Bushfire Model

A guide to using the Bushfire Model®

Fourth Edition

Training Disclaimer and Agency Requirements

This document is a general information only and must not be used as operational guidance.

It does not validate, assess, or replace agency doctrine, policies, standard operating procedures, operational direction, or approved tactics.

All insights or concepts from training and exercises must only be applied operationally when consistent with agency-approved doctrine, supervision, and command direction.

All exercises and training must be planned, delivered, and supervised in accordance with agency safety procedures, training frameworks, qualification requirements, WHS obligations, and risk-management processes.

Training and exercises must be appropriately scaled to the experience and capability of both participants and facilitators.

Trainers and facilitators must have appropriate experience, qualifications, or agency endorsement for the exercise type being delivered. They are responsible for ensuring the physical setup is safe and stable, monitoring participant welfare, and pausing or stopping the activity if safety or wellbeing concerns arise.

All training and exercises must be conducted in a supportive, psychologically safe environment that encourages participation without judgement and respects the welfare needs of all personnel.

Any photos, videos, or other materials collected during training and exercises must be captured, stored, and used in accordance with agency privacy, security, and information-management requirements.

Multi-agency training and exercises must follow relevant approval and coordination processes to ensure shared understanding of roles, responsibilities, and expectations.

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Introduction

Introduction

The Bushfire Model® is a physical fire model used by experienced firefighters to demonstrate fire behaviour, bushfire suppression and a whole lot more.

The model draws on the wealth of knowledge held by firefighters and provides a means for this experience to be shared. It is used across Australia by career and volunteer firefighters, parks & wildlife, forestry and mining industry personnel to deliver training and share knowledge.

Photo John Hansen: Toodyay Bush Fire Brigade

With an extensive selection of different models and items, the Bushfire Model meets a broad range of needs.

This Guide describes the models and their benefits together with suggestions and ideas on how it can be used.

This is not a training manual; the model and this Guide are communication tools for firefighters.

Photo: Wayne Teece
Queensland Fire Department

The Bushfire Model offers advantages comparable to sand tables used by the military and firefighters to simulate real-world scenarios. However, the Bushfire Model stands out due to its lightweight design, ease of mobility, and extensive selection of items.

Photo J. Pinho: Pacific Southwest Forest Service, USDA
https://www.flickr.com/photos/usfsregion5/26830279827/in/photostream/

The model's design reflects that firefighter's are practical, hands-on people. The fire scene attracts interest, invites questions and supports learning. Participation comes naturally with firefighters moving pieces to share knowledge.

Photo: Arthurs Creek & Strathewen Country Fire Authority (CFA) brigade

Photo John Hansen: Toodyay Bush Fire Brigade

The model is a powerful visual tool helping firefighters to effectively apply their training in real-world situations. These mental images serve as valuable reference points, helping them to make informed decisions and respond swiftly and confidently during emergencies.

The model enables new firefighters to actively engage with the material, seek clarification, and reinforce their knowledge. Simultaneously, trainers gain real-time feedback from observing students as they demonstrate their understanding. This ensures effective communication and understanding among all participants.

A positive learning environment is created. Whether explaining tactical choices, sharing lessons learned, or reinforcing safety protocols, this collaborative approach fosters continuous improvement and enhances overall team effectiveness.

The Bushfire Model has been incorporated into fire department and mining related training courses as a training resource. Whether focusing on a specific aspect or incorporating subjects into bushfire exercises, the model enhances understanding of fire behaviour and suppression.

This approach compliments established training courses and provides a means of providing performance evidence for practical components of online / eLearning.

Photo: Eleanor Killen Dept. Biodiversity Conservation & Attractions

A brief history

The first model was built in 2016 for a Chief Bush Fire Control Officer who wanted to share his knowledge with new brigade members. He was after something that was easy to use, effective and not a PowerPoint presentation.

The first test run was very successful. Since then, firefighters have seen the potential and requests for more models followed. Along the way there have been lots of suggestions and more models and items have been added in response to this feedback.

While the original Bushfire Model® remains the most popular, additional models have been developed in response to requests from Fire & Rescue Service and State Emergency Services.

The model draws upon the designer's 40 years of bushfire experience and the valuable input from firefighters across Australia. Each model is made by hand, an investment in time that maintains our aim of helping firefighters share their knowledge.

Bushfire Model is a small business based in regional Western Australia; the Bushfire Model® is a registered design (copyright).

Firefighter feedback

The recommendations and ideas from firefighters can be found throughout this Guide; other feedback has included:

"The kit has been used multiple times with the crews loving it, asking why we have not had something like this in the past."

"Guys this is a fantastic idea, we have purchased a kit for our station, we use it for all different scenarios from bushfire to HAZMAT"

"You could see that they really understood the material we covered."

"Happy to advise we have received the box and just wow. There is so much thought put into the pieces and the scenarios are endless that we can set up."

"Today we received our Bushfire Model Kit – it is even better than I had hoped! Thank you so much, our learners will benefit enormously from this kit."

"Thank you very much, we can't wait to get into it, many thanks, they're such amazing tools, every brigade should have one."

"The guys were still talking about the session days afterwards; it really made an impression on them."

"I can't tell you how these kits have changed the way we train and assess – they make it so much more realistic, and fun at the same time."

"I have benefitted from using your kits in both participating in and leading training. I like being able to run through previous incidents, having those who were involved moving their appliances over the map."

Using the models

The topics within this section include:

Using the models

This section explores the different ways in which the models can be used. The next section looks at a range of discussion topics and exercises. The **insights and ideas from firefighters in Appendix 2** highlights a wide range of uses that have been developed by firefighters.

Firefighters across Australia have successfully used the model for:

- state-based and mining industry training courses
- brigade training
- practicing skills
- preseason exercises
- re-creating fire events
- bushfire mitigation programs
- hazard reduction burns
- community engagement

State-based training courses

The Bushfire Model has been included into State Government training courses as a training resource. Several mining companies have also embraced this approach as a way to deliver training and focus on company specific standards.

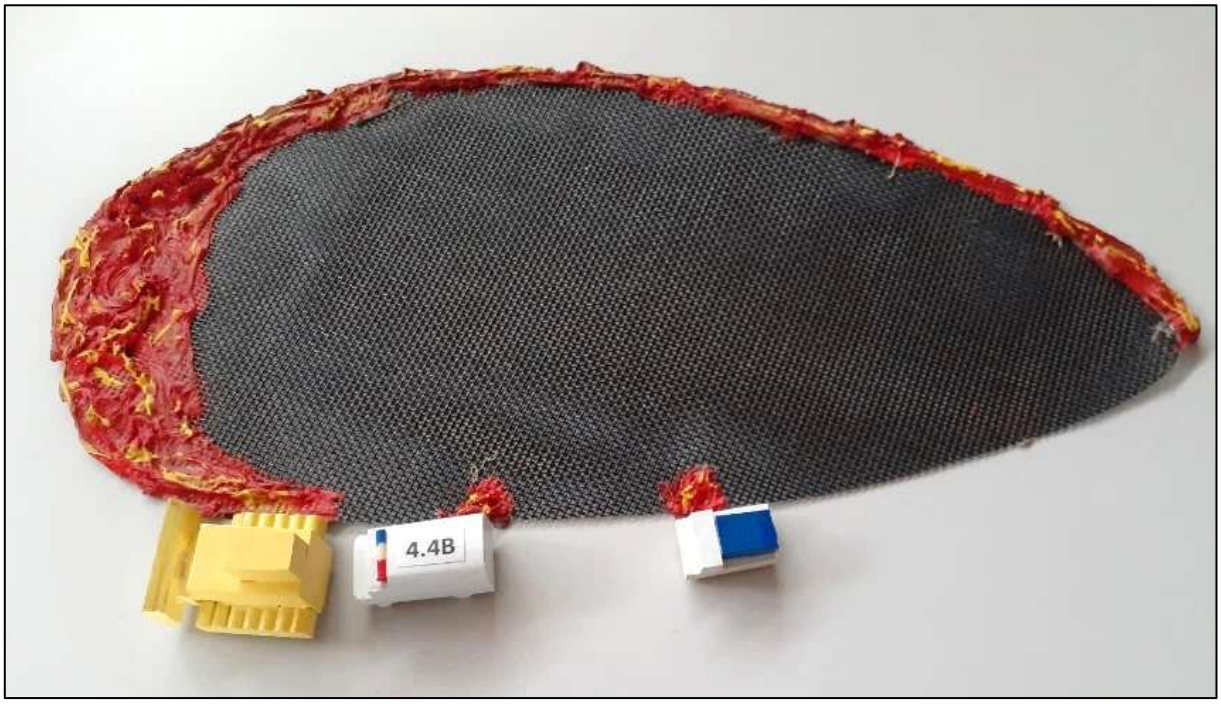
The Model allows firefighters to see the entire fire scene. This perspective is valuable in understanding everything that is occurring during a bushfire. The ability to step back from the tactical aspects of firefighting to see the big picture is a useful message for aspiring Incident Controllers.

Trainers have used simple desk setups for one-on-one discussions and answering questions. Likewise, students have appreciated the opportunity to use the model to better describe questions and demonstrate their understanding.

The high level of engagement frequently results in participants returning to the model during breaks in training to examine the layout and discuss the situation further.

Using the model complements existing training courses and methods including PowerPoints, drills as well as augmented and virtual reality. Exercises and demonstrations by students are valuable ways to obtain performance evidence for the practical components of online / eLearning courses.

The model suits a broad range of Language, Literacy and Numeracy abilities and successfully integrating visual, auditory and kinaesthetic (physical activity) learning styles.



Brigade training

Experienced firefighters have found the model intuitive and easy to use. The model's design supports quick and easy operation from simple set-ups using just a few items to more complex scenarios.

Scenarios can vary from bushfires in grasslands and forests through to fires impacting the Rural Urban Interface. More complex exercises can be created by replacing fire shapes to imitate fire development. As the exercise unfolds, participants use the resources to respond to the incident.

To accommodate the group's requirements, exercises can be kept straightforward to ensure that new firefighters understand the essential points, or they can be made more challenging to align with the experience level of seasoned firefighters.

Photo John Hansen: Toodyay Bush Fire Brigade

Practicing skills

Experienced firefighters have successfully used the model to practice roles such as incident control, operations, and sector command. Brigade leaders have commented that this practice helps to maintain these skills particularly outside the bushfire season.

The model has been used by skilled firefighters to explain their approach to bushfire suppression and the factors that they consider. Having several experienced firefighters describe different approaches is a great way of sharing knowledge.

Photo Aaron Kain: Roleystone Volunteer Fire & Rescue Service incident management training.

Using the model helps maintain and develop decision-making skills. Different types of assets, fire behaviour, time constraints and resource levels can be built into exercises to practice decision making.

Fire Departments in different states have created training products such as exercises, scenario sheets and skill cards to support brigades when using the Bushfire Model.

Preseason exercises

The model has been used successfully by brigades, local governments and firefighting agencies for pre-season training exercises.

These events have been helpful in preparing firefighters for the season ahead.

Photo John Hansen Toodyay Volunteer Fire & Rescue Service

Photo Wayne Teece: Queensland Fire Department

Re-creating fire events

The model can be used to re-create past events for incident debriefs or sharing experiences. The sharing of stories from fires can provide a valuable learning opportunity.

The Bushfire Model can be used to review an incident, showing terrain, roads, assets, firefighting resources and the fire's location and behaviour. Labels can be added to name features such as roads and rivers. By reconstructing fire grounds and landscapes, firefighters can more effectively convey information about past events.

Firefighters have found that using the model simplifies the process of explaining a complex fire situation.

Arthurs Creek & Strathewen Country Fire Authority (CFA) brigade reviewing past incidents to identify improvements.

Bushfire Mitigation Programs

Brigades have used the model to support mitigation programs in their communities through education, consultation and burn planning.

The model can be used to explain to stakeholders and community members how mitigation treatments can reduce fire behaviour and risk.

Local areas can be re-created to show mitigation treatments. Demonstrating how these treatments can reduce bushfire behaviour is important when speaking to community members about their bushfire risk and mitigation programs.

Hazard Reduction Burns

Horseshoe Bay Rural Fire Brigade (Queensland) have successfully used the model to simulate an upcoming planned hazard reduction burn with their fire management partners from Queensland National Parks and Wildlife (QPWS) and Northern Drone services.

This innovative approach looked at ignition sequence, water sources, public safety, spot fire ignitions to produce a low intensity burn, weather variables, topography and appliance positioning.

The modelling for the planned burn of The Forts with QPWS rangers was a real success. Before the burn they were able to identify communication issues and brainstorm scenarios to overcome this challenge.

The brigade is keen to explore further opportunities to use the model for these burns including real-time positioning on appliances during the burn and post-burn debriefs.

Photo: Horseshoe Bay Rural Fire Brigade

Community engagement

The model helps firefighters to share their knowledge with their community. This helps people gain a clear understanding of what they need to do before and during bushfires. Explaining possible fire scenarios helps the public recognise the importance of having a plan and preparing their properties.

Explaining what firefighters will be doing at a fire and the challenges they face helps people understand how important it is for them to act. This clear communication assists communities to be better prepared, empowered and contributes to their resilience.

Other ways that the model can be used for community engagement include:

- Bushfire awareness programs
- Describing fire danger ratings and community warnings
- Promoting brigade activities and recruitment
- School visits

Bushfire Awareness Programs

Re-creating a local area can demonstrate how a bushfire may impact a community. Issues concerning access, property preparation and potential fire behaviour are just some of the discussions that can occur.

This birds-eye-view of a local area can support:

- A better understanding of potential bushfire behaviour in the area
- Identifying local risks; developing local solutions
- Recognising the value of preparation, planning, and taking prompt action
- A better appreciation of community information and warnings

The risk of being caught on roads can be illustrated to encourage people to leave early.

Fire Danger Ratings and Community Warnings

Using the model and the fire danger rating boards can help the public better understand Fire Danger Ratings.

The differences in ratings can be demonstrated by creating two bushfires side by side using different fire danger ratings. In the example below the scenario on the left (Moderate FDR) shows an ignition point resulting in a small and easily suppressed fire while the fire on the right (Extreme FDR) has the same ignition point resulting in a larger, more intense fire that is harder to suppress.

This comparison can highlight differences in suppression difficulty and the resulting risk to life and property. The session concludes with explaining relevant action messages and questions.

The **Community Warning** tags and boundaries can be used to describe the different warnings and the actions that must be taken. Positioning these warnings on the model can help people understand the risks and the need to act.

School visits and cadet programs

Brigades have used the Model as part of school visits and cadet training sessions. The hands-on nature of the model has made these events more engaging.

Horseshoe Bay Rural Fire Brigade hosted a visit from the Grade 1 students and their teachers from the Enkindle Village School. Together with Queensland Parks and Wildlife and the Yunbenun Land and Sea Rangers they delivered a morning of environmental, cultural, communication and fire awareness activities.

They modelled a fire on their bushfire model table top using the area around their school as the example, looking at risks and resources and actions required.

Photos: Horseshoe Bay Rural Fire Brigade

Coondle-Nunile Bushfire Brigade used their model as part of a 6-week training course with High School Cadets.

Photo: Coondle/Nunile BFB

Pingelly Youth in Emergency Services Cadets learning about firefighting operations.

Photo Peter Narducci AFSM

Horseshoe Bay Rural Fire Brigade used the model at a fire safety engagement with their local Girl Guides and Grade 1 school kids. This was a huge success as they were able to recreate the space at the school in Nelly Bay and discuss the options and actions required in relation to evacuation.

Photos Horseshoe Bay Rural Fire Brigade

Attracting interest at community events

Displaying the model at community events attracts attention. People are drawn to the model and the events depicted, questions flow and interest is generated.

Many people have a keen interest in the work of firefighters. The model provides an opportunity to explain what happens at a bushfire and what firefighters do.

This level of engagement serves as the foundation for discussing a range of brigade activities and encouraging recruitment.

Discussion Topics & Exercises

Discussion Topics

The Bushfire Model® can be used to focus on a single a topic as part of a brigade training event or formal training course. Multiple topics can be incorporated into a bushfire exercise to provide context regarding the conditions in which they may occur.

As an example, the model can effectively demonstrate the concept of the Dead Man Zone. However, additional benefits arise by showing where these situations can occur how they can be avoided.

Appendix 1 describes a range of discussion topics including:

- Fire Behaviour:
- Safety
- Incident Planning
- Aerial Fire Suppression
- Firefighting in the Rural Urban Interface
- Various other topics

Exercises

Exercises (also known as Tactical Decision Games) place participants in different roles when faced with a challenging incident. These scenarios can be used as part of training courses or conducted on a local level for practicing skills.

Exercises can vary in complexity, ranging from short and simple scenarios to longer-duration simulations. These exercises may involve incident weather forecasts, calculating rates of spread, and suppression actions.

Scenarios can be simulated by creating a landscape with various assets and features. An ignition source (such as lightning, car fire, or arson) is established before the exercise begins. As the exercise unfolds, larger fire shapes are introduced to simulate fire growth, and firefighters respond by using the available resources or requesting additional support.

Incident appreciation leads to developing objectives, strategies and tactics. The selection of strategies depends on the model's description of the bushfire, the assets under threat and available firefighting resources. Actions such as road closures, community warnings, and even evacuations can be included.

During the exercise particpants are encouraged to describe their thoughts as they respond to the bushfire. While it is possible to allow an exercise to develop intuitively, firefighters have also planned out and delivered more structured scenarios to ensure that key aspects are covered.

Depending on the type of exercise, experienced firefighters may provide feedback during the session or later as part of the debrief.

An alternative way to start an exercise is during a fully developed incident with a shift change briefing. These scenarios may provide the opportunity for the incoming personnel to review objective, strategies, resource allocation and much more.

Above, an example of a simple scenario involving fire development and backburning.

A more challenging scenario may involve road closures, wind changes, community warnings, RUI strategies and possible evacuations. As part of the exercise participants can be asked to prepare and deliver briefings and sector / incident situation reports.

The ability to customise the model means that actual locations can be re-created for exercises.

Exercise ideas

The **Insights and ideas from firefighters** in Appendix 2 contains a growing number of ideas for exercises that firefighters have developed involving the Bushfire Model.

Exercise resources

State fire departments have developed an extensive range of training products and guides to assist their firefighters in designing and delivering exercises using this model.

Available resources for designing and delivering exercises include:

- Tactical Exercises Without Troops (Country Fire Authority)
- *The Australian Disaster Resilience Handbook 3: Managing Exercises* published by the Australian Institute for Disaster Resilience.
- Design and Delivery of Tactical Decision Games (National Wildfire Coordinating Group)

The Models

The topics within this section include:

The Models

This section will look at the different models and kits available. Although the original Bushfire Model remains the most popular, a range of custom-made models are also available including the Urban Model, Emergency Services Model and many more.

Models are stand-alone sets focusing on a specific incident type or scale. While most items can be swapped between models the exceptions are the finer scall model (very small items and the Urban Model with larger scale buildings. Kits are a convenient way of packaging similar items for use with a model. Kits provide firefighters with the flexibility of choosing a package that best suits their needs and budget.

The original Bushfire Model comes in Basic, Standard, and Enhanced Kits. The Basic and Standard Kits are base models that can be used with the Enhanced Kit or additional items. These kits are contained in carry cases, all kits fit in a heavy-duty storage box that is easy to carry (less than 10kg) and transport.

- The **Basic Kit** has the main items, suits smaller budgets and can be customised by adding other items.
- With over 120 pieces the **Standard Kit** is designed to meet most needs and is usually ordered together with the enhanced kit.
- The **Enhanced Kit** is used with either the basic or standard kits to create customised landscapes with roads, rivers and infrastructure. It is particularly useful for re-creating fires in the Rural Urban Interface.

Custom made items and orders

All models and kits can be customised by changing the number of items or including different items.

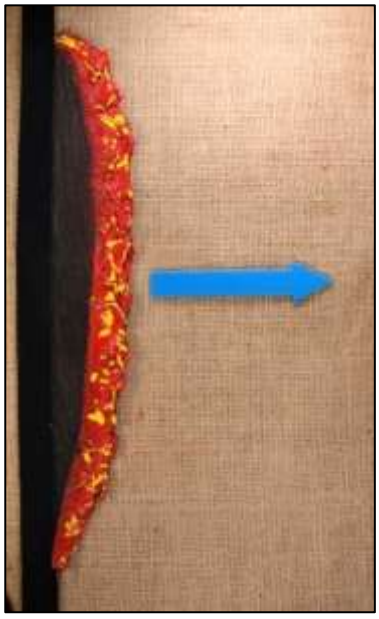
New products are continually being developed. While this guide describes some of these items, please contact us for details on the current product range or if there is something specific that you are looking for.

Examples of custom-made items include:

- Air Attack Supervisor (fixed wing & rotary)
- Bulldozers - D10 & D9 dozer with tree arm
- Harvester
- Helicopters with aerial incendiary
- Helicopter and Bambi Bucket
- Large Air Tanker
- Logging skidder and wheeled dozer
- 500 KVA Transmission Tower
- SES vehicles, design specific to state
- Tatra 9.6 for a mining company
- Trigger Point
- Vehicle mounted flamethrowers

The growing range of custom fire shapes include:

- Developed fire with a strong wind, flank fire becoming a head fire
- Spot fire with either no wind or strong wind.
- Wind-driven edge
- Crown fire



Custom-made models and kits

Over time an extensive range of custom-made models and kits have been produced.

These products are listed below and are described in detail in Appendix 2.

Please contact us if you would like more information on these products info@bushfiremodel.com.au

These specialty models include:

- **Whiteboard Model**
  Items are suitable for use on whiteboards to deliver clearer images while reducing time spent drawing and cleaning whiteboards.

- **Urban Model**
  This model is used by Fire and Rescue instructors to demonstrate structure fire, crash / rescue and HAZMAT incident responses in urban environments.

- **Emergency Services Model**
  This model was purpose-built for State Emergency Services personnel to share their knowledge of a range of incidents including Severe Weather, Crash / Rescue and Land Search.

Kits are packages of items that are able to be used with most models and include:

- **HAZMAT Kit**
  The HAZMAT kit has a range of items to replicate HAZMAT incidents involving liquids, gas and powder.
- **Crash / Rescue Kit**
  Supports road, rail, aviation and general rescue scenarios.

The Bushfire Model

The Bushfire Model

This section examines various components of the Bushfire Model® and their uses.

The Discussion Topics appendix goes further by describing how these components can be positioned to explore fire behaviour, suppression, safety and much more.

The Bushfire Model is available as either a basic or standard kit and enhanced kit.

- The **Basic Kit** has the main items, suits smaller budgets and can be customised by adding other items.

- The **Standard Kit** is designed to meet most needs and is usually ordered together with the enhanced kit.

- The **Enhanced Kit** is used with either the basic or standard kits to create customised landscapes with roads, rivers and infrastructure. It is particularly useful for re-creating fires in the Rural Urban Interface.

More detailed lists of the contents of each kit together with their prices are available on request - info@bushfiremodel.com.au

Standard and Enhanced Kits

The Standard Kit includes appliances, machinery, landscape features and fire shapes to meet a wide range of needs. The Enhanced Kit takes scenarios to the next level with more features to develop custom landscapes and complex scenarios. This section collectively describes the items in both the Standard and Enhanced Kits as they are often ordered together.

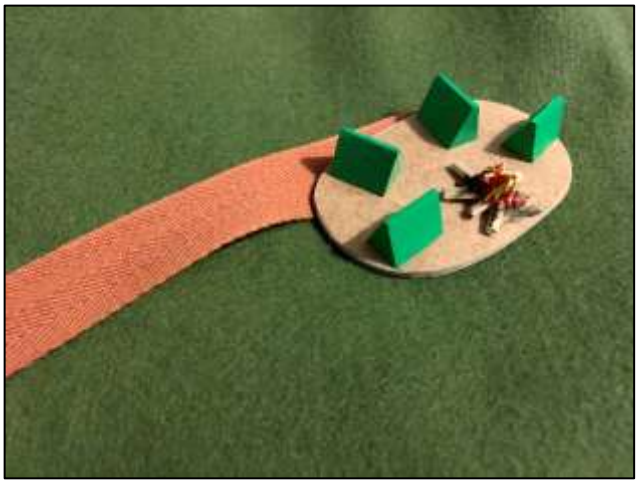
The standard landscape mat (1.7m x 0.9m) is the foundation of the Basic and Standard Kits. Other custom mats include remote area, riverine and large (~ 2.4m x 1.8m). All mats come ready to create scenarios and can be turned over to create a customised landscape on the blank side.

Riverine mat is part of the Emergency Services Model.

The Remote Area mat

Large Landscape Mat

The large landscape mat measures approximately 2.4m x 1.8m and comes on its own or with foam inserts to create topographic features. Other custom items can be included such as roads, campsites, pine & eucalypt plantations, mine and walk trail.



Some of the items available in the Standard and Enhanced Kits include:

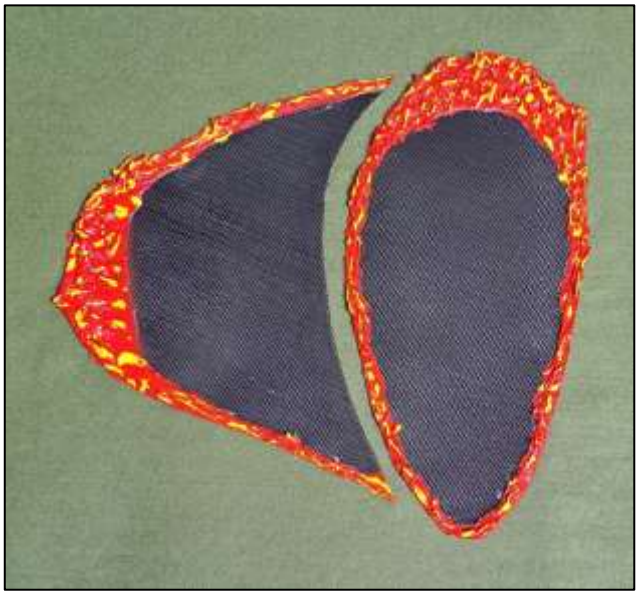
- Ambulance
- Appliance - Light tanker (Rural Fire)
- Appliance - Light tanker (Fire & Rescue)
- Appliance - (Fire & Rescue)
- Appliances – Rural Fire, state specific
- Bridge (road and rail)
- Building – Bushfire Shed
- Building – Chemical Storage
- Building – Council Office
- Building – Evacuation Centre
- Building – Fire Station
- Building – Hospital
- Building – House (partly & fully alight)
- Building – House (white and timber)
- Building – House with solar panels
- Building – Incident Control Centre
- Building – Motel
- Building – Residential Aged Care
- Building – Power Station
- Building – School
- Building – Service / Fuel Station
- Building – Shed
- Building – Stable
- Building – Supermarket / Grocery Store
- Building – Tyre Shop
- Building – Winery
- Burnt ground (mesh and fabric)
- Bulldozer D6
- Bush (fabric)
- Car
- Caravan Park
- Collar Tank
- Communication panel
- Containment line
- Control point
- Dam
- Farm firefighting unit
- Fire shapes
- Front End Loader
- Grader & windrow
- Haystack
- Helitak
- Hill
- Hydrant
- Incident Control Vehicle
- Lake
- Landscape mat
- Lightning strike
- Log heap and log heap burning
- Low loader
- LPG cylinder /bullet
- Pipeline
- Police Station / Police car
- Power lines
- Railway line
- River (fabric)
- Roads: main, secondary & gravel
- Road closed
- Road train
- Rocks
- Scale ruler
- School bus
- Sector boundary / names
- Smoke
- Sports Oval
- Spot fire
- Standpipe
- Tags
- Tower (mobile phone & radio)
- Truck – Diesel and LPG
- Unburnt pocket
- Water bomber (AT 802)
- Drops (water, foam & retardant)
- Water tanks
- Water truck
- Wind direction

Fire shapes

These distinctive items can be used alone or in combination to represent different types of fire behaviour. There are eight fire shapes included in the Standard Kit and a growing number of custom fire shapes.

Small, medium, large and extra-large fire shapes.

Flank to head fire is overlayed on the flank of a larger fire shape to show the effect of a wind change.



Fire fingers left & right.

Burnt ground mesh & backburn.

Spot fires can be used to create:

- An ignition point
  - Lighting pattern to indicate arson,
  - pole-top fire
  - haystack combustion
  - on an exposure (radiant heat)
  - as part of a lighting pattern for hazard reduction burns

- A spot from the head fire

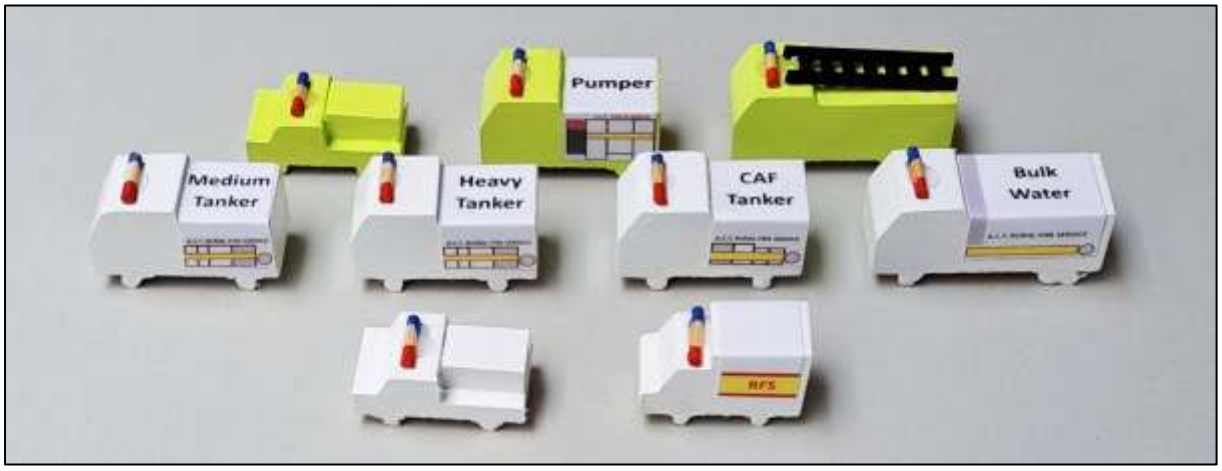
- Heavy spotting creating a safety hazard

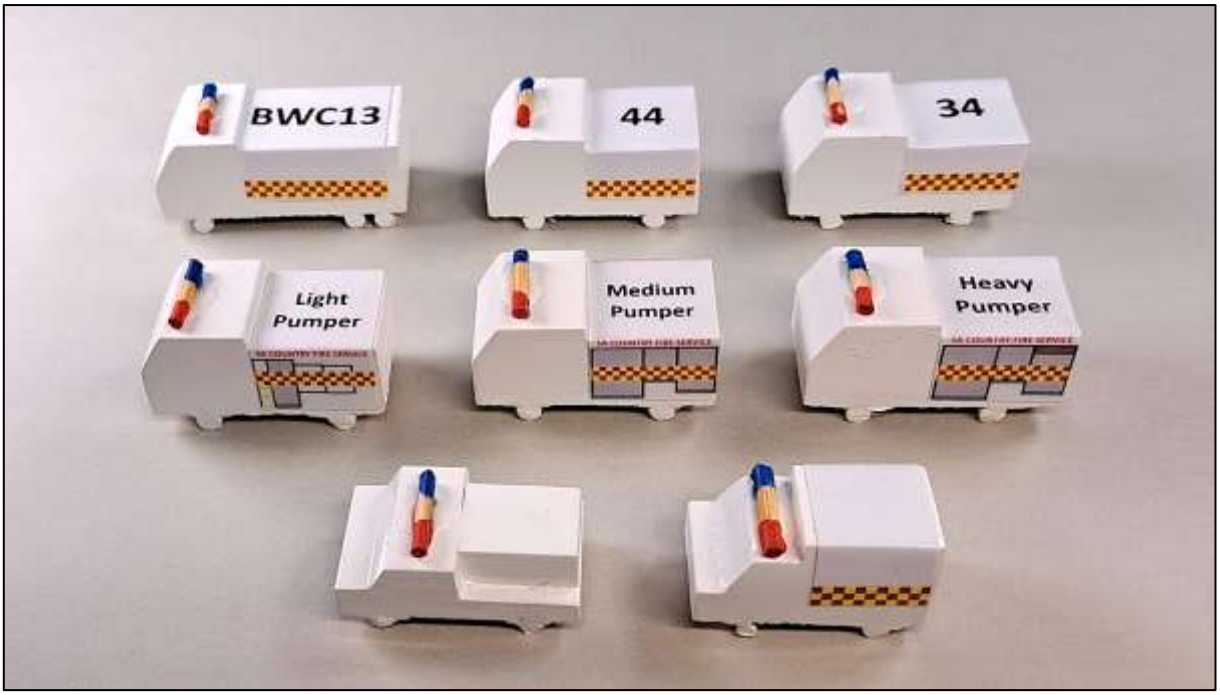
- A hop-over across a containment line

- A hotspot in a tree, on the edge of a containment line

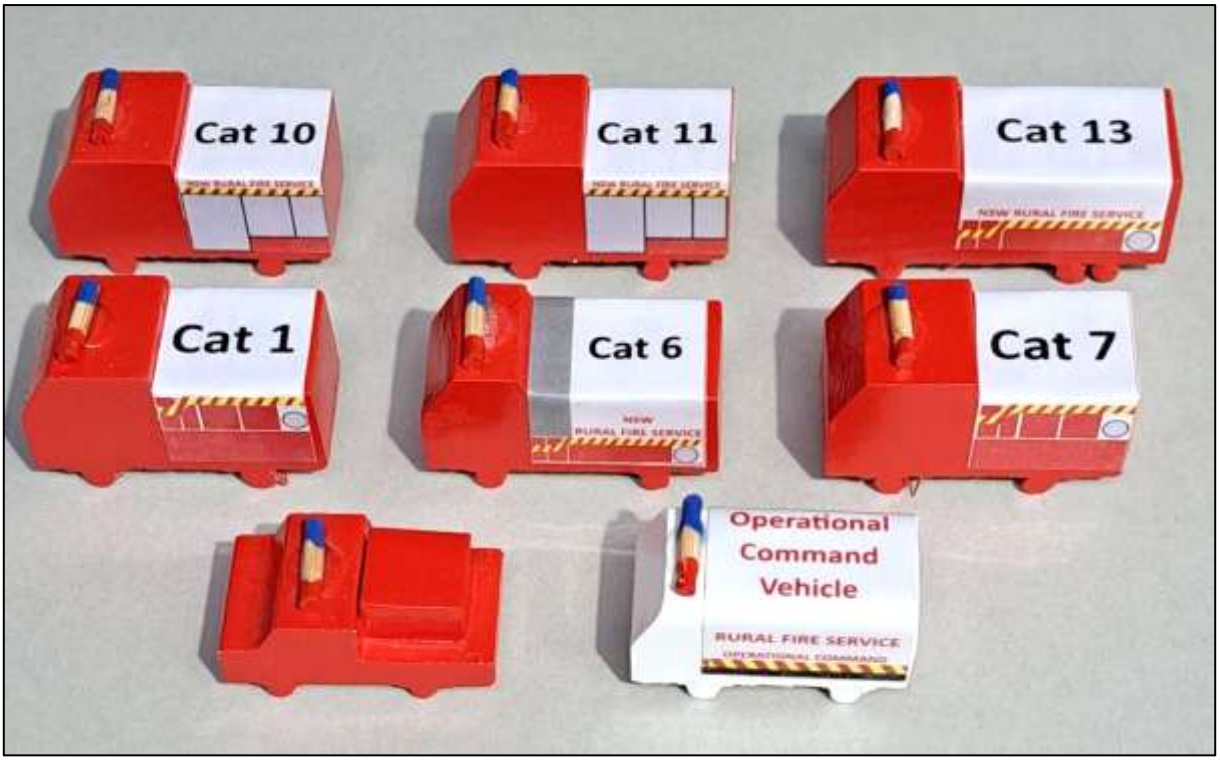
Appliances & vehicles

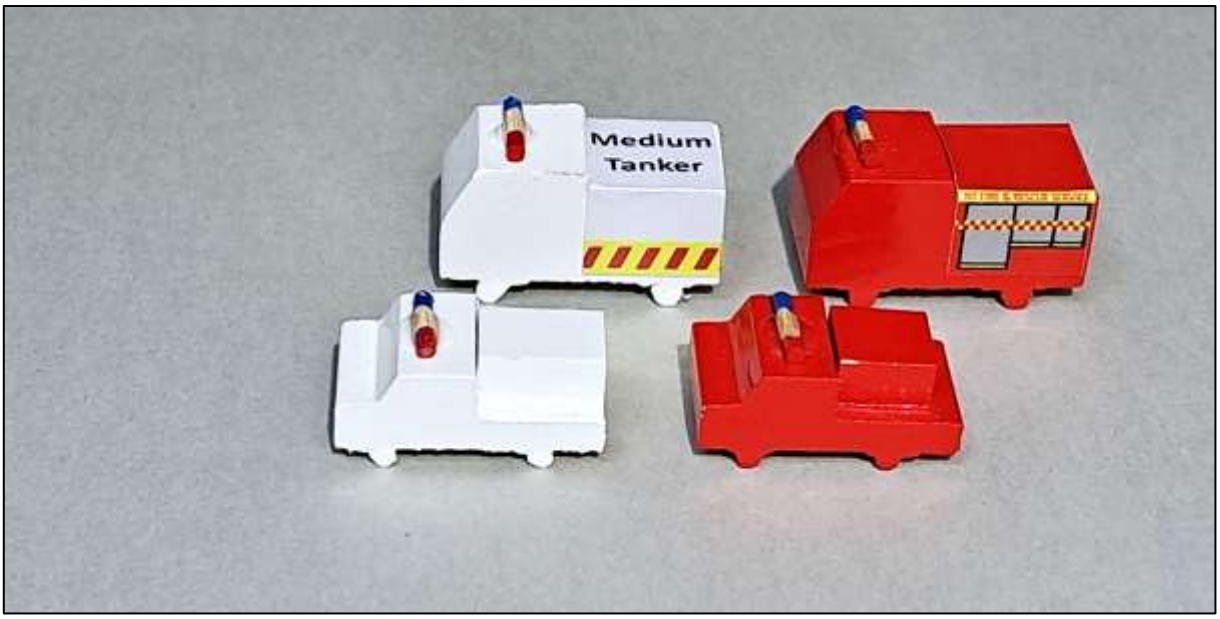
Appliances can be customised for industry and state firefighting agencies.

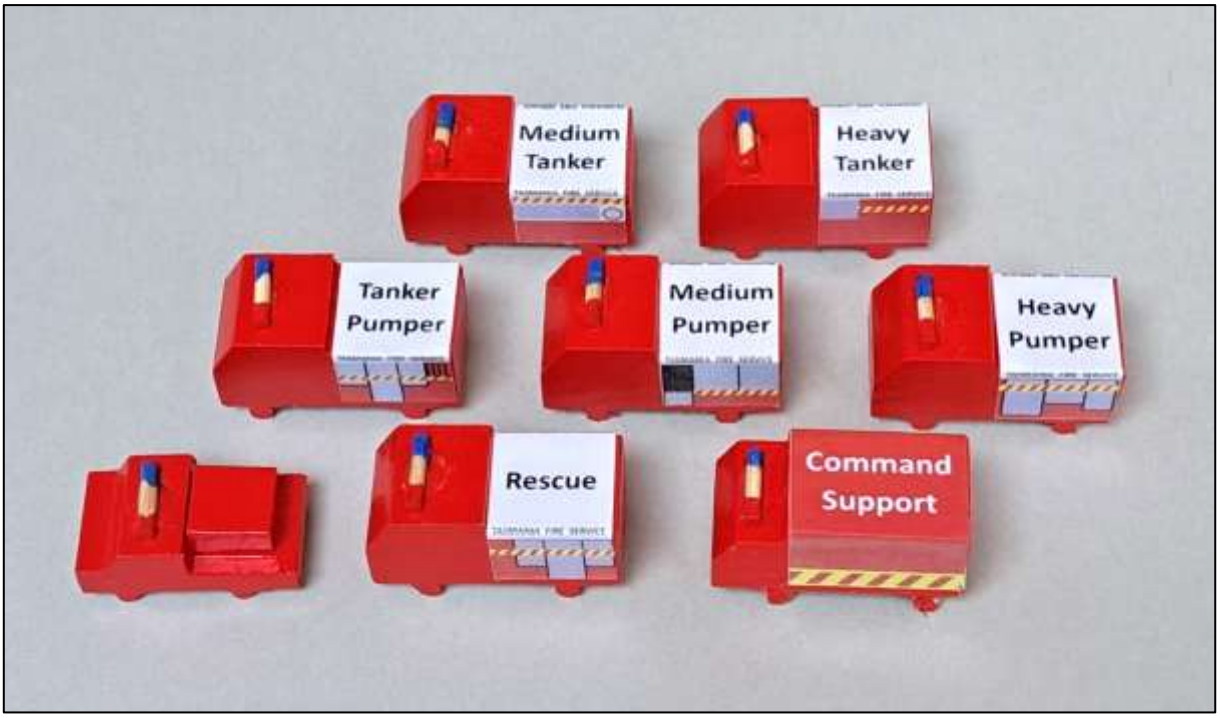



BWC13
44
34
Light Pumper
Medium Pumper
Heavy Pumper


Light Tanker
Medium Tanker
Heavy Tanker
Ultra Heavy Tanker
Pumper Tanker
Rescue
Pumper
Field Operations
FCV


Cat 10
Cat 11
Cat 13
Cat 1
Cat 6
Cat 7
Operational
Command
Vehicle
RURAL FIRE SERVICE


Medium
Tanker



Ambulances have been designed for each Australian state and territory.

Bulldozer (D6), grader & front-end loader.

Rocks are used to show difficult terrain and obstacles during fire suppression.

Assets include buildings, roads, railway lines, bridges, powerlines and even caravan parks.

Lightning can be used as an ignition source; other ignition sources include harvesters, vehicle accidents, powerlines and spot fires (arson).

Mobile phone towers are an asset that can prompt discussions about the impact of losing phone service during a bushfire.

Log heaps are used to discuss suppression, machine operations and mop-up.

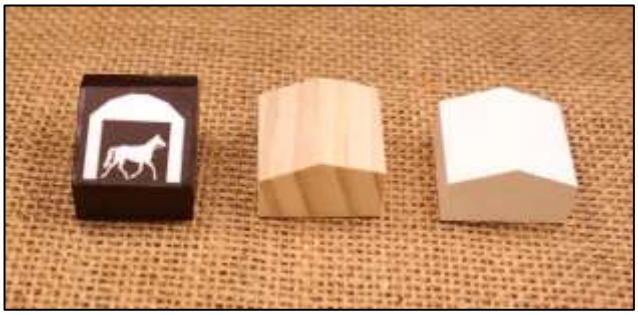
Lakes, rivers and bush can be used to show high and low fuel areas.

Water sources include rivers, standpipes, lakes, hydrants, dams and collar tanks.

Water tanks can show different levels of property preparedness.

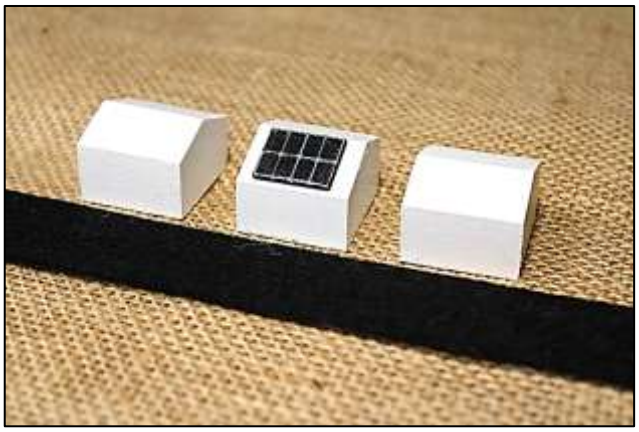
The school, hospital and service station suit simple Rural Urban Interface scenarios.

Painted and timber houses can be used to represent different construction materials; stables can introduce a new element into scenarios.



Partially or fully burnt buildings can be used to show losses, guide assessments and resource allocation.

House with solar can be used to discuss power isolation.

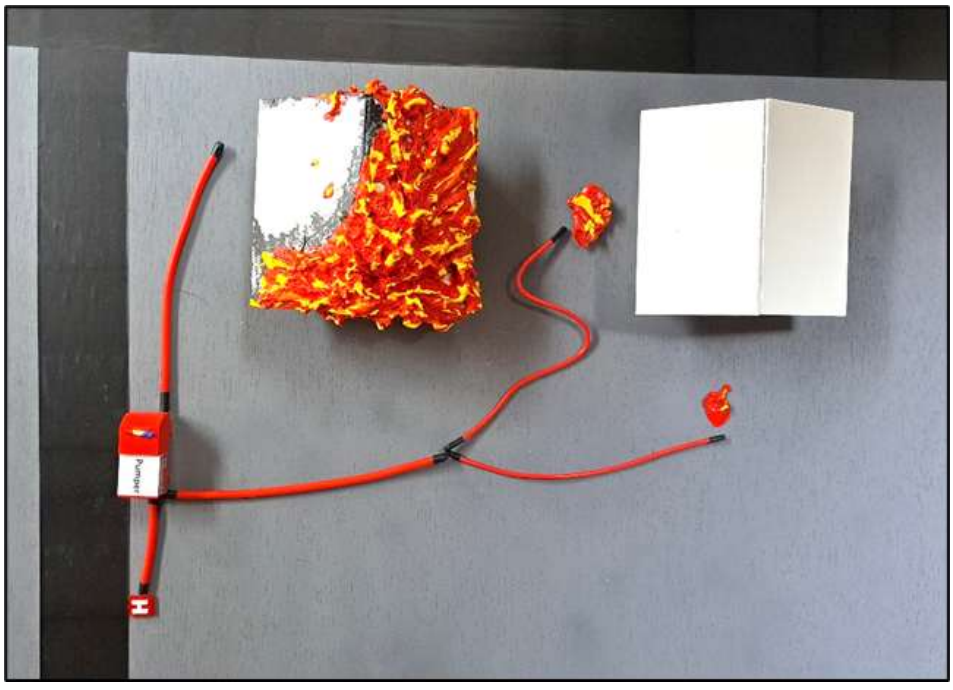


Additional buildings are available to create more complex RUI scenarios. Buildings may be necessary for incident management, represent high value assets and / or contain specific safety risks.

The industrial LPG cylinder / bullet can be included to increase firefighting complexity.

Hydrants can be used as part of urban scenarios.

The hose lines can be used to show different hose lays and hydrant connections or relay pumping from tankers. The 60/40 hose (below) is a custom item.



Spot fires

Spot fires can be used to show spotting ahead of the head fire or the fire's point of origin.

Replacing the initial spot fire with larger fire shapes can demonstrate fire growth.

Spot fires can be placed on features to represent spotting and fires becoming established.

Developing spot fires are a custom item designed to demonstrate fire behaviour under strong wind and low - no wind conditions.

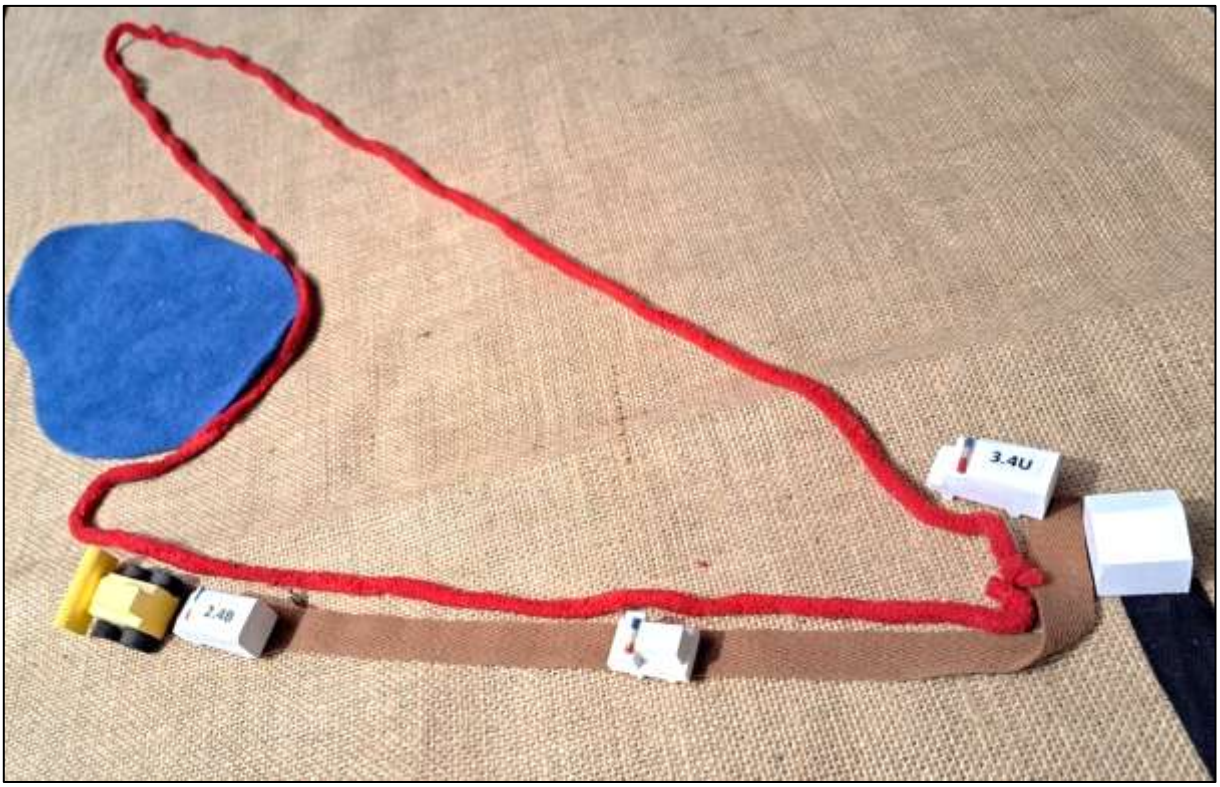
Spot fires and the small fire shape can be arranged to create a pattern of deliberately lit fires along roads.

Alternatively, the spot fires can be positioned to show how a backburn can be deepened.

The incendiary drone is a custom item that can also be used in these situations.

Flexible fire line

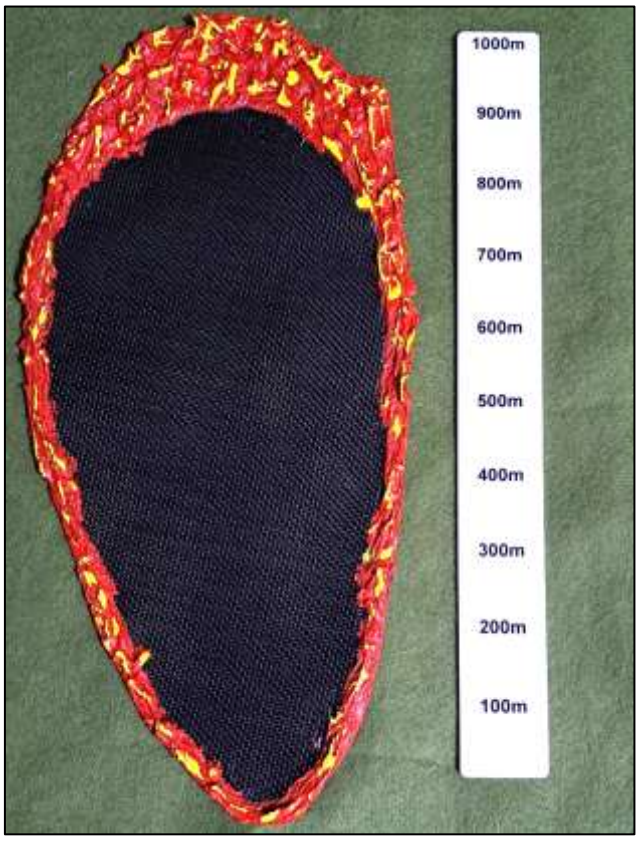
These flexible lines are used to form complex fire shapes and to show fire predictions.



Fire predictions identify assets at risk together with other elements to be considered in developing objectives and strategies.

The burnt ground cloth can be placed over the fire edge to create a suppressed edge.

The ruler provides a sense of scale for understanding rates of spread. It can be used to measure a fire's length and perimeter to estimate the fire's area. Fireline production can also be measured and compared to the rate of spread to assess the effectiveness of suppression strategies.

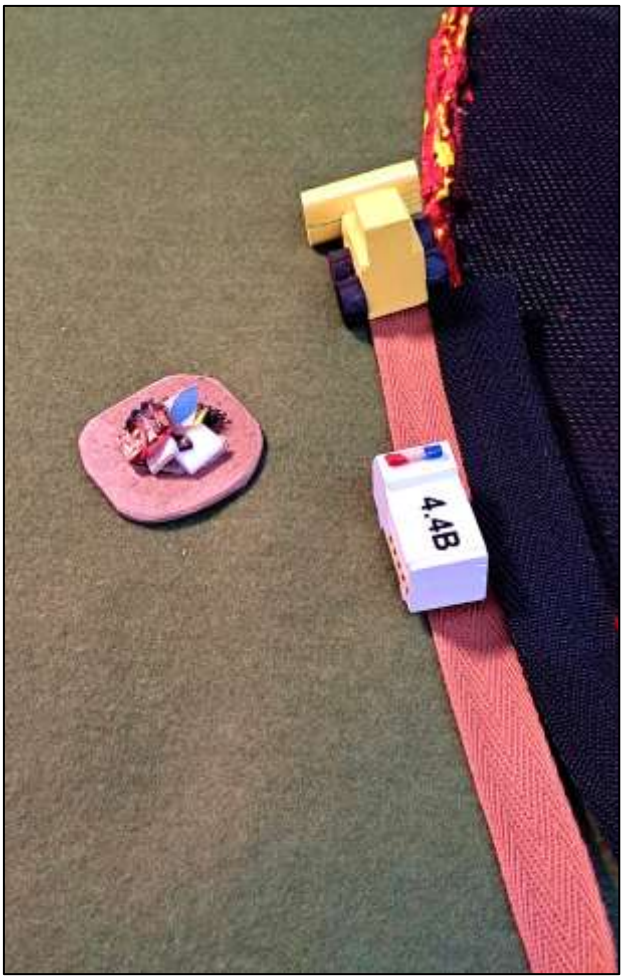


Containment line

The containment line can be used as a machine constructed line, a dirt track, firebreak or even a cleared area.

Refuse site

The refuse site is a custom build available as a simple refuse site and one with general and green waste. This item can be used as both a source of ignition as well as a priority for excluding fire. Discussions can focus on the challenges and safety hazards of managing well established fires in refuse sites.



Tags

Tags have been designed to introduce complexity to exercises. They can be placed on the model at the start of an exercise to show a known area requiring special consideration. Alternatively, these tags may be introduced during an exercise to indicate new information coming to hand.

Appendices

1. Discussion Topics
2. Insights and ideas from firefighters
3. The Different Models and Kits

Discussion Topics

The topics within this section include:

Discussion Topics

The Bushfire Model® can be used to focus on a single a topic or can build multiple topics into a bushfire exercise. As an example, the model can effectively demonstrate the concept of the Dead Man Zone. However, additional benefits arise by showing where these situations can occur how they can be avoided.

This section details some of the possible discussion topics such as:

- Fire Behaviour:
    - Fuel
    - Topography
    - Weather
    - Atmospheric stability
    - Fire intensity

- Safety
    - Safety hazards,
    - Safety systems

- Incident Planning
    - Incident Appreciation and Risk Assessments
    - Objectives and strategies
    - Defensive and Offensive Strategies
    - Community warnings
    - Evacuations
    - Trigger Points

- Rural Urban Interface

- Aerial Fire Suppression

- Additional
    - Fire Danger Ratings
    - Establishing Sectors
    - Radio Communication
    - Control lines
    - HAZMAT
    - Community Warnings
    - Communication Plans
    - Machinery
    - Crash

Fire Behaviour and fuel

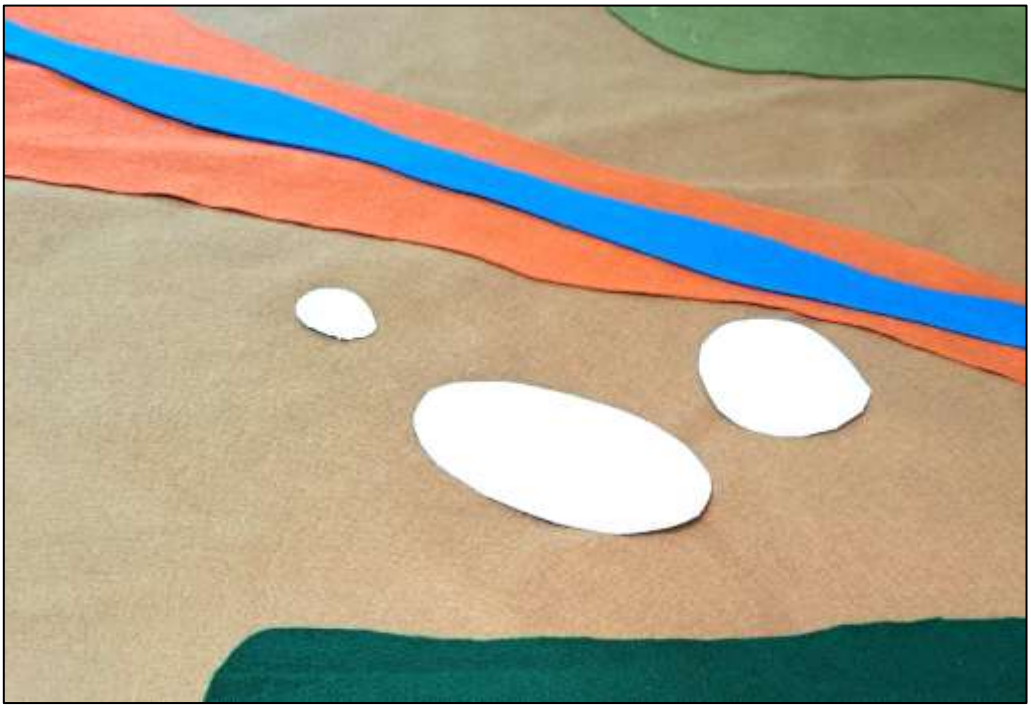
These specialty fuel cards are placed on the model to identify different fuel types and support fire behaviour discussions.

Additional information about fuel loads, fuel condition and weather can be provided to support participants using fire behaviour models to predict rates of spread and fire intensity.

Handmade labels can be used as an alternative to fuel cards.

The low fuel area tag can be used to show areas of reduced fuel due to recent bushfires or mitigation treatments. Overlaying the grey fabric onto the fire shape can demonstrate how the fire behaviour can be reduced within the low fuel area. Other areas of low fuel may include rivers, lakes and salt lakes (picture below - Remote Area Model). Using these low/no fuel areas can be considered as part of planning fire suppression.

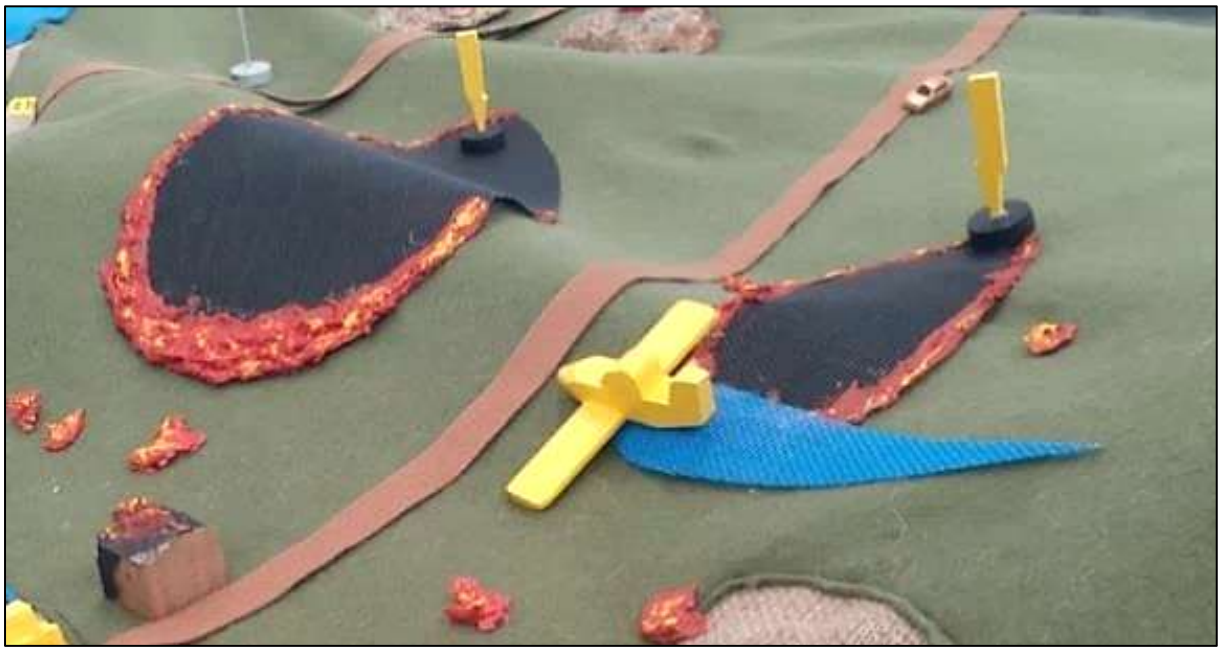
Using the model can help to explain the importance of bushfire mitigation planning and treatments to stakeholders and community members.



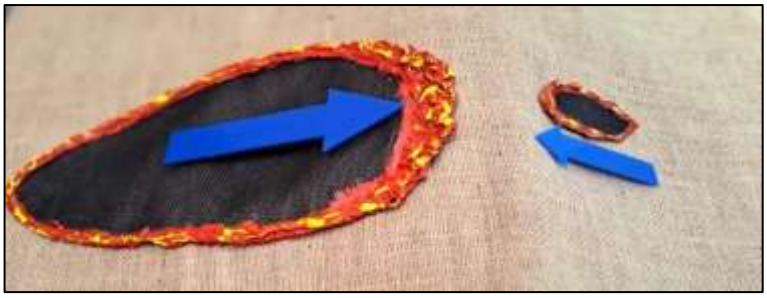
Fire Behaviour and topography

The landscape mats can be shaped to create hills, valleys and ridges by positioning foam or similar materials under the mat.

The influence of topography on fire behaviour is shown with fire shapes and spot fires. Discussions may consider rates of spread, spotting, slope, aspect, fuel load and moisture content.



The effect of topography on wind direction can also be shown.



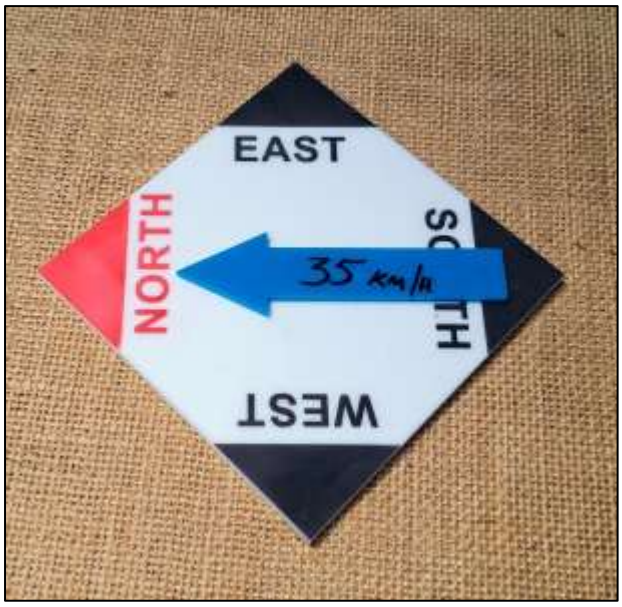
Arrows are used to show topography influencing wind speed and direction. E.g. an eddy on a leeward slope.

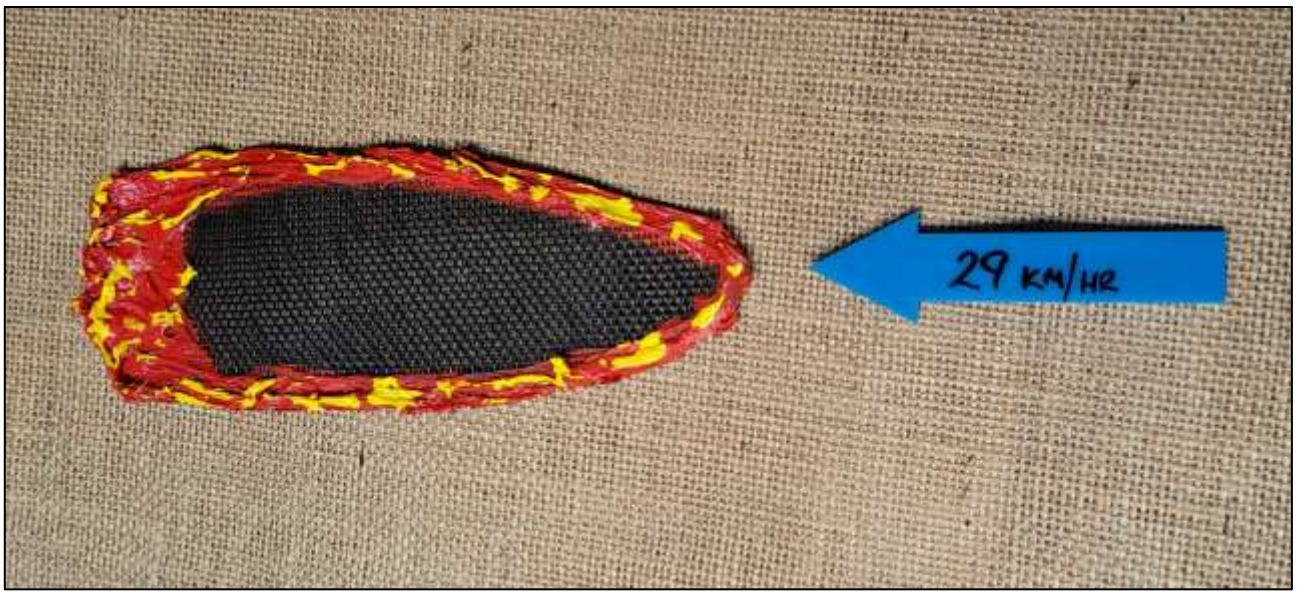
Fire Behaviour and weather

The effect of wind speed and direction can be shown using the model by using the wind direction arrows. Firefighters have used whiteboard markers on the arrows to show wind speed.

Scenarios can include inputs including temperature, relative humidity, curing, wind speed / direction and drought factors. When combined with fuel information, participants can input this data into fire models to predict rates of spread and intensities.

Incident Weather Forecasts can be used to provide the detailed weather inputs.

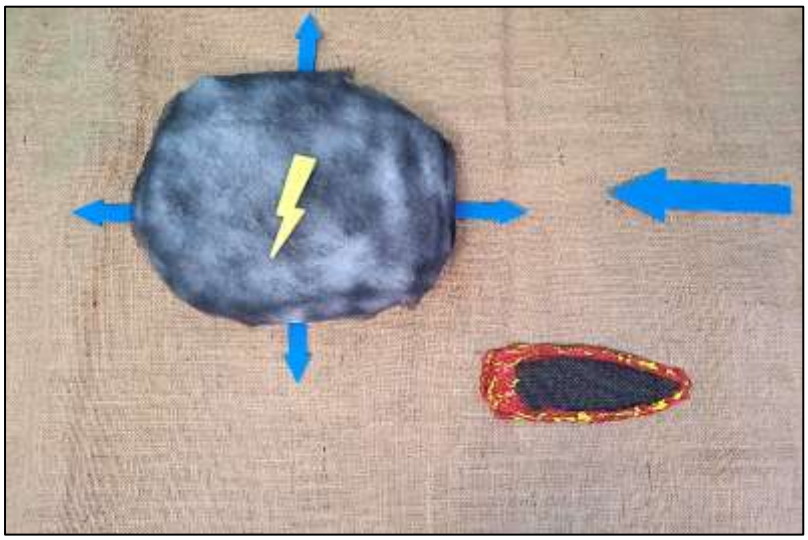




Fire Behaviour and atmospheric stability

Atmospheric stability can be demonstrated using different smoke plumes and thunderstorm features.

Having a three-dimensional model helps with discussions involving the vertical movement of air and the relationship with fire behaviour.



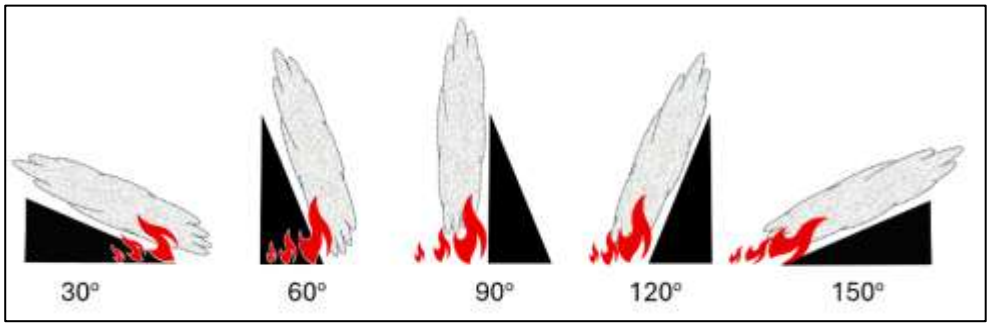
Smoke Plumes

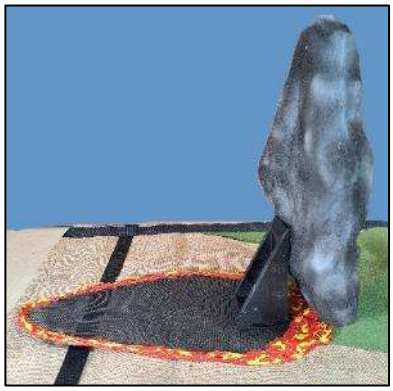
Smoke plumes are used to discuss a range of fire behaviour related topics including:

- Airflow into and above the fire.
- Atmospheric stability, spotting and plume-driven fires.
- Changes in wind direction.
- Changes in fire behaviour (example white plume, darkening at base)

Smoke Stand

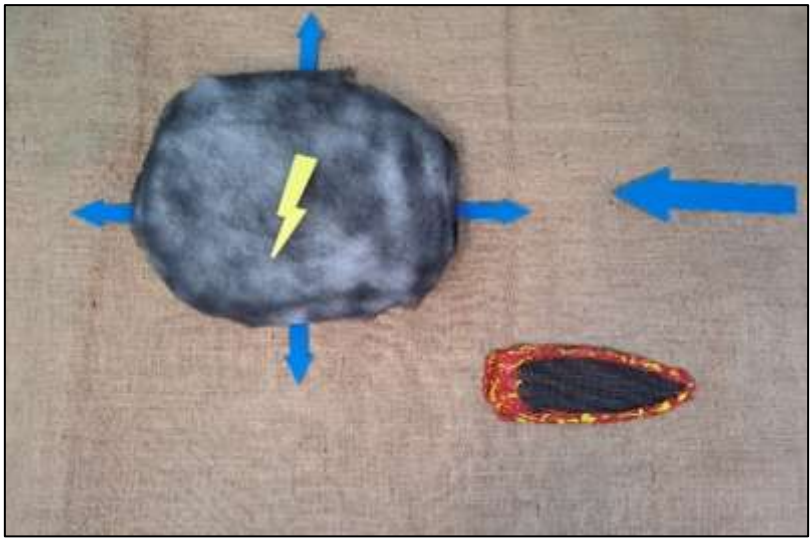
The smoke stand is a simple structure used to position the plume at different angles





Fire Behaviour and atmospheric stability - Thunderstorms

The smoke can be used together with the large lightning bolt to indicate a thunderstorm. This can support discussions concerning atmospheric instability, downdrafts (and their implications for aerial suppression) and the effect on fire behaviour.



The effect of thunderstorms on fire behaviour can be discussed using the large and small wind direction arrows. Alternatively, the custom-built thunderstorm / Pyrocumulonimbus supports a closer inspection of the processes involved.

Fire Behaviour and fire intensity

The edge of most fire shape shows different levels of fire behaviour and can be used to discuss fire intensity and suppression strategies. Labels can also be used to define rates of spread and fire intensities which together with suppression priorities and available resources guide selecting the most appropriate strategies.

The importance of situational awareness can be demonstrated during an exercise by increasing spotting activity.

Safety hazards and safety systems

The model can be used to demonstrate a range of safety hazards and systems designed to improve the safety of firefighters including LACES and Red Flag Warnings.

Hazards may be discussed individually or incorporated into exercises. This sub-section will explore ways to demonstrate and discuss safety issues including:

- Safety Hazards
  - Fire behaviour
    - Entrapment and burn over
    - Dead Man Zone
    - barriers restricting escape
    - anchor points
  - Electrical hazards
  - Structural hazards
  - Hazardous materials
  - Dangerous trees
  - Working on roads / closing roads

- Safety systems
  - LACES
  - Red Flag Warnings

Safety Hazard – Fire behaviour

Hazards relating to fire behaviour, spotting, entrapment and burn over can be demonstrated.

Many different safety scenarios involving fire behaviour can be demonstrated using the landscape mat and different fire shapes.

The model supports showing how an entrapment and or burn over may occur. Walking through this process can highlight the importance of systems such as LACES and the actions to be taken when involved in a burn over.

Photos: Eleanor Killen Dept. Biodiversity Conservation and Attractions

Safety Hazard – Fire behaviour and the Dead Man Zone

The model is useful in demonstrating what the Dead Man Zone is and the circumstances that contribute to these situations.

Showing the unburnt fuels and the Dead Man Zone.

Displaying the tactic of 'bringing the black with you' by burning out unburnt fuels (burnt ground mesh).

A Dead Man Zone and burn over can be shown using the flank-to-head fire, fire shape.

The picture on the left demonstrates the risk associated with changes in both topography and fuel where difficult terrain causes machines to move off the fire edge, upslope and into heavier fuels.

Showing appliances in a burn-over can make safety messages more real, helping new firefighters to recognise dangerous situations in the field.

The wind direction arrow can be used to show how changes in wind direction can create a Dead Man Zone.

A range of different burn over situations can be created including the use of machines to clear a safety zone.

Safety Hazard – Fire behaviour and barriers restricting escape

Safety hazards may include the combination of fire behaviour and barriers restricting escape.

Demonstrating these hazards supports lessons about situational awareness and systems such as LACES.

Safety Hazard – Fire behaviour and anchor points

The importance of selecting a safe anchor point is easily demonstrated by showing what an effective anchor point is and how poor positioning can result in firefighters being outflanked by the fire.

Using the tail as an anchor point (above) and fire outflanking firefighters due to poor positioning (below).

Safety Hazard - Electrical Hazards

The risks associated with electrical arcing can be demonstrated to reinforce the importance of no-go zones when power lines are impacted by smoke.

Other power related hazards include pole-top fires and fallen, or suspended lines combined with poor visibility.

Safety Hazard – structure related hazards

Several buildings / items can be used to discuss specific hazards if fire is involved, including:

- Power station,
- Service station
- LPG bullet
- Tyre shop and
- Winery

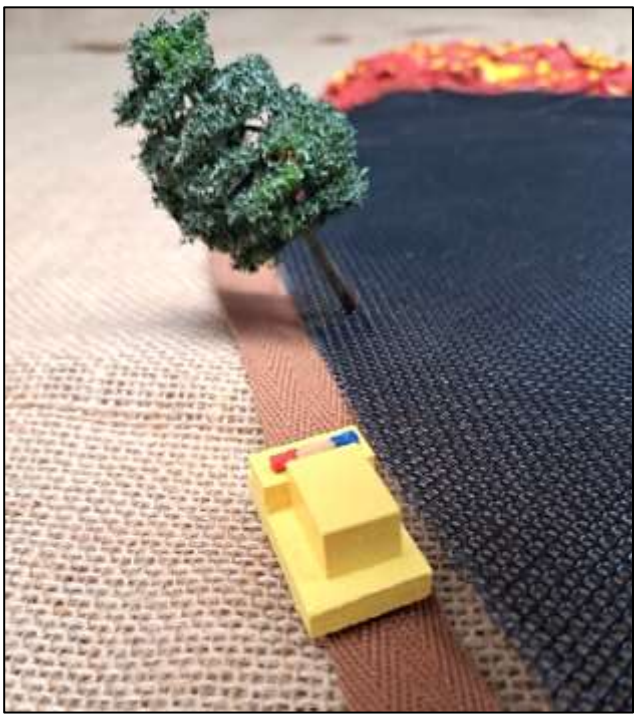
The LPG bullet can be used to increase risk.

Safety Hazard – Hazardous materials

Hazardous materials can be incorporated into bushfire incidents to reproduce hazards that may be encountered during bushfires. Alternatively, a stand-alone HAZMAT scenario can be created using these items.

Safety Hazard – Dangerous trees

Dangerous trees may be at risk of falling or have widow-makers in the canopy.

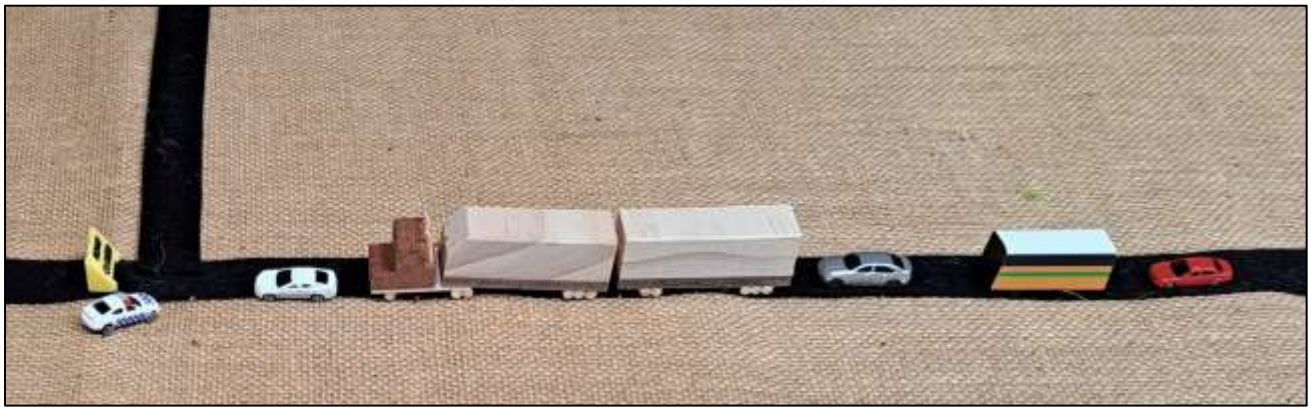


The importance of water protection for machines and safety when working around heavy plant can also be discussed.

Safety Hazard - working on roads / closing roads

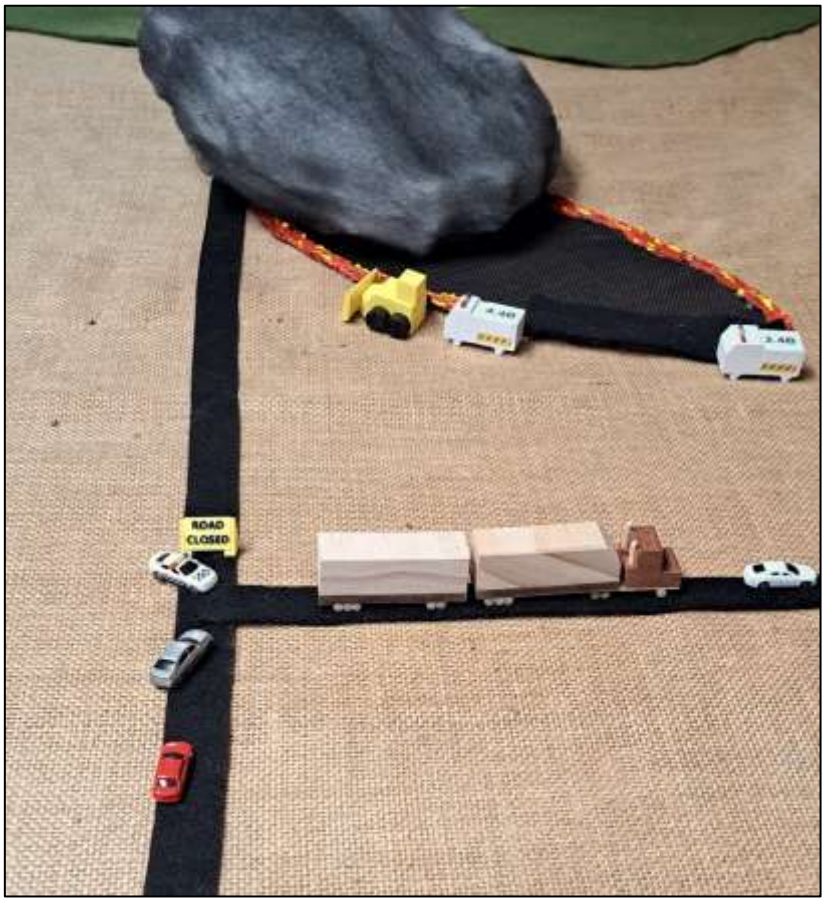
The safety aspects of fires and smoke impacting roads is easily shown together with the importance of timely and well-located road closures. Discussions may focus on the serious risk to the travelling public and to firefighters when working on roads. Actions to address these risks may include closing roads, issuing warnings while also reinforcing the importance of using beacons and personal protective clothing.

Roads can be closed by using the road closed signs and discussions focus on their correct positioning. Police cars can be added to demonstrate Vehicle Control Points. Closing rail lines is another important consideration.



The road train is used to discuss the correct positioning of road closures to ensure that there is enough room to turn large vehicles. The school bus can be included to highlight traffic issues at certain times of the day.

The implications of poorly located road closures can be demonstrated and compared to those that are correctly positioned. Discussions can touch on the processes by which roads are closed and reopened together with the risks associated with diverting traffic.



Safety System – LACES

The ability to create a bird's eye view of an incident assists greatly in creating a scenario to show how LACES can be established and maintained. Changing the scenario by modifying fire shapes and extending containment lines can demonstrate that LACES is not a once-off action, rather one that must be continually reviewed and adjusted in response to changes with the incident.

The following provides ideas on how the model can be used to demonstrate LACES

Lookouts

- Show how the fire can be located and monitored / observed
- Illustrate changes in fire behaviour / direction
- Show crew location relative to fire

Awareness

- Show the importance of knowing the country / using local knowledge
- How an adequate briefing is essential in understanding the situation
- Discuss current and forecast fire behaviour and weather conditions
- Ensure hazards have been identified and communicated
- Discuss importance of correct PPC / PPE being worn at all times

Communications

- Radio channels are confirmed (command and sector channels),
- Communications are established with all crew, radio checks performed
- Changes in conditions and sit-reps are communicated
- Concerns are raised in a timely manner and communicated effectively
- Ensuring clear instructions are issued / followed

Escape Routes

- Escape routes are confirmed as accessible and are free of hazards
- Demonstrate risks of having only one escape route. Appreciating that escape routes may change due to fire behaviour and / or fire line extensions
- Escape routes are clearly marked and known to everyone

Safety Zones

- Safety zone size and position is suitable and is also free of combustible material and other hazards
- Safety zone is accessible to all and known by everyone on the fireground.
- Appliances and vehicles are correctly positioned for escape

Safety System - Red Flag Warnings

The process for applying Red Flag Warnings (RFW) can be shown using the model.

A safety hazard is created to support identifying and managing the risk. The RFW process is then explored in terms of structuring the message, approvals, distributing and acknowledging the warning.

The process for delivering the RFW makes more sense when the path of the message from the IC through the chain to each firefighter is shown. Equally, the same approach is used to show how the RFW is acknowledged back up the chain.

The HAZMAT plume, spill or leaking chemical drum can be used to represent chemical hazards that warrant a warning being issued.

The powerlines and UXO tag can also be used in much the same way.

Incident Planning

A range of incident planning factors can be examined from initial assessments through to setting, implementing and monitoring strategies. The following section looks at how the model can be used to demonstrate:

- Incident Appreciation and Risk Assessments
    - Objectives and strategies
    - Community warnings
    - Evacuations
    - Trigger Points
- Resource availability
- Selecting strategies and tactics
- Defensive and Offensive Strategies
- Defensive
- Offensive:
    - Indirect
    - Direct and
    - Parallel
- Comparing Suppression methods
- Backburning, burning out and wind-driven edges
- Rural Urban Interface
    - Line defence tactic
    - Ember defence tactic
    - Backstop tactic
    - Safeguarding strategy

Incident Appreciation and Risk Assessments

The model can be used to show assets at risk and the importance of an effective incident appreciation and risk assessment.

The scale ruler can be used with rates of spread to determine a predicted fire edge. This in turn identifies assets at risk and the time available for suppression. The predicted fire shape also provides valuable information for setting trigger points and preparing community warnings.

Once information on the incident, values at risk and initial resources are known the objectives and strategies can be selected together with important initial actions involving community warnings, evacuations and trigger points.

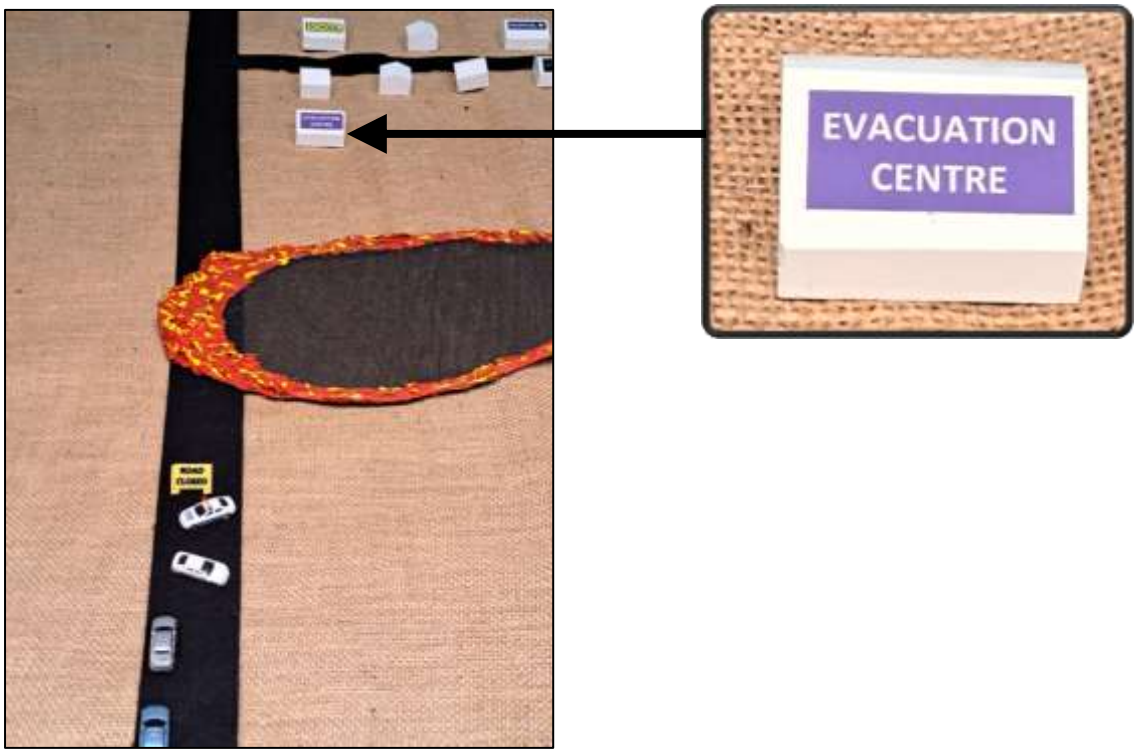
Community warnings

Informed by incident predictions the community warnings can be defined using the tags and lines. Further messages concerning the direction to leave can be described in detail. Changes in incident behaviour and direction can show the risks of the public being caught on roads while self-evacuating.

Evacuations

Evacuating rural and urban areas can be demonstrated using the model. Townsites can be created to discuss which areas need to be evacuated and how this can be implemented using the available resources.

The use of the evacuation centre building helps to provide detail and demonstrate that multiple evacuation centres may be required when the community is separated by a large bushfire.

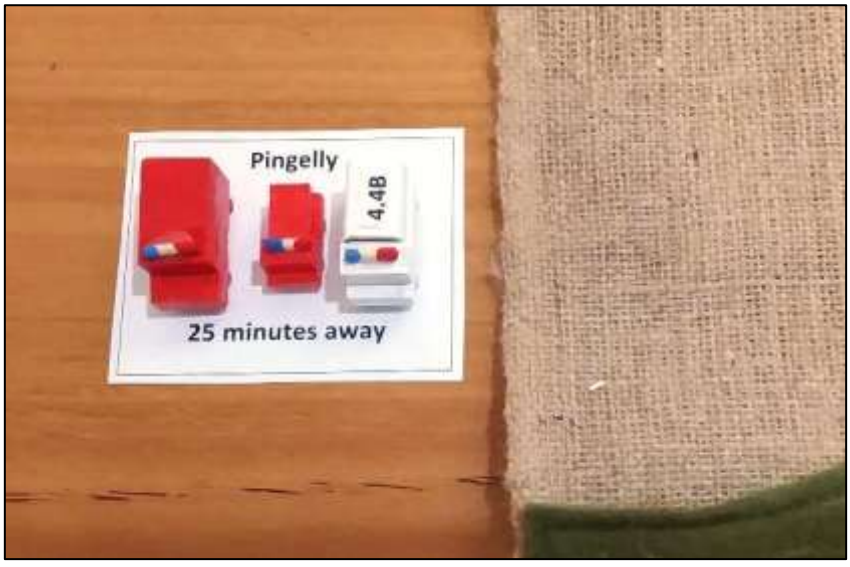


Trigger Points

Trigger points show when a predetermined decision needs to be actioned. Actions may include closing roads, changing community warnings or evacuations while discussions can focus on planning, monitoring and actioning trigger points.

Resource availability

The availability of resources will influence strategies. While the model can clearly display the resources currently available, some trainers have used cards to show the travel times for resources from neighbours and further afield. Likewise delays in resource arrival and breakdowns can also be factored in.



Defensive and Offensive Strategies

Defensive and offensive strategies can be shown in a range of situations.

A significant advantage of using the model is its ability to clearly differentiate between various strategies and tactics. This benefit allows instructors to effectively demonstrate concepts while enabling participants to showcase their understanding.

The relationship between fire location, intensity, resource availability and strategies can be demonstrated with the model.

- Limited resources may initially be tasked with defending life, critical infrastructure and other assets, however as more resources arrive strategies can become more offensive.

- Predicted / actual fire intensities and rates of spread may preclude the use of some strategies.

- The location of the fire and type of terrain may limit the effectiveness of direct or parrellel attack.

Defensive strategies

The importance of protecting critical infrastructure can be shown with discussions including the impacts to firefighting operations if infrastructure is lost.

The replacement cost and time together with the impact to the community is another important consideration. The use of plantations supports discussions about the suppression options and the value to the local / state economy.

Offensive strategies

Indirect attack may be a preferred option when the fire is inaccessible or if resources are limited. An inaccessible fire can be created using rocks or steep terrain to indicate difficult access. Alternatively if the headfire is too intense a backburn may be considered.

Direct attack can be demonstrated with appliances and machines.

The containment line is unrolled in front of machines to show fire line production.

Parallel attack showing how to bring the black with you by burning the unburnt fuels.

Dry firefighting

The aspects of dry firefighting can be explored focusing on the correct machine selection, mobilisation times, crew welfare at remote locations as well as using fire and conserving water.

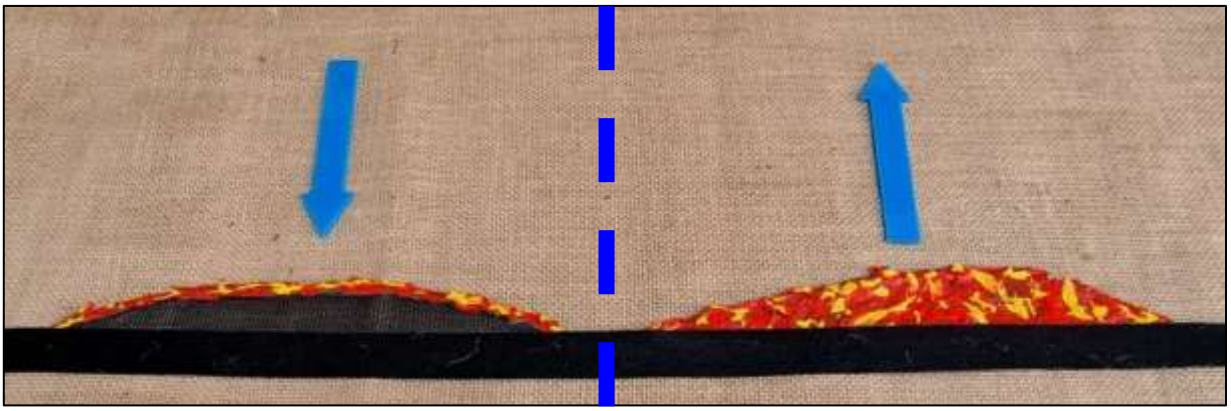
Comparing suppression methods

The model can be used to show different suppression methods to support a sound understanding of their advantages, disadvantages and applications. As an example, direct and parallel attacks can be shown side by side to highlight their differences and promote discussion on their benefits and drawbacks.

Backburning, burning out and wind-driven edges

The different uses of fire can be discussed including backburning, burning out pockets, edging and wind-driven edges. Understanding these differences avoids confusion at bushfires and helps to achieve objectives safely.

Showing backburn being established in front of the oncoming fire



Backburn (left), wind driven edge (right)

Burning out as part of parallel attack

The difference between a defensive protective burn and a backburn (offensive strategy) is shown below. Using the model can help to reduce confusion between these different strategies.

Defensive burn to protect structures

Backburn as an offensive strategy

The model can be used to describe the planning necessary for successful backburning. This may incorporate different rates of spread and incident weather forecasts.

Discussions can consider:

- Selecting the location for the backburn (fire prediction / wind forecasts)
- Time required to position resources and start lighting
- Sufficient resources / structure to control backburn
- Rates of spread (head fire burning with wind / backburn burning into the wind)
- Minimum length and depth of backburn
- Spotting from main fire over the backburn
- Expected fire behaviour in the junction zone
- The impact of wind changes (shown below)

Rural Urban Interface

Rural Urban Interface

The model can be used to replicate fire occurring in several types of urban interfaces including:

- where the edge of the town meets the bush
- isolated houses in vegetated areas
- areas of bush within urban areas

Once the scene is set, the Rural Urban Interface (RUI) topics can be discussed including:

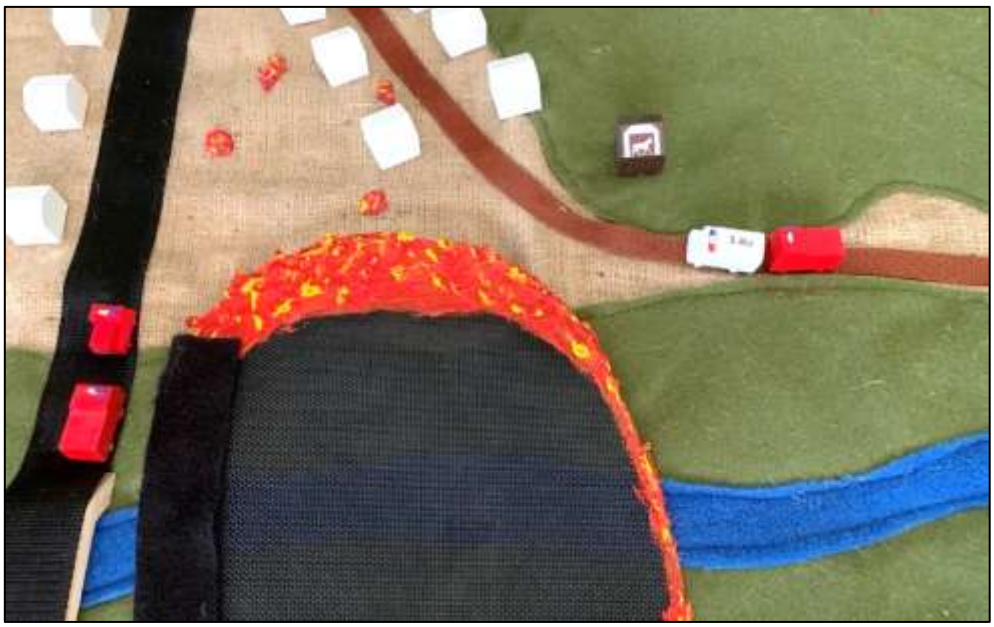
- Firefighter safety
- Fire behaviour in the RUI
- RUI defensive tactics
- Sectorising
- Assessing structures
- Prioritising resource allocations when multiple structures are impacted
- Water supply

RUI Defensive tactics

Line, ember and backstop defence can be shown with the model.

Describing line defence can be achieved by placing the burnt ground fabric over the fire edge. Positioning hose lines are valuable in describing different tactics.

Line defence (left), ember defence (right) and backstop defence (below) can be shown.

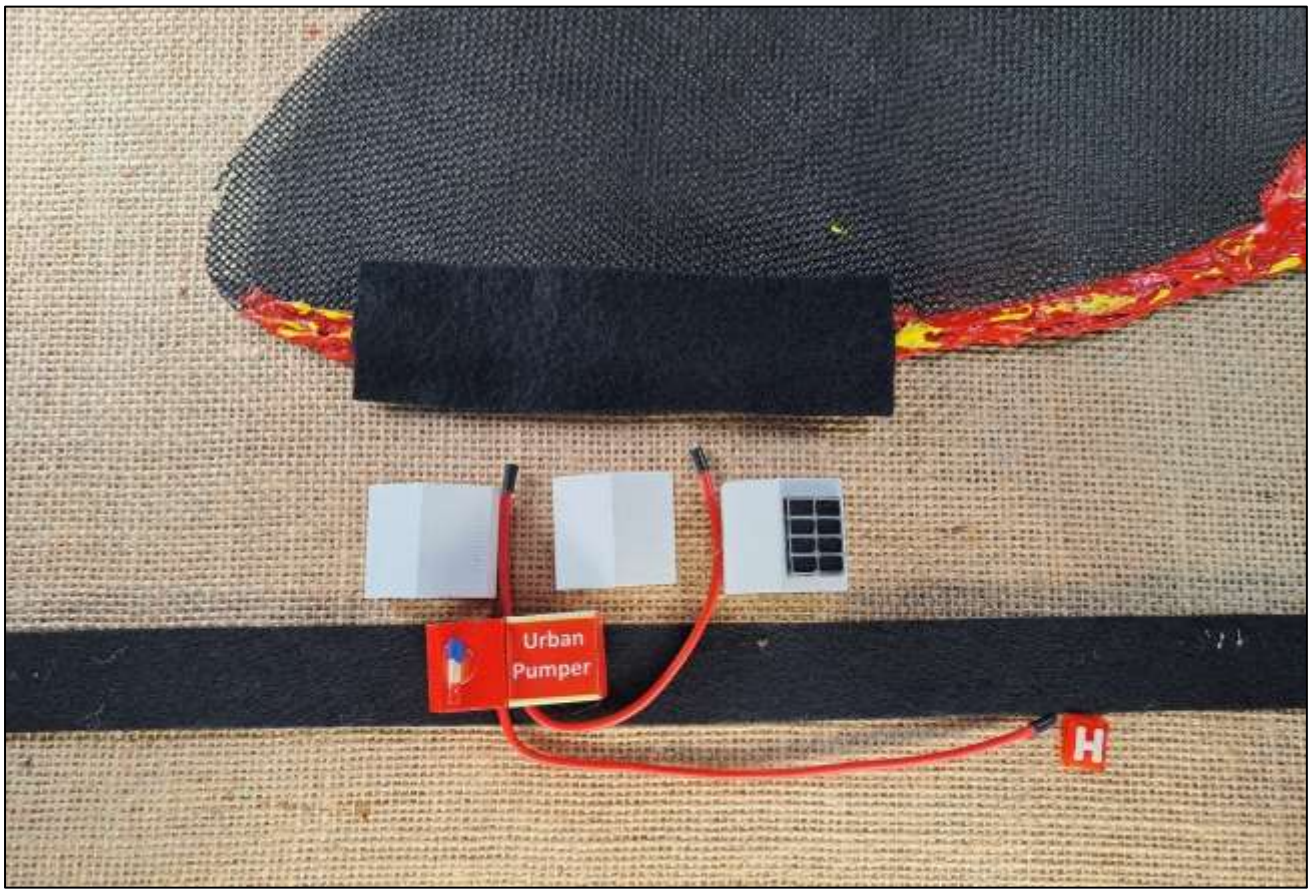


Safeguarding can also be discussed as a strategy on its own or as part of evacuations.

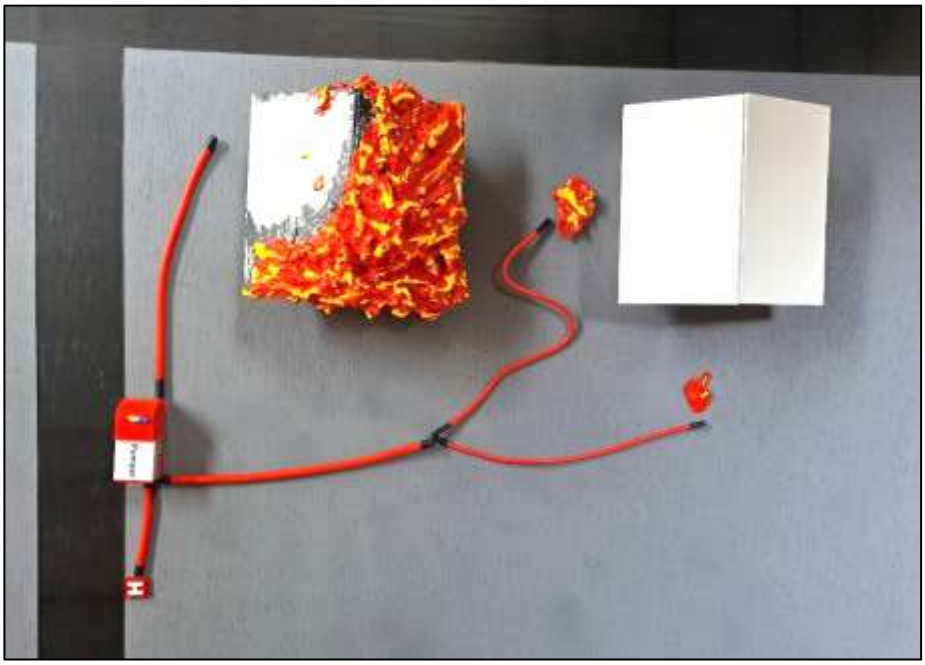
Related discussions may include:

- firefighter access / egress,
- appliance and personnel capability,
- defendable space / asset protection zone
- dependability of reticulated water supplies and
- asset construction type.

Hose lays



The hose lines can be used to discuss firefighting in the RUI, water availability and mobility. These lines can be used as a simple layout or with more detail such as the 60/40 lines and dividing breach shown below.



Aerial Fire Suppression

Aerial fire suppression

With so many different air resources it is possible to re-create a large range of scenarios. Helitaks, water bombers, LATs, bambi buckets and air intel. aircraft can be positioned at different parts of the fire to represent the tasking of aerial firefighting resources.

Trainers can use the model to describe individual aspects of aerial fire suppression or bring everything together in sequence. This may start with the Incident Controller identifying the need for aerial resources, placing the request, receiving, using and then releasing the aircraft.

The model provides a pilot's view of the fire. By stepping away from the model firefighters can better appreciate the pilot's perspective and the information needed at the 5-minute and 1-minute inbound calls.

Water, foam, gel and retardant drops are available to demonstrate different suppression options.

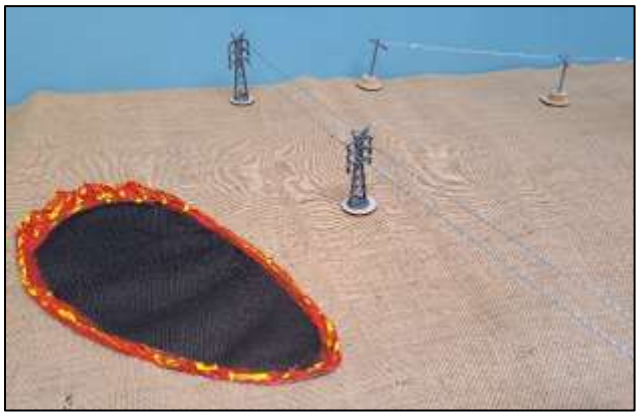
Environmentally sensitive areas can be shown using rivers, lakes or the tag.

The helicopter and Bambi Bucket is used to demonstrate drop accuracy and the advantages of refilling from nearby rivers, lakes, dams or collar tanks.

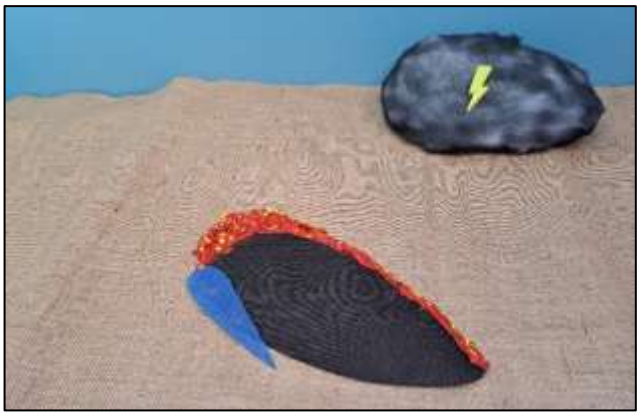
Aerial incendiary options include helicopters with capsules, burning gel or drone with incendiary capability.

Aircraft hazards can be used, making exercises more realistic; these include:

- Powerlines
- Wind turbines
- Drones
- Radio towers
- Rough terrain
- Thunderstorms



Powerlines (distribution and transmission)

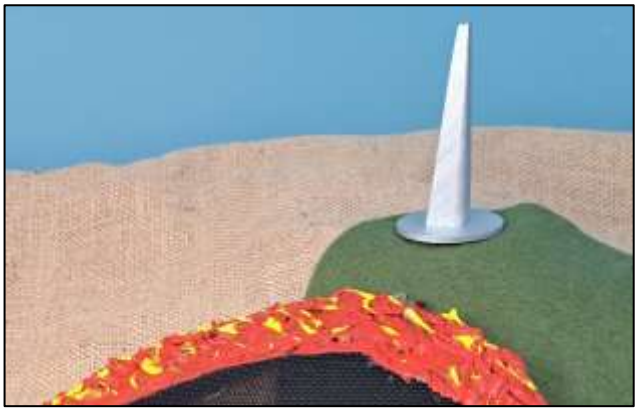


Thunderstorms

Drones

Wind turbines

Smoke obscuring steep terrain



Towers

A range of factors affecting the performance of aircraft can be shown and discussed including:

- smoke restricting visibility
- drop height
- strong winds (wind arrows showing strong crosswinds)
- daylight (time to depart incident to return by last light)
- fire behaviour / vegetation structure
- terrain
- turnaround times for refilling (airfield positioned away from area of operations)

The model can show the preferred position for ground controllers.

The importance of crews clearing the drop zone and what to do if caught in a drop zone can be discussed.

Drop patterns and terminology can be demonstrated including:

- Anchor points
- Type of drop (half on, half off and parallel)
- Action of drop (roll up and tag on)
- Accuracy (bullseye, gap, early, late etc.)
- Instructions after drop

Trainers have used the model as part of Ground Controller training to demonstrate the entire process from the Incident Controller (IC) requesting aircraft, their arrival, operation and eventual release.

Similarly, participants can do the same to provide evidence of their understanding as part of an assessment. Some of these aspects may include:

- An IC identifying the need for aircraft and the associated criteria for activation.
- Appointing a Ground Controller
- Selecting strategies
- Ground Controller communications with IC or delegate
- Ground Controller communicating with aircraft
    - 5-minute inbound call
    - 1-minute inbound call
- Confirming drop zone is clear / advising crews to return.
- Feedback on drop
- Instructions after the drop

A scenario may involve a fire moving into an area with features and aircraft hazards already in place. Similarly, the assessor may provide injects such as an appliance entering the drop-zone or a new hazard being identified (e.g. drone or thunderstorm / changing winds).

Additional Discussion Topics

The remaining discussion topics are an assortment of topics relating to different aspects of bushfire suppression.

- Fire Danger Ratings
- Community Warnings
- Establishing Sectors
- Communication Plans
- Radio communications
- Machinery
    - benefits and limitations of different machines
    - Using machinery for mop-up
- Crash
- HAZMAT

Fire Danger Ratings

The four Fire Danger Rating (FDR) boards support discussions around the ratings and what they mean in terms of fire behaviour and potential impacts.

Combined with the FDR messages and publications, these boards are a great addition to community engagement activities. Having local firefighters deliver these sessions sends a powerful message.

The boards can be used on their own to discuss what each rating means. Alternatively, a simple scenario can be created using the model to represent a local area. An FDR board is placed in the scenario and discussion focuses on what the fire danger and message means. Fire shapes can then be added to show the potential fire behaviour and impact more clearly.

The value continues for new firefighters as local fuel types are considered. Discussions may centre on the expected fire behaviour and suppression difficulty for each of these fuel types under different FDRs.

The FDR boards can be used to demonstrate the relationship between FDRs, fire behaviour and potential impact.

As an example, the Extreme FDR board is placed on the model to support discussion about what this means if a bushfire fire starts.

A bushfire is introduced showing the type of fire behaviour possible under these conditions.

Burnt or burning buildings are used to demonstrate losses.

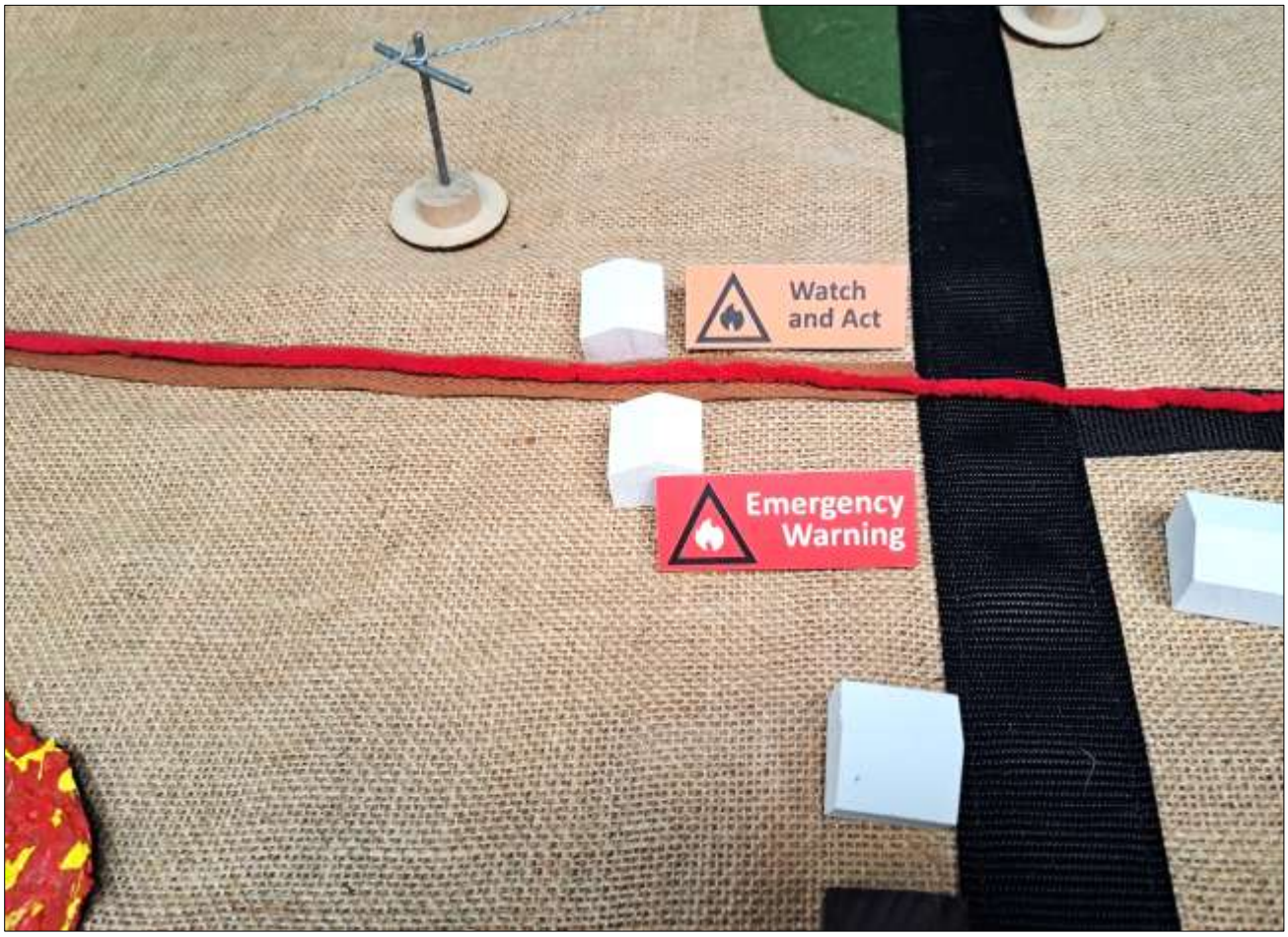
As a comparison, the Moderate FDR board can be used in the same landscape. The reduced fire behaviour together with easier suppression are shown.

Community Warnings

Community warning tags and lines are used to define the different types of bushfire warnings.

The model can show how fire predictions are used to identify these warning areas. Planning, applying and reviewing community warnings are an ongoing activity during an incident.

Used with community engagement, these warnings help people understand their meaning and the actions that must be taken.



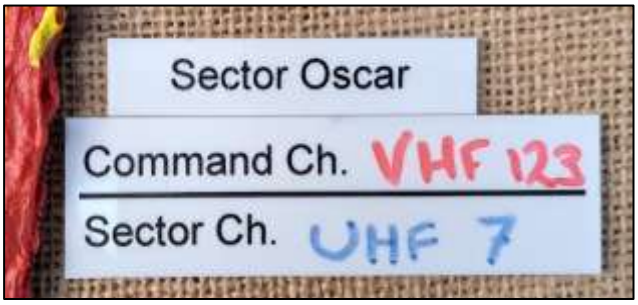
Establishing Sectors

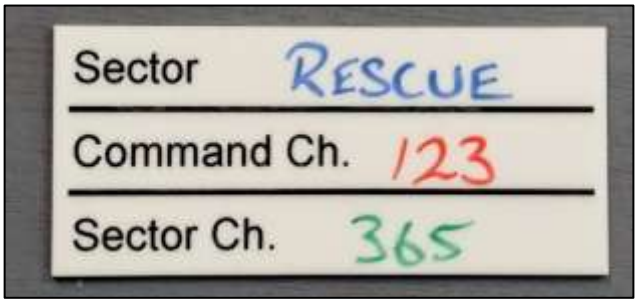
Positioning control points and sectors can be easily shown. Allocating resources adds detail and supports discussion of tasking service-specific skills.

Communication Plans

Applying communication plans at a fire can be shown using the communication panels. These panels are used to show the command and fireground channels that are normally used by firefighters. The panel for functional sectors is shown bottom right.

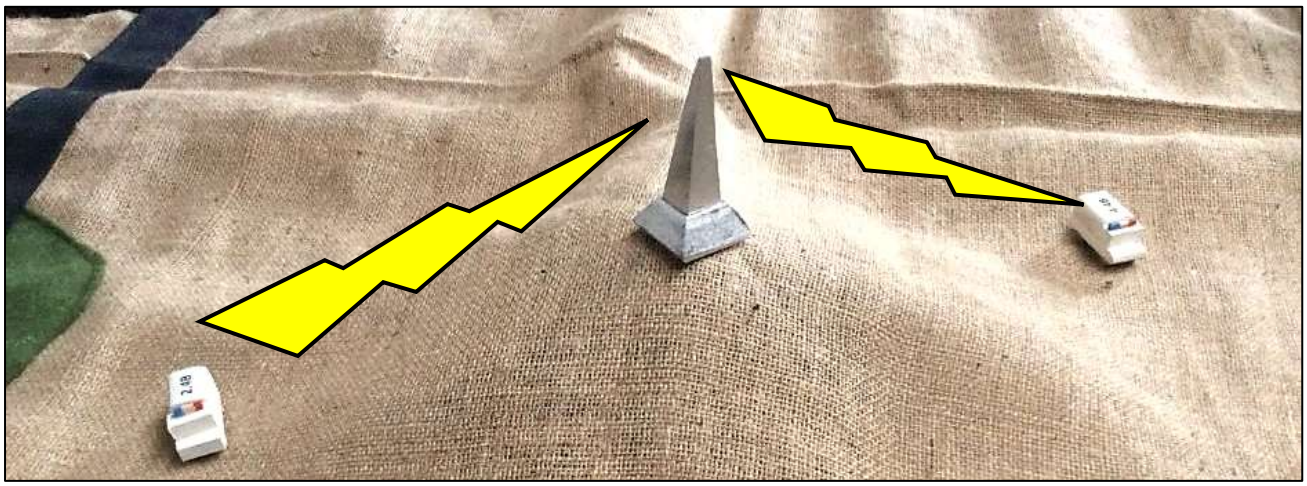
The radio repeater tower can also be brought in to further explain radio communication options and limitations.



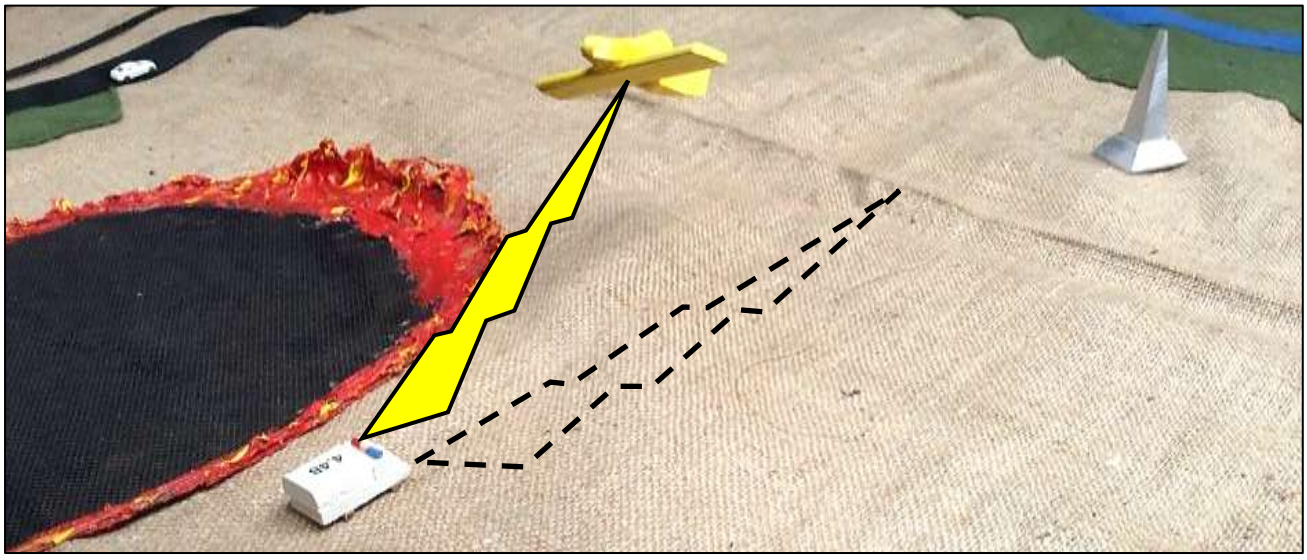


Radio communication

Simplex and duplex radio communication can be demonstrated with a radio repeater on a hill to show how issues with distance and obstacles can be addressed.



Likewise simplex / duplex communication with water bombers can be shown.



Machinery

Discussions can include the benefits and limitations of different machines as well as:

- fire line construction standards
- water protection for machines
- anchoring control lines.
- correct positioning of debris and windrows.
- mop-up using machines.

Features of dry firefighting in remote and semi-remote areas can be discussed to help firefighters understand the importance of using machines for suppression and mop-up while conserving limited water supplies.

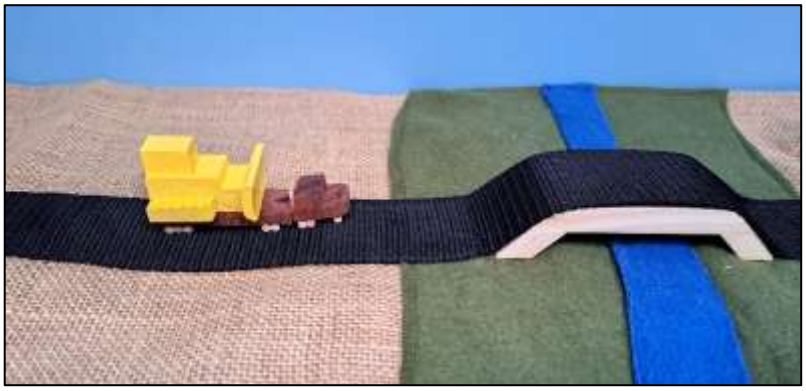
Effectively communicating with machine operators and maintaining a safe distance are other good discussions. Dealing with machinery breakdowns at fires and the impact on suppression operations is another useful conversation.

The grader windrow is used to demonstrate correct positioning. Other discussions may include establishing vehicle turnarounds, environmental considerations and post-fire rehabilitation.

Using machines for mop-up

The range of machinery and other items can be used for demonstrating dry firefighting and effective use with mop-up. The advantages and disadvantages of different machines in terms of production rates, terrain, vegetation and vulnerability of rubber tyres can be discussed.

Operating machines in tandem provides advantages with production rates and track condition. Likewise the role of the appliance providing water prorection can be discussed.



Logistical issues with mobilising machinery can be discussed. These include weight-rated bridges and time taken to float or walk different machines.

Control lines

A range of control line features can be shown using different items. Unburnt pockets can be used to demonstrate weak control lines, alternatively a weak edge can be created by moving the control line away from the fire edge.

Spot fires can be used to create hotspots and hop-overs, supporting discussions about patrol and mop-up.

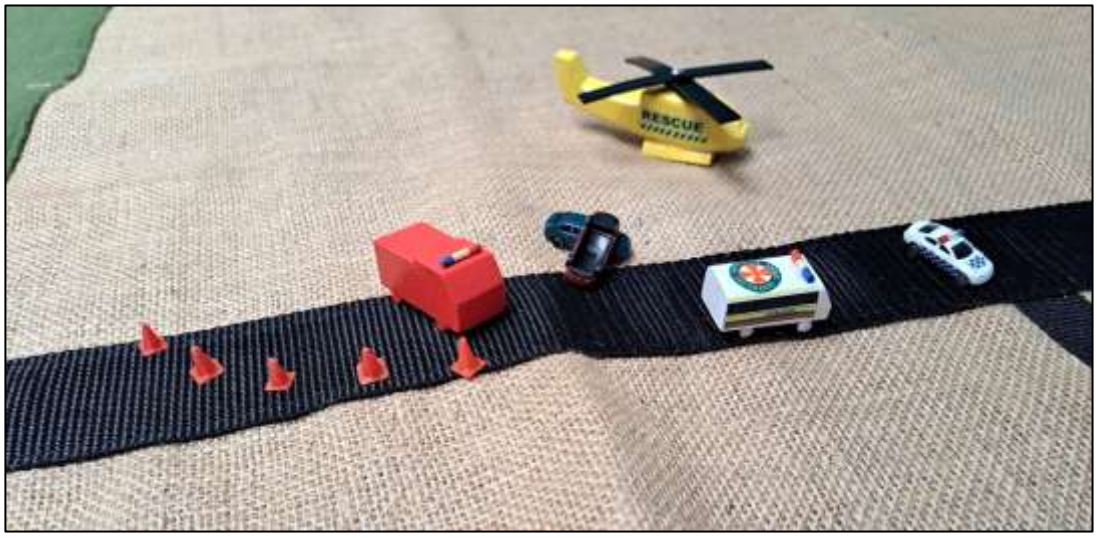
Trees with burning crowns (spot fire placed in tree) can be positioned to show the risk of spotting over control lines.

The positioning of turn-around points along containment lines can be demonstrated.

Crash

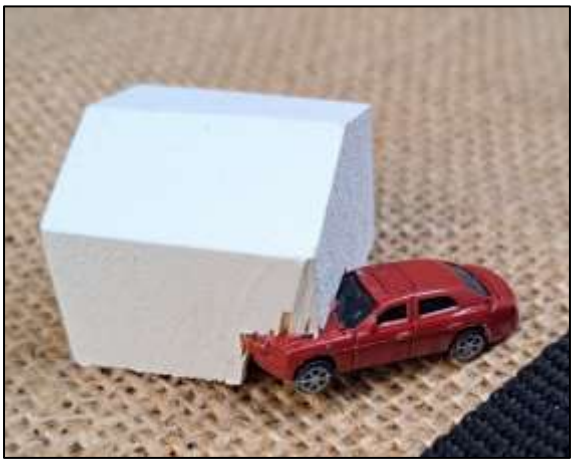
A range of crash scenarios can be constructed to support rescue related discussions.

The rescue helicopter was requested by a volunteer brigade to help members understand what to expect on their first turnout. The ambulance, rescue helicopter and appliances can be used to demonstrate incident site management.



Discussions may include:

- Positioning appliances
- Working with other agencies
- Traffic management
- Rescue operations
- Communicating with the rescue helicopter



Car Vs house can be used to discuss incident appreciation, rescue / extraction, structural collapse and scene / traffic management.

Likewise the aircraft and train can be used to create other crash scenarios.

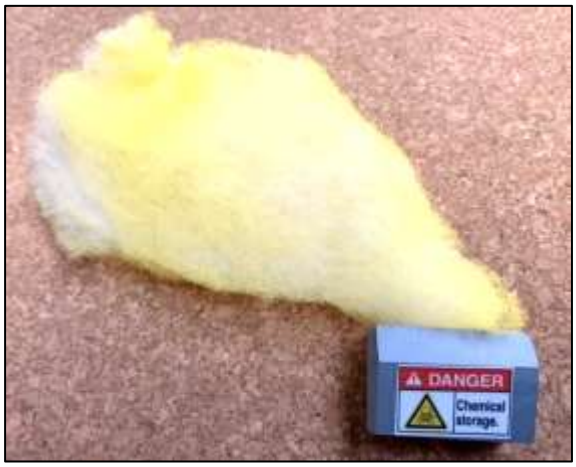
HAZMAT

The HAZMAT plume was created for a Volunteer Fire and Rescue Service brigade. Since then 17 new HAZMAT items and a dedicated **HAZMAT Kit** have been produced.

These items can be used to create scenarios to support discussions about:

- approach routes
- assessing the scene
- product identification and specialist advice
- firefighter safety and PPC / PPE
- public safety
- site layout
- product recovery and
- decontamination

Alternatively these items can be included in bushfire exercises to add complexity.



Insights and ideas from firefighters

Insights and ideas from firefighters

This section contains ideas for using the model, as shared by firefighters themselves.

The following feedback was received from Julian Martin, Shire of Collie Chief Bush Fire Control Officer and Emergency Services Supervisor, South32.

I purchased the Bushfire Model Kit as I recognised the benefit it would provide to demonstrate and teach concepts, SOP's and techniques in bushfire combat and management, in a desktop fashion, not previously available or experienced by my fire fighters and crew leaders and brigade leaders alike.

The feedback from my teams has been overwhelmingly positive and the insight gained from the ability to gain an overarching view of "the bigger picture" has proven paramount in developing everyone involved in a level 1 incident.

The kit is extremely adaptive to teach direct and indirect fire fighting techniques, the various modes of RUI and overall incident management; from public warnings and upgrades/downgrades of those, understanding the need to establish trigger zones, PAFTACS, LACES and so much more.

The kit is being continuously improved has evolved incredibly since the first prototype was developed. You only need to see what it now comes with, to see that the incident types and potentials for it are limitless. If you have specific risks, appliances, equipment or assets, Blue Frog Innovations can include these in the kit.

Evacuation exercises

Collie Volunteer Fire and Rescue Service firefighters have used notes placed under buildings for evacuation scenarios. When revealed, the notes describe the number of occupants, their mobility and any health concerns.

Local bushfire sessions

Many Community Emergency Service Managers / Fire Control Officers from the SW of WA have run sessions for firefighters and Local Government employees with a focus on fire safety. Significant discussion has resulted with common feedback that the sessions went longer than originally planned and people who were normally quiet were really getting involved and asking lots of questions.

These events were great opportunities for firefighters and machine operators to discuss the important aspects of using machines at fires, including:

- contacting the Incident Controller
- water protection for machines
- positioning control points
- windrow size and positioning
- excluding areas of high fuel loads
- mop-up using machines
- cutting fences
- fire line rehabilitation on farms

Bushfire Exercises

Byford Bushfire Brigade ran an exercise where an experienced firefighter managed the scenario while an Incident Controller / Operations Officer was based in a separate part of the building. Sector commanders were present at the model responding to developments.

The IC relied on sector commanders to provide information such as situation reports and resource requests via radio. This information was then used by the IC to manage the response. Other brigade members assumed different roles (e.g., concerned residents, contractors, and police) interacting with the sector commanders and IC to make the scenario more realistic.

At the end of the exercise the IC came into the room to view the model and compare it to his mental picture of the incident. At the post exercise discussion firefighters said that it felt more realistic than other tabletop exercises.

Rural Fire Service brigades have led exercises where half the brigade members prepared an exercise for the others who were waiting outside.

Firefighting in sandy soils

Sandpaper was used to support discussions about firefighting in sandy soils. The sandpaper showed areas of deep sand with a modified (bogged) appliance.

Other suggestions were to use areas of deep sand as sector boundaries to reduce traveling through boggy areas.

Large sand dunes can represent low fuel areas that may be used as part of suppression strategies.

Air observer training

Aerial observer training has been conducted using the larger model to depict the fire, assets, landscape features and firefighting resources. Participants must then proceed around the model recording observations within a strict time limit.

Map reading

Fire agencies have used the landscape mat and features as part of map reading exercises. An alternative was to use the items and fire shapes on larger maps to better represent map features.

Photo: Dept. Biodiversity Conservation and Attractions
Sector Commander training

Fences & road names

Arthurs Creek & Strathewen Country Fire Authority (CFA) brigade used pipe cleaners to represent fences and labels to name local roads. The use of livestock (horses, cattle and sheep) added another dimension to incident response.

Hose lays

City of Albany firefighters used red pipe cleaners to show hose lays as part of structural defence. This great idea has been picked up with two hose lines now included in the Standard Kit.

Arson scenarios

An arson setting was included at the start of an exercise. In this case the participants quickly identified that the lighting pattern as suspicious and noted the description of the car leaving the area. The exercise debrief touched on the importance of preserving the points of origin and associated evidence.

Partnering with fire demonstration tables

The Bushfire Model has been used in combination with fire demonstration tables. The model is employed to discuss aspects of fire behaviour before moving onto the demonstration table when fire is added and observed in real time.

Brigade posts

An aim of this guide is to acknowledge the work of firefighters and share the ideas that they have developed using the model.

The following is a summary of some of the ideas posted on facebook together with the link to the original post.

Coondle-Nunile Volunteer Bush Fire Brigade

The brigade set the model up to replicate their town and ran a truck crash scenario that resulted in a fire. Road closures, resource allocation, incident control and use of water bombers were all factored in.

https://www.facebook.com/share/p/DF8HUnFozq99onQh/

Photo John Hansen: Coondle-Nunile Volunteer Bush Fire Brigade

Roleystone Volunteer Fire & Rescue Service

This proactive brigade has run many exercises using the Bushfire Model both within the brigade and together with others including:

- Volunteer Bushfire Brigades
- Volunteer Fire and Rescue Service Brigades
- State Wide Operational Response Division (SWORD) Volunteer Fire
- Emergency Services Brigade.

One exercise involved a simulated bushfire turning into an IMT exercise. Using the Bushfire Model, they were able to create an incident where a fire then impacted a townsite.

https://www.facebook.com/share/p/PRQ3jzDfdDsB58Cq/
https://www.facebook.com/share/p/aXcr5kyc7mVfYQLA/
https://www.facebook.com/share/p/3yJ8orsEgLdTbJLC/
https://www.facebook.com/share/p/zqp8XUEfTrXwKprq/
https://www.facebook.com/share/p/yYSnXq9B67rdfwft/

Photo: Roleystone Volunteer Fire & Rescue Service

Photos: Roleystone Volunteer Fire & Rescue Service

Horseshoe Bay Rural Fire Brigade

Have used their models for a huge range of activities from training, education engagement to planning hazard reduction burns.

https://www.facebook.com/share/p/cHYFRGHknnSDP9x6/
https://www.facebook.com/share/p/LKr54vdThHqVp86E/

Photos: Horseshoe Bay Rural Fire Brigade

Arthurs Creek & Strathewen CFA

Ran some tactical exercises using their models to look at the management of complex incidents.

https://www.facebook.com/share/p/npxXRBhJpSiq1Yze/

Photos: Arthurs Creek & Strathewen Country Fire Authority (CFA) brigade

Dunsborough Volunteer Bush Fire Brigade

Have used the model for several different scenarios. A recent exercised focused on the importance of communications and PAFTACS. In this case the Incident Controller was in another room, and the crews radioed in their sit-reps while the IC responded and updated his map. After it was over, the IC compared his map with the scenario and discussed the differences.

https://www.facebook.com/share/p/oNHfKSCSKiCjNZcE/

Photo: Dunsborough Volunteer Bush Fire Brigade

Glenwood Rural Fire Brigade

Used the model as part of their training night to run through different scenarios.

https://www.facebook.com/share/p/3s8WLp8enZJzU8LX/

Photos: Glenwood Rural Fire Brigade

Oak Valley Rural Fire Service

Made the most of down-time during a fire ban by using the model with the team given realistic scenarios, a list of resources and had to show how they would control fires.

https://www.facebook.com/share/p/9WK5SwANPaDxMB25/

Photos: Oak Valley Rural Fire Service

Tamborine Mountain Rural Fire Brigade

Conducted an exercise using the model. This exercise involved two groups look at a hands-on approach in how they would tackle a fire. They were given the weather conditions and had to work together in groups.

The groups needed to find out how fast the fire is going to move, what resources they were needing and what they would do to get the fire under control. The crews then needed to brief the room with a SMEAC briefing.

This saw some in depth conversations about fire behaviour, forward rate of spread, grass curing rates and command and control.

At another training event, the model supported teaching new members many different things to do with firefighting. This includes but is not limited to firefighting strategies, lighting patterns, where to park trucks, access, exposure awareness and many more useful learnings.

https://www.facebook.com/share/p/bpeA9pQyA9SSr7XS/
https://www.facebook.com/share/p/4VZjtEodY13v71E6/

Photo Tamborine Mountain Rural Fire Brigade

Birnam Rural Fire Brigade

Put the model to work by applying the Australian Fire Danger Rating System to scenarios.

https://www.facebook.com/share/p/FwEYqeYAqFKgcp9v/

Photos Birnam Rural Fire Brigade

Kalamunda Volunteer Bush Fire Brigade

Use the model for their senior firefighters to practice their skills on a simulated incident.

https://www.facebook.com/share/p/d9mi17zyfcUrY8xN/

Photos: Kalamunda Volunteer Bush Fire Brigade

Tirroan Rural Fire Brigade

Used their model as part of the community engagement activities during the Gin Gin Show.

https://www.facebook.com/share/p/bTZQE3uukJ9oxYjr/

Margaret River Volunteer Fire & Rescue Service

Used the model for a dynamic tabletop exercise involving an escalating incident requiring a coordinated multi-agency response.

https://www.facebook.com/share/p/QspdZXG5ndRYL3k9/

Coomera Valley Rural Fire Brigade

Used the model for a tabletop scenario exercise based on a large fire that had happened in the brigade area.

https://www.facebook.com/share/p/93isXt9Xm2S5zHsM/

Photos Wayne Teece – Coomera Valley Rural Fire Brigade

The Different Models & Kits

The different models and kits described in this section include:

The Models

Kits

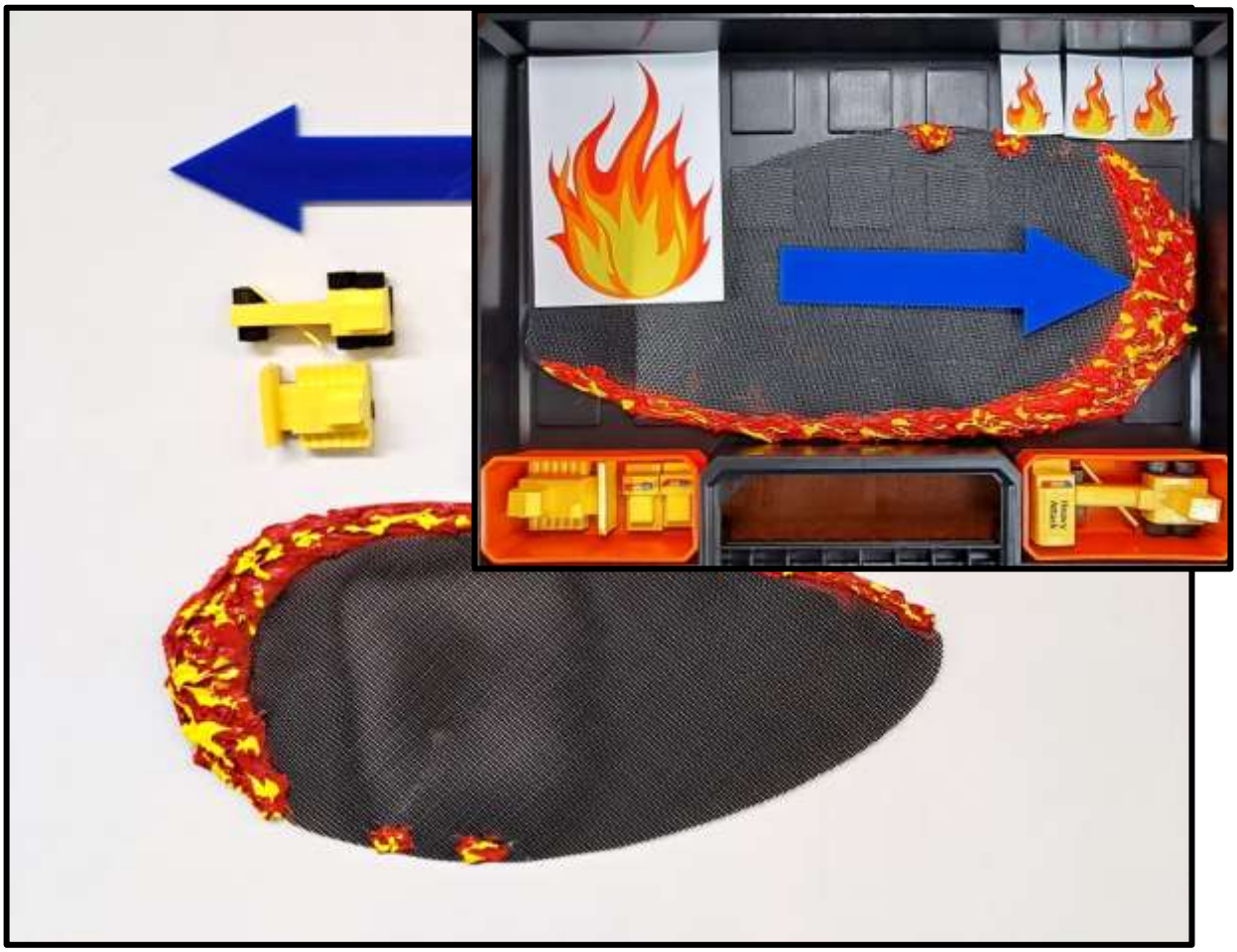
Whiteboard Model

Several items are suitable for use on whiteboards and are included in a stand-alone whiteboard model.

This model is used to deliver clearer images while reducing time spent drawing and cleaning whiteboards. It contains:

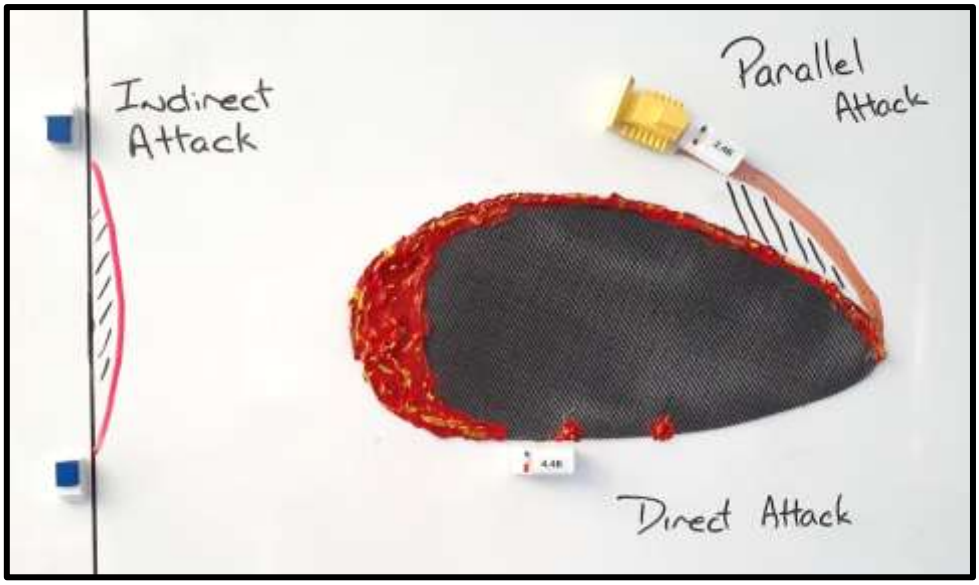
- Appliances (state specific)
- Bulldozer
- Farm firefighting unit
- Fire shape
- Fire Image
- Grader
- Spot fires (images)
- Wind direction arrow

The model is used to quickly produce clear pictures on whiteboards.

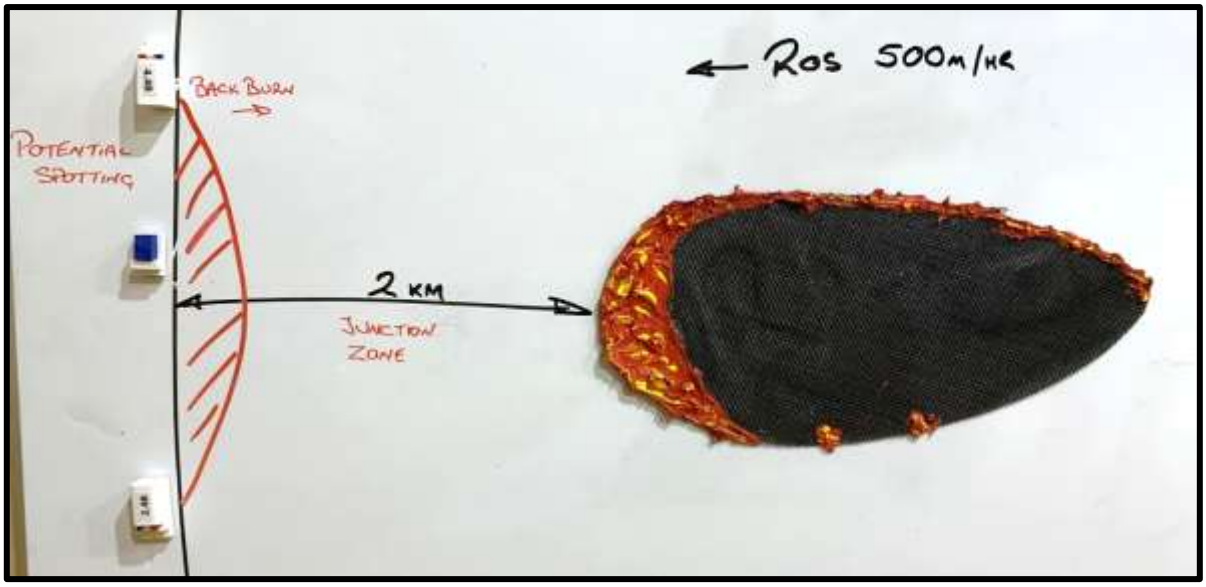


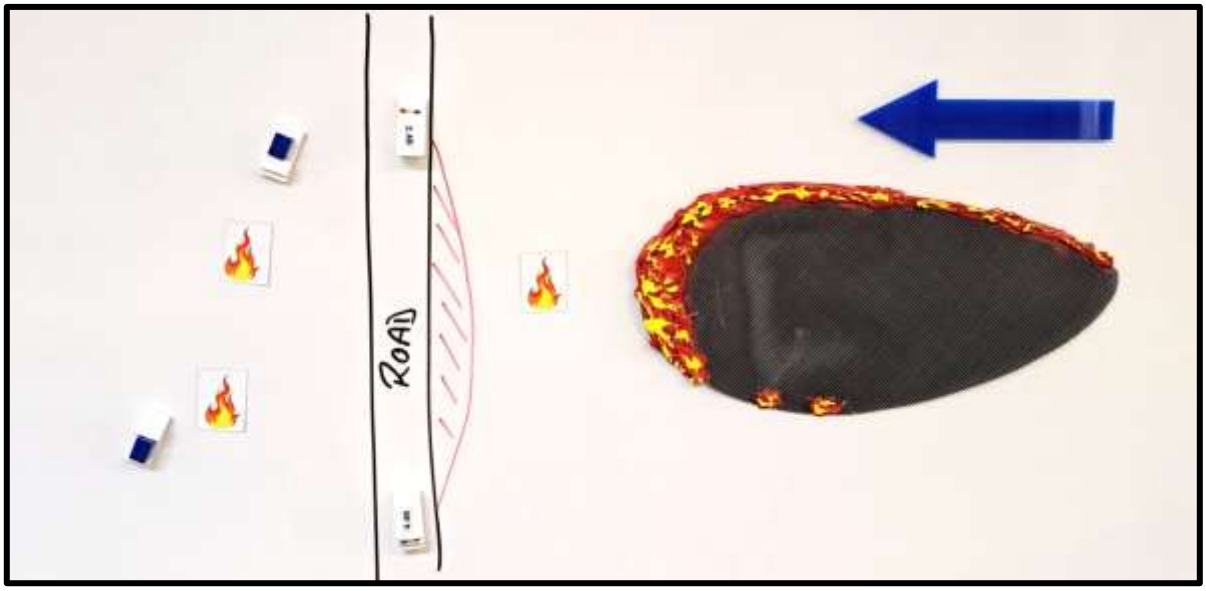
All components are contained in a carry case.

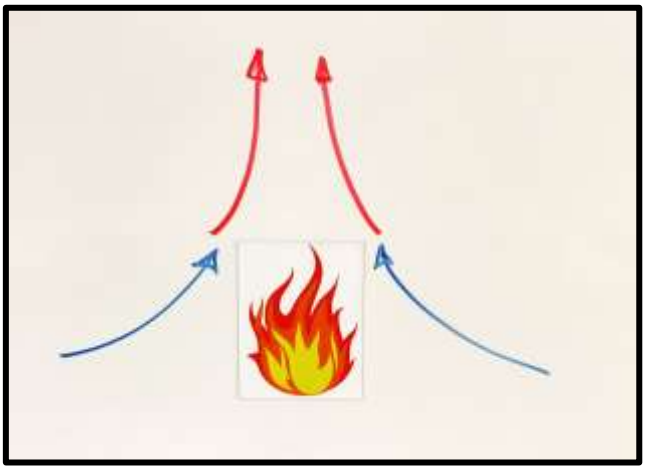
Text and items are used to clearly convey concepts on whiteboards.



Demonstrating forward rate of spread and planning for a backburn. Junction zone, spotting and resource positioning.


ROS 500m/hr
BACK BURN
POTENTIAL SPOTTING
2 KM
JUNCTION ZONE


ROAD



Urban Model

The Urban Model is a custom build for the Queensland Fire Department, Fire and Rescue Service.

The model can re-create an extensive range of urban incidents, including those in residential, high-rise, commercial, and industrial settings. Instructors can discuss specific aspects of incidents while also describing the larger picture.

Possible scenarios include:

Structure fire

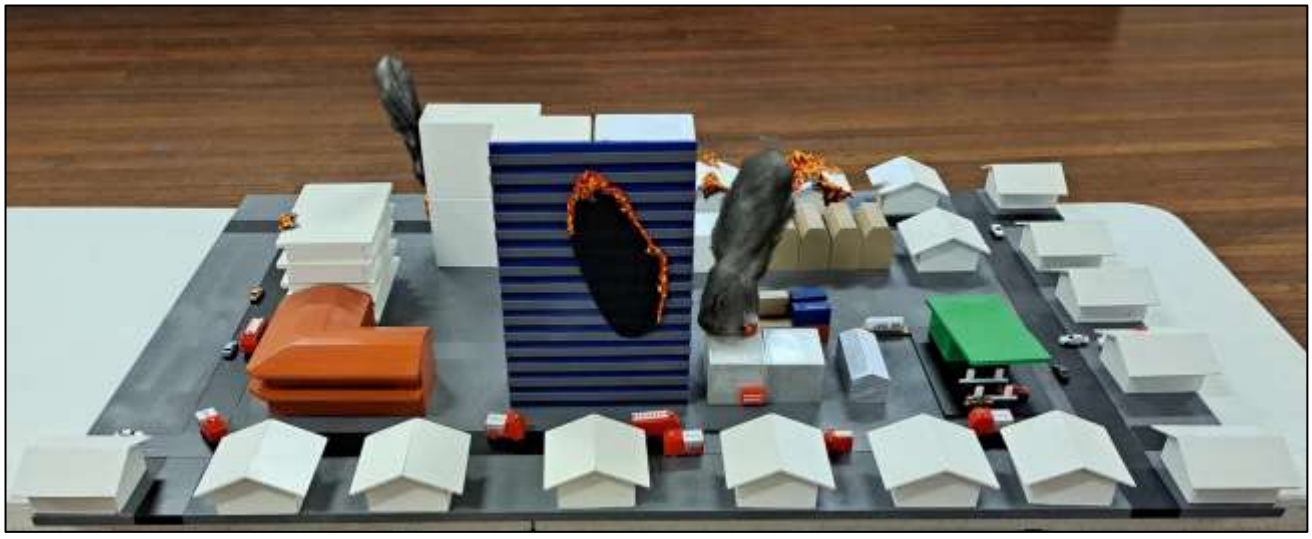
- House
- Warehouses
- Shopping complex
- Hotel (two-level)
- Shop (single level)
- Block of flats / apartments
- Townhouses (two-level, attached dwellings)

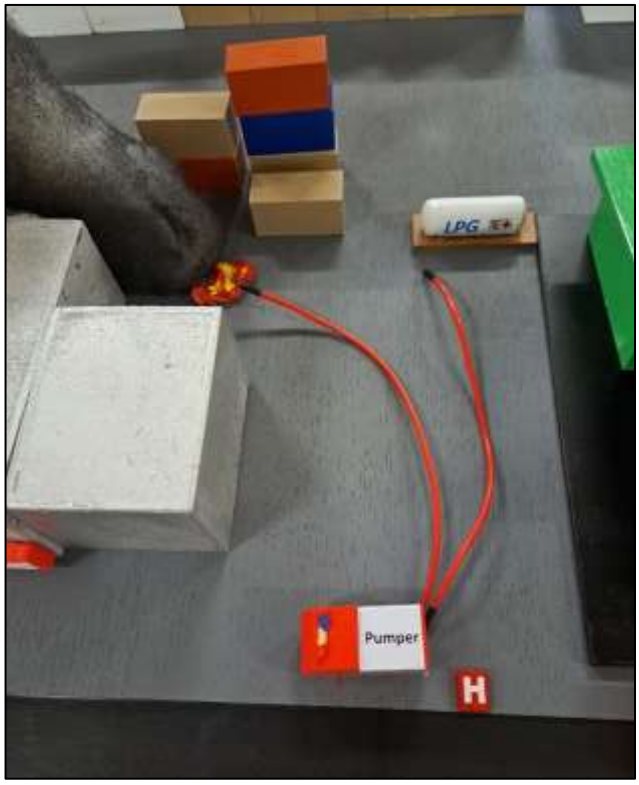
Vehicle fire

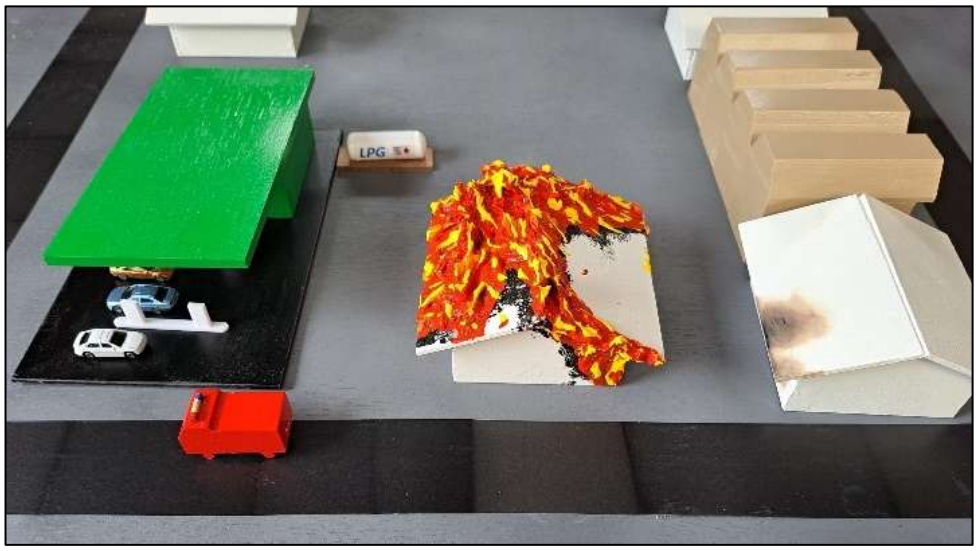
Crash:

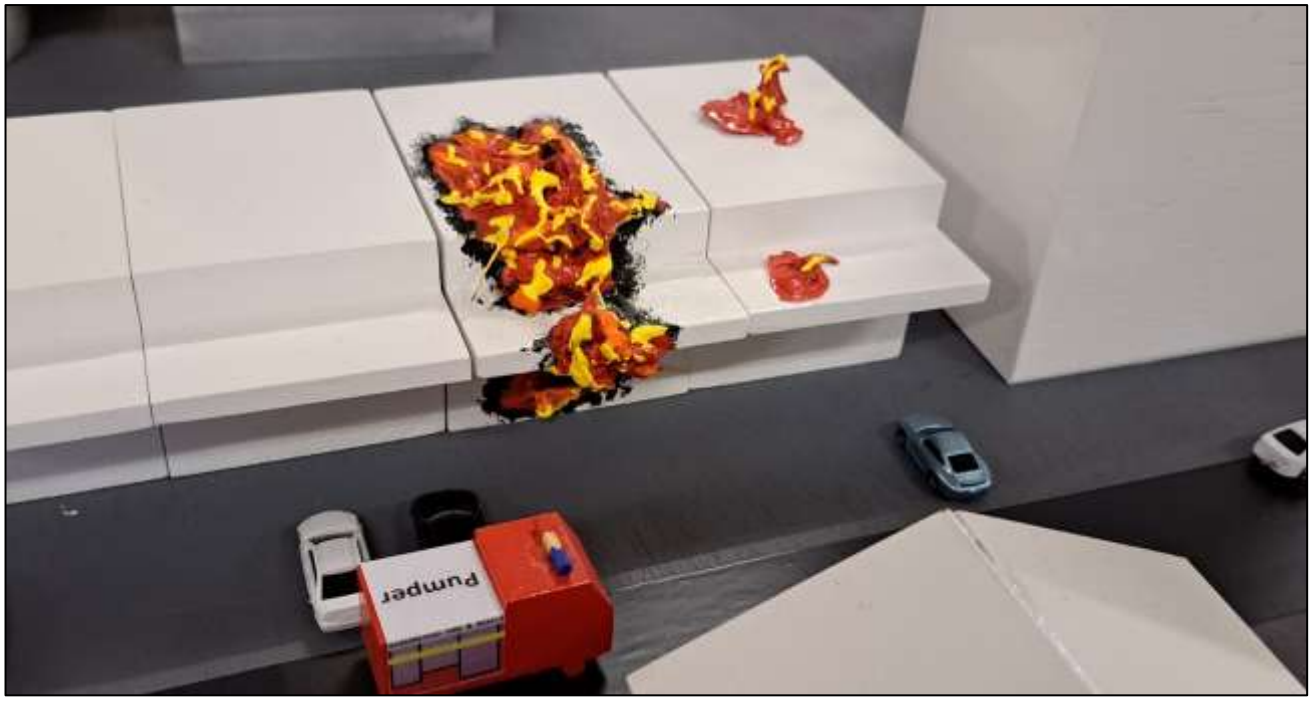
- Car v train
- Car v bus
- Multiple vehicle
- Light aircraft

HAZMAT

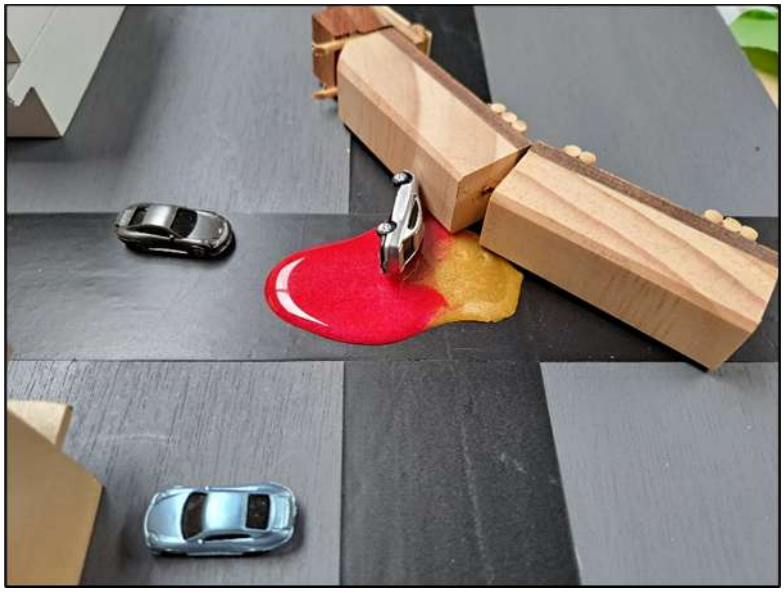



LPG
Pumper
H


LPG


Pumper

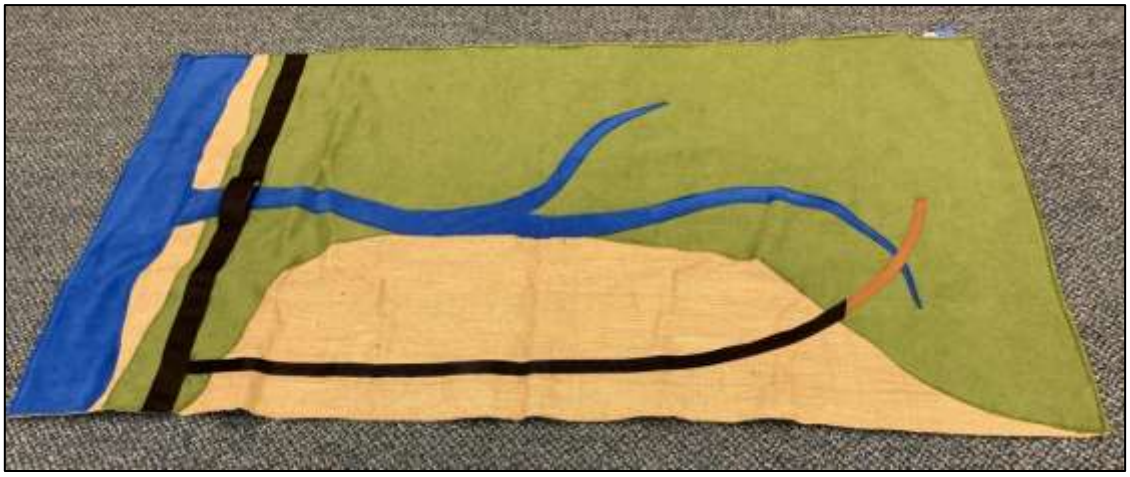

Rescue



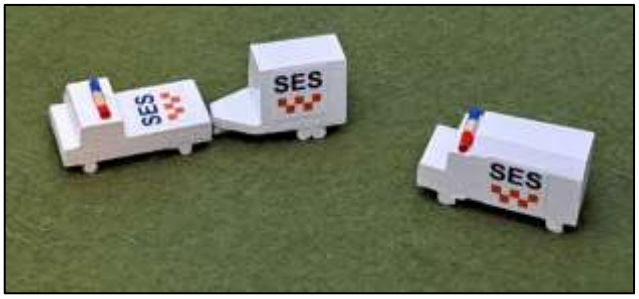
Emergency Services Model

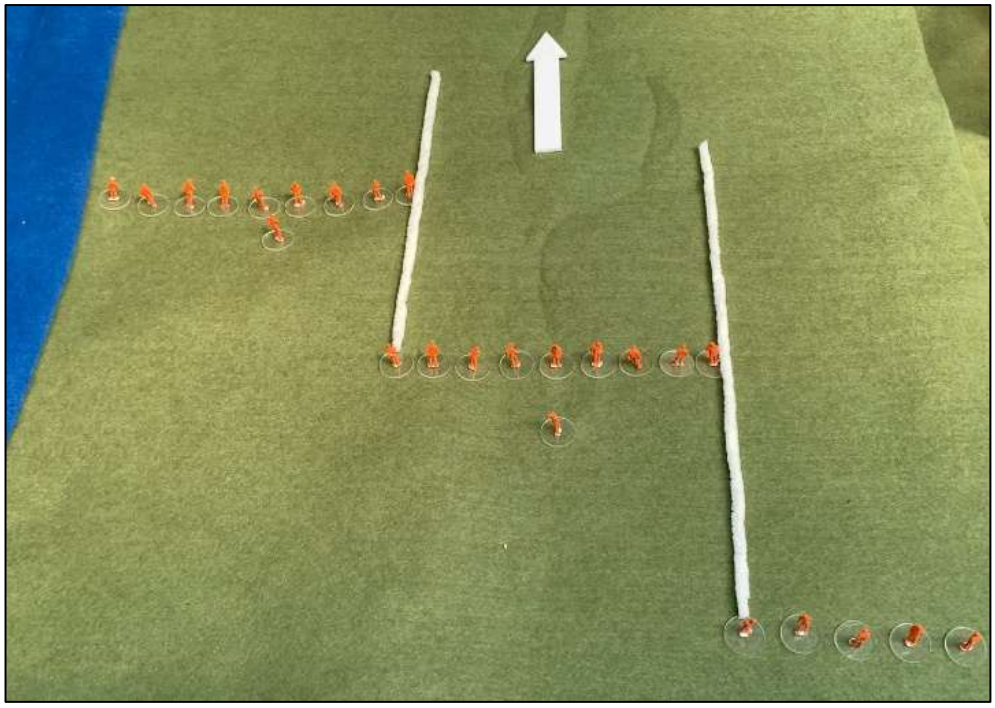
The Emergency Services Model was designed on request from the Queensland State Emergency Service and covers a range of incidents and actions including:

- Severe Weather
- Land Search
- Fire
- Crash / Rescue
- Community Warnings
- HAZMAT

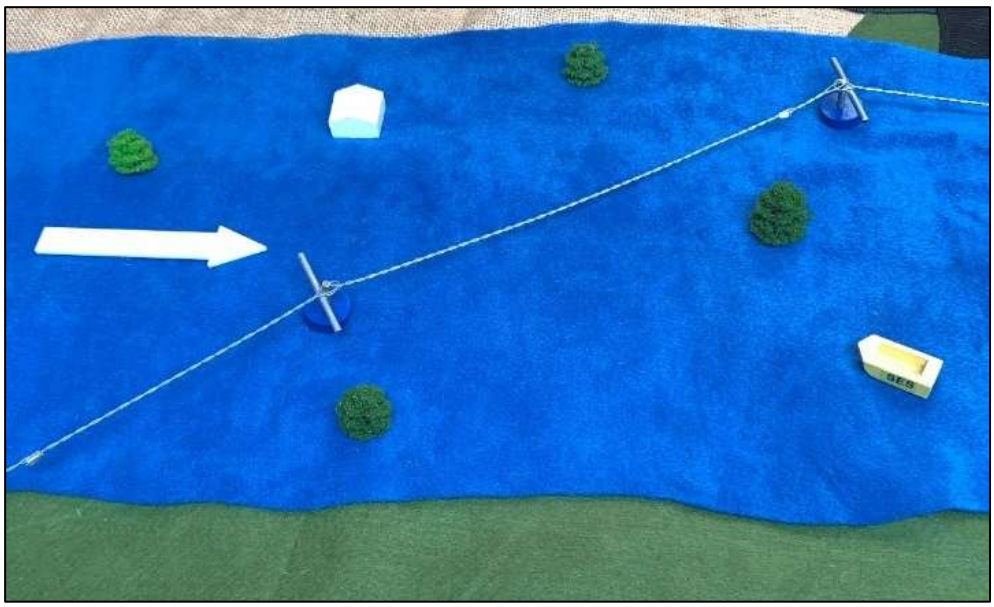


Riverine mat – river feeding into larger river or flowing to coast / ocean.





Land Search – search pattern



Flood scenario

Kits

HAZMAT Kit

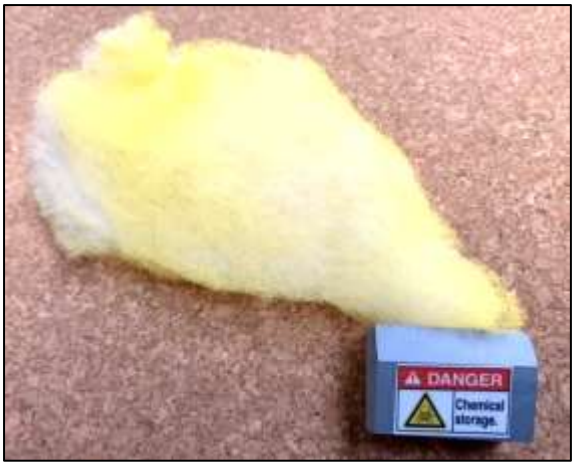
The HAZMAT Kit can be used with most models, however it comes into its own when used with the Urban Model. Items within the kit include:

- Bulk storage tank
- Bunding
- Casualty (red, yellow, orange)
- Demarcation lines – hot, warm & cold zones
- Demarcation lines – plume / threat zones (red, orange and yellow)
- Chemical products
    - Chemical drum
    - Chemical drum – leaking
    - Chemical 1,000 litre IBC Container
    - Gas / vapour cloud
    - Plume
    - Liquid spill (single product small, medium and large)
    - Liquid spill (two products mixing)
    - Liquid spill off-gassing
    - Powder / granules spill
- Truck (Four Axle Rigid)
- Truck (road train)
- Wind direction arrow (small blue)

These items can be used to create HAZMAT scenarios or be included in bushfire exercises to add complexity and support discussions about:

- approach routes
- assessing the scene
- product identification and specialist advice
- firefighter safety and PPC / PPE
- public safety
- site layout and corrective actions
- product recovery and
- decontamination

Firefighters have used small dangerous goods placards to add product identification detail to incident scenarios. Further coloured lines have also been used to show hot, warm and cold zones as well as plume modelling.



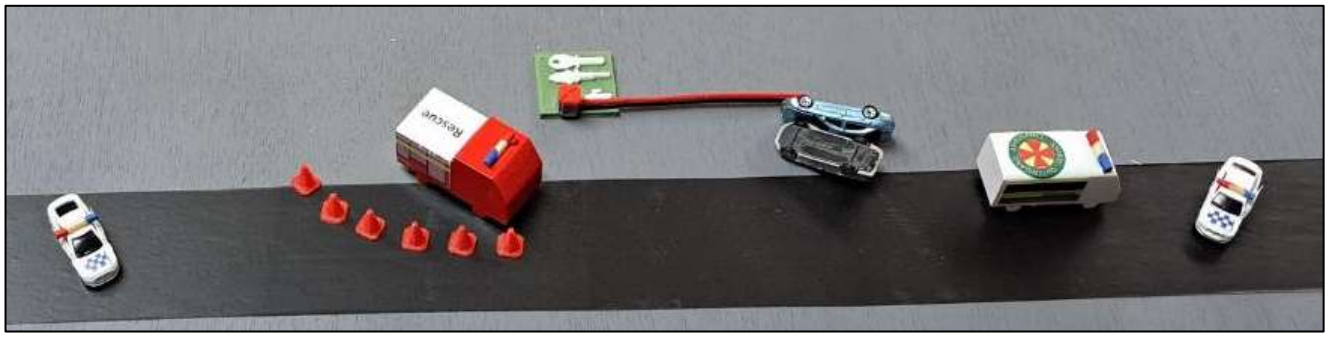
Vapour cloud is used to discuss safe approach and appliance positioning. It can also be placed over / near the LPG bullet to indicate release of product.

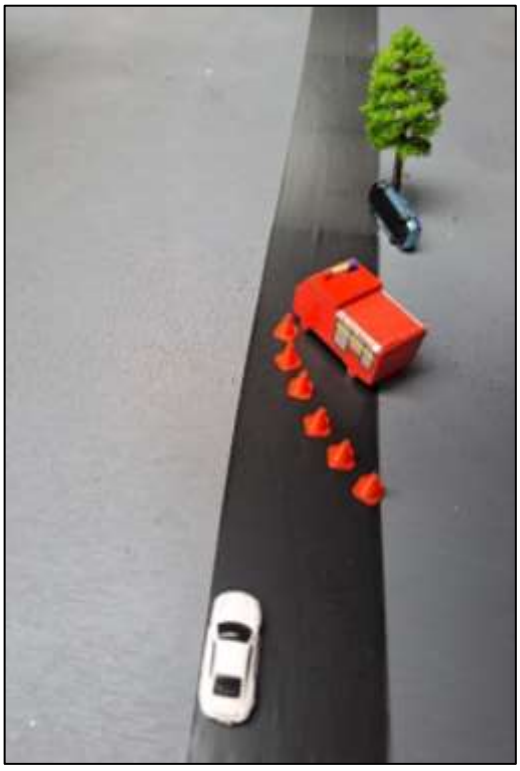
The casualty figure can be used to discuss rescue operations.

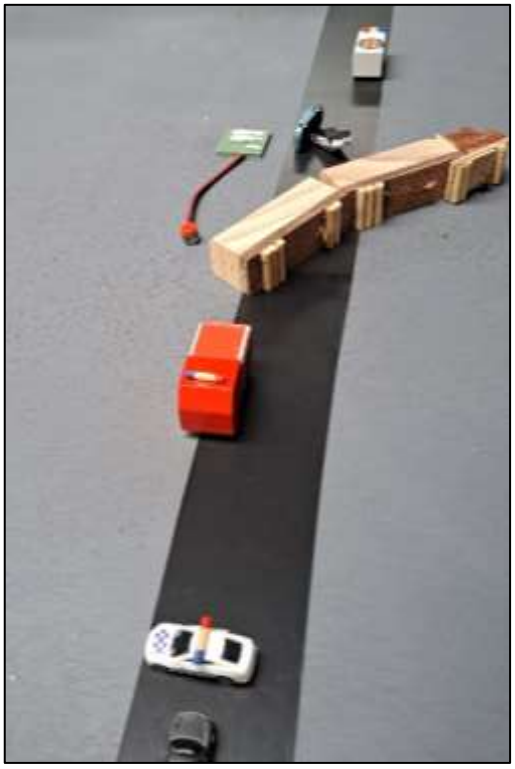
The goods train is a custom build that can add a level of complexity to rescue and crash scenarios.

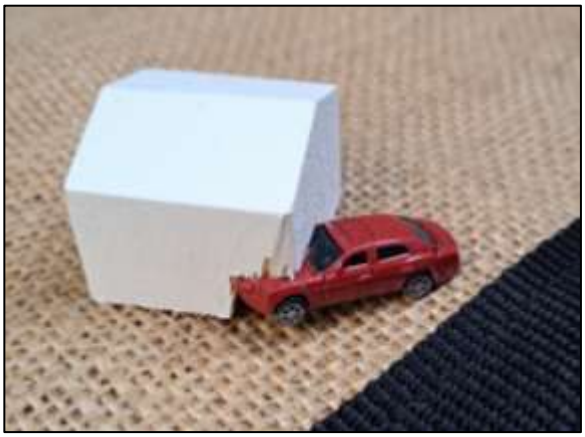
Crash / Rescue Kit

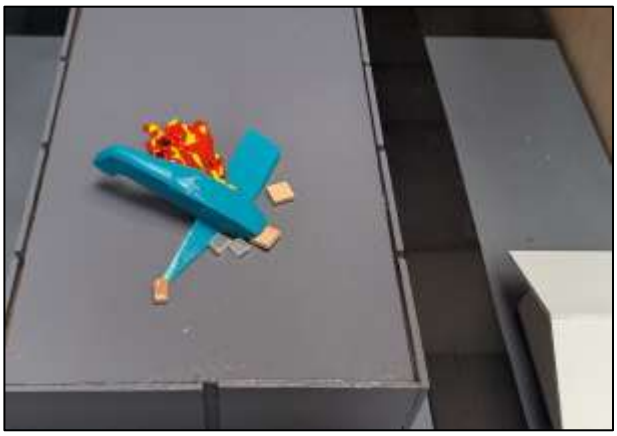
The Crash / Rescue Kit can be used to create crash scenarios involving aircraft, cars, busses and trains.












Rescue

Please contact us if you would like more information on the range of models and kits available.

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