

Module 11: Wildland/Urban Interface

Topic 1: Introduction

Wildland/urban interface size-up introduction

Narration Script: You've been dispatched to a grass and scrub fire at the corner of Highway 67 and Rampart Range Road. But this isn't your run-of-the-mill wildland fire—now you have to deal with structures too. These are buildings that people call home. Homes that contain their possessions, their memories ... and their loved ones. For a growing number of fire departments, it's not just about wildland fires anymore; it's about the more complex issues of protecting the wildland/urban interface.

Scenic beauty and changing lifestyles have motivated people to purchase and develop homes and businesses in once pristine areas. People, homes, and workplaces in these areas increase the wildland fire problem in many ways. And therefore, the wildland now becomes the wildland/urban interface.

However, before delving deeper into structure protection and fire suppression in the interface, you have to recognize the unique aspects of size-up for these types of fires. Get ready to take what you have already learned and apply it in a new environment—the wildland/urban interface. That's our order of business in this topic!

Wildland/urban interface introduction

Because fires in the *wildland/urban interface* present specific issues, this module is devoted to discussing the unique aspects of fire fighting in the interface. First and foremost, we'll discuss your top priority—safety.

In the following topic, you'll be reminded of specific fire fighting principles when you are in the interface, including:

- **“Watch-out!” scenarios just for use in the interface**
- **Assessments to be made on a wildland/urban incident**
- **Operational modes available for an interface tactical plan**

Narration Script: When fire spreads toward improved properties, you have a variety of tactics available to achieve the objectives stated in the incident action plan. This may involve a combination of direct and indirect fire fighting methods as well as calling for various types of air- and ground-based resources.

Topic 2: Watch-Outs

Topic introduction

Narration Script: You can pretty much guarantee that there will be fires coming to a wildland/urban interface near you. Increased human activity multiplies both the ways that fires can start and the total number of fires in these areas. And many homes in the interface are very expensive, greatly increasing the dollar value of property you are expected to protect.

Many times, developments in the interface have less than adequate fire protection. Minimal planning and code enforcement often result in a random pattern of structure types in heavy vegetation and on terrain that provides breathtaking scenic vistas but also makes the structures vulnerable to fire.

When these factors are combined with minimal fire fighting resources, a single fire can quickly destroy hundreds of structures and other improvements. Despite the value of the structures you find in the wildland/urban interface, your safety and that of your fellow firefighters is the most important issue.

The wildland/urban interface

Have you ever heard it said that someone is “in the zone”? For wildland firefighters, the zone will sometimes be the *wildland/urban interface*—known as the zone where human-made improvements intermix with wildland *fuels*.

The interface is where wildland *strategies* and *tactics* shift and where you might be exposed to unfamiliar hazards.

In this topic, we’re going to show you how to stay safe while analyzing *incidents* and making good tactical decisions in the interface. You’ll examine:

- **Foundational principles**
- **Interface “Watch-out!” scenarios**
- **Scene assessment considerations**
- **Interface response tactics**

Let’s get started!

Narration Script: When fire threatens structures in the wildland/urban interface, the factors that can harm you take a sharp turn to the north. While saving those structures is a priority, what matters most is your life. Smart firefighters don’t risk their necks for buildings. So pay attention. We’re about to tell you how to stay safe, and how to carefully analyze and make good tactical decisions while managing incidents in the wildland/urban interface.

Foundational principles

Before we get to the heart of this topic, let's review some key foundational principles.

The foundational principles are:

- Understand that your first priority is your *safety*—your second priority is saving property and natural resources
- Know where your *escape routes* and *safety zones* are at all times
- Keep an eye on any potential problem areas
- Know your equipment placement guidelines
- Establish good communications with all involved agencies
- Adhere to the *incident command system*—know who you are working for

And don't forget these principles from your Incident Response Pocket Guide (IRPG):

- LCES (*lookouts, communications, escape routes, safety zones*)
- 10 Standard Fire Orders
- 18 wildland “Watch-out!” situations
- Five-step risk management process

You can find a copy of the IRPG in the resources associated with this course.

Narration Script: No amount of training is “guaranteed” to keep you safe on every incident. But the more you know, the safer you will be. Guesswork has no place in a firefighter’s world. You need to know exactly what to look for, how to react, and what to do. Let’s begin by revisiting some foundational fire fighting principles specifically designed for the wildland/urban interface. Review these principles early and often. You can find these principles in your IRPG. It should be a pocket’s length away from you at all times.

Wildland/urban interface concerns

You will be confronted with safety concerns in the wildland/urban interface you might not otherwise see on a typical wildland fire. Simply stated, structural hazards are *different* from hazards on a wildland fire.

Not only is structural defense an unfamiliar role for many wildland firefighters, but the value of homes can place undue psychological pressures on firefighters, leading to unfounded risk taking. Don't take unnecessary risks. Homes can be rebuilt—firefighters can't. Safety for yourself, the crew, and local residents are your top priorities.

In a moment, we'll investigate some new “Watch-outs!” that are tailor-made for fighting fires in the wildland/urban interface.

Narration Script: Fighting fires in the wildland/urban interface can be very different from engaging a strictly wildland incident, and it can be more dangerous. Structural fire fighting is complex and can involve such factors as electrical hazards and toxic materials. The value placed

on homes and the pressure from homeowners might compel you to take greater risks. Don't do it. No structure is worth putting your life or the life of your crew members in jeopardy.

Knowledge Check 1

Multiple choice—check the box of the answer(s) you choose.

Are you staying true to the foundational principles?

Your first priority working in the wildland/urban interface is

- homes.**
- safety.**
- wildlife and pets.**
- fire suppression.**

The correct answer is safety.

Wildland-urban “Watch-outs!”

Structure defense adds a whole new dimension to wildland fire fighting. Your IRPG provides an additional list of “Watch-outs!” designed specifically for the tactical challenges confronting you in the wildland/urban interface.

The wildland/urban interface “Watch-outs!” include:

- **Poor roads**
- **Bridge load limits**
- **Wooden construction and wood shake roofs**
- **Power lines**
- **Propane tanks and HazMat threat**
- **Inadequate water supply**
- **Natural fuels within 30 ft. (9 m) or closer to structures**
- **Structures in chimneys, box canyons, narrow canyons, or on steep slopes**
- **Extreme fire behavior**
- **Strong winds**
- **Panic during an evacuation**

You will investigate each situation in turn to learn about its hazards.

Narration Script: The more you understand each incident-related “Watch-out!” situation, the better you will be at assessing those incidents. Are you ready? Let's jump into the wildland-urban interface “Watch-outs!” now.

Poor roads

Poor road conditions are often notorious in the interface. Poor roads can delay your egress and threaten your safety. On the way to an incident, always consider access and escape routes, as well as the difficulties those routes might contain.

Watch out for these road problems in particular:

- Poor access and congestion
- Narrow roads
- Poor traction
- Steep slopes
- Adjacent fuels

Read the following about each road problem to drive these details home.

Poor Access and Congestion

Poor access and congestion can result from:

- Private roads and driveways with only one way in and one way out
- Dead-end roads or cul-de-sacs
- Driveways and turnarounds with poor access
- Vehicles blocking an egress

Narrow Roads

Traffic congestion may be a problem when you are dealing with roads less than 16 ft. (5 m) wide. This problem can be even worse if:

- Roads are winding.
- Smoke is causing poor visibility.
- Heavy equipment and apparatus, such as type 1 structural engines, are attempting to pass evacuating vehicles.

This situation can be remedied by securing the road. Control traffic at each end using common communications. Often, law enforcement agencies will assume this responsibility.

Poor Traction

Road traction can be compromised when the road bed consists of loose gravel, loosely compacted rock and sand, decomposed granite, or clay.

These types of roads can deteriorate, causing washouts, washboards, and large potholes.

Steep Slopes

Roads built in the middle of a slope or on upper slopes often have a grade between 10 and 20 percent. These roads are especially susceptible to convective and radiant heat, making them poor barriers to a spreading fire and a poor place to be when a fire front passes.

Adjacent Fuels

Be aware of the characteristics of fuels adjacent to the roadway. Determine if fuel type, fuel moisture, loading, or fuel arrangement could make the area more susceptible to fire. Burning fuels could block your egress.

When constructing safety zones near roadways, bear in mind that some roadway fuels are easier to burn out than others.

Narration Script: Poor roads are one “Watch-out!” you’ll need to be especially wary of in the interface. A road’s design and maintenance will vary from region to region—and in wildland areas, roads can put a vehicle’s shocks and alignment to the test. Road conditions can delay your egress and threaten your safety.

By “poor roads,” we mean roads with poor access and those that are narrow and congested. “Poor roads” can also mean those with bad traction, steep or winding roads, and those that are lined with fuels. Review the Transportation Safety Module if you want even more details on this subject.

Bridge load limits

Bridge load limits are another wildland/urban interface hazard you need to watch out for. Fire vehicles, such as engines may exceed the weight limits of many rural bridges and culverts.

Check bridge and culvert weight capacities before allowing *heavy equipment or apparatus* to cross them.

Wooden construction and wood shake roofs

Wooden structures and wood shake roofs may be pretty—but they are easy targets for firebrands and adjacent burning fuels.

Wood structures are often:

- Untreatable with flame-resistant compounds
- Susceptible to *radiant heat*
- Vulnerable to fire entry because of openings, such as doors and windows

A structure’s overall vulnerability depends on the *fire intensity* and the placement and construction of the structure itself. To reduce a structure’s vulnerability:

- Check eaves, roof, roof vents, and decks for *smoldering* or flames
- Remove combustible furniture and objects from decks and place them inside the structure

However, don't remove anything from a burning or at-risk structure. Leaving things in the condition you found them will minimize legal problems down the road.

Narration Script: The problem with structures in the interface is that they are so often made of a highly combustible material—wood. Not only that, homes in the interface may also have wood shake roofs, which are especially vulnerable to firebrands. A structure's vulnerability depends on several factors, not the least of which is the number of openings it contains, such as doors and windows.

Structure situations to avoid

Structure fires can be deadly, but there are tell-tale signs pointing to trouble.

Avoid the following situations at all times—they are your indicator of impending danger:

- Bulging windows and an unventilated roof—hot gases are trapped, and a backdraft is brewing
- Smoked-over or blackened windows—an interior fire is raging
- Burning roofs that are 25 percent engulfed in *windy* conditions—saving the structure is probably hopeless, so stay away

Narration Script: When you are called to a wildland/urban interface fire and structures are already involved, watch out for these crucial tell-tale signs—all of them indicate the potential for some serious problems. Bulging windows foretell of a potential backdraft. Smoked-over or blackened windows indicate a fire is already inside. A roof that is 25 percent burned in windy conditions tells you that the structure is probably lost anyway and you shouldn't risk your safety trying to save it. As a wildland firefighter, NEVER enter burning buildings without the proper training and the right equipment.

Downed power lines

Working around power lines can be especially dangerous. Power lines on the ground are dangerous even if you don't touch them. When an electrical wire is on the ground, current flows in all directions from the point of contact. Electricity can extend for several feet depending upon the voltage and factors such as ground moisture. Always assume all power lines are charged!

What you DON'T do when working around power lines may be more important than what you do.

When working around *downed* power lines, DON'T:

- Approach or move the line
- Leave vehicle

- Hang on to vehicle
- Approach liquids
- Apply a straight stream

Read the following to discover more details about each guideline.

Approach or Move

If a power line is lying on the ground, DON'T go near it or attempt to move it.

Leave Vehicle

If a power line is touching your vehicle, DON'T leave the vehicle until the power company arrives.

Hang on to Vehicle

If you must leave the vehicle because it has caught fire, DON'T hang on to the vehicle when you exit it. Instead, jump clear and bunny hop away with your feet together.

Approach Liquids

If water or liquids are pooled or running along the ground, DON'T approach them—liquids conduct electric currents.

Apply Straight Stream

If you are applying water or retardant near a downed power line, DON'T apply a straight stream to the power line.

Narration Script: Downed power lines pose significant danger even if you don't touch them. Keep a considerable distance away from any downed power line until it's confirmed that the power is shut off. Use extreme caution when approaching it because energy can conduct through the ground. Don't even come near it! Don't take chances with a live wire!

Power lines

There are more general guidelines for working around power lines.

Follow these DON'Ts when working around power lines in the wildland/urban interface:

- DON'T stand near power lines during *retardant* or *water drops*
- DON'T work in dense smoke near power lines
- DON'T use the area near power lines as a cargo drop spot
- DON'T operate fire apparatus or heavy equipment under power lines
- DON'T drive vehicles with long antennas under power lines
- DON'T park any vehicle or piece of equipment under power lines

- **DON'T fuel vehicles under power lines**

Narration Script: You're not through with the "Don'ts" quite yet. Here are a few more guidelines to follow when working around power lines in the interface.

Metal fences

There's one more danger of fallen power lines we want you to know. If an energized electrical line falls across a metal fence or guardrail, the entire length (as long as it is continuous) can become charged. This makes controlling the scene difficult because of the length of some fences.

Knowledge Check 2

Multiple choice—check the box of the answer(s) you choose.

Identify THREE things you should NOT do when working around a downed power line.

- Attempt to move the power line**
- Stay in your vehicle if the power line is touching it**
- Apply a straight stream to the power line**
- Assume that the power line is live**
- Leave a live power line unattended without attempting to move it**
- Approach liquids that are pooled near the power line**

The correct answers are attempt to move the power line, apply a straight stream to the power line, and approach liquids that are pooled near the power line.

Hazardous materials

Hazardous materials pose another threat to your safety because of their *flammability* or *toxicity*.

Identify and mark all hazardous materials with flagging material or other warning devices. Post a lookout. Keep your supervisor informed of hazards, and avoid breathing toxic fumes unless you have been trained and equipped to use HazMat protective gear.

Be especially cautious around:

- **Petroleum and propane tanks**
- **Garages and sheds**
- **Drug labs**

Read the following to get more information about each hazard.

Petroleum and Propane Tanks

Many rural homes use liquefied petroleum gas (LPG) for heating. When working around petroleum and propane tanks:

- Check all storage tanks for LPG
- Check for a 30 ft. (9 m) vegetation clearance around storage tanks
- Clear vegetation if necessary and if time allows
- Check outbuildings or barns for flammable liquid storage

Garages and Sheds

Garages and sheds might contain any of the following hazardous materials:

- Paint
- Cleaning materials
- Pesticides
- Gas cans
- Ammunition and explosives
- Plastics and synthetic material
- Vehicles

Drug Labs

Clandestine drug labs—like those producing methamphetamines—are often found in out-of-the-way places like the wildland/urban interface. Meth labs contain several different toxic and explosive chemicals.

Narration Script: Hazardous materials such as petroleum and propane tanks, garages and sheds housing gasoline and pesticides, and clandestine drug labs containing explosive chemicals are not uncommon in rural areas.

Inadequate water supply

Both your water flow and supply must be constantly monitored. If you are using hydrants, the flow can be interrupted or have serious pressure loss due to heavy use. Be especially attentive to water flows during power outages because water supplies can be tied to electrical pump systems—no electricity means no water.

Follow these guidelines to protect your water supply:

- Don't waste water by wetting down roofs or ground fuels too far in advance of a *fire front*
- Know your pump capacity and hose complement setup
- Know the limits of your water supply, and top off your tank at every opportunity
- Keep a reserve of 100 gal. (400 l) in your tank for your own protection

Fuels close to structures

Fuels surrounding or those downslope from a structure present a situation where structure survivability is low and firefighter risk is high.

Fuels should be no closer than 30 ft. (9 m) to a structure. Re-evaluate your location if there is no defensible space (an area large enough to safely defend a structure) and no safety zone for personnel.

When working around structures:

- Always position engines and vehicles facing outward for easy egress
- Watch out for firewood stacked against houses
- *Pre-treat* stacked firewood with *foam* if time allows
- Move stacked firewood away from the house if time allows

If time allows, remove fuels away from the structure with power and hand tools—but be aware that some residents do not want firefighters to do so.

Narration Script: Structures with fuels surrounding them or those with fuels downslope from their location represent a situation where structure survivability is low and firefighter risk is high. Fuels need to be at least 30 feet away from the structure. As always, the crew needs to follow the principles of LCES and establish safety zones. If you don't have a safety zone, you need to re-evaluate your location—and pronto!

Structures in extreme terrain

Working in or around severe terrain is a scenario that represents a slim chance for structure survivability and high risks to your safety. *Extreme fire behavior* and multi-front blazes can lead to poor egress, a lack of good safety zones, and entrapment.

Watch out for fires in these types of dangerous *topography* (terrain) features:

- Chimneys
- Box and narrow canyons
- Steep slopes in flashy fuels

Read the following to examine the specific hazards for each type of terrain.

Chimneys

A chimney is a steep, narrow draw or canyon where heated air can rise rapidly as it would in a flue pipe. Chimneys are a path of least resistance for heat, smoke, and searing gases.

Box and Narrow Canyons

In box and narrow canyons:

- Wind usually gets channeled upslope, resulting in rapid rates of spread (ROS).

- There can be radiant heat transfer from one slope to another, leading to spot fires across the canyon.

Steep Slopes

When dealing with flashy fuels on steep slopes (30 percent grades or greater), the hazards are many:

- Accelerated ROS from radiation and convection
- Spot fires that outflank the main fire
- Burning materials that roll downhill

Narration Script: One of the high-risk, low-yield environments you may deal with is extreme terrain. Be especially careful in chimneys and box canyons, and on steep slopes with flashy fuels.

Extreme fire behavior

Extreme fire behavior, such as *crown fires, firewhirls, and intense burning*, has been responsible for major losses of life and property.

Watch for these conditions contributing to extreme fire behavior:

- Dry and plentiful fuels
- *Atmosphere* that is or has been unstable for hours or days before the fire
- Topography aligned with wind and *aspect* during the peak burning period
- Eye-level wind speed greater than 15 mph (24 km/h)

Read the following for additional extreme fire behavior concerns and a warning you must heed.

Extreme Fire Behavior Hazards

Extreme fire behavior becomes especially dangerous when:

- Safe egress is compromised.
- The potential of being overrun is high.
- Winds become gusty and erratic, and air attack is nullified.
- Fire behavior increases before peak burning conditions arrive.

Warning! Fire fighting efforts should be kept mobile and flexible. Resources should not be committed to a single water source. Do not allow other vehicles to block your escape routes. Firefighters must know when it is time to pull back to a safety zone. If necessary, the inside of a structure can be used as a safety zone while the fire front passes.

Narration Script: Look for the signs pointing to the potential for extreme fire behavior. Is it excessively hot and dry? Are there plenty of fuels around? Is the topography working against me? Is it windy? These are just a few of the questions you should be asking yourself when thinking about extreme fire behavior.

Strong winds

Strong winds are a major contributing factor to extreme fire behavior.

Strong winds can cause:

- *Convective heat transfer* when the wind pushes the flame's angle closer to fuels
- **Increased fireline intensity** when greater air velocity supplies oxygen to the fire
- **In-drafts** developing on one or both *flanks* or the entire fire area

Strong winds also add to a fire's rate of spread (ROS). A fire's head and flanks become more active, crown fires can develop if both ground and *aerial fires* become involved, and firebrands can be transported longer distances.

Panic during evacuation

Public evacuation is a "Watch-out!" situation where you might have to interact with both law enforcement personnel and a large number of civilians.

The purpose behind evacuation is twofold: it guarantees residents' safe and orderly egress, and it allows firefighters to focus on their own fire operations and safety.

Residents are normally evacuated by law enforcement personnel prior to the crew's arrival, but don't think it will always work out that way. Frequently, your crew *will* be actively engaged. On large fires that include a *Command* structure, the *incident management* team will brief the public on the fire prior to the evacuation.

Evacuations won't always go according to plan. Watch for glitches caused by panic or lack of training.

Panic

Sometimes, law enforcement agencies are hesitant to force residents to evacuate, preferring to allow them to decide for themselves when to leave. However, this can cause the situation to backfire. If the decision to do forced evacuation is delayed for too long, it can reduce the total time available for an evacuation. When the lead time is small, an orderly evacuation can turn into a panicked flight.

Lack of Training

Law enforcement personnel lack the training, communications, and personal protective equipment required for fire fighting. They may be unable to recognize dangerous fire situations, delaying their own evacuation during extreme fire situations.

Narration Script: Not all evacuations go according to plan. Sometimes, residents don't want to leave, and often, law enforcement personnel let them stay. The trouble comes when law enforcement, or the residents themselves, later change their minds. Precious minutes or hours have already clicked by, leaving a much smaller evacuation window. What might have been an

orderly evacuation can deteriorate into a panicked flight. In addition, those law enforcement personnel might lack the training or gear for wildland fires, and they might end up having to evacuate themselves.

Knowledge Check 3

Multiple choice—check the box of the answer(s) you choose.

Natural fuels should be no closer to a structure than

- 20 ft. (6 m).**
- 30 ft. (9 m).**
- 40 ft. (12 m).**
- 50 ft. (15.25 m).**

The correct answer is 30 ft. (9 m).

Knowledge Check 4

Multiple choice—check the box of the answer(s) you choose.

When working in the wildland/urban interface, you need to stay mobile and have more than one way out.

Identify THREE potential road access problems you want to avoid.

- Private roads and driveways with only one way in and one way out**
- Wide roads with pullouts**
- Driveways and turnarounds with poor access**
- Houses with two-car garage setups**
- Multiple outlets**
- Dead-end roads or cul-de-sacs**

The correct answers are private roads and driveways with only one way in and one way out, dead-end roads or cul-de-sacs, and driveways and turnarounds with poor access.

Scene assessment

Now that you understand the hazards to watch out for in the wildland/urban interface, you are ready to learn how to assess the incident scene. Each factor you assess will help determine *how* best to defend structures and *how* to protect yourself and your equipment.

In other words, you are going to become a first-rate analyzer and decider. You will assess the:

- Estimated time when the fire will hit**
- Distribution of structures**

- Number and vulnerability of structures
- Fire fighting tactics that are likely to work

You will investigate each of these issues in turn to increase your analyzer skills.

Narration Script: For sure, understanding the hazards is the first step before you can assess an incident. However, now that you understand the “Watch-out!” hazards, you are prepared for some scene assessment guidelines. And, once you know HOW to assess a wildland/urban interface scene, you will know HOW a structure should be defended and personnel and equipment protected. You might say this knowledge puts you in the driver’s seat—making you a critical observer and decider.

Estimated time of fire arrival

A solid assessment of when the fire front will arrive is critical to knowing when you should escape to a safety zone. Make this call by following the LCES guidelines in your IRPG.

Base escape time and safety zone requirements on your estimation of wind speed, wildland fuel loads, and the fire’s current and expected behavior.

Narration Script: You need to estimate when the fire front will reach a structure. When you know this, you will know when it’s time to move to a safety zone.

Distribution of structures

When you assess the distribution of the structures, you can determine what structures it might be practical to save. This activity is referred to as *structure triage*.

Are the structures located in close proximity, or are they spread out? Is it practical to build a *control line* for all the homes or for only a few?

Narration Script: You can determine what structures to save and what structures to leave alone by assessing their distribution.

Number and vulnerability of structures

Assessing the number and vulnerability of structures in your area helps you determine how many structures can be saved.

This can be a complicated assessment, and it is based on many factors. The IRPG’s Structure Assessment Checklist provides straight-forward guidelines on making this assessment. Gather all of these bits of information:

- Address or property name
- Road access
- Structure or building characteristics
- Clearance, exposures, and defensible space

- **Hazardous materials**
- **Water sources**
- **Evacuation and escape**
- **Estimated resources for protection**

Read the following to get the facts on each factor.

Address or Property Name

A structure's address or property name consists of the:

- **Numerical street address, rural address, or ranch or farm name**
- **Number of residents at the address**

Road Access

Determining how accessible a structure is helps determine its vulnerability. Consider whether:

- **Road surfaces are drivable**
- **Roads are wide enough for fire vehicles to pass**
- **Adequate turnouts or turnarounds are available**
- **Bridge load limits will support response vehicles**
- **Stream crossings are passable**
- **Hill grades are no greater than 15 percent**

Structure or Building Characteristics

A structure's size, construction, and other features help determine if it can be saved. Ask yourself these questions:

- **Is the structure a single residence, multi-family residence, multi-use complex, or out building?**
- **What building materials are used on exterior walls?**
- **Are large and unprotected windows facing the heat source?**
- **Are there above-ground fuel tanks close to the structure?**
- **What type of roofing material is used?**
- **Are the eaves or roof littered, contacted, or overhung by fuels?**
- **Do rain gutters contain flammable fuels, such as dead leaves and sticks?**
- **What other features might increase the structure's vulnerability—wood deck, patio cover, lawn furniture, wood fencing?**

Clearance, Exposures, and Defensible Space

How a structure is situated can determine its vulnerability. The structure will be *more* vulnerable if:

- **It is located on a narrow ridge, in a canyon, at mid-slope, or in a chimney.**

- There is less than 30 ft. (9 m) of clearance between the structure and surrounding fuels; there should be more clearance if the structure is on a steep slope or near heavy fuels.
- Trees, ladder fuels, or shrubs are adjacent to the structure.
- Other combustibles are near the structure, such as wood piles, furniture, or fuel tanks.
- There is not adequate clearance between the fuel tank and the structure or surrounding fuels.
- Power lines or transformers are nearby.

Hazardous Materials

Look for chemicals, pesticides, herbicides, petroleum products, and paint stored in or around the structure or in out buildings. Remove these materials from the structure, or protect them from fire exposure.

Water Sources

The more water you have, the more defensible the structure may be. Besides natural water sources, look for hydrants, stand pipes, water storage tanks, swimming pools, hot tubs, ponds, and irrigation ditches.

Evacuation

Of what benefit is it if you save the house but can't evacuate residents or escape from the fire yourself? That would be a bad day. When considering whether to save or abandon a structure, safe evacuation and escape should always be a concern. Be sure to:

- Identify safe evacuation routes and areas of refuge
- Coordinate with law enforcement and other emergency services personnel

Estimated Resources for Protection

Structures can't be protected without adequate resources. Ask yourself how many and what kinds of engines, water tenders, crews, dozers, and aircraft will be needed.

Narration Script: Assessing the number of structures in your area, and their vulnerability, will help you determine how many of them can be saved. This will be one of your more complicated assessments. Consult the Structure Assessment Checklist in your IRPG for some practical guidelines.

Choosing tactics

To determine the tactics that are likely to be effective for protecting structures, use all the information you gather on the structures' number and vulnerability. Road access, construction type, defensible space, water sources, and available fire fighting *resources* all play into the tactics your crew will choose to manage the situation.

The tactics you will use are:

- *Direct attack*—attack the fire directly at the *burning edge* before it arrives at the structure
- *Indirect attack*—control the fire before it reaches the structure using a fireline or control line along natural fire breaks
- **Hopeless situation**—abandon fire fighting efforts and retreat to a safety zone

We'll be giving you some more details in just a bit. Also, for more information on attack methods, you can review the **Suppression, Communication, and Mop-Up Module**.

Narration Script: All the information you gather during your structure assessment assists you to choose tactics appropriate to the situation. Ultimately, you need to use this information to decide if a direct or indirect attack would be best—or if saving the structures is hopeless and it's time to high-tail it to a safety zone.

Knowledge Check 5

Multiple choice—check the box of the answer(s) you choose.

You've arrived at a wildland/urban interface incident and need to perform some scene assessment. Choose the set of terms **BEST** completing the following sentence.

Assessing the _____ and _____ of structures in your area helps you determine how many structures can be saved.

- size, shape
- number, vulnerability
- value, improvements
- importance, occupants

The correct answer is number and vulnerability.

Tactical plans

Now that you have identified the “Watch-out!” situations and assessed the interface scene, it's time to perform your tactical plan. Plans aren't set in stone—it's all based on fire behavior—so stay adaptable to the situation you're in.

Here are three general tactical plan categories:

- **Offensive mode**
- **Defensive mode**
- **Combined mode**

Read the following to investigate what each mode entails.

Offensive Mode

The purpose of offensive mode is to attack the wildland fire before it reaches the structures.

Defensive Mode

The purpose of defensive mode is to protect the structures without directly engaging the wildland fire.

Defensive mode will sometimes be your only option. Just make sure you don't get stuck in it when other options are available.

Combined Mode

The purpose of combined mode is to hold a portion of the wildland fire edge to reduce the number of structures threatened.

Combined mode makes it possible to control a large part of the fire by:

- **Firing out from control lines at the structure perimeter**
- **Holding the fire at the structure or road**

Narration Script: While the supervisor will choose a tactical plan based on the situation at hand, you'll need to understand the principles behind the choice. As always, scene size-up is based on the Watch-outs, LCES, and frankly, where the crew can make the biggest positive impact. The tactical options are offensive mode, defensive mode, and combined mode; check them out!

Determining if structures are defensible

Theoretically, you can defend any structure if you have enough people, equipment, and water. But let's be realistic. Assume there are usually not enough resources at the scene to reasonably defend all structures. This assumption will lead you to prioritize and classify structures when doing your assessment.

The three categories to use are:

- **Needs little or no attention**
- **Defensible**
- **Indefensible**

However, there are some important caveats about defensible structures, and it involves making cold analytical decisions. What if you have both a defensible structure and an indefensible structure that are threatened but not yet involved? Protect the defensible one! What if you have two structures that are both burning? Attack the fire in the structure with the *least* involvement first.

Narration Script: When you're in the throws of an incident, how do you know which structures to focus on? There are three categories—those that need little attention for now, those that are

defensible but need protection, and those that are indefensible or hopeless. Clearly the defensible structures ought to be your priority.

Recognizing hopeless situations

Part of your tactical plan assessment will involve recognizing when a situation is hopeless. *Hopeless* refers to a situation where a structure or group of structures can't be saved and you need to retreat to a safety zone.

These are your warning signs:

- **Fire is making significant runs.**
- ***Spot fires* are igniting faster than they can be put out.**
- **Water supply is running out or is gone.**
- **Your safety is in jeopardy, and the escape route is in danger of being cut off.**
- **More than one-quarter of the roof is involved in windy conditions.**
- **Interior rooms are involved, windows are broken in windy conditions, and other structures are threatened or involved.**

Narration Script: None of your fire suppression operations will go exactly according to plan. Sometimes a situation will become hopeless. In firefighter lingo, "hopeless" means the structures you are trying to protect can't be saved, or your safety is imminently threatened. When you are deciding on a tactical plan, you have to know if the situation is hopeless to begin with. Watch for the warning signs.

Preparing a structure

If saving a structure is *not* hopeless, then your crew needs to prepare the structure before the fire arrives. To prepare a structure:

- **Determine if the residents are home**
- **Place a ladder on the side of the house that is least threatened and away from power lines**
- **Clean the roof of combustible materials**
- **Cover the roof vents**
- **Remove and scatter all fuels away from the structure**
- **Shut off any above-ground fuel tanks, and clear the area around them**
- **Place combustible furniture inside the structure**
- **Close all windows and doors (including the garage door), and leave the doors unlocked—in case you have to use the structure as a refuge**
- **Charge all available garden hoses**

Narration Script: When a structure CAN be saved, you'll have some work to do to get it prepared before the fire front arrives.

Water and foam use

Here are a few more structure protection guidelines about using water or foam.

When using water:

- Keep at least 100 gal. (400 l) in reserve
- Top off the tank at every opportunity
- Conserve water—apply it only if doing so will control the fire’s spread or significantly reduce the structure’s heat
- Keep the fire out of *heavier fuels*
- Extinguish fires in *lighter fuels*
- Make your water last through the main heat wave so that you still have water to protect the crew

When using Class A foam:

- During a direct attack, apply foam to the flame’s base
- During an indirect attack, lay out a wet line and allow the flame to burn itself out
- During the application to a structure, apply the foam to the roof and siding 10 to 15 minutes before the fire arrives

Knowledge Check 6

Multiple choice—check the box of the answer(s) you choose.

Identify FOUR factors you must assess at the incident scene.

- Estimated time when the fire will hit
- Possible fire fighting tactics
- Percentage of trees with diameters less than 20 in. (50 cm)
- Distribution of structures
- Ratio of natural to non-natural fuels
- Number and vulnerability of structures

The correct answers are estimated time when the fire will hit, distribution of structures, number and vulnerability of structures, and possible fire fighting tactics.

Structural fire fighting do’s and don’ts

When fighting a fire in the interface, stick to these “Do’s” and “Don’ts”:

- DO wear full *personal protective equipment (PPE)*
- DO keep at least 100 gal. (400 l) of water in reserve
- DO have a protective line for personnel and vehicles
- DO back vehicles in for quick egress
- DO use a 1.5 in. (4 cm) hose when possible
- DO post lookouts as necessary
- DON’T park in *saddles or chimneys*

- **DON'T enter burning buildings unless you are properly trained and equipped**

DO know that the dangers you face in the wildland are greatly increased by a structure fire. Be sure to take every precaution.

Narration Script: Before we wrap up this discussion, remember these wildland/urban interface Do's and Don'ts, and stick them in your memory bank. These are some of the most important interface safety guidelines you could know. They are designed to save your life—and they will.

Topic summary

As a wildland firefighter, you need to think on the run while watching for hazards. When structures are tossed into the mix, you've got yourself a complex and potentially deadly situation.

In this topic, we've covered some of the hazards, analytical abilities, and tactical skills you'll need to know for fires in the wildland/urban interface. Specifically, we've examined:

- **Foundational principles**
- **Interface "Watch-out!" scenarios**
- **Scene assessment considerations**
- **Interface response tactics**

Narration Script: In case you have forgotten, fighting a wildland fire can be dangerous in itself. Throwing structures into the wildfire mix dramatically increases the stakes and lowers your threshold to injury. In this topic, we've reviewed some core safety guidelines, introduced new ones designed specifically for the interface, and shown you factors you must consider when planning structure defense.