

V. WILDFIRE RISK ASSESSMENT

WHAT IS THE WILDFIRE RISK ASSESSMENT?

The Barnes-Drummond Wildfire Risk Assessment project is one part of the overall planning process. It is intended to identify the locations for focused resource allocation to most effectively reduce the wildfire risk. While wildfire risk may never be entirely eliminated, the strategic implementation of sound management policy can reduce the threat of wildfire and minimize losses. This assessment provides decision-making bodies with the information necessary to allocate resources effectively to reduce the risks from wildfire.

The model used in this assessment was based on similar approaches used in other planning processes. A GIS based modeling approach was utilized, along with suggestions and inputs from resource management professionals and representatives from the participating local units of government. The purpose of the assessment was to develop a relative ranking for wildfire risk and hazard, not to define specific local conditions or local hazard conditions.

DATA INPUTS

The Wildfire Risk Assessment utilizes data from a wide range of sources. This information was developed for differing uses; thus, data is at varying scales of precision and accuracy. Some inputs may not be completely inclusive. In cases where data was developed specifically for input into the model, every step possible was taken to ensure data quality and accuracy. Additionally, obtaining data for each of the required inputs was difficult. The model was revised several times to compensate for missing or incomplete data.

MODEL DESCRIPTION

Using the steps outlined in "Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities" (SAF, 2004) models were developed for each phase listed under step 5 "Community Risk Assessment". Individual models were created for Fuel Hazards, Risk of Wildfire Occurrence, Essential Infrastructure at Risk, Other Community Values at Risk, and Local Preparedness and Firefighting Capability. Each model was comprised of a series of input themes (GIS data layers) representing components, or aspects of the selected phase. The model utilizes a total of 23 input themes as depicted below.

Fuel Hazards = 1

Risk of Wildfire Occurrence = 4

Essential Infrastructure at Risk = 10

Other Community Values at Risk = 4

Local Preparedness and Firefighting Capability = 4



The final overlay is a composite of the outputs of each of the 5 individual phases.

WEIGHTING THE INPUTS

In order to quantify the relative significance of each of the inputs, weighting values were assigned based on data components and theme values. These values were determined by the CWPP Planning Committee. This approach allowed us to examine multiple variables simultaneously and to understand the cumulative impact of risk factors.

An example of theme weighting for fuel hazards shows how this process was done. Fuel types were weighted according to their relative hazard risk. Low risk fuels (FM 5, 8) were assigned lower weighing values than high-risk fuels (FM 2, 4, 9-1) in the Fuel Hazard model. In models where there were more than one theme used, the raster cell values of each theme were reclassified (numerically rated) using a common scale (0-9). Each theme was then assigned a weighting value, or percentage influence based on its importance to the model. The total influence for all themes used in a model was equal to 100 %. In the weighted overlay analysis, the reclassified cell values were multiplied by the theme weighting value to produce the final output maps.

MODEL INPUT DESCRIPTIONS

Fuel Hazards

Themes

- 1) Fuel Types- Derived from Forest Service stand data, WISCLAND land cover data, and Bayfield County Forestry stand data. Identifies the fuel model type which best corresponds to the Washburn District's current stand data and the Great Lakes region vegetation.

Risk of Wildfire Occurrence

Themes

- 1) Trails – Derived from Forest Service, Wisconsin DNR and Bayfield County digital data sets. Data depicts major (named) trail networks.
- 2) Roads – Derived from the US Census TIGER line and Forest Service road network data. Depicts federal, state, county and local roads, along with Forest Service roads.
- 3) Residential Development – Derived from the Bayfield County tax parcel dataset and tax assessment database. Parcels with improvement values were converted to points.



- 4) Historic Fire Occurrences – Point data locations of historic fire occurrences collected from USFS and WDNR. Density GRID created using GIS.

Essential Infrastructure at Risk

Themes

- 1) Subdivisions – Derived from the Bayfield County tax parcel database.
- 2) Power Lines- Extracted from US Census Bureau TIGER line data.
- 3) Water Intakes – Data provided by Bayfield County and created through consultation with Town staff.
- 4) Substations – Electric utility substations, data provided by Wisconsin Public Service Commission
- 5) Sensitive Facilities – Public buildings, places where people congregate. Data set created through consultation with local government officials.
- 6) Essential Infrastructure - Emergency response facilities and critical public utilities. Data set created through consultation with local government officials
- 7) Businesses – Extracted from the Bayfield County tax parcel database. Points were created for all properties with commercial improvement values.
- 8) Homes - Derived from the Bayfield County tax parcel dataset and tax assessment database. Parcels with improvement values were converted to points.
- 9) Communications Structures – Communications relay towers, radio towers, and cell phone towers. Data developed through consultation with local government officials.
- 10) Escape Routes – Principal community evacuation routes. Data developed through consultation with local government officials.

Other Community Values at Risk

Themes

- 1) Recreation/Scenic Areas – Public recreation areas, campgrounds, picnic areas, boat & canoe landings, trailheads. Created using US Forest Service data and consultation with local government officials.



- 2) Significant Landscapes – Special management areas (Wilderness, semi-primitive non-motorized areas, special management areas, research natural areas and old growth areas). Based on US Forest Service data.
- 3) Open Space/Public Land – Publicly owned and managed lands (Bayfield County Forest, Chequamegon-Nicolet National Forest). Data provided by the US Forest Service and Wisconsin DNR.
- 4) Shoreland Areas – 100' buffer along lakes and streams. Based on WDNR 1:24,000 hydrography GIS data layer.

Local Preparedness and Firefighting Capability

Themes

- 1) Distance to Fire Stations – Proximity analysis depicting the distance from any given location in the project area to the nearest fire station (Barnes and Drummond Fire Department's, Barnes Ranger Station and local fire stations within adjoining communities).
- 2) Dead End Roads – Roads closed off at one end. Created using USFS data and TIGER data line files.
- 3) Distance to Water Sources - GIS GRID analysis calculating linear distance to water access points.
- 4) Access - GIS GRID analysis of distance from roads to interior portions of the project area.

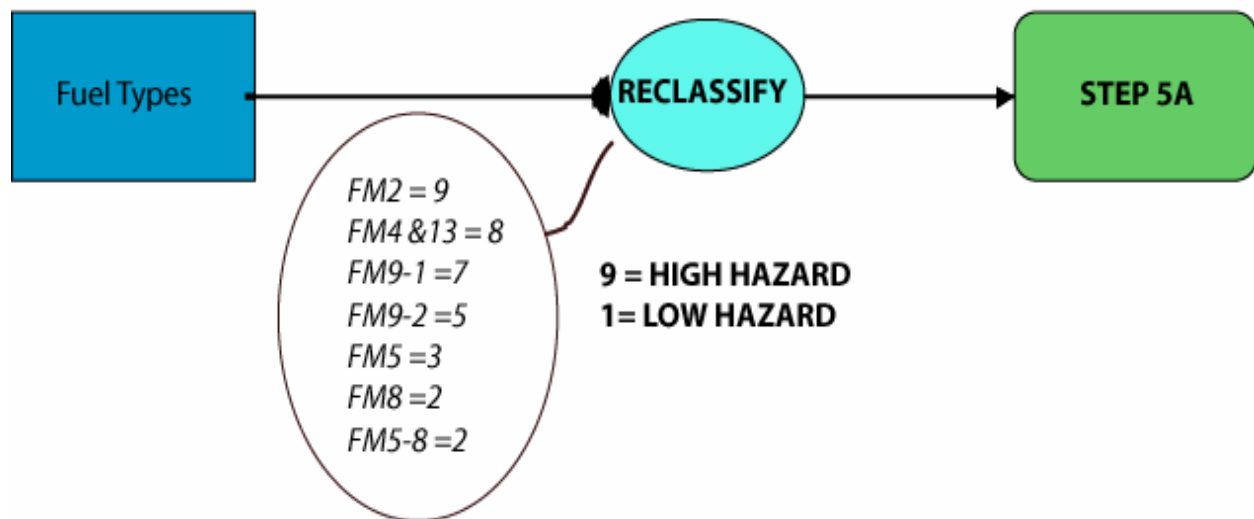
RISK ASSESSMENT METHODOLOGY

Fuel Hazards (Step 5A)

Evaluates the vegetative fuels present within the project area. Specific areas will be identified where the condition of vegetative fuels is such that, if ignited, they would pose a significant threat to the community or essential community infrastructure. The vegetation information identifies major fuel model types based on Washburn District stand data, Bayfield County Forestry data and the WISCLAND land cover model. Fuel values were rated on a scale from 1 to 9, or low to high hazard (**Figure 7**).

Fuel model types with similar fire behavior were merged or split to best reflect current landscape conditions. For example, FM 4 (closed canopy pine stands) and FM13 (slash/blowdown model) intermix within the same geographic area. It is expected that fire behavior within both models would be similar. FM's 5 and 8 also were also grouped together due to similar fire behavior. The fuel hazard model is depicted in **Map 8**.

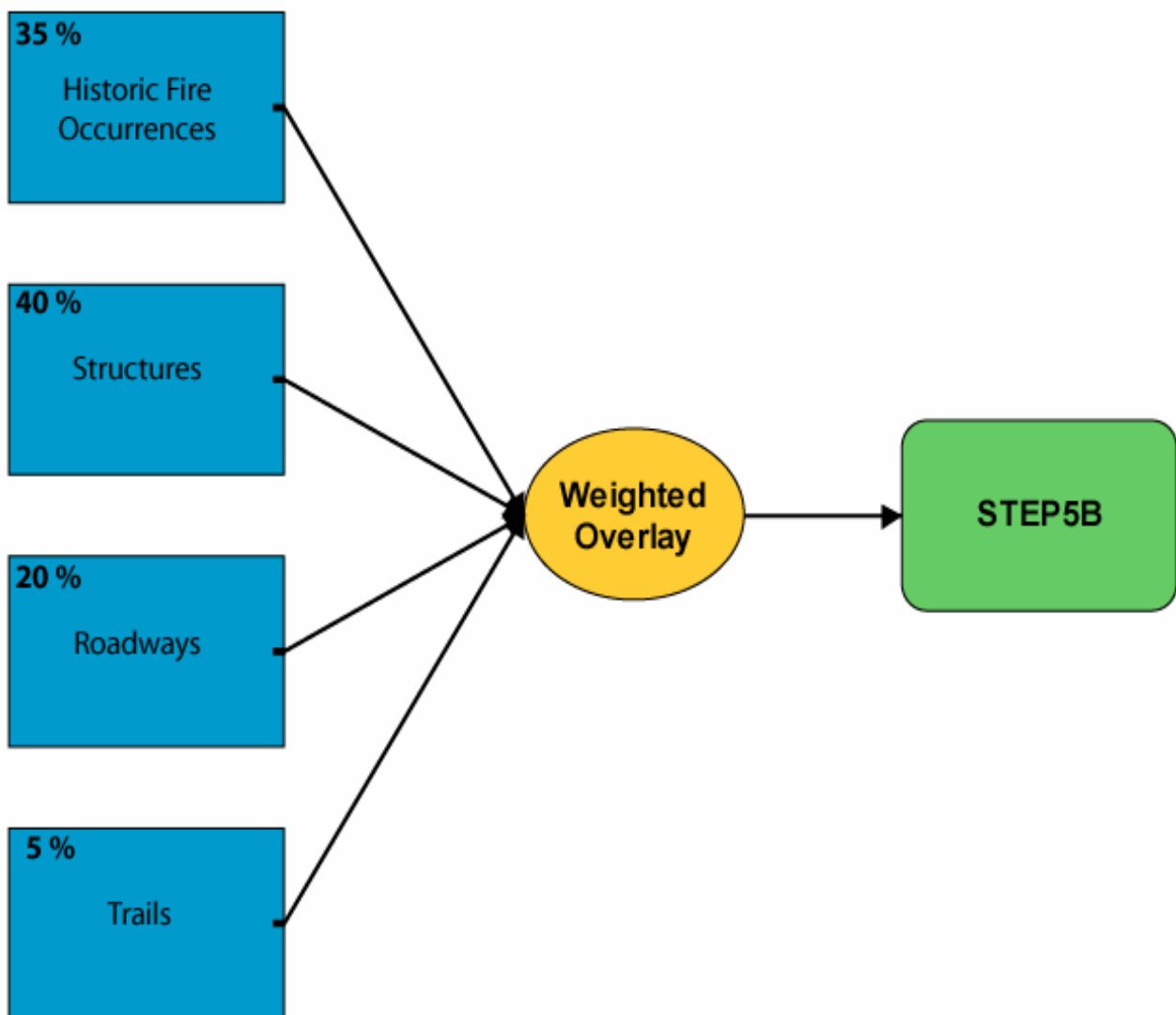
Figure 7, Fuel Hazard Model



Risk of Wildfire Occurrence (Step 5B)

This assessment determines the common causes and relative frequency of wildfires in the vicinity of the project area using historical data and local knowledge. Historically, most wildfires in the project area have resulted from human actions, namely debris burning. This assessment is based on the assumption that human development and interaction on the landscape pose inherent wildfire risks. The assessment calculates this risk by defining the spatial location of development and other risk-related factors such as historic fire occurrences (fire density), roadways and trails. The model structure for Step 5B is depicted below in **Figure 8**, with the output depicted in **Map 9**.

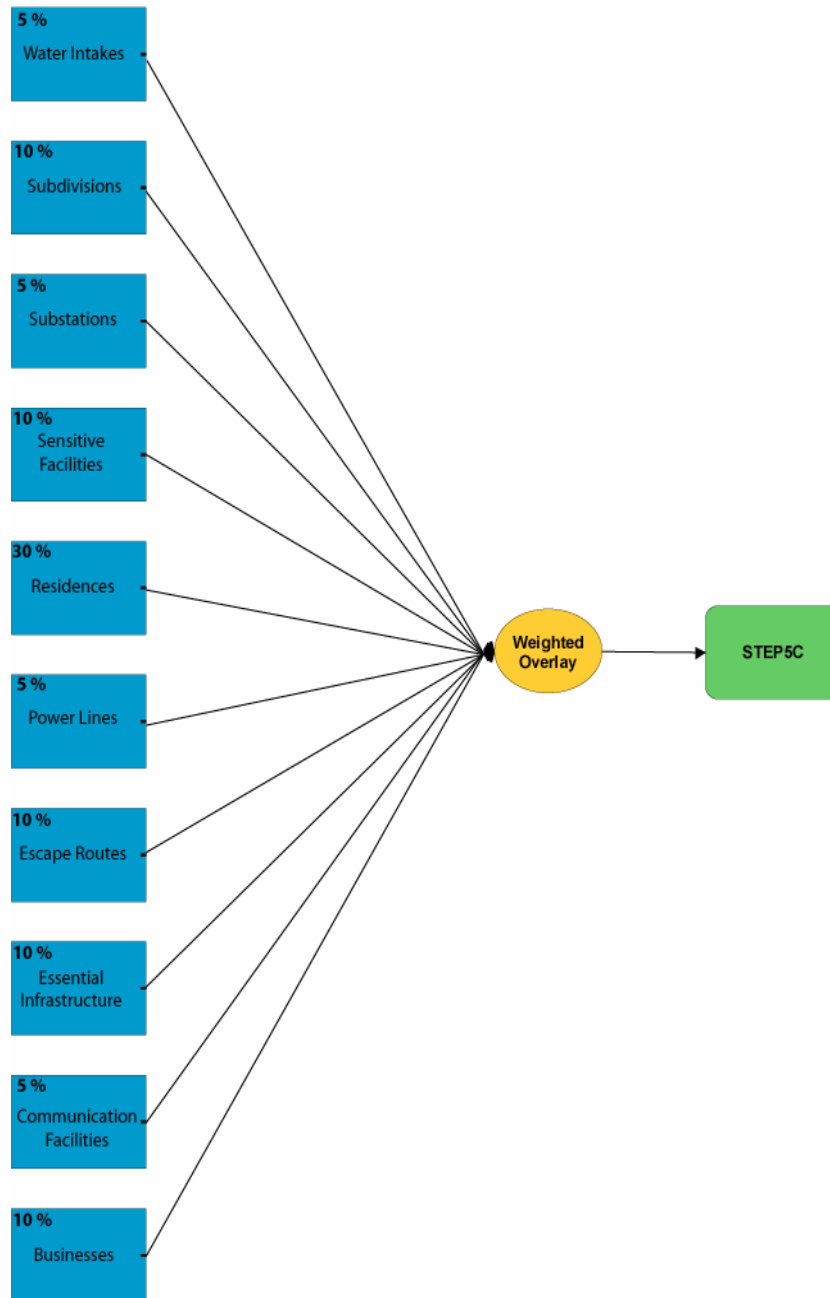
Figure 8, Risk of Wildfire Occurrence Model



Essential Infrastructure at Risk (Step 5C)

This assessment identifies essential infrastructure that would be adversely impacted by wildfire. Weighting values and model structure are depicted in **Figure 9**. Features identified include subdivisions (platted and areas of concentrated development), communication facilities, power lines, water intakes, substations (power and communication), sensitive facilities, businesses, residences, essential infrastructure, and escape routes. The model output is depicted in **Map 10**.

Figure 9, Essential Infrastructure at Risk Model

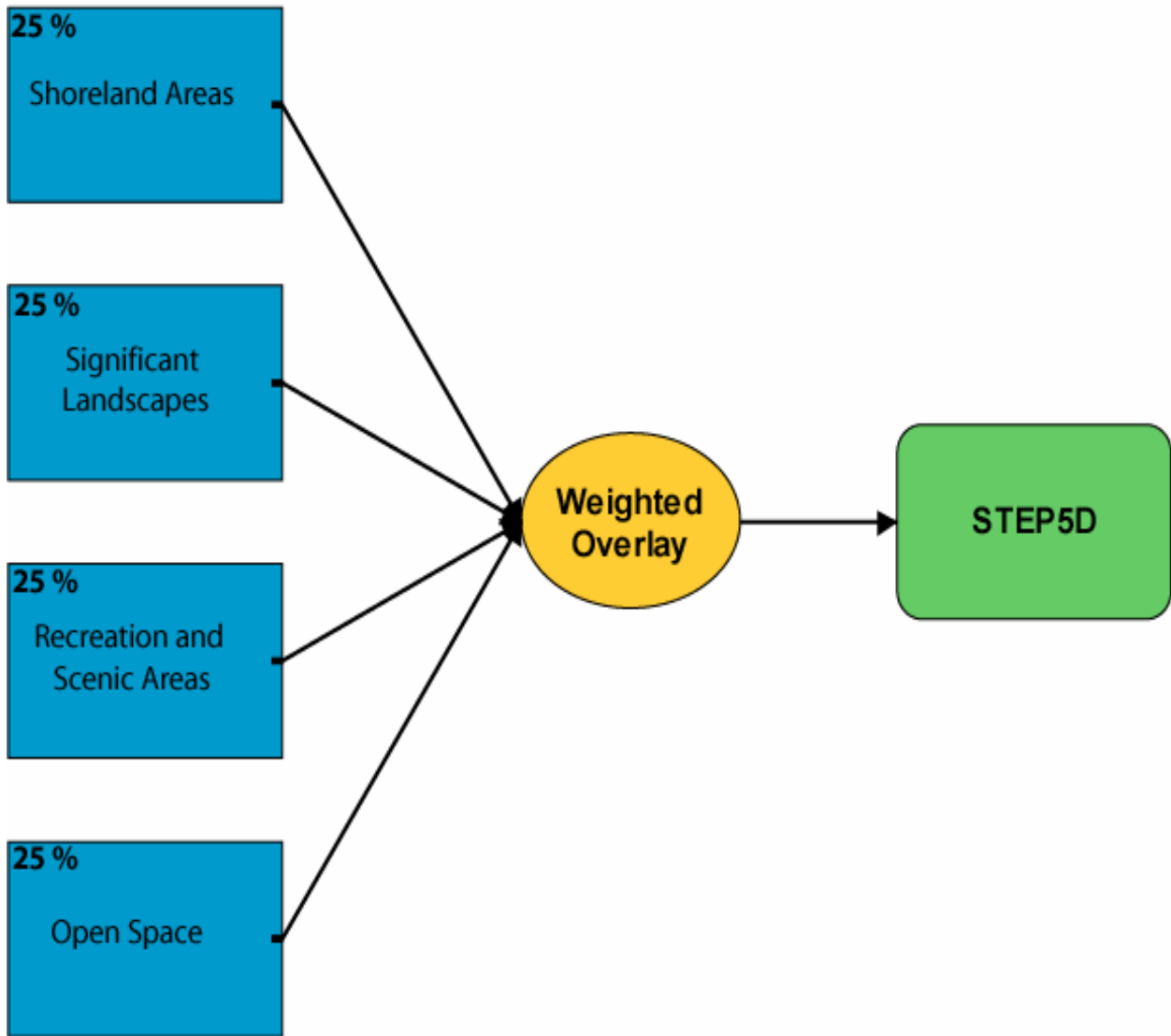


Other Community Values at Risk (Step 5D)

This assessment evaluates other areas that would be adversely impacted by wildfire.

Figure 10 depicts the model structure used in this step of the process, while the output is depicted in **Map 11**.

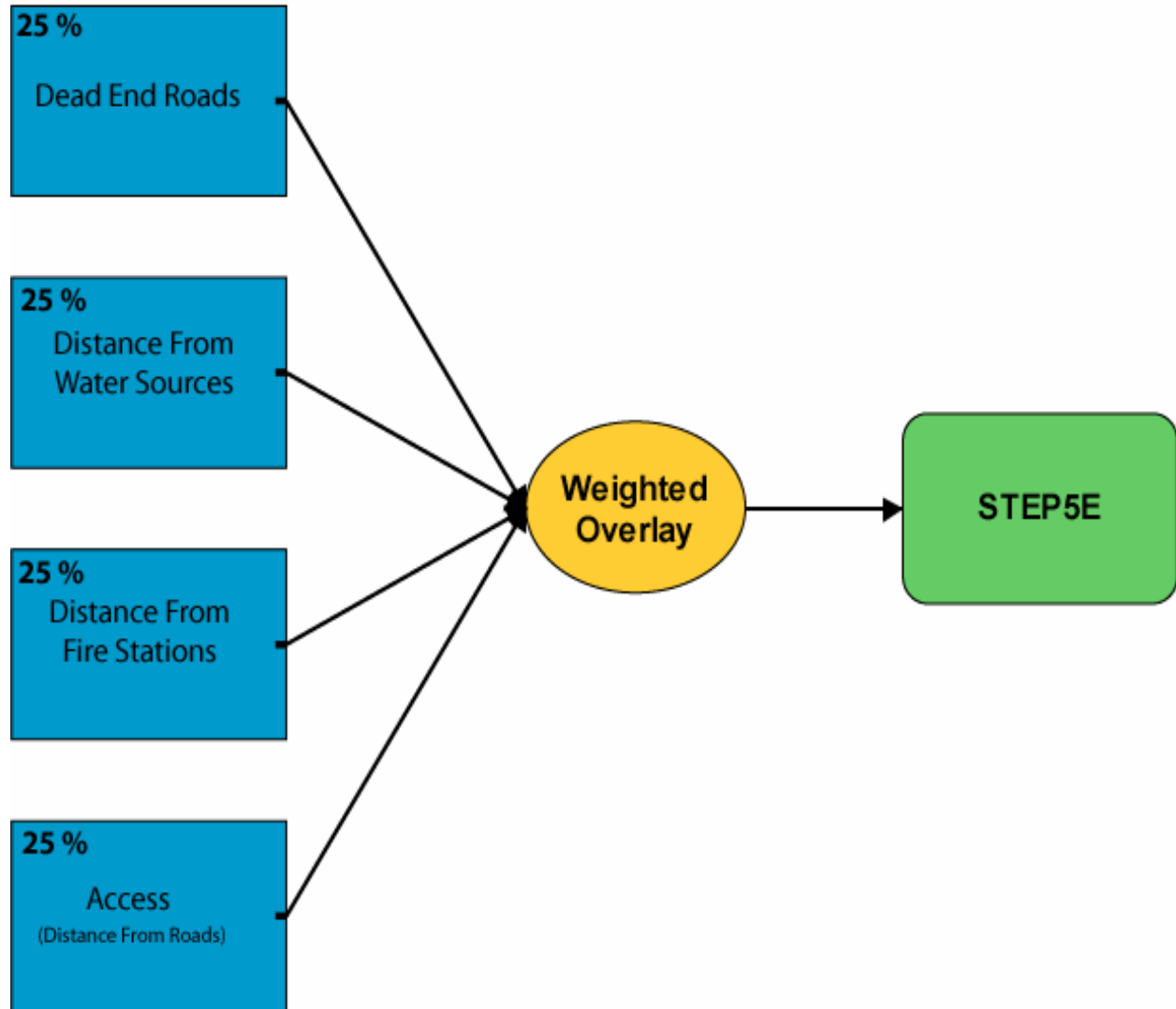
Figure 10, Other Community Values at Risk Model



Local Preparedness and Firefighting Capability (Step 5E)

This step assesses the overall preparedness and capability to fight structure fires and wildfire in the project area. Key modeling components included distance to fire stations, road access, access constraints (dead-end roads) and distance from water sources, as shown below in **Figure 11**. The model output is depicted in **Map 12**.

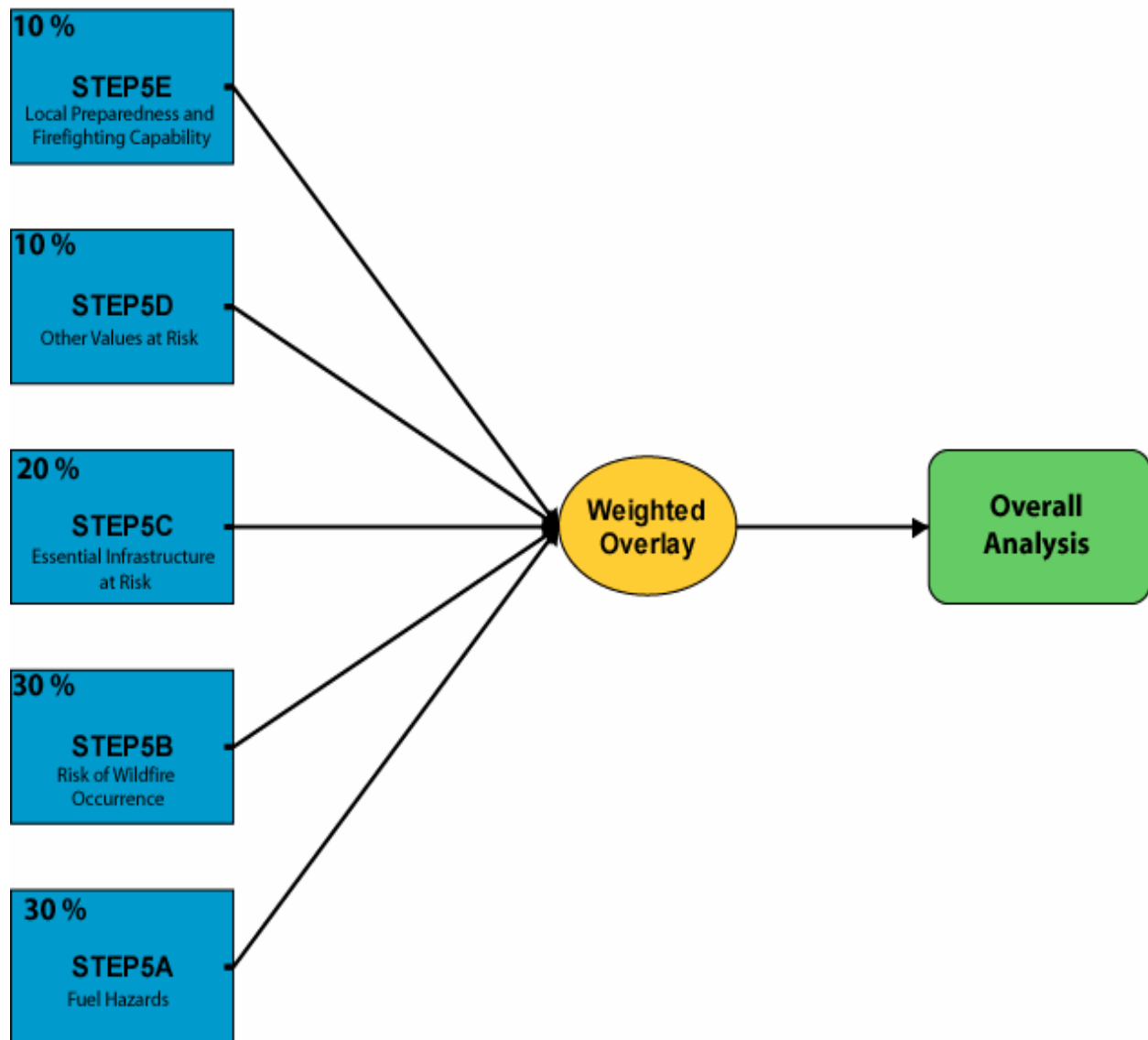
Figure 11, Local Preparedness and Firefighting Capability Model



Overall Assessment

Each of the previous five steps was designed to analyze one component of wildfire risk in the project area. Each map (**Maps 8-12**) expresses the relative degree of risk or hazard on a numeric scale. The final overlay (Overall Analysis) is a weighted overlay of each of the five individual phases of the model. The outputs for each phase were weighted on a scale of 1 to 100, with the total for all inputs not to exceed 100, described in the flowing diagram (**Figure 12**). The results of the overall assessment are depicted in **Map 13**.

Figure 12, Overall Assessment Model



WILDLAND URBAN INTERFACE (WUI)

The Wildland Urban Interface (WUI) identifies areas where structures and human development intermingle with undeveloped wildlands. It is within these areas where wildfire poses the greatest risk to human lives and structures.

Base WUI data for the Barnes-Drummond CWPP was obtained from the SILVIS Lab at the University of Wisconsin-Madison. WUI boundaries were then modified using density calculations derived from Bayfield County tax parcel information. Maps generated from this data illustrate the WUI areas as either interface or intermix areas. Interface WUI are areas with housing in the vicinity of contiguous wildland vegetation, while the intermix WUI defines areas where housing and vegetation intermingle.

Within the intermix areas, wildland vegetation is continuous (more than 50 % vegetated). These areas have a residential development density of more than 1 house per 40 acres. Interface communities are areas with residential development in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres, have less than 50 percent vegetation, and are within 1 ½ miles of an area over 1,325 acres that is more than 75 percent vegetated.

Based on HFRA authorization, the State of Wisconsin will define the boundaries of the WUI for CWPP purposes to align exactly with civil town boundaries. In addition, funding for planned treatments adjacent to Federal lands could extend up to 1.5 miles beyond the defined WUI boundary.

The WUI for the Barnes-Drummond project area is depicted in **Map 14**.