Use of Decision Support Tools for Bushfire Risk Management in NSW

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NSW Rural Fire Service

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Definition

❑ Decision support tools or decision supporting systems are interactive computer-based programs that aid users in decision making

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Why Use Decision Support Tools?

- ❑ Aid human cognitive deficiencies
- ❑ Support choice among well-defined alternatives
- ❑ Employ artificial intelligence methods to heuristically address problems that are intractable by formal techniques
- ❑ Increase productivity, efficiency, and effectiveness

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Decision Support Tools for Bushfire Risk Management in NSW

- ❑ Bushfire Attack Assessor – A tool for bushfire attack assessment
- ❑ Bushfire Risk Register – A tool for bushfire risk management planning

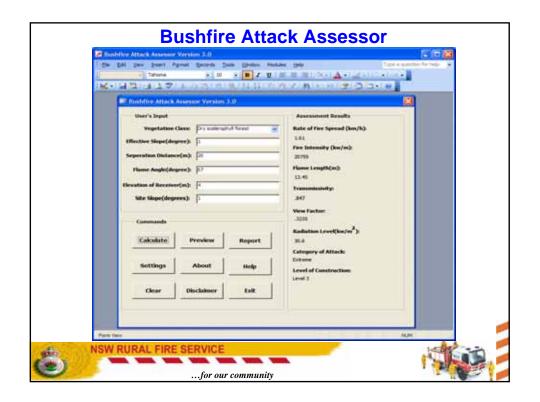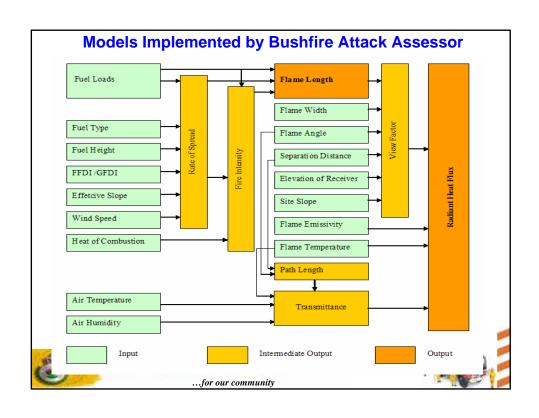**NSW RURAL FIRE SERVICE**

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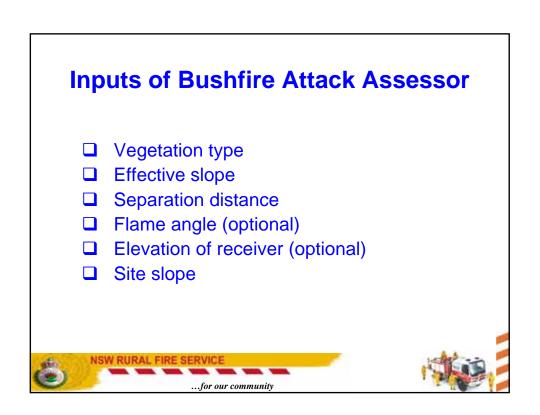
What Is Bushfire Attack Assessor?

Bushfire Attack Assessor is a computer program which can be used to:

❑ determine the level of bushfire attack and the corresponding standard construction level

❑ calculate safe setback distance for a given construction level or a radiant heat threshold
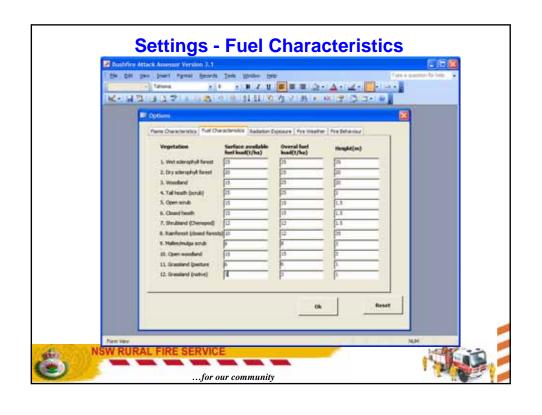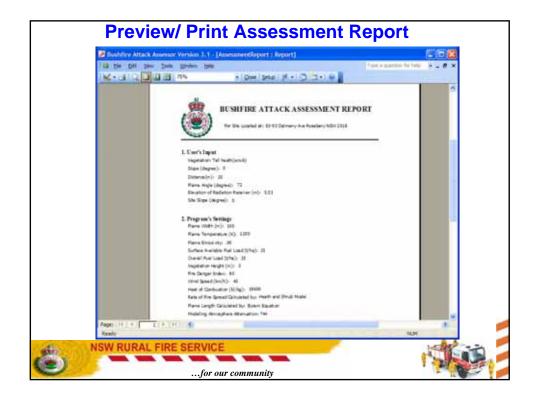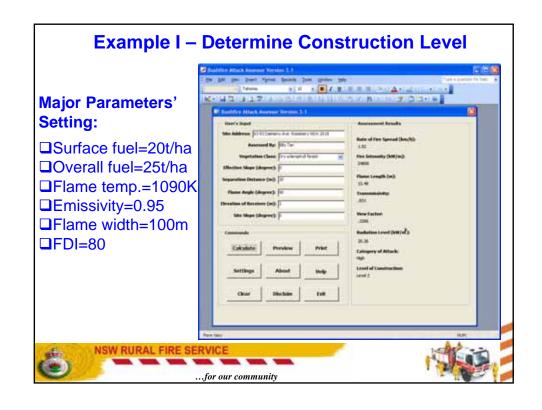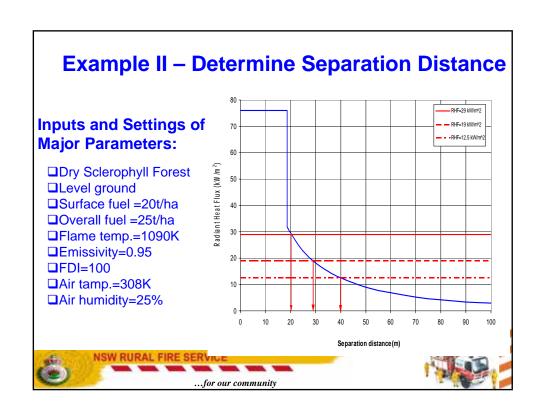
❑ Formulate and evaluate alternative solutions

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Bushfire Attack Assessor

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Models Implemented by Bushfire Attack Assessor

Inputs: Fuel Loads, Fuel Type, Fuel Height, FFDI /GFDI, Effetcive Slope, Wind Speed, Heat of Combustion, Air Temperature, Air Humidity

Intermediate Outputs: Rate of Spread, Fire Intensity, Flame Length, Flame Width, Flame Angle, Separation Distance, Elevation of Receiver, Site Slope, Flame Emissivity, Flame Temperature, Path Length, View Factor, Transmittance

Output: Radiant Heat Flux

Input — Intermediate Output — Output

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Inputs of Bushfire Attack Assessor

❑ Vegetation type
❑ Effective slope
❑ Separation distance
❑ Flame angle (optional)
❑ Elevation of receiver (optional)
❑ Site slope

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Settings of Bushfire Attack Assessor

- **Flame characteristics**
  - Flame temperature
  - Flame emissivity
  - Flame width
- **Fuel characteristics**
  - Surface fuel load
  - Overall fuel load
  - Fuel height
- **Fire behaviour**
  - Rate of spread model
  - Flame length model

- **Fire weather**
  - Fire Danger Index
  - Wind speed
  - Ambient temperature
  - Relative humidity
- **Radiation exposure**
  - Predefined radiation thresholds for each category of attack
  - Choice for modelling atmospheric attenuation

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Settings - Fuel Characteristics

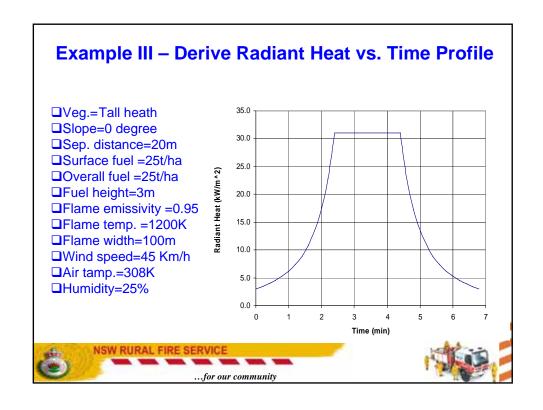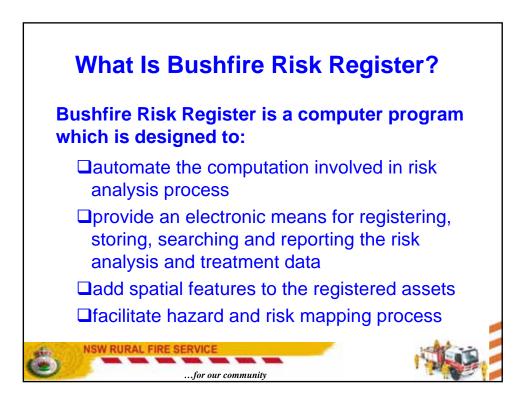**NSW RURAL FIRE SERVICE**

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Outputs of Bushfire Attack Assessor

- Rate of Spread
- Fire Intensity
- Flame Length
- View Factor
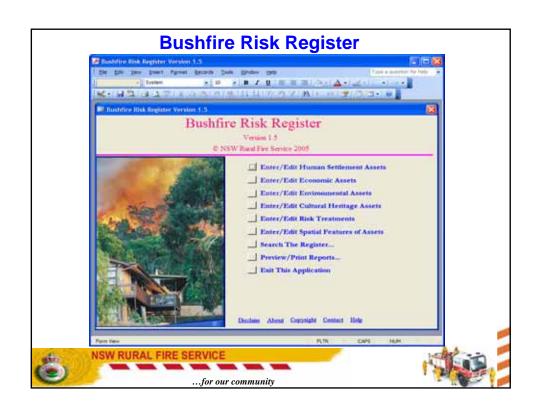- Radiant Heat Flux
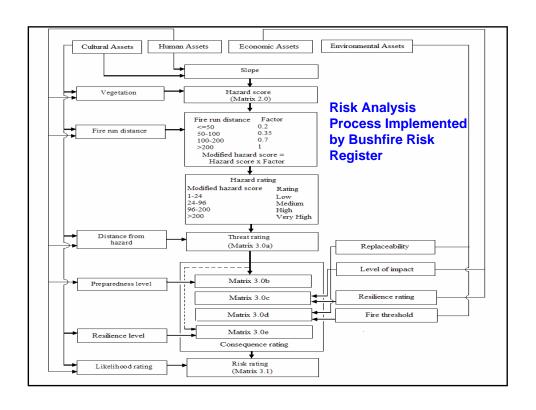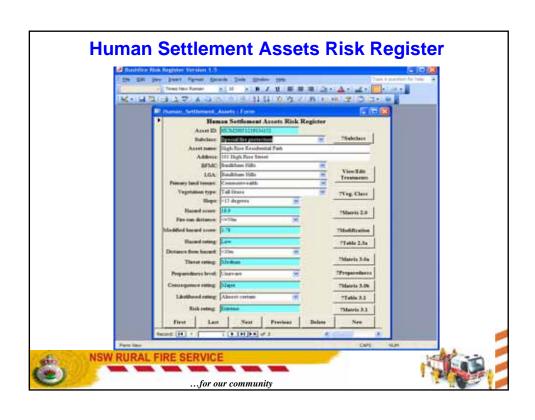- Category of Bushfire Attack
- Level of Construction Standard

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Preview/ Print Assessment Report

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Example I – Determine Construction Level

Major Parameters' Setting:

❑Surface fuel=20t/ha
❑Overall fuel=25t/ha
❑Flame temp.=1090K
❑Emissivity=0.95
❑Flame width=100m
❑FDI=80

Example II – Determine Separation Distance

Inputs and Settings of Major Parameters:

❑Dry Sclerophyll Forest
❑Level ground
❑Surface fuel =20t/ha
❑Overall fuel =25t/ha
❑Flame temp.=1090K
❑Emissivity=0.95
❑FDI=100
❑Air tamp.=308K
❑Air humidity=25%

Example III – Derive Radiant Heat vs. Time Profile

❑Veg.=Tall heath
❑Slope=0 degree
❑Sep. distance=20m
❑Surface fuel =25t/ha
❑Overall fuel =25t/ha
❑Fuel height=3m
❑Flame emissivity =0.95
❑Flame temp. =1200K
❑Flame width=100m
❑Wind speed=45 Km/h
❑Air tamp.=308K
❑Humidity=25%

[Graph: Radiant Heat (kW/m^2) vs Time (min). Y-axis from 0.0 to 35.0 in increments of 5.0. X-axis from 0 to 7. Curve rises from about 3 at time 0, increases to a plateau around 31 between time 2.5 and 4.5, then decreases back to about 3 at time 6.8.]

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What Is Bushfire Risk Register?

Bushfire Risk Register is a computer program which is designed to:

❑automate the computation involved in risk analysis process

❑provide an electronic means for registering, storing, searching and reporting the risk analysis and treatment data

❑add spatial features to the registered assets

❑facilitate hazard and risk mapping process

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Bushfire Risk Register

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Risk Analysis Process Implemented by Bushfire Risk Register

Human Settlement Assets Risk Register

Economic Assets Risk Register

Environmental Assets Risk Register

Cultural Heritage Assets Risk Register

Treatment Plans Register

Mapping Assets in MapInfo

Search the Register

Generate Reports

Sample Report

Human Settlement Assets Risk Register

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Future Works

❑ Improve the existing decision support tools
- ➢ Create more user friendly interface
- ➢ Add more functionalities
- ➢ Integrate the existing tools

❑ Develop new decision support tools
- ➢ Bushfire simulator
- ➢ Prescribed burning planner
- ➢ Operational planning facilitator
- ➢ House loss risk analyser
- ➢ Bushfire escape route planner

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