

## **PERIL:** Toolkit for the design of wildfire trigger buffers in WUI evacuations

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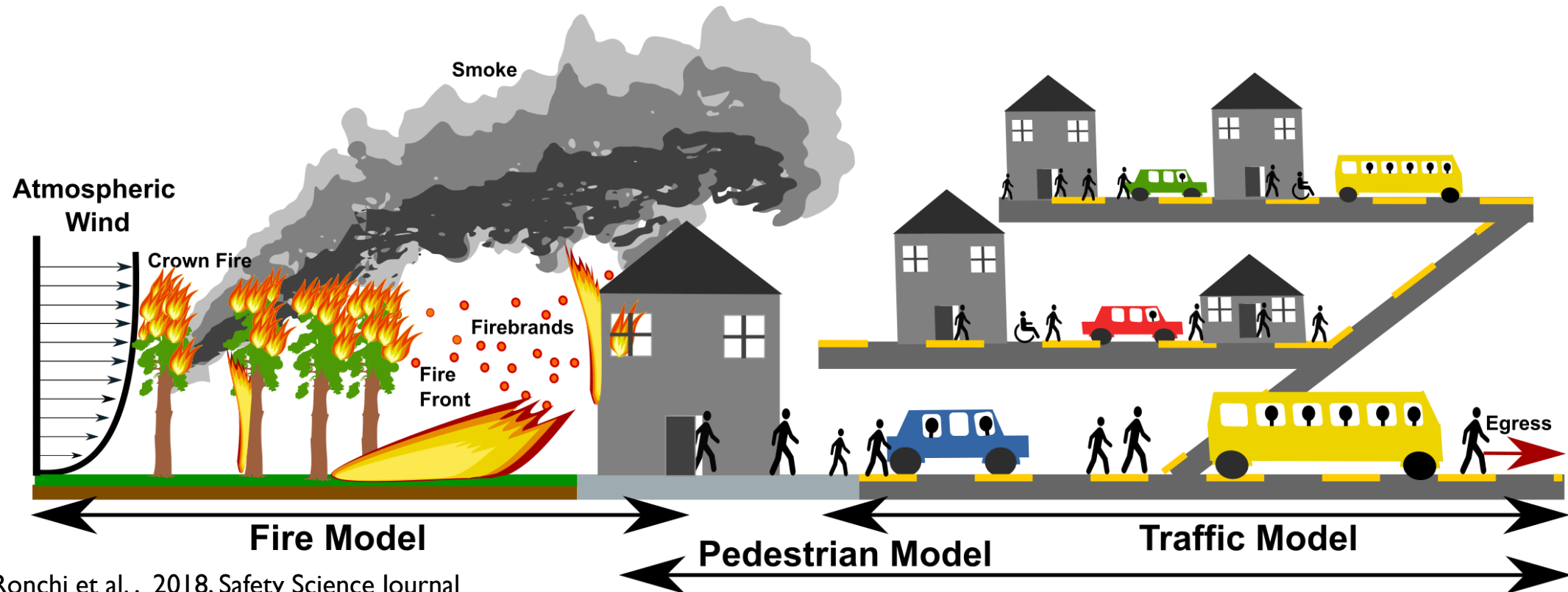
**IMPERIAL**  
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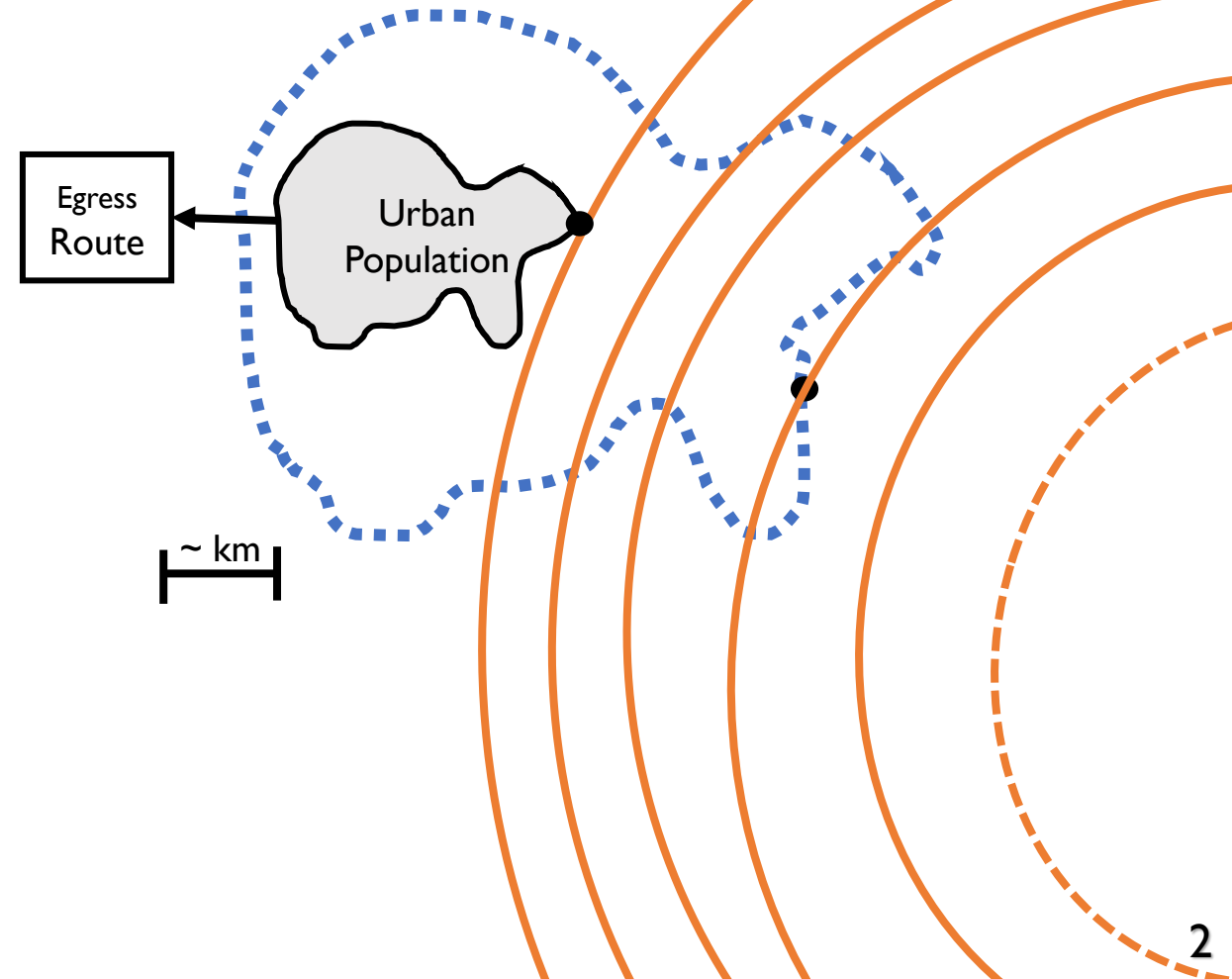
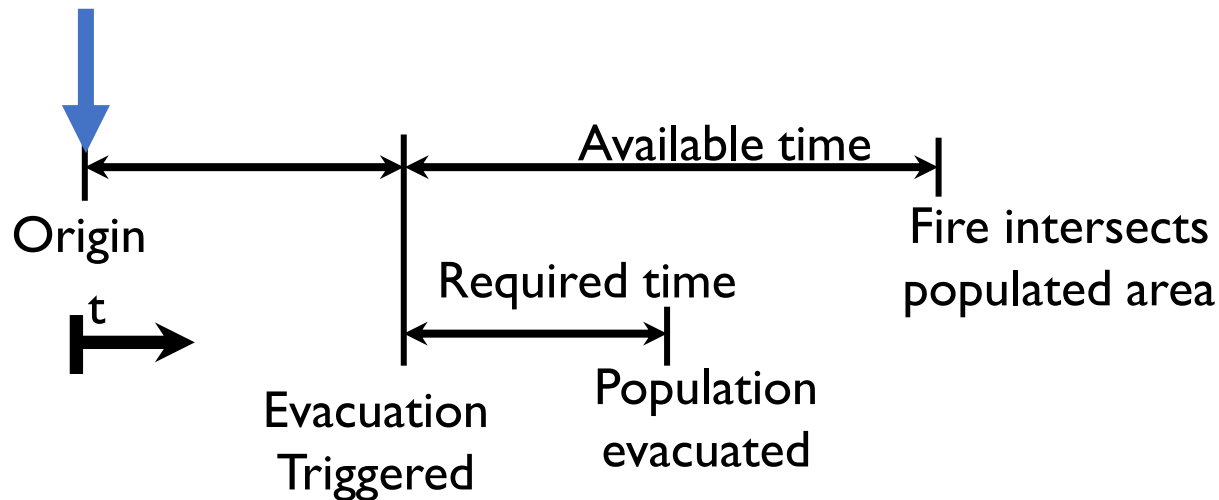
# Background

- Wildfires impact millions of people annually
- When is a safe time to call for an evacuation?

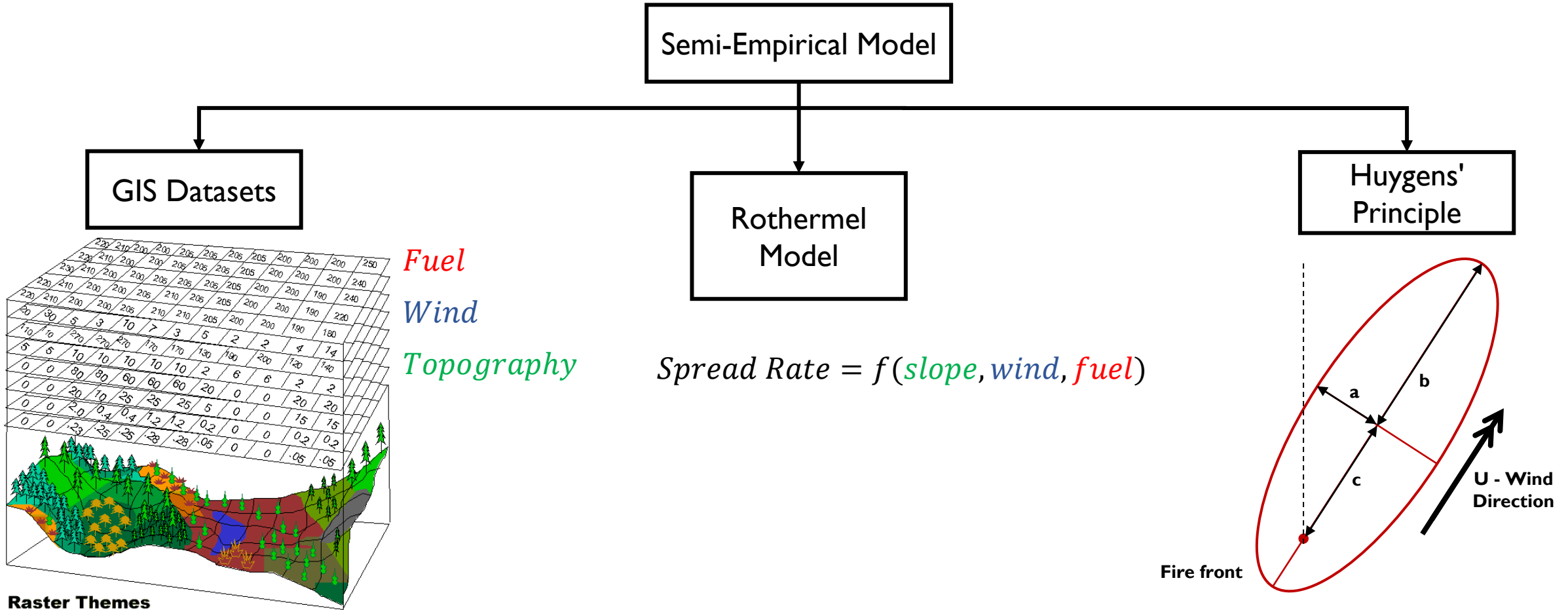


# Evacuation timescale

- Available safe evacuation time
- Required safe evacuation time

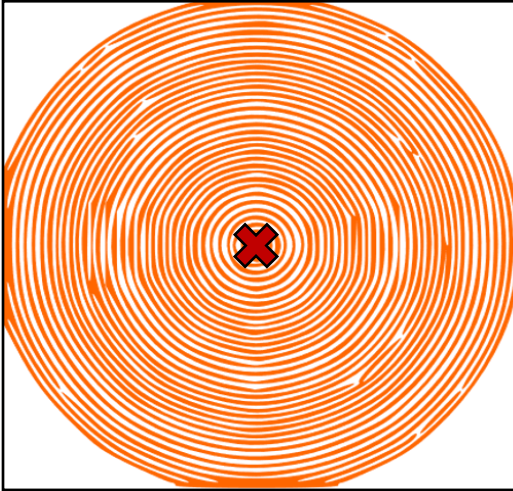


# Wildfire Modelling

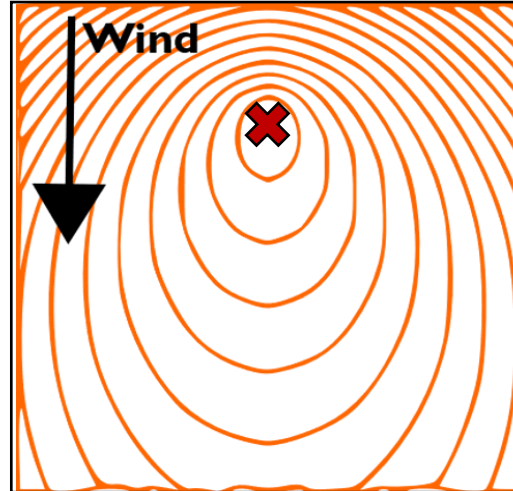


# Wildfire Test Scenarios

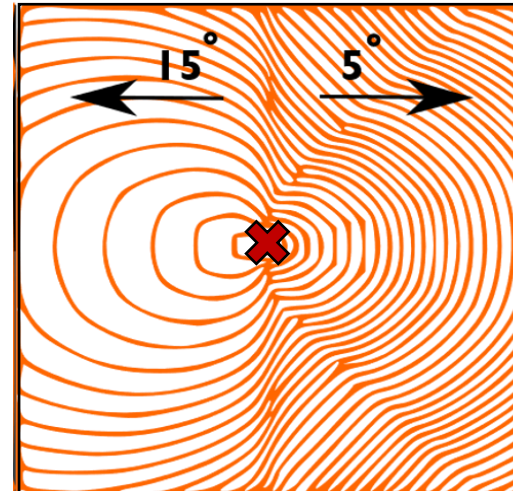
Homogeneous



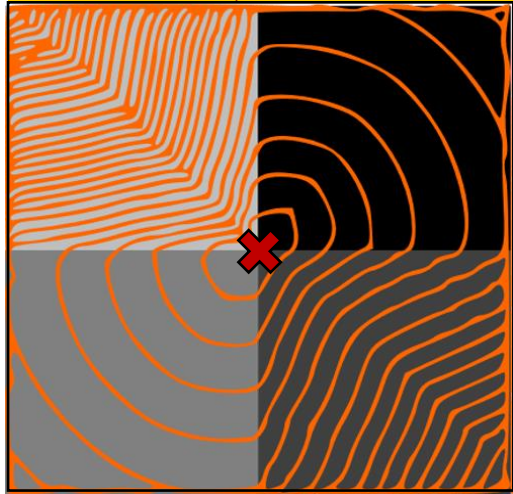
Wind



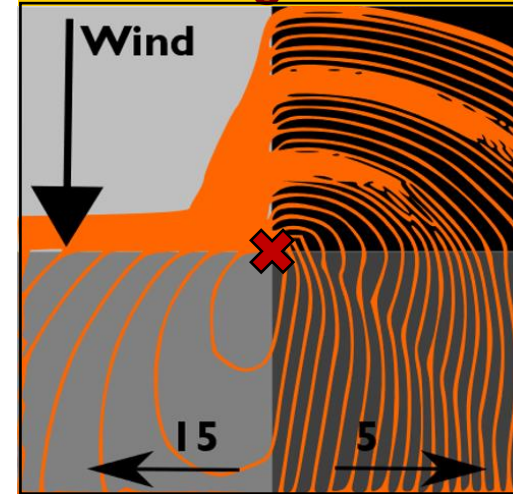
Valley



Fuel Quadrant

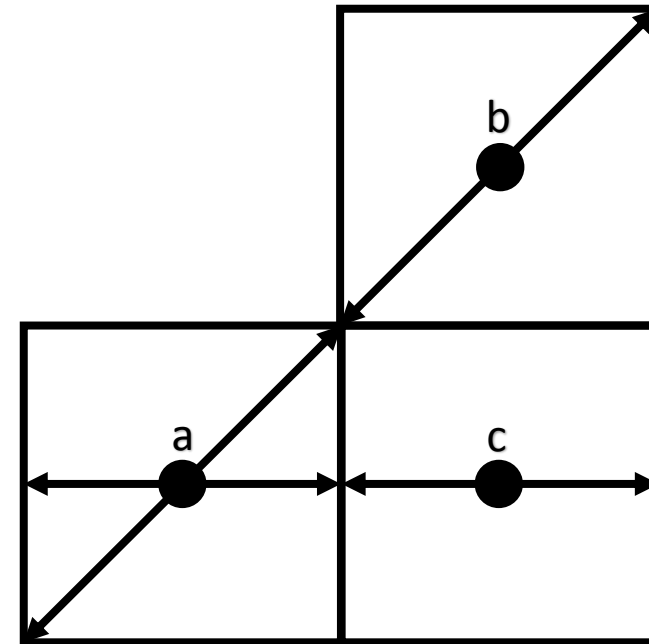
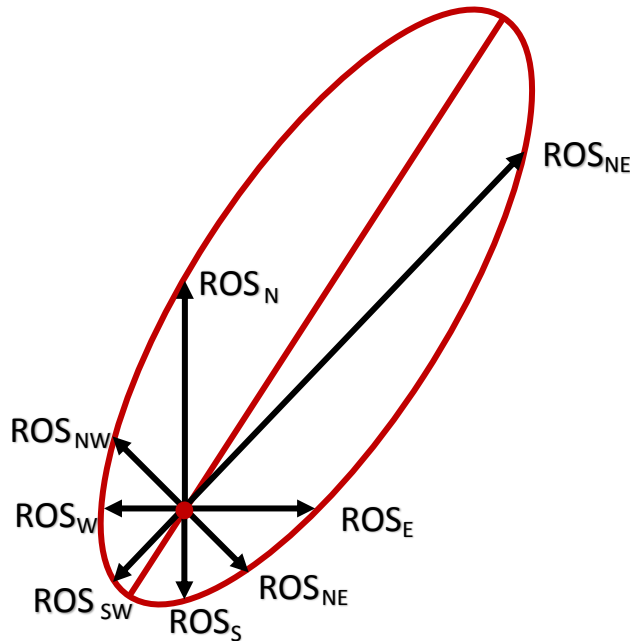


Heterogeneous



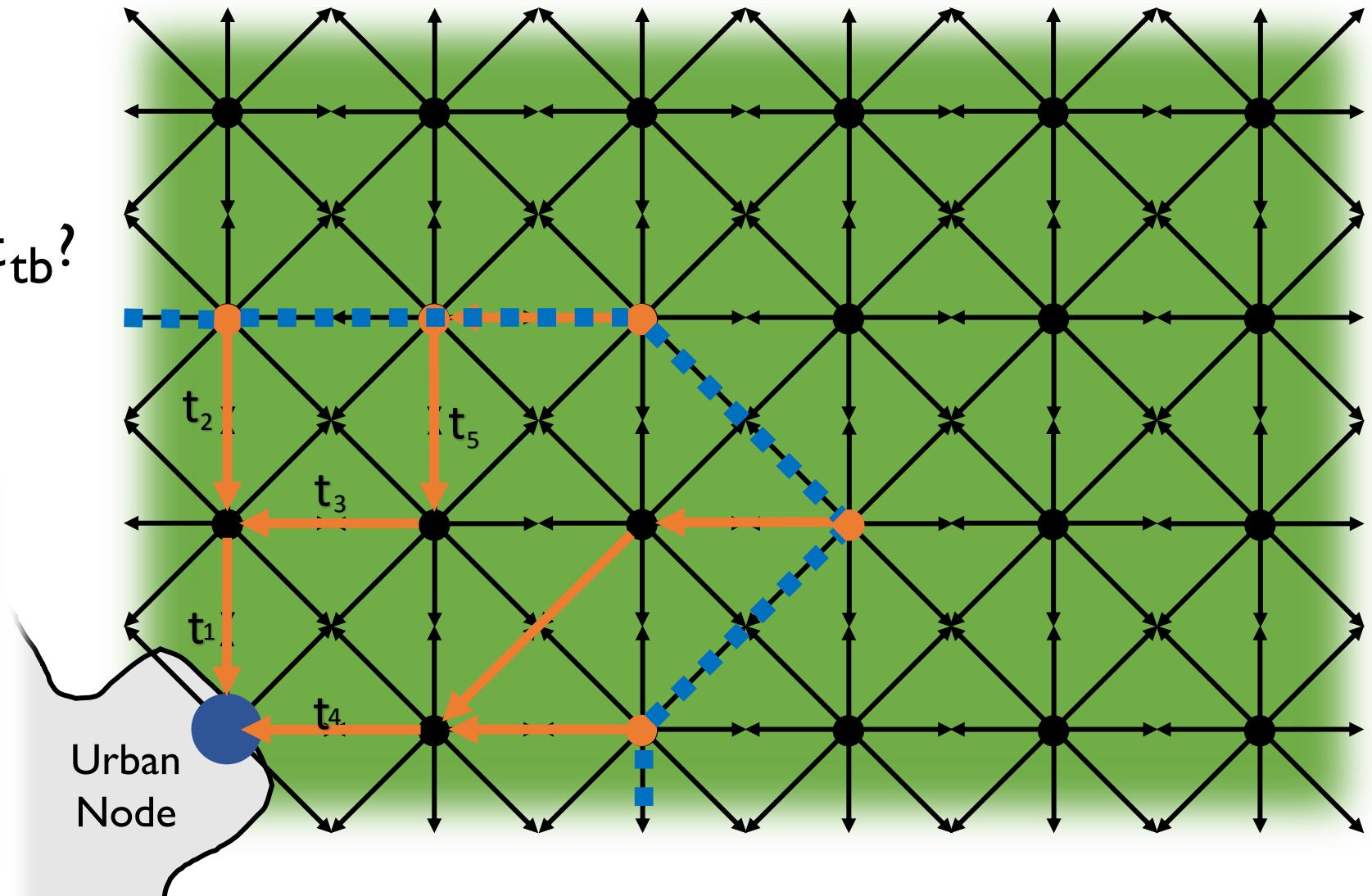
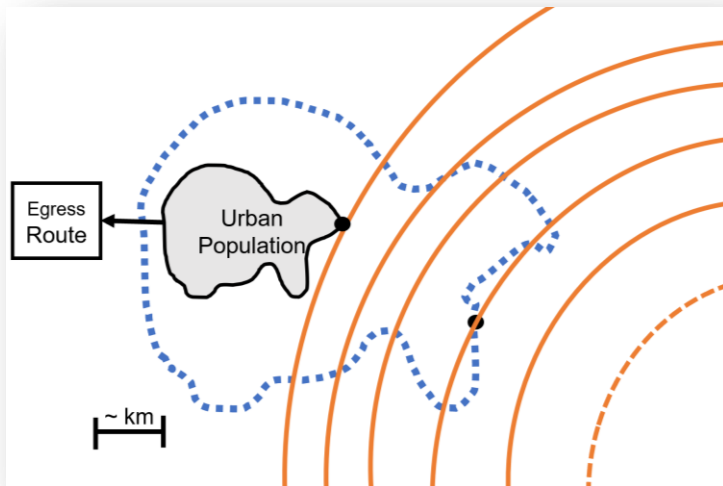
# Methodology

- Single wildfire spread scenario run in FARSITE
- Direction and rate of fire spread taken from FARSITE
- Calculate travel times between adjacent GIS cells



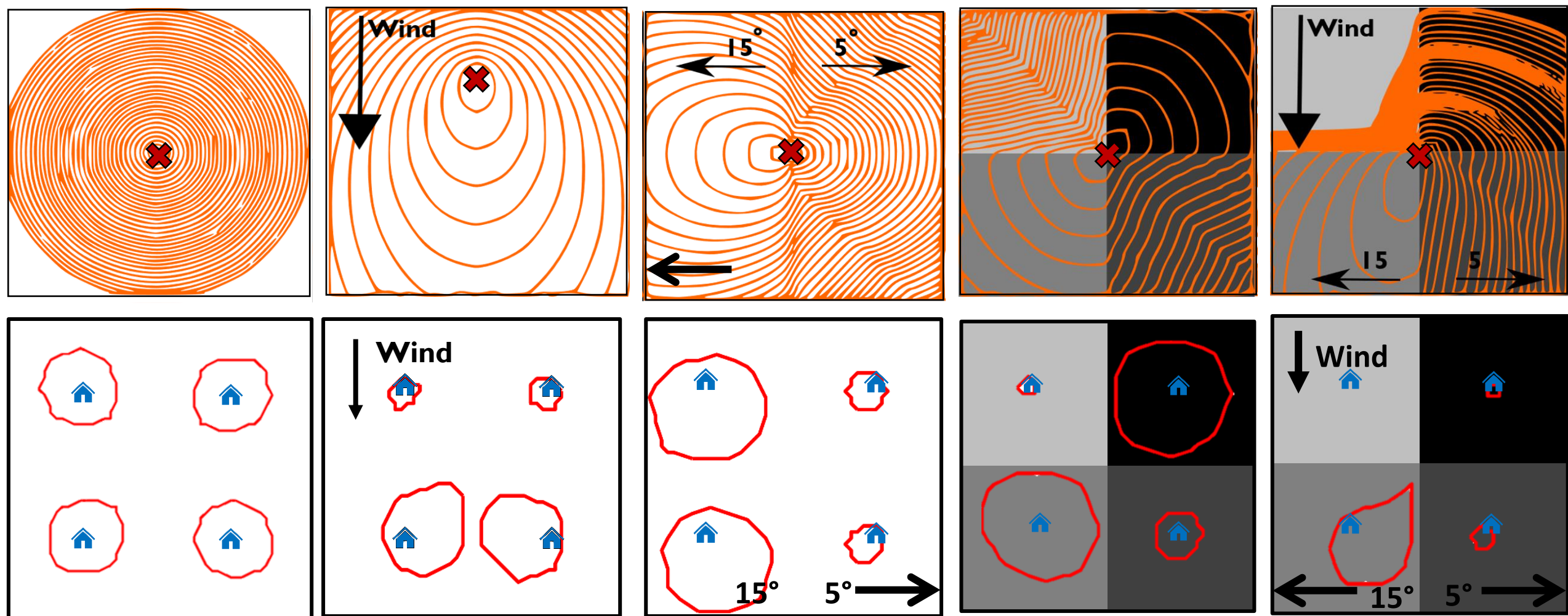
# Methodology

- Travel time network
- Shortest Path algorithm
- is shortest travel time  $< t_{tb}$ ?





# Application to Test Scenarios

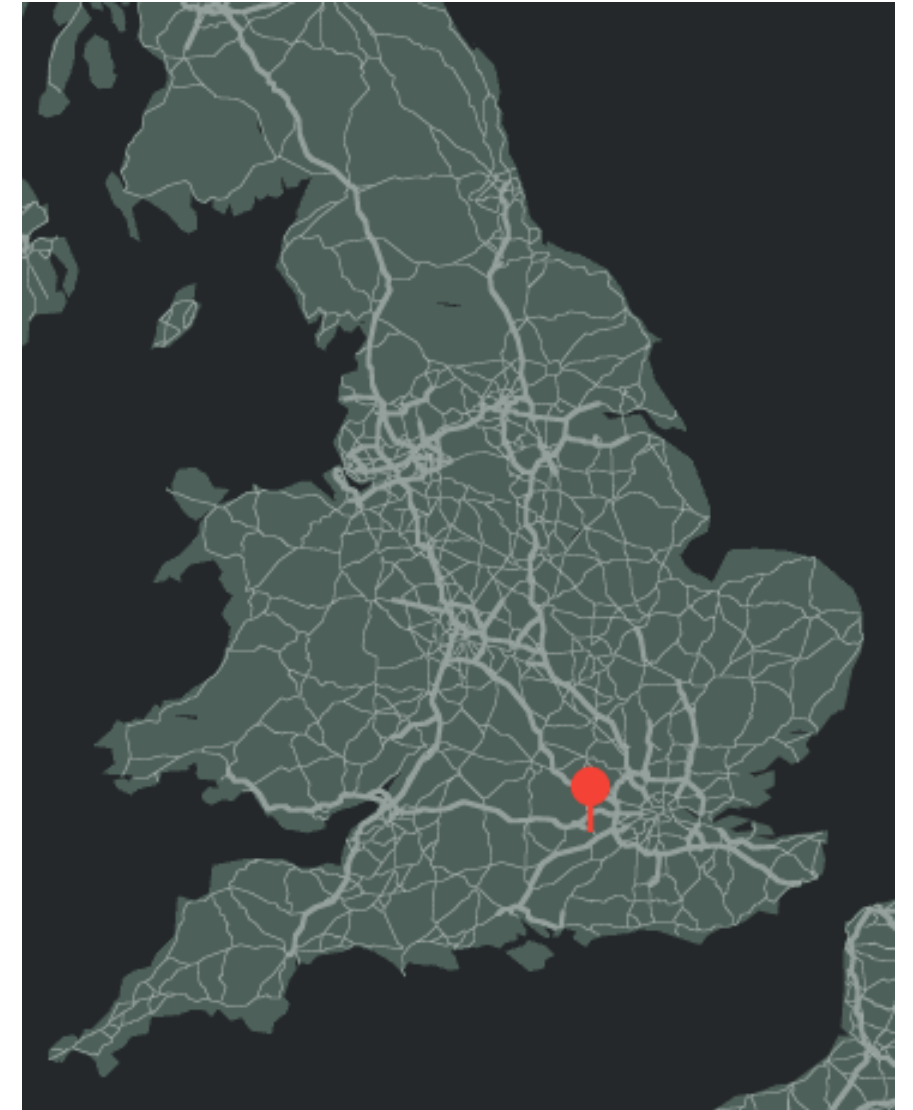




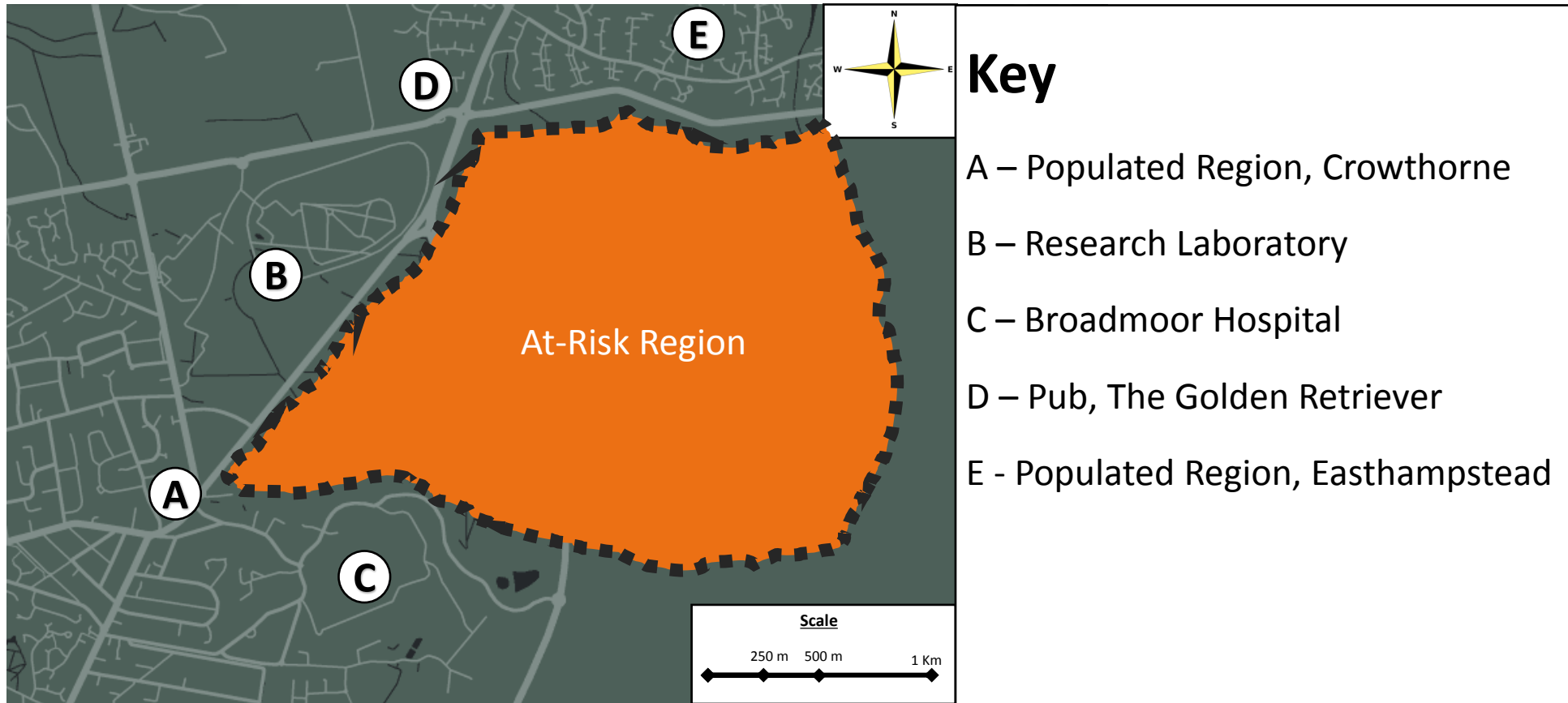
# Swinley Forest : Wildfire Case Study

- Largest wildfire recorded in Berkshire, UK
- Caused evacuation of 13 residences
- 165 Ha burnt
- Calibrated wildfire model (Smith, 2015)

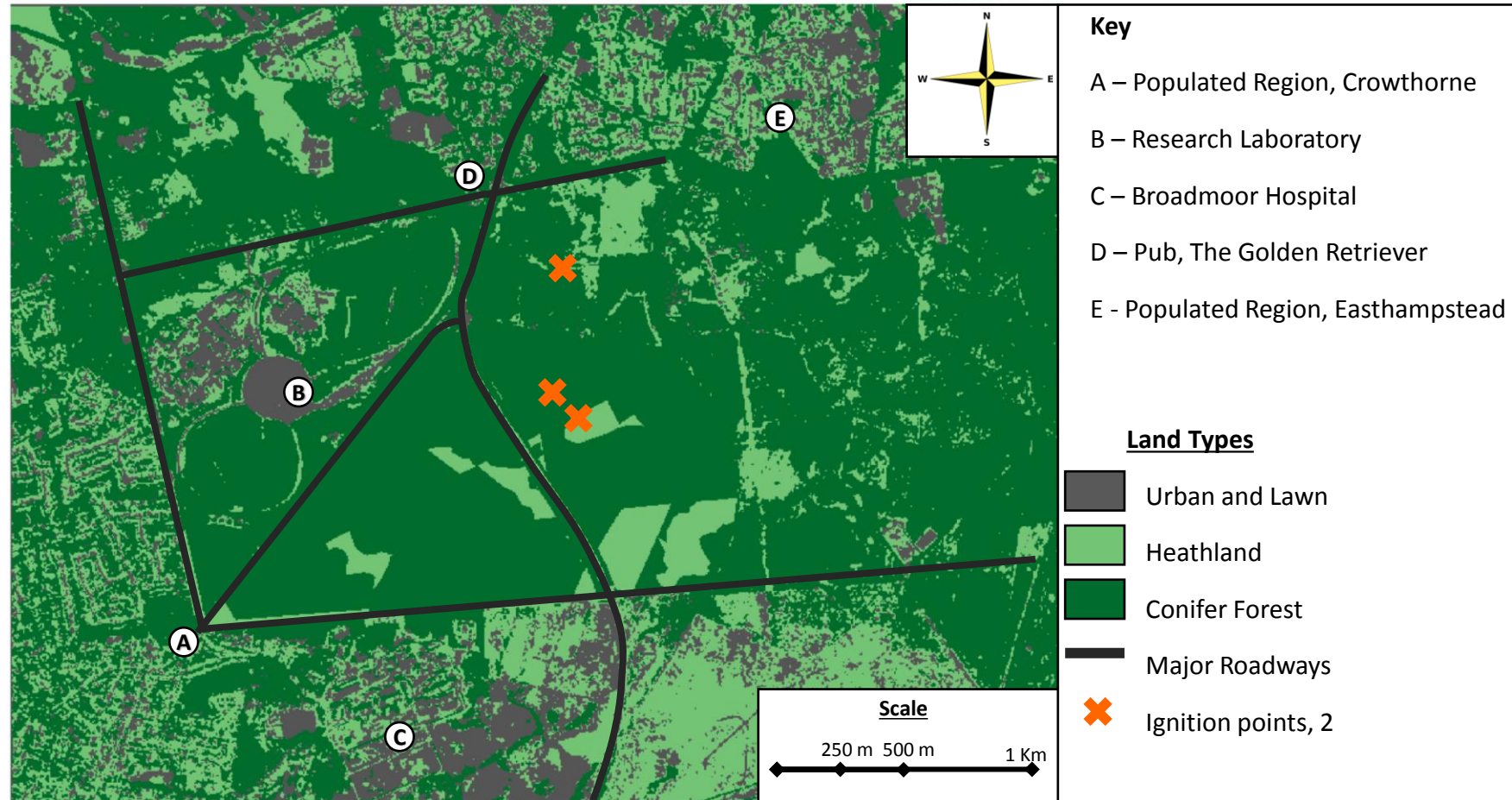
*Summary: UK, Small wildfire, well studied & modelled*



# Swinley Forest : Wildfire Case Study



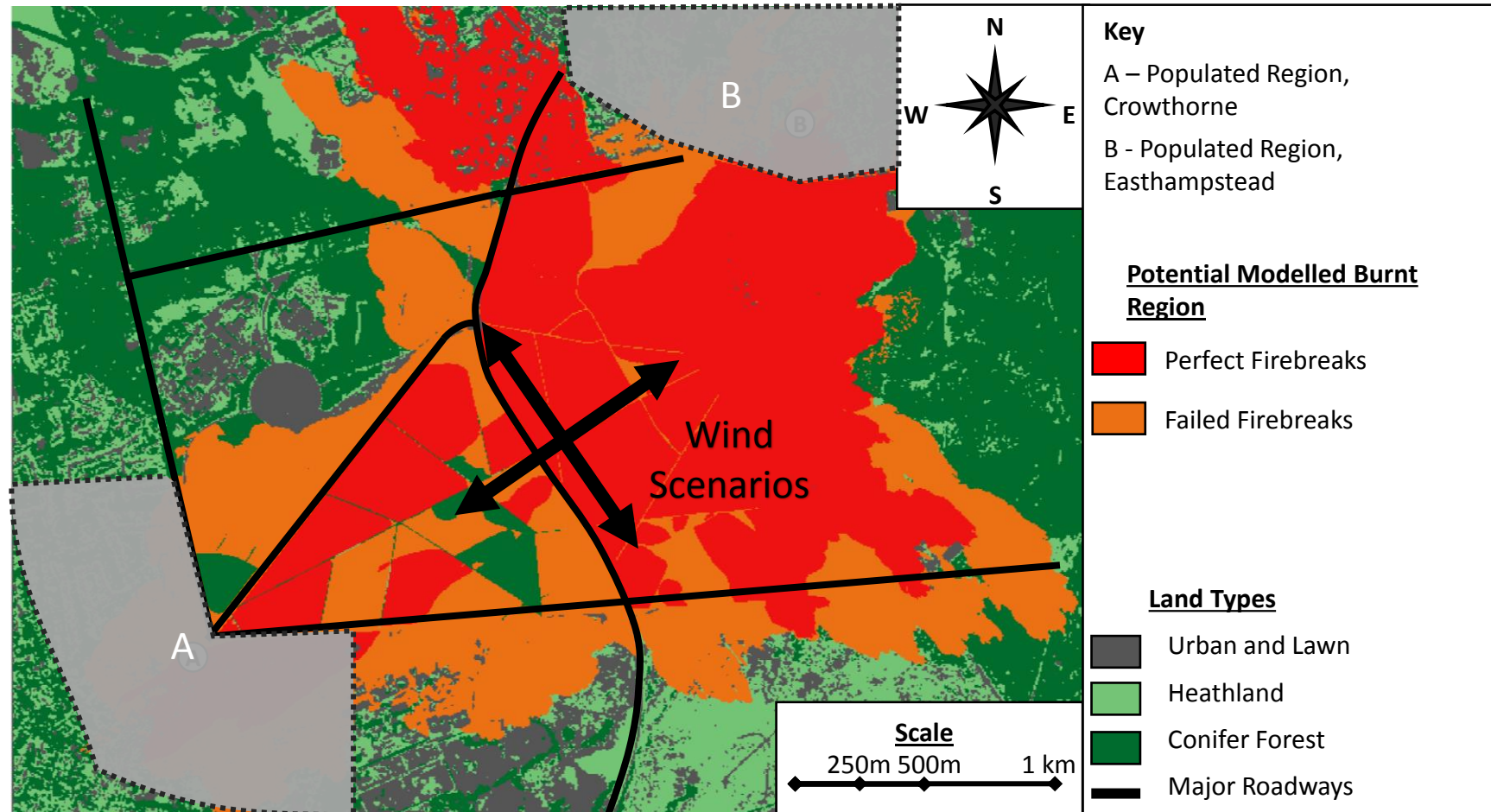
# Swinley Forest : Wildfire Case Study



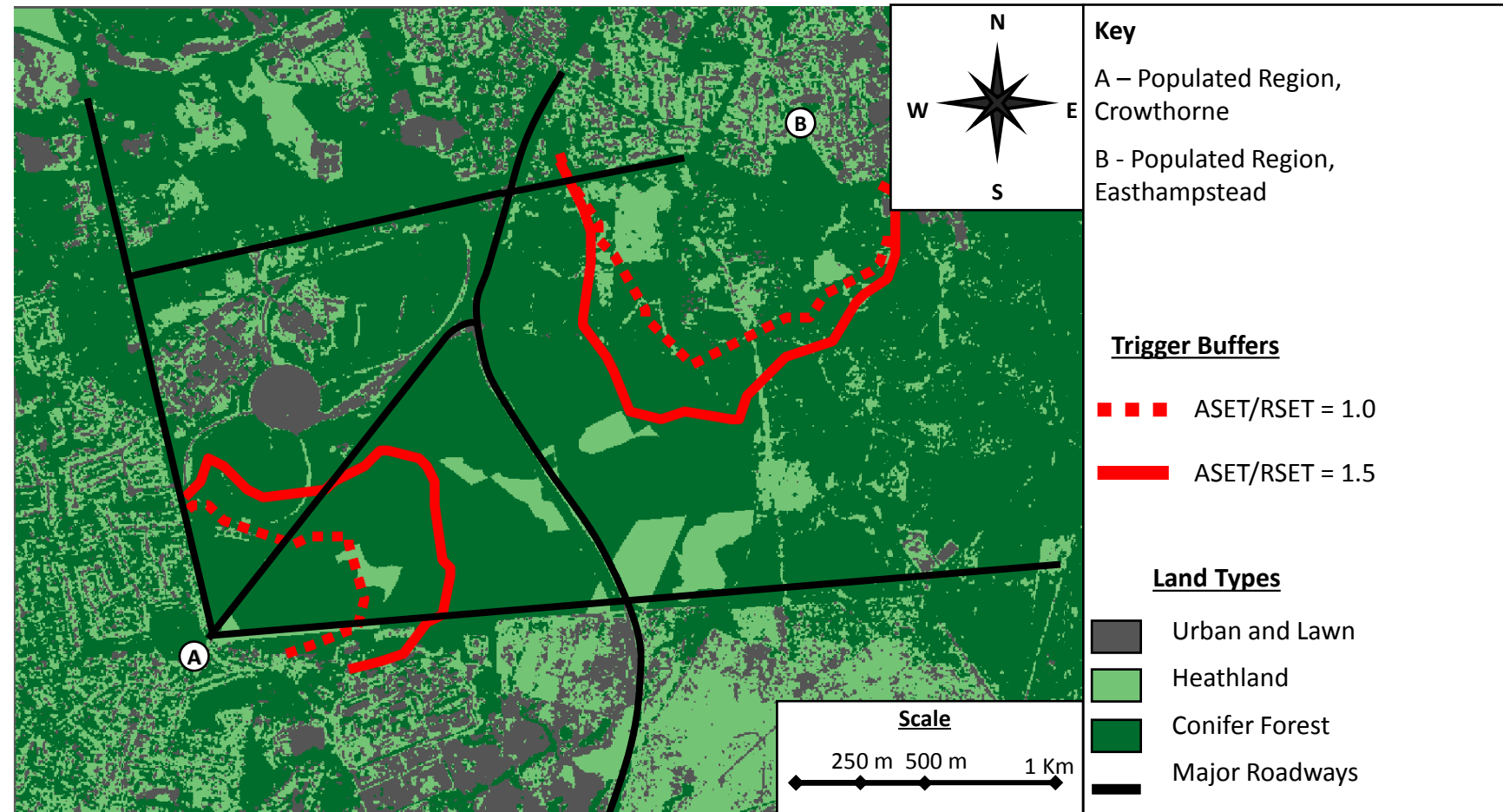


# Swinley Fire Model

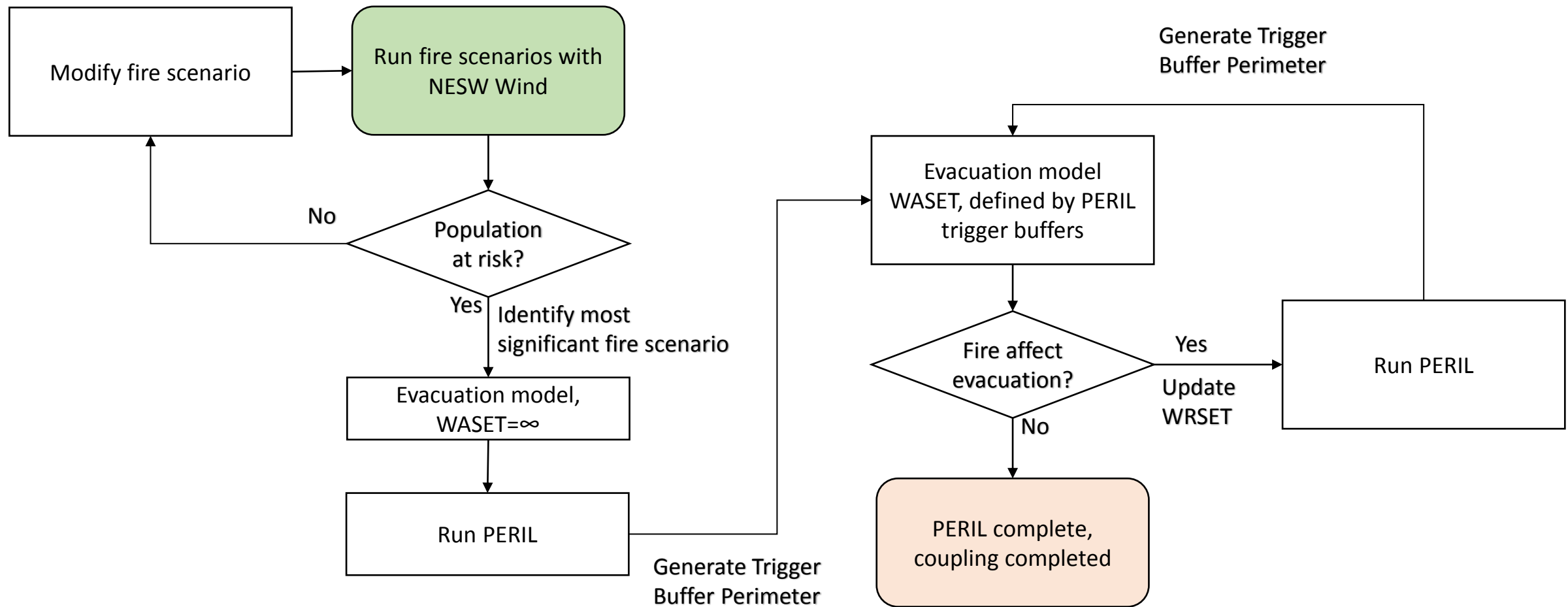
- Multiple fire scenarios
  - Prometheus fire model
  - Fuel/Topography/Wind
- Perfect/Failed Fire Breaks
- Safety factor



# Swinley Trigger Buffer Perimeters



# Evacuation Model Coupling





# Summary

- PERIL developed (Population Evacuation Trigger algorithm).
- Tested using simplified fire scenarios.
- Applied to UK case study (Swinley Forest, 2011) to develop unique trigger buffer perimeters.
- Development of iterative coupling with Evacuation models
- PERIL has potential to be applied worldwide to inform WUI wildfire strategies.



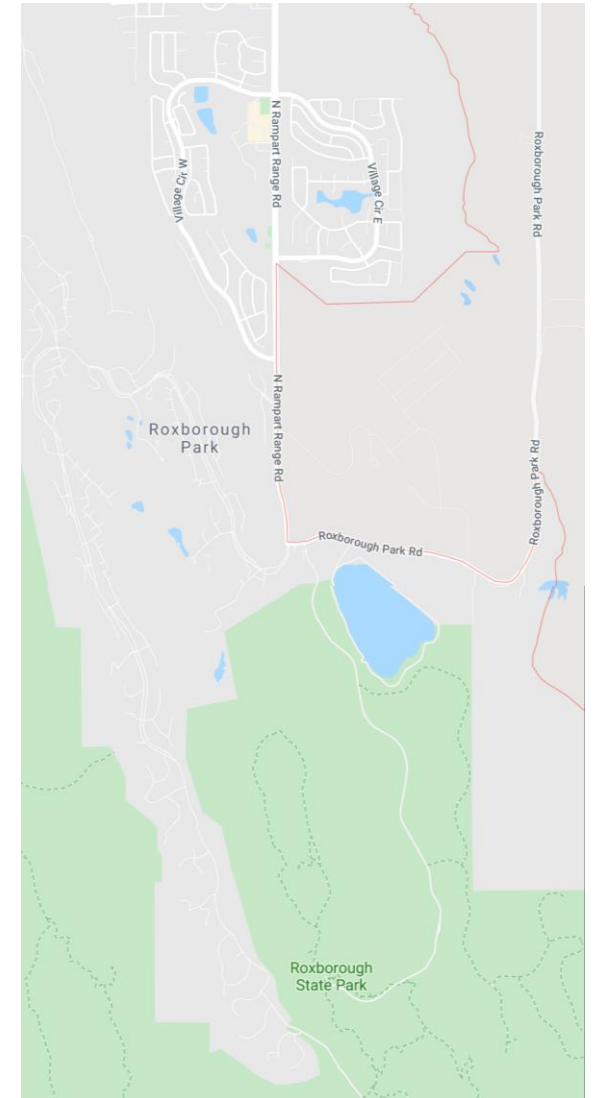
Thank you for listening!



# Roxborough– Evacuation case study

- Colorado, USA
- Evacuation drill ran to determine community evacuation behaviour and required evacuation time

*Summary: USA, large WUI community, evacuation drill*





# Roxborough– Evacuation case study

- Trigger buffer generated for populated region B using required evacuation time from evacuation drill

