Vegetation Risk Management Plan *Template*

Step 1 -- Introduction

Introduce the Vegetation Risk Management Plan (VRMP) and its purpose.

Discussion:

The Vegetation Risk Management Plan (VRMP) has been developed as a tool to assist in reducing vegetative debris following a storm event and increase public safety. The VRMP also aids in maintaining optimum urban tree canopy, promoting tree health, providing for the management, both emergency and arboriculture, and decreasing emergency management costs. The VRMP is a living and dynamic plan that should be reviewed, evaluated, and updated periodically and especially after major storm events that have altered the tree canopy in a major or significant manner.

Developing and adopting a VRMP for your community or area of interest will decrease emergency management costs, reduce the likelihood of damage from tree debris, and reduce the overall impact of major storms on the urban forest. Trees and the debris accumulated from their destruction is the number one cost to emergency management in the aftermath of a storm event. The VRMP is a proactive approach to identifying and mitigating trees that are in need of pruning, removal, or inspection. This plan will establish a schedule for areas that are most prone to limit or block access to critical infrastructure located on or associated with major transportation routes, including areas with the highest population.

The VRMP will be unique for your community or area of interest. All VRMP's will share the similarity of identifying the most prone areas as related to Emergency Management and trees/vegetation. The plan is a beginning to a more detailed community based urban tree risk management plan.

STEP 2 -- Purpose and Need of VRMP

Describe the purpose and need of the VRMP for the county or area. Identify the sections within the Natural Hazard Mitigation Plan where the VRMP can be utilized to meet specific goals outlined within the plan.

Discussion:

The justification for developing a VRMP is often noted within the Natural Hazard Mitigation Plan as goals, objectives, and mitigation actions. *See Definitions below*.

Definitions:

A ***Goal*** is a general guideline that explains a desired result or outcome. Goals are broad policy statements representing global visions with long term results.

An ***Objective*** is a strategy or implementation step to attain an identified goal. Objectives are more specific than goals and can be measured.

A ***Mitigation Action*** is a specific action that helps achieve identified goals and objectives.

The VRMP is a mitigation action used to implement objectives in Natural Hazard Mitigation Plans for many US counties to meet the overall goals that they have identified.

All Natural Hazard Mitigation Plans (NHMP) and VRMP's can, and are, formatted differently. The examples below demonstrate how a VRMP might be specifically noted in an NHMP as with Example 1, or implied as with Example 2. Search your area or county's NHMP to find where the VRMP fits.

Example 1: *from Autauga County, Alabama – 2009 Natural Hazard Mitigation Plan*

- **Goal:** *Protect the citizens of Autauga County as well as public and private property from the impacts of natural hazards*
    - **Objective**: *Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property*
        - **Mitigation Action**: Develop and implement a *Vegetative/Tree Risk Management Plan*

Example 2: from Elmore County, Alabama – 2009 Natural Hazard Mitigation Plan

- *Goal #1 – Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during events*
- *Goal #2 – Enhance strategies for debris management events*

Discussion within the Elmore County-2009 Natural Hazard Mitigation Plan

Elmore County is ranked as one of the fastest growing counties in Alabama and is characterized by the attractive landscape and lakes. However, the potential impacts of natural hazards make the population and environment vulnerable to natural disaster situations. The county is subject to flooding, thunderstorms, tornados, high winds, lightning, fires, temperature extremes, hail and drought. Through the review of the data, citizen surveys and governmental action, the first nine hazards are addressed as a part of this plan:

- *Flooding,*
- *Thunderstorms,*
- *Tornados,*
- *High Winds,*
- *Lightning,*
- *Wild Fire,*
- *Drought and Heat Wave,*
- *Hurricanes, and*
- *Winter Storms.*

*The **Vegetative Risk Management Plan*** fits as *a mitigation action to meet the **Immediate Goals** identified under **Thunderstorms, Windstorms or Tornados in the Natural Hazard Mitigation Plan** and repeated here.*

- *Goal #1 – Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during events*
- *Goal #2 – Enhance strategies for debris management events*

STEP 3 -- Overview of the County

This wording can often be taken from the county's Natural Hazard/Hazard Mitigation Plan. Items included can be: population, growth over 10 years, future growth potential, prior events (thunderstorm and hurricane events for example), or similar statistical information such as a hazard exposure profile – See Example below.

Also include any current urban forest management activity, particularly urban tree risk management that is being implemented that directly relates to tree risk mitigation and disasters.

Example 1: from Autauga County – 2009 Natural Hazard Mitigation Plan

Hazard Exposure Profile

An important component of the planning process is examining the composition of the community. Looking at what is at risk of a disaster not only provides insight into a community's potential post-disaster losses but also emphasizes the need for protecting its assets. A Hazard Exposure Profile examines all of the important assets of a community, including demographics, critical facilities, and structures. The following are some key assets of Autauga County that are at risk of a disaster.

Autauga County Hazard Exposure Profile

- *Area (square miles)* — *604 square miles ,596 square miles of it is land, and 8 square miles of it (1.40%) is water*
- *Population (2000 Census)* — *43,671 50,364 (2008 Estimate)*
- *Households* — *16,003*
- *Families* — *12,354*
- *Miles of Roads* — *1,075*
- *Miles of Interstate* — *16*
- *Miles of Railroad* — *45*
- *Airports (#)* — *1*
- *Hospitals (#)* — *1*
- *Jail (#)* — *1*
- *Medical Clinic (#)* — *2*
- *Personal Care Home (#)* — *2*
- *Police Station (#)* — *3*
- *School (#)-public/private* — *17*
- *Sewage Treatment Plants (#)* — *2*
- *Utility Providers (#)* — *6*
- *Fire/Rescue (#)* — *14*
- *Bridges (#)* — *71*
- *Historic Places (#)* — *27*

STEP 4 -- The Urban Tree Risk Index (UTRI) Tool Results

Included in this section are the summary of the layers, which provides the overall county image, as well as any highlighted areas that are representative of the overall outcomes and images that are representative of areas that warrant further evaluation and assessment frequencies. Also included is the table (*See Attachment 1: VRMP Verification and Inspection Work Sheet)* that will be utilized for field verification and subsequent inspections of areas identified.

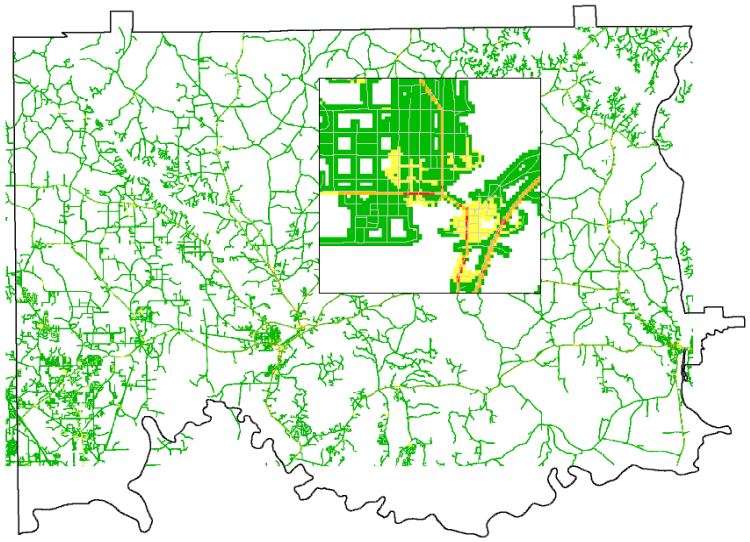
- The results are taken from the Urban Tree Risk Index (UTRI) Tool developed previously. Visit the Urban Forestry South website http://www.urbanforestrysouth.org/ and search for "UTRI" to find the document (Urban Tree Risk Index Model & the UTRI Data Process and GIS Tool Description) with detailed step by step instructions on how to develop the GIS model.

A. *Summary of the Layers*

Below is the summary image produced from the UTRI.

Example 1: The picture below is the summary of all layers for Elmore County and also a blow up detail from downtown Wetumpka, Alabama. It shows the summary combination of all layers – to include canopy, transportation, critical facilities, and population.

Urban Tree Risk Index UTRI



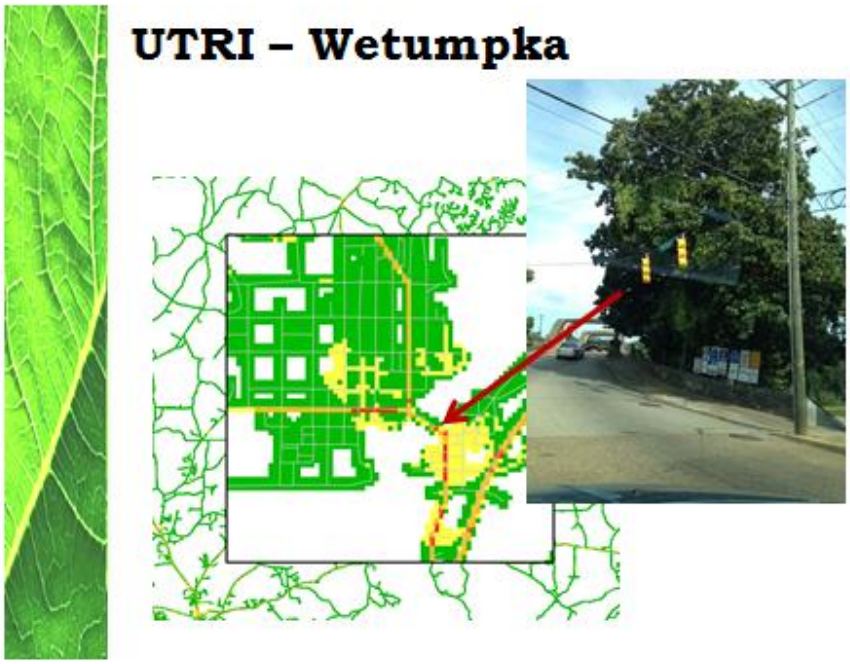
The UTRI is color coded with **red** as the highest potential tree risk during a disaster.

B. *Areas that Warrant Further Evaluation and Assessment for Mitigation Needs*

Below is an example map image produced from the UTRI and an explanation based on the site visit.

Example 2: The image that follows demonstrates the area in Wetumpka that is located near the downtown business district on a major transportation corridor. This area is a

highly populated area with several critical facilities including the 911 Emergency Management Agency. Also shown is the presence of tree canopy that has a need for annual inspection to evaluate the likelihood of tree failure.



C. *Areas of Assessment and Mitigation by Table*

Below is an image of the overall worksheet produced from the information derived from the UTRI. The table is explained in this section and its use for field verification.

Complete the worksheet up to the Inspection Schedule column.
(Example below and also as Attachment 1)

VRMP Verification and Inspection Worksheet

Map ID	Street	Street Segment Address Ranges				Length (Feet)	UTRI (Raw Data)	UTRI (Adjusted Index 1-4)	Field Check and Verify Index	Mitigation Prune-Remove-None	Mitigation Complete Date (if applicable)	Inspection Schedule	Year 1	Year 2	Year 3	Year 4	Year 5	Inspection Schedule	Storm - Date
		Left-From	Left-To	Right-From	Right-To														
563	Chapel Lakes Dr					118	20	4				Annual						After Storm	
410	Chapel Lakes Loop					1063	18	4				Annual						After Storm	
532	Chapel Rd	54	2	55	1	186	19	4				Annual						After Storm	
292	Chapel Rd	69	95	68	94	9	15	4				Annual						After Storm	
214	Chapel Rd	97	99	96	98	26	14	3				1-2 Years						After Storm	
489	Chapel Rd	101	129	100	128	118	12	3				1-2 Years						After Storm	
44	Chapel Rd	131	161	130	160	428	12	3				1-2 Years						After Storm	
379	Coosa River Pkwy					186	9	2				3-5 Years						After Storm	
204	Holtville Rd	1117	1233			71	9	2				3-5 Years						After Storm	
246	Holtville Rd	1235	1309	1234	1310	71	8	2				3-5 Years						After Storm	
354	Tallassee Hwy	128	356	129	357	348	6	2				3-5 Years						After Storm	
45	Barnes Ct	2	198	1	199	1257	3	1				5-7 Years						After Storm	
29	Tallassee Hwy	358	406	359	407	235	3	1				5-7 Years						After Storm	

1

UTRI	Inspection Schedule
15-20 (or 4)	Very High - Red - Annual
10-14 (or 3)	High - Orange - 1-2 years
5-9 (or 2)	Moderate - Yellow - 3-5 years
0-4 (or 1)	Low - Green - 5-7 years
All	After Severe Storm - Blue

This table is used during field verification to verify that the UTRI ranking is correct or not at each location and to notate necessary mitigation required, if any. If the UTRI ranking is not correct it will be necessary to adjust the ranking to a higher or lower ranking which in turn will change that road segments' inspection schedule accordingly.

The worksheet, which includes Right of Way Road Segments listed by priority (very high, high, moderate, and low), utilizes initial tree evaluations and mitigation steps recommended and completed. After field verifications are made, the results for action needed are placed in the Mitigation column.

From the worksheet above – UTRI Index- Priority Level – Inspection Schedule

1

UTRI	Inspection Schedule
15-20 (or 4)	Very High - Red - Annual
10-14 (or 3)	High - Orange - 1-2 years
5-9 (or 2)	Moderate - Yellow - 3-5 years
0-4 (or 1)	Low - Green - 5-7 years
All	After Severe Storm - Blue

The worksheet therefore guides the mitigation work. Mitigation might include pruning, removing, or taking no action. Mitigation, if any, will be listed in the Mitigation column. Of course, a detailed spreadsheet or another mechanism of tracking work planning will need to be developed or tallied to total number of trees for prunes and removals as well as size of tree by caliper, etc.

STEP 5 -- Outcomes

A. Field Verification Worksheet Results

This section will show the details of the overall worksheet provided at Step 4, section C.

First: 1

Check and verify UTRI index number

- If the assessor finds the index to be incorrect when doing a visual assessment in the field, then the new index number is placed here and the corresponding inspection schedules made

1 2 3

Field Check and Verify Index	Mitigation Prune-Remove-None	Mitigation Complete Date (if applicable)

Second: ❷

Field check for mitigation and, if any is necessary, at each road segment. The worksheet can be sorted to have each road segment by name, regardless of UTRI ranking, listed together.

- Results of mitigation will include pruning, removing, or taking no action

Third: ❸

The worksheet is used to track the mitigation needed and completion date

- Keep track of dates mitigation is complete

B. Inspection schedule

The same worksheet will also be placed here with noted frequency of inspection listed by each.

The areas identified by the UTRI model that are Very High (red) are inspected yearly with any developments or requirements for mitigation noted and acted upon. Areas identified as High (orange) are inspected every 1-2 years, Moderate (yellow) areas every 3-5 years, and Low (green) areas every 5-7 years. Note on the worksheet that all road segments, at a minimum, get a drive by windshield survey after a severe storm event. You will most likely find trees in need of removal or pruning during the scheduled inspections.

Inspection Schedule	Year 1	Year 2	Year 3	Year 4	Year 5	Inspection Schedule	Storm - Date
Annual						After Storm	
Annual						After Storm	
Annual						After Storm	
Annual						After Storm	
1-2 Years						After Storm	
1-2 Years						After Storm	
1-2 Years						After Storm	
3-5 Years						After Storm	
3-5 Years						After Storm	
3-5 Years						After Storm	
3-5 Years						After Storm	
5-7 Years						After Storm	
5-7 Years						After Storm	

The inspection schedules and descriptions of those inspections are derived from ***Urban Tree Risk Management – A Community Guide to Program Design and Implementation*** *developed by the USDA Forest Service (NA-TP-03-03; 2003, USDA Forest Service, Northeastern Area St, Paul, MN, Jill D. Pokorny, Editor* and are found below.

You can see from the information so far that the VRMP is a living and dynamic plan that can change as needed. By following this plan you have identified your most prone areas as they relate to emergency management, disaster response, and tree risk. This plan is the beginning to a more detailed community based tree risk management plan.

Inspection Schedule and Description

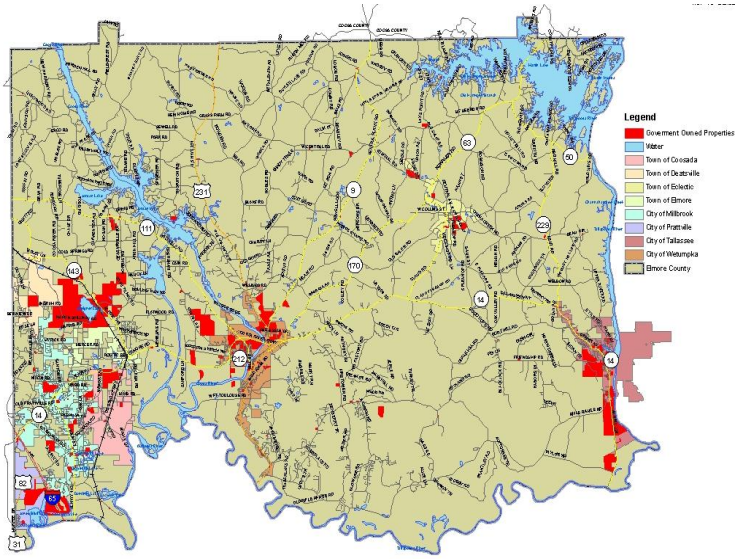
Hazard Categories	Color Codes	Timing of Inspections	Suggested Inspection Method	Comments
Very High	Red	Annual	Walk-by/ Individual Tree Inspections	
High	Orange	1-2 years	Walk-by/ Individual Tree Inspections	
Moderate	Yellow	3-5 years	Walk-by/ Individual Tree Inspections	Consider conducting a drive-by/windshield survey on an "off-year" when individual tree inspections are not scheduled.
Low	Green	5-7 years	Walk-by/ Individual Tree Inspections or Drive-by/ Windshield Surveys	
All Rated Zones	NA	After Severe Storms	Drive-by/ Windshield Surveys	If potentially hazardous trees are detected, follow-up with individual tree inspections

STEP 6 -- Potential Debris Staging Areas Identified

One of the added benefits of utilizing the URTI and its supporting GIS layers (e.g. parcel file that includes publicly owned property) is developing a portion of a debris management plan to identify potential staging areas. Staging areas might vary in size.

By utilizing a parcel file while developing the UTRI, a map of potential sites can be developed and then sites can be strategically identified taking into consideration access, size of parcel, whether it is cleared or wooded, as well as proximity to areas closest to population centers and significant areas of highest UTRI risk for tree (debris) failure.

See Examples that follow.

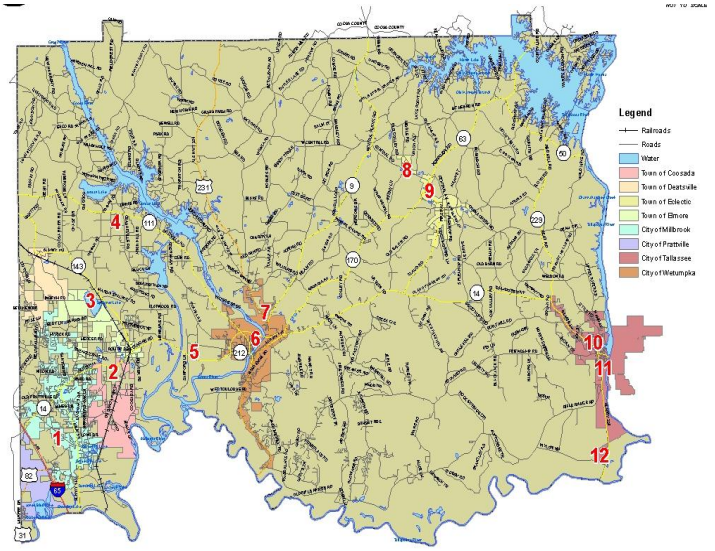


Example 1:

All of the properties in red are local, county, state, or school board owned. The debris staging sites are then linked to the most populated areas as well as areas with the most canopy.

If public property is not sufficient, then large, suitable tracts of private property can possibly be located for contracting.

Example 2: This image shows the 12 most viable debris staging sites that can then be related to population density, tree canopy, road access, or the UTRI index by street segment.



STEP 7 -- Collaborative Strategies

Include in this section additional opportunities for urban forestry professionals and emergency managers to work together to provide additional benefits to the VRMP as it relates to mitigation/planning, response, and recovery.

Visit the Urban Forestry South website http://www.urbanforestrysouth.org/ and search for "VRMP or Vegetative Risk Management Plan" to find information and webinars discussing each of the collaboration methods described below.

The collaborative strategies were developed by taking into consideration the three primary segments of emergency management (Mitigation/Planning, Response, and Recovery) and uniting them with areas of expertise that a forester/urban forester might possess to build additional strategies within the VRMP or otherwise. These collaborative strategies strengthen a community's emergency management and urban forest while protecting the citizens as well as public and private property from the impacts of natural hazards.

Items and areas to consider include the following, some of which are already identified in the VRMP itself.

Mitigation/Planning

- **Identifying critical infrastructure vegetation** – Evaluate and mitigate as necessary
- **GIS mapping** – Identify potential high debris and hazard areas. Where is the highest potential for vegetative removal and where are your hazard areas ranked from highest to lowest – this could be a segment distance weighted index that would represent "potential volume" – several GIS techniques could be used to develop these types of maps for planning and response
- **Debris estimation** – Utilizing street segments and random sampling after an event and other methods would allow stratification of the sample for greater accuracy
- **Exercises** – Utilize UTRI data and model for disaster exercises – prioritized response for Public Works personnel and prioritization of resources
- **Pre-hazard mitigation planning** – Mitigate by pruning, removing, and scheduling inspections of identified areas
- **Debris Management Plan** – Utilize UTRI GIS tool to identify staging areas for debris that are closest to areas with most potential for debris (canopy % by street segment)
- **Local ordinances** – Analysis and development of ordinances such as tree planting requirements on major corridors and emergency routes

Response

- **Identifying critical infrastructure** – Prioritize response to high hazard areas and routes
- **Staging areas for debris** – Utilize UTRI tool
- **Pre-disaster mobilization of resources** (e.g. when utility companies mobilize to a point before the disaster)
- **Debris estimation** – Identifying high hazard areas and utilizing street segments for random sampling in debris estimation models

Recovery

- **Debris management protocol** – High Hazard areas will most likely produce highest amounts of debris, so plan accordingly

- **Insect/disease and invasive species separation and management protocol** – Utilize a VRMP and the UTRI model to develop an opportunity to include these protocols
- **Pruning and/or removal** – as determined by identified areas and based off of evaluation and inspection
- **Replanting** – BMPs for planting the right tree in the right spot
- **Education** – Proper pruning and planting – (*See: FEMA BMP's Examples: Pre-emptive Pruning: Tree Trimming as a Damage Reduction Measure and others* http://www.fema.gov/mitigation-best-practices-portfolio)

STEP 8 -- Next Steps

The last area to highlight includes next steps and in particular, the timing of updating the VRMP.

- Update the VRMP every five years in conjunction with the county's Natural Hazard Mitigation Plan

This process fits into the Natural Hazard Mitigation Plan update required every five years. As populations change, critical infrastructure and the tree canopy change. The VRMP provides a basis to manage the vegetation as it relates to Emergency Management.

Urban Foresters and Emergency Managers will continue to see changes in their identified needs as they collaborate and work together to help Emergency Managers meet the overall need of increasing safety and reducing the cost of clean-up. These changes will ultimately lead to the improvement of overall health of the urban forest and increasing worth of an Urban Forestry program. Therefore, the two, the Hazard Mitigation Plan and the VRMP, work hand in hand.

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Attachment 1

VRMP Verification and Inspection Worksheet

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