

# APPENDIX D: DEBRIS MANAGEMENT PLAN

## JOB AID

FEMA encourages State, Territorial, Tribal, and local governments to establish written procedures and guidance for managing debris in an expeditious, efficient and environmentally sound manner. FEMA refers to this as a Debris Management Plan (DMP).

The content of a DMP will vary depending on State, Territorial, Tribal, and local vulnerabilities, ordinances, zoning, critical infrastructure locations, disposal locations, and other localized factors. The following 10 elements are the basic components of a comprehensive DMP:

### Overview

This section should include the following information:

- The purpose of the DMP and its overarching goals,
- How the DMP was developed and who participated in development (include all internal departments and external entities that may be involved with debris operations), and
- Whether the DMP is officially adopted by the governing body.

### Incidents and Assumptions

Forecasting the type and quantity of debris is essential to the debris removal operations planning process. The DMP should include:

- Identification of the types and severity of incidents most likely to occur along with the types and anticipated quantities of debris that may be generated,
- Identification of the type of handling and equipment necessary to safely manage the debris, and
- A description of the general terrain types, land use, and accessibility for the areas that would most likely be impacted by the incident and how these characteristics may affect debris operations.

There are many types of debris with various considerations for each, as shown in the table below.

<b>Vegetative Debris</b>	Vegetative debris includes whole trees, stumps, trunks, branches, limbs, and other leafy material.
<b>Construction and Demolition Debris</b>	Construction and demolition debris includes components of buildings and structures, such as lumber and wood, gypsum wallboard, glass, metal, roofing material, tile, carpeting and other floor coverings, window coverings, pipe, concrete, asphalt, equipment, furnishings, and fixtures. The definition of construction and demolition debris may vary between jurisdictions.

<b>Hazardous Waste</b>	<p>Hazardous waste is a waste that appears on one of the four hazardous waste lists in Title 40 of the Code of Federal Regulations (CFR) Part 261 or exhibits at least one of the following four characteristics:</p> <ul style="list-style-type: none"> <li>• Ignitability</li> <li>• Corrosivity</li> <li>• Reactivity</li> <li>• Toxicity</li> </ul> <p>Hazardous waste is regulated under the Resource Conservation and Recovery Act (RCRA) and contains properties that make it potentially harmful to human health or the environment. The State or Tribal environmental office and the U.S. Environmental Protection Agency (EPA) provide first response functions in cases of commercial, agricultural, industrial, and toxic waste spills. The DMP should include the contact information for both parties in case of a large contamination issue.</p>
<b>Household Hazardous Waste</b>	<p>Household Hazardous Waste (HHW) is a hazardous product or material used and disposed of by residential consumers, rather than commercial or industrial consumers. HHW includes some paints, stains, varnishes, solvents, pesticides, and other products or materials containing volatile chemicals that catch fire, react, or explode under certain circumstances, or that are corrosive or toxic. HHW mixed with other debris types will contaminate the entire load, which necessitates special disposal methods. The overall cost of debris disposal can escalate quickly if HHW collection and disposal is not planned and executed with care.</p> <p>Pre-disaster planning should include training for hazardous waste response teams to collect, sort, store, and dispose of excessive quantities of HHW. The planning staff should consider having emergency hazardous waste removal contracts in place with pre-qualified contractors to perform the work.</p> <p>After an incident, the Applicants should set-up HHW collection centers to avoid commingling of HHW with other debris.</p>
<b>White Goods</b>	<p>White goods are defined as discarded household appliances such as refrigerators, freezers, air conditioners, heat pumps, ovens, ranges, washing machines, dryers, and water heaters. Many white goods contain ozone-depleting refrigerants, mercury, or compressor oils. The Clean Air Act prohibits the release of refrigerants into the atmosphere and requires that certified technicians extract refrigerants from white goods before disposal or recycling. Some States and Tribal Governments also require certified technicians to extract compressor oils before disposal or recycling. To avoid releases of refrigerants or oils, the collection of white goods should be accomplished carefully by manually placing the appliance on trucks or by using lifting equipment that will not damage the elements that contain the refrigerants or oils.</p> <p>The DMP should identify certified recycling centers that are permitted to take white goods.</p>
<b>Electronic Waste</b>	<p>Electronic waste (e-waste) refers to electronics that contain hazardous materials, such as computer monitors, televisions, cell phones, and batteries. These products may contain minerals and chemicals that require specific disposal methods.</p>

<b>Soil, Mud, and Sand</b>	Floods, landslides, winds, and storm surges often deposit soil, mud, and sand on improved public property and public rights-of-way. Facilities commonly affected by this type of debris include streets, sidewalks, storm and sanitary sewers, water treatment facilities, drainage canals and basins, parks, and public swimming pools.
<b>Vehicles and Vessels</b>	Vehicles and vessels may be damaged, destroyed, displaced, or lost as a result of a disaster. These vehicles and vessels may eventually be abandoned because of the damage incurred or because the original owners have relocated. Vehicles and vessels may be classified as debris if they block public access and critical facilities.
<b>Putrescent Debris</b>	Putrescent debris is any debris that will decompose or rot, such as animal carcasses and other fleshy organic matter.
<b>Infectious Waste</b>	Infectious waste is waste capable of causing infections in humans and can include contaminated animal waste, human blood, blood products, medical waste, pathological waste, and discarded sharp objects (needles, scalpels, or broken medical instruments). Clearance, removal, and disposal of infectious waste may be under the authority of another Federal agency (the Centers for Disease Control and Prevention, EPA, etc.).
<b>Chemical, Biological, Radiological, and Nuclear–Contaminated Debris</b>	Chemical, biological, radiological, and nuclear–contaminated debris is any debris contaminated by chemical, biological, radiological, or nuclear materials.

### **Debris Collection and Removal**

A debris collection strategy establishes a systematic approach for the efficient removal of debris. The clearance and collection of debris should be structured to meet response and recovery priorities. As such, the DMP should:

- Identify and prioritize facilities that may be impacted by debris;
- Define the priorities during both the response and recovery phase operations;
- Describe the coordination process with other entities responsible for managing debris;
- Identify the roles and responsibilities for all entities and departments involved; and
- Describe the methods that will be used to collect debris (e.g., curbside collection, community drop-off bins).

### **Debris Removal from Private Property**

Debris removal from private property is generally the responsibility of the individual property owners; however, when it is in the public interest to remove debris, the Applicant may act to abate the threat. The DMP should include:

- Identification of the circumstances under which the Applicant will take such action;
- The enabling laws that allow government to intercede in private property matters;

- The process the jurisdiction will use to obtain permissions to enter onto private property; and
- The process the Applicant will undertake to recoup costs (such as insurance proceeds).

### **Public Information**

The dissemination of debris removal information is critical to the effective and efficient removal of debris. The DMP should include a public information strategy to ensure that residents receive accurate and timely information about the parameters, rules, and guidelines for debris removal. For example, if allowing residents to place debris on the curb, information regarding the timeframe allowed and where and how to place the debris (e.g., segregated in shared piles with neighbors, not placed on sidewalks, in roadways, against fire hydrants or power lines).

### **Health and Safety Requirements**

Debris operations can pose safety hazards and health risks to emergency workers and the public. The DMP should include specific details on safety rules and procedures to protect workers and the public and specific measures for adherence to safety rules and procedures.

### **Environmental Considerations and Other Regulatory Requirements**

The removal and disposal of certain types of debris have impact on the human and physical environment. Successful debris operations depend on compliance with Federal, State, Territorial, Tribal, and local environmental laws. The DMP should identify all debris operations that may trigger compliance with environmental and historic preservation (EHP) laws, regulations, and Executive Orders. It should also identify how compliance will be achieved.

### **Temporary Debris Management Sites and Disposal Locations**

The DMP should identify locations where the debris will be segregated, reduced, and disposed and whether it will be recycled.

The Applicants should avoid selecting sites in or near environmentally or historically sensitive areas such as floodplains, wetlands, critical habitats of federally endangered species, historic districts, and archaeologically sensitive areas. Debris must be staged a safe distance from property boundaries, surface water, wetlands, structures, wells, and septic tanks with leach fields. If an EHP concern is identified, the potential site should be ranked lower than others.

Environmental permits and land-use variances may be required to establish a temporary site. Several agencies may be involved in issuing permits and granting approvals. The planning process should identify the potential permits that will be required to establish a facility. A listing of the permits should be part of the DMP and may include:

- Waste processing and recycling operations permit
- Temporary land-use permits
- Land-use variances
- Traffic circulation strategies
- Air quality permits
- Water quality permits
- Coastal commission land-use permits

- HHW permits
- Fire department permits
- Burn permits

The DMP should address traffic circulation at each of the disposal sites, disposal capacity, and how debris will be managed if there is a lack of landfill capacity. The DMP should identify the final disposal site of whole, reduced, or recycled debris.

### **Force Account or Contract Resources and Procurement**

Jurisdictions can use staff resources, contractors, or a combination of both to monitor or conduct debris removal operations. The DMP should clearly define the types of work that the Applicant will perform with staff resources versus contracted services.

The DMP should describe the process and procedure for acquiring competitively procured contracted services, provide specific contract requirements, and explain how contractor qualifications are established.

### **Monitoring Debris Operations**

The Applicant must monitor contracted debris removal operations. It may use staff resources, contractors, or a combination of both to monitor debris removal operations. FEMA encourages the Applicant to use its own employees to monitor debris removal operations. Professional Engineers and other certified professionals are not necessary for debris monitoring. The primary role for debris monitors is to document the location and amount of debris collected. Debris monitors should be able to estimate debris quantities, differentiate between debris types, properly fill out load tickets, and follow all site safety procedures.

The DMP should include details as to how the jurisdiction will monitor its debris removal contractor at pickup sites and all disposal sites, including temporary sites and final disposal areas. The DMP should discuss who will perform the monitoring and describe each monitoring task. If the jurisdiction outsources a monitoring task, it must award the contract to a contractor who has no vested interest in the debris removal contract or contractor. There must be no conflict of interest between the monitoring contractor and the debris removal contractor.



#### **Debris Removal Contractor Registry**

FEMA developed an on-line debris contractor registry tool to assist Applicants in identifying and contacting contractor resources. The registry tool can be found on FEMA's website (<https://asd.fema.gov/inter/drcr/home.htm>). The information provided in the registry is maintained by contractors and their representatives. FEMA does not verify and takes no responsibility for the accuracy of the information submitted. FEMA does not endorse, approve, or recommend any contractors, including those in the registry. State, Tribal, and local governments should perform all appropriate due diligence prior to entering into a contract. Contracting with any of the entities listed in the registry does not ensure reimbursement.

## Debris Management Plan Checklist

Yes	No	Plan Requirements	Comment
		<b>Overview</b> – Does the plan describe the purpose and objectives?	
		<b>Incidents and Assumptions</b> – Does the plan provide information on the types and anticipated quantities of debris that will be generated from various types and sizes of incidents?	
		<b>Debris Collection and Removal</b> – Does the plan have a debris collection strategy? Does the plan discuss the methods that will be used to remove debris and establish priorities for clearance and removal? Does the plan outline the roles and responsibilities of the various functions involved (Public Works, Finance, and Solid Waste Departments, etc.)?	
		<b>Debris Removal on Private Property</b> – Does the plan address the authority and processes for private property debris removal?	
		<b>Public Information</b> – Does the plan include a public information strategy to ensure that residents receive accurate and timely information about debris operations?	
		<b>Health and Safety Requirements</b> – Does the plan describe how workers and the public will be protected and discuss the specific measures for adherence to safety rules and procedures?	
		<b>Environmental Considerations and Other Regulatory Requirements</b> – Does the plan identify all debris operations that will trigger compliance with environmental and historic preservation laws and how compliance will be attained?	
		<b>Debris Management Sites and Disposal Locations</b> – Does the plan identify where the disaster debris will be segregated, reduced, and disposed or whether debris will be hauled to a recycler?	
		<b>Use and Force Account or Contracted Resources and Procurement</b> – Does the plan define the types of work force account labor will accomplish and the types of debris operations that will be contracted? Does the plan describe the process and procedure for acquiring competitively procured contracted services? Does the jurisdiction identify debris contractors that it has prequalified?	
		<b>Monitoring of Debris Operations</b> – Does the plan describe how debris removal contractors will be monitored and who will monitor at pickup sites, Debris Management Sites / Temporary Debris Storage and Reduction Sites, and final disposal?	

# APPENDIX E: STUMP CONVERSION TABLE

## Diameter to Volume Capacity

FEMA quantifies the amount of cubic yards of debris for each size of stump based on the following formula:

$$\frac{[(\text{Stump Diameter}^2 \times 0.7854) \times \text{Stump Length}] + [(\text{Root-Ball Diameter}^2 \times 0.7854) \times \text{Root-Ball Height}]}{46,656}$$

0.7854 is one-fourth Pi and is a constant.

46,656 is used to convert cubic inches to cubic yards and is a constant.

The formula used to calculate the cubic yardage used the following factors, based upon findings in the field:

- Stump diameter measured 2 feet up from the ground
- Stump diameter to root-ball diameter ratio of 1:3.6
- Root-ball height of 31 inches

Stump Diameter (Inches)	Debris Volume (Cubic Yards)	Stump Diameter (Inches)	Debris Volume (Cubic Yards)
6	0.3	46	15.2
7	0.4	47	15.8
8	0.5	48	16.5
9	0.6	49	17.2
10	0.7	50	17.9
11	0.9	51	18.6
12	1	52	19.4
13	1.2	53	20.1
14	1.4	54	20.9
15	1.6	55	21.7
16	1.8	56	22.5
17	2.1	57	23.3
18	2.3	58	24.1
19	2.6	59	24.9
20	2.9	60	25.8
21	3.2	61	26.7
22	3.5	62	27.6
23	3.8	63	28.4
24	4.1	64	29.4

Stump Diameter (Inches)	Debris Volume (Cubic Yards)	Stump Diameter (Inches)	Debris Volume (Cubic Yards)
25	4.5	65	30.3
26	4.8	66	31.2
27	5.2	67	32.2
28	5.6	68	33.1
29	6	69	34.1
30	6.5	70	35.1
31	6.9	71	36.1
32	7.3	72	37.2
33	7.8	73	38.2
34	8.3	74	39.2
35	8.8	75	40.3
36	9.3	76	41.4
37	9.8	77	42.5
38	10.3	78	43.6
39	10.9	79	44.7
40	11.5	80	45.9
41	12	81	47
42	12.6	82	48.2
43	13.3	83	49.4
44	13.9	84	50.6
45	14.5		

# APPENDIX F: HAZARDOUS STUMP WORKSHEET

Applicant: \_\_\_\_\_

Date: \_\_\_\_\_

Applicant Representative: \_\_\_\_\_

Signature: \_\_\_\_\_

FEMA Representative (if available) \_\_\_\_\_

Signature: \_\_\_\_\_

	Physical Location (i.e., Street address, road, cross streets, etc.)	Description of Facility (ROW, Park, City Hall, etc.)	Hazard		U.S. National Grid (USNG) Location	Tree Size (Diameter)	Eligible		Fill For Debris Stumps CY	Comments (See attached sketch, photo, etc.)
			Yes	No			Yes	No		
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										