stairs and landings attached to residence:** Replace deck boards within 1 ft of residence with non-combustible deck boards, or replace the entire deck with non-combustible material, and the area under the deck, stairs or landing must be maintained with no combustible materials. Install metal flashing between deck boards at joists. Yes No
- Notes: Replace wood deck boards <1ft from wall siding with noncombustible material on balcony.**
-
- 12.14 **Deck-to-wall intersection:** Replace bottom 2ft of combustible siding with non-combustible siding and install metal flashing to protect exposed sheathing with thermal barrier such as fiber cement board. Yes No
- Notes: Install 6 inch metal flashing at deck-to-wall interface on balcony.**
-
- 12.15 **Fence-to-residence:** Replace wood fence with metal/non-combustible option. Yes No
- Notes: Remove or replace wood handrail attaching to residence with noncombustible material.**
-

Section 12: 100% Ember Hardening Required

12.16 **Retaining Walls:** Replace retaining wall length equal to two times retaining wall height with non-combustible material. Yes No

Notes:

12.17 **Combustible Furniture:** Replace furniture with non-combustible framing materials or move away 5ft. Place cushions inside residence when not in use. Yes No

Notes: Replace combustible furniture on front porch & 2nd level deck. Store cushions indoors.

12.18 **Other Penetrations:** Seal around penetrations with fire caulking. Yes No

Notes: Opening around the exterior door to the water heater. Seal hole on the siding on the SW side.

Section 13: Hardening Against Direct Flame, Radiant Heat & Convection

✓ 13) **Hardening Against Direct Flame Exposure, Radiant Heat & Convection**
(If sections 13.1 through 13.6 applies to your parcel, then proceed with Fire Hardening)

- *13.1 *Primary & auxiliary structure hardening with non-combustible materials is required, per California Building Code Chapter 7A Section 710A.3, if a permit is required & the structure separation distance is between 3ft - 50ft for structures located in Fire Hazard Severity Zones.*
- *13.2 *Primary & auxiliary structure hardening with non-combustible materials is required, along with defensible space, for existing structures, sheds, ADU's, if the structure separation distance is <50ft.*
- *13.3 *Primary & auxiliary structure hardening with non-combustible materials is recommended if they do not meet the Minimum Fuel Separation Distance (**MFSD**) between untreated wildland fuels & (Applies to **Perimeter** and **Intermix** settings. See "Housing Density Type" chart above.)*

Section 13: Hardening Against Direct Flame, Radiant Heat & Convection

- Flat to mild slope (<20 degrees) = **100ft**
- Mild to moderate slope (20 - 40 degrees) = **150ft**
- Moderate to steep slope (>40 degrees) = **200ft**
- Does not apply (*Interface Interior* = >0.25 miles from wildlands.)

***13.4 Primary & auxiliary structure hardening with non-combustible materials is recommended if they do not meet the Minimum Fuel Separation Distance (**MFSD**) of 100ft between treated wildland fuels & structures.**

***13.5 Proximity of small combustible fuels, such as a single wood fence or detached retaining wall, is <10ft.**

***13.6 Proximity of combustible fuels, such as a double fence or detached retaining wall, is <20ft.**

Section 13: Hardening Against Direct Flame, Radiant Heat & Convection

Fire Hardening (Start top down)	Mitigate?	
<p>EE13.7 Roof Covering: Class A roof, repair damages, plug openings with non-combustible material, install thermal barrier such as insulation, fiber cement, and/or FR sheathing.</p> <p>Notes: Install 1-sided SIPs panel, repair damages to Class A roof, metal flashing around roof edges.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>EE13.8 Dormer Side and Dormer Under-Eave: Replace all combustible material with non-combustible material, enclose eave, and fill gaps with fire caulking, install thermal barrier such as insulation, fiber cement, and/or FR sheathing.</p> <p>Notes:</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>13.9 Eaves: Enclose eaves using non-combustible material, ember & FR vents 1/16 - 1/8 inch openings, intumescent option, seal gaps w/fire caulking.</p> <p>Notes: Enclose eaves with noncombustible material. If metal, add a thermal barrier. Use fire caulking on gaps.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p>13.10 All Vents: Ember & FR vents, openings 1/16 - 1/8 inches, intumescent option.</p> <p>Notes:</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Section 13: Hardening Against Direct Flame, Radiant Heat & Convection

EE13.11 Exterior Wall Siding including bump outs: Use non-combustible siding, add metal flashing to protect bottom edge of sheathing, ensure 6 inches vertical clearance from ground, **seal gaps**, install **thermal barrier** such as insulation, fiber cement, and/or FR sheathing. Trim must be non-combustible. Option to add on top of existing cladding if it has a flat profile. Add moisture barrier. Yes No

Notes: Install insulated thermal barrier & noncombustible siding. 2hr FR exterior wall on North, West & South.

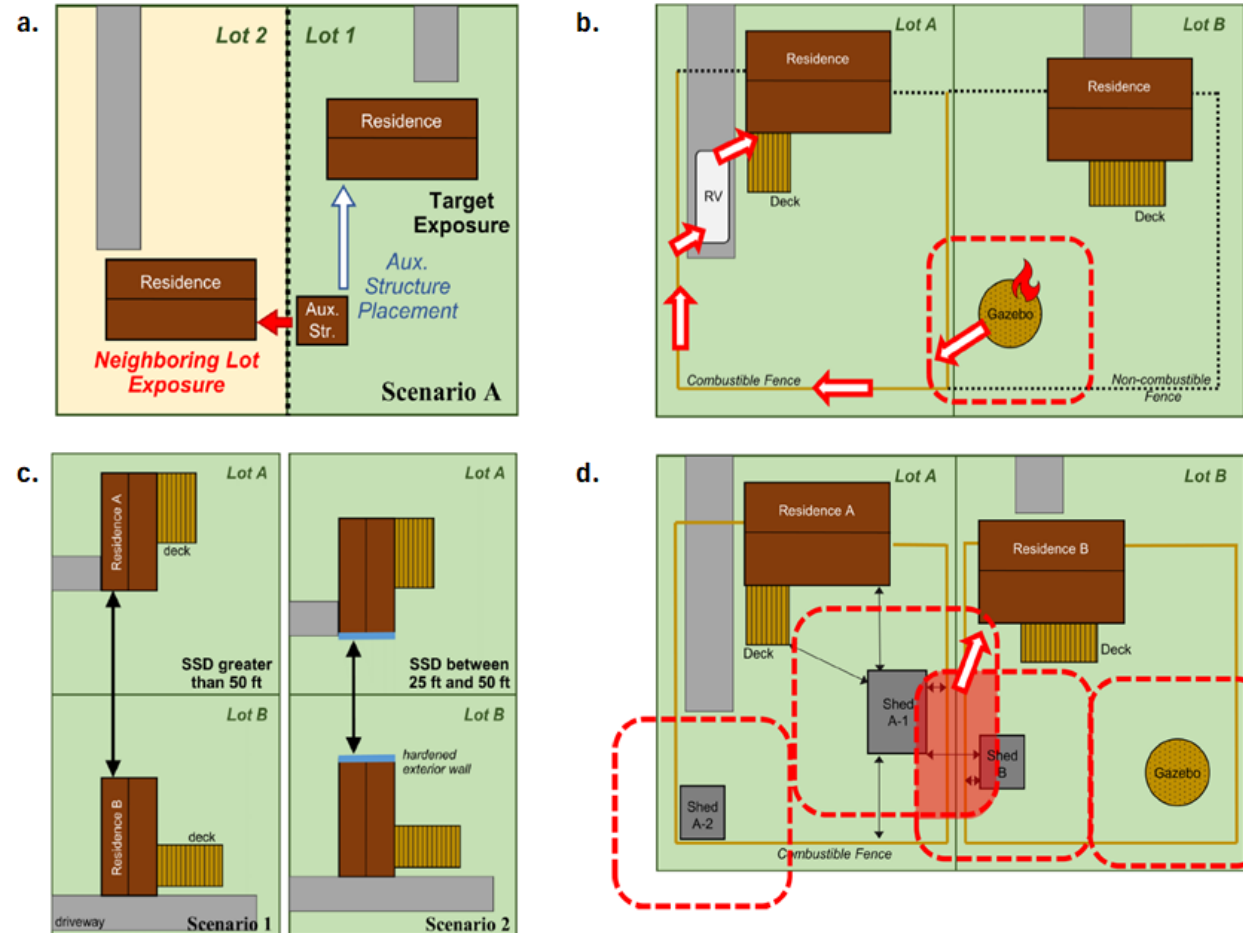
EE13.12 Windows: Replace wood & vinyl frames with metal, **thermally broken frames** with double pane tempered glass, 60 - 120 minute fire rated windows, install metal screens if operable windows, install **thermal barrier** such as fiber cement between window & wood framing. Yes No

Notes: Replace all windows on the north, west & south sides. Follow all above recommendations.

EE13.13 Exterior Doors: Install metal or 60-120 minute fire rated door, metal door jamb kit, metal threshold, **thermal barrier** such as fiber cement board between metal door jamb and/or FR sheathing & wood framing, **seal gaps**, install fire rated weather striping. Any glass must be dual pane & tempered. Yes No

Notes: Replace both doors on the south side with the above recommendations.

Section 13: Hardening Against Direct Flame, Radiant Heat & Convection



a. Auxiliary structure exposure, b. fire ladder, c. harden the side of the structure exposed, d. fuel agglomeration.

Section 14: Insert an Overview of Required Mitigation

- 14) Overview of Structure & Fuel Separation Distances (Insert an overview of required mitigation)



Conclusion

The Parcel Assessment for Wildfire Hardening:

- 1. Will significantly reduce loss of life & property.**
- 2. Helps homeowners assess and mitigate their property.**
- 3. Help homeowners benefit from energy efficiency improvements.**

Kliewer & Assoc.' Building Science Team



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**This project was funded by:
Southern California Edison Codes & Standards Program**

For more information, contact Charles Kim at charles.kim@sce.com

The Parcel Assessment for Wildfire Hardening (PAWH) form can be found at:

<https://tinyurl.com/cfk6yt3h>