



Planning for Disaster Debris Management MGT-460

Participant Guide
December 2024
Version 3.0



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NTED Branded Disclaimer



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The Federal Emergency Management Agency's NTED offers a full catalog of courses at no cost to help build critical skills that responders need to function effectively in mass consequence events. Courses include subjects such as weapons of mass destruction terrorism, agroterrorism, cybersecurity, citizen preparedness, and public works. NTED courses include multiple delivery methods: Instructor-led (direct deliveries), train-the-trainers (indirect deliveries), customized (conferences and seminars), and web-based. Instructor-led courses are offered in residence (i.e., at a training facility) or through mobile programs in which courses are brought to state and local jurisdictions that request the training.



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Course Introduction

The focus of the course will be to identify debris management plan components and best planning practices using existing plan examples and case studies and to draft an outline of a debris management plan. This course will empower participants to create pre-disaster debris management plans for their own communities.

This course will enhance participants' abilities to support their community's overall preparedness for disaster debris management by providing them with an understanding of:

- An overview of debris management operations;
- The benefits of planning for debris management;
- Debris management plan components;
- How to integrate debris management planning with the FEMA Public Assistance Program; and
- Debris management planning practices for special considerations.

And the ability to:

- Apply debris management planning concepts to their own community; and
- Create an outline of a debris management plan incorporating information sources to collect further information to complete a plan.



Icon Map



Discussion: Instructor-facilitated, large-group discussion



Example: Descriptive illustration to show or explain a course concept



Handout: Additional information provided to facilitate the scenario-based activity



Key Point: Essential learning concept and discussion



Knowledge Check: Assess learners' knowledge or application of course content



Participant Note: Additional information for participants



Resource: Reference to books, websites, articles, and other external information sources



Video: Video clip that reinforces the course content or facilitates the scenario's progression



Module

1

Welcome, Introduction and Administration



Module 1 Administration



Slide 1: Module 1: Welcome, Introduction and Administration

Duration

50 minutes

Scope Statement

In this module, the instructor will welcome participants to the course, explain how instruction will take place, and provide an agenda. The instructor will discuss the course purpose, goals and objectives; describe the course content; and wrap up any administrative details that remain. The instructor will introduce him or herself and lead a round of introductions among the participants. Finally, the instructor will assess the participants' existing comprehension of course materials by conducting a pre-test.

Terminal Learning Objective (TLO)

Not applicable

Enabling Learning Objectives (ELOs)

Not applicable



Module 1 Content

Welcome

- Instructor Introduction
- Class Structure and Housekeeping
 - Breaks
 - Restrooms
 - Emergency Exits
 - Cell Phones
- IACET CEUs and Other Professional CECs Available



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Module 1: Slide 2

Slide 2: Welcome



Participant Note: The National Disaster Preparedness Training Center (NDPTC) mission is as follows: Uniquely positioned geographically and culturally, the NDPTC works collaboratively to develop and deliver training and education in the areas of disaster preparedness, response, and recovery to governmental, private, tribal, and non-profit entities, and under-represented/under-served communities. It incorporates urban planning and environmental management, emphasizing community preparedness and addressing the needs of vulnerable at-risk populations.



Introductions

- Name
- Agency or Organization
- Title



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Module 1: Slide 3

Slide 3: Introductions

Participants are asked to provide information designed to help the instructor learn names and understand the participants' backgrounds and motivations:

- Name;
- Organization or agency and title, if applicable;
- Title.



Continuing Education

- International Association of Continuing Education and Training (IACET)
 - Participants who successfully complete this course will receive 0.1 CEUs for every eligible course contact hour
- This course may also be eligible to provide other professional continuing education credits



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Module 1: Slide 4

Slide 4: Continuing Education

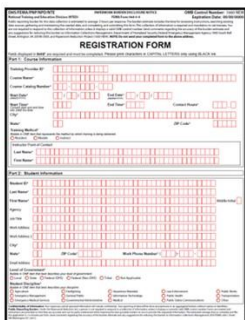
This course may also be eligible to provide the following professional continuing education credits:

- International Association of Emergency Managers (IAEM) – Training hours
- Association of State Floodplain Managers (ASFPM) -- Continuing Education Credits (CEC)
- American Planning Association (APA) – Certification Maintenance (CM)

Eligibility to receive credits from the designated professional organizations is dependent on the specific membership and/or qualification requirements as enforced by each individual organization. Submission processes enforced by each organization should be followed to successfully receive credits. For more information, visit the NDPTC website or contact NDPTC at 808-725-5220 or ndptc-training@lists.hawaii.edu.



Course Registration

A FEMA Course Registration Form, Form 460-1, used for registering participants for FEMA courses. The form includes sections for personal information, contact information, and a grid for course selection. The title "REGISTRATION FORM" is prominently displayed in the center.

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- Electronic
 - ❑ Create or Log in to account at ndptc.hawaii.edu
- Hard Copy in Class
 - ❑ Use upper case letters
 - ❑ Avoid abbreviations

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Module 1: Slide 5

Slide 5: Course Registration

The instructor will distribute the course registration forms for those participants who have not already completed the online registration. The instructor will then collect the registration forms.



Evaluation Strategy

- Post-test administered at conclusion of course
- Score 70% or better on the post-test to successfully complete the course
 - Participants will have an opportunity to re-take the test if they do not score 70% or higher.



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Module 1: Slide 6

Slide 6: Evaluation Strategy

Participants will be given two tests – a pre-test administered next, and a post-test at the end of the course. Each test includes one or more items designed to assess mastery of the module enabling learning objectives. Successful performance on the post-test (i.e., scoring 70 percent or better) will be recognized by issuance of a Certificate of Achievement. During the course, knowledge checks will offer participants an opportunity to reinforce new knowledge and get corrective feedback prior to the post-test. If a participant does not receive a 70 percent or above on the post-test, they will have the opportunity to take the test again. Should they need additional assistance after re-taking the test, an instructor will discuss any issues with the participant and offer another chance to take the test.

The instructor will inform the participants that, working independently, they will have 10 minutes to complete the pre-test.

Participants should follow these instructions as they take the pre-test and indicate their answers on the test answer sheet:

- Write legibly using uppercase letters.
- Use the same first name, last name, and date of birth provided on the participant registration form. This information is used to generate a unique participant identification number.
- Complete the Test Date field in the upper right-hand portion of the sheet by writing the day the test is administered.
- Write the test document ID number in the Test Doc ID field. The ID number is in the test handout footer.
- Fill-in the Pre-Test answer bubble.
- Completely fill-in each bubble making certain the darkened bubble is correctly aligned to the selected answer letter on the test answer sheet.



Course Goal

This course will enable participants to outline a disaster debris management plan and recognize special considerations when planning for debris management after a natural disaster.



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Module 1: Slide 7

Slide 7: Course Goal

This course will prepare participants to outline a disaster debris management plan and recognize special considerations when planning for debris management after a natural disaster.



Learning Objectives

Upon successful completion of this course, participants will be able to:

- Explain the basic concepts of debris management operations and the benefits of debris management planning;
- Outline the key components of a debris management plan; and
- Apply strategies for special considerations encountered during debris management operations to plan outlines.



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Module 1: Slide 8

Slide 8: Learning Objectives

Upon successful completion of this course, participants will be able to:

- Explain basic concepts of debris management operations and the benefits of debris management planning;
- Outline the key components of a debris management plan; and
- Apply strategies for special considerations encountered during debris management operations to plan outlines.



Course Agenda

Module	Title	Time
1	Welcome, Introduction, and Administration	50 minutes
2	Introduction to Debris Management Planning	100 minutes
3	Disaster Debris Management Plan Components	150 minutes
4	Scenario-Based Learning	50 minutes
5	Course Summary and Administration	40 minutes

(Three 10-minute breaks will take place between modules as needed with a 1-hour lunch break)



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Module 1: Slide 9

Slide 9: Course Agenda

This course is composed of five distinct modules designed to address various topics as well as to satisfy administrative requirements. Each session includes an introduction, lecture content, and class discussions, which expand upon the topics or ideas that are presented.

Module 1: Welcome, Introduction, and Administration. 50 minutes

Module 2: Introduction to Debris management Planning. 100 minutes.

Module 3: Disaster Debris Management Plan Components. 150 minutes.

Module 4: Scenario-Based Learning. 50 minutes.

Module 5: Course Summary and Administration. 40 minutes



Module 1 Summary

Module 1 Summary

- Stated the course agenda
- Stated the course goal
- Explained how performance will be evaluated



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Module 1: Slide 10

Slide 10: Module 1 Summary

In Module 1, we stated the course agenda, stated the course goal, and explained how performance will be evaluated.



Module 1 Reference List

None



Module

2

Introduction to Debris Management Planning



Module 2 Administration



Slide 11: Module 2: Introduction to Debris Management Planning

Duration

100 minutes.

Scope Statement

This module introduces participants to the basic concepts and key dimensions associated with debris management planning. Participants will learn about the benefits of debris management planning, different types of debris generated from different disasters, and basic functions of debris operations. The role of debris management operations will be further explained in relation to the disaster declaration process, FEMA's Public Assistance Program, and an overall disaster response operation.

Terminal Learning Objective (TLO)

Participants will be able to explain the basic concepts of debris management operations and the benefits of debris management planning.



Module 2 Enabling Learning Objectives

#	Objective
2-1	Identify the different types of debris
2-2	Outline the benefits of debris management planning
2-3	Describe key terms and concepts in disaster debris planning and operations



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Module 2: Slide 12

Slide 12: Module 2 Enabling Learning Objectives

Enabling Learning Objectives (ELOs)


By the end of this module, participants will be able to:

1. Identify the different types of debris
2. Outline the benefits of debris management planning
3. Describe key terms and concepts in disaster debris planning and operations




Module 2 Content

Disaster Debris Introduction



[Indistinct vehicle noises]

 **FEMA**

(Source: FEMA, 2011)

MGT-460 Planning for Disaster Debris Management Module 2: Slide 13

Slide 13: Disaster Debris Introduction

We are going to start this module with a short, two-minute video. It shows the aftermath of the Joplin, Missouri, tornado. May 22, 2011 was a harrowing night for many residents of the southwestern Missouri town of Joplin. This is the story of one of its survivors.



Video: Play video. Approximately 2 minutes.

We show this video so that while we go through this course, we hope you will remember why this task of debris management planning is so important and how daunting the task can be. We also hope you will keep in mind that the debris we collect, manage, and dispose of after a disaster is comprised of families' possessions, houses, yards, schools, and sometimes entire towns. And these families and towns cannot begin to recover and rebuild until the debris begins to move. This is one of the most important tasks of disaster response and recovery.



What is Debris?



“Scattered items or materials
either broken or misplaced by
a disaster”

- FEMA, 2012



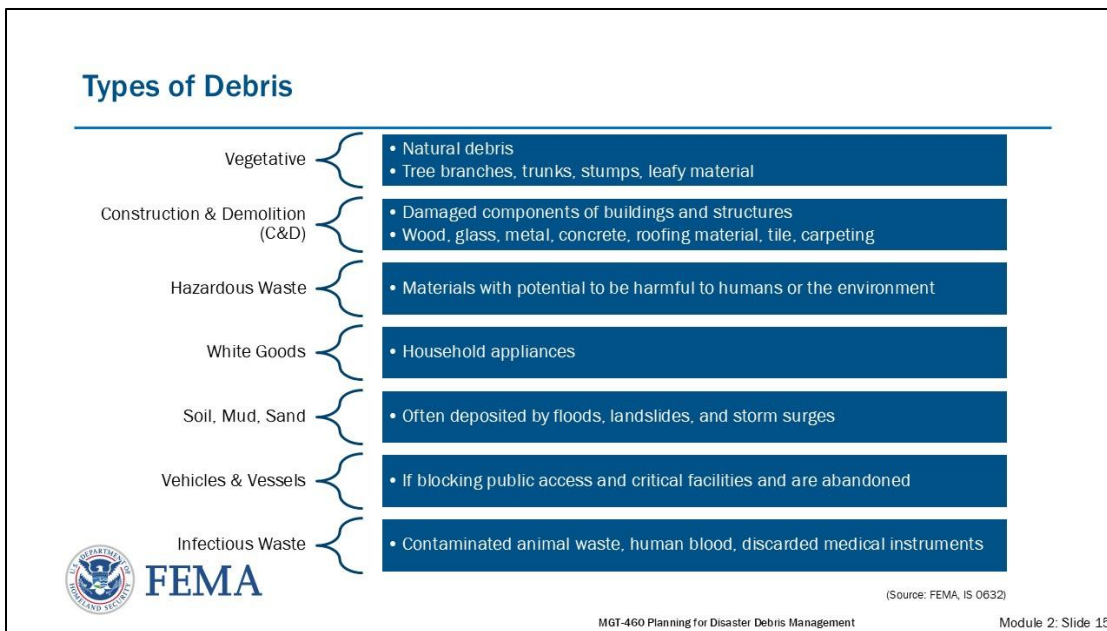
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Module 2: Slide 14

Slide 14: What is Debris?

When we use the word “debris,” what exactly are we talking about? Debris can take many forms, including but not limited to vegetative, construction and demolition (C&D), hazardous waste, soil, mud, sand, white goods, putrescent, vehicles and vessels, etc. The type of disaster may also influence the types of debris generated, but there is never complete certainty. Remember that ultimately, debris is often the remnants of people’s property and can be very meaningful to both the owner and the community.



Slide 15: Types of Debris



Key Point: Different disasters generate different types of debris. For example, a landslide would generate a lot of soil, mud, and sand, but a tornado would not.

There are many different types of debris generated by disasters and defined by FEMA.

- Vegetative debris consists of all types of natural debris, including tree branches, tree stumps, tree trunks, and leafy materials.
- Construction and Demolition (C&D) includes damaged components of buildings and structures such as wood, metal, carpets, roofing materials, and windows.
- Hazardous waste materials have the potential to be harmful to humans or the environment. Hazardous waste is regulated under Resource Conservation and Recovery Act (RCRA). In regulatory terms, a RCRA hazardous waste is a waste that appears on one of the four hazardous waste lists or exhibits at least one of the following four characteristics: ignitability, corrosivity, reactivity, or toxicity. The Resource Conservation and Recovery Act (RCRA) requires safe disposal of waste materials, promotes the recycling of waste materials, and encourages cooperation with local agencies. It applies to disposal of disaster-generated debris and is of particular concern when hazardous materials may be present.
- Household Hazardous Waste refers to hazardous products and materials that are used and disposed of by residential consumers rather than commercial or industrial entities.
- Electronic Waste refers to electronics that contain hazardous materials.
- White Goods are household appliances. This is an old term coined when most appliances like refrigerators and washing machines were all white.
- Soil, mud, and sand are often deposited by floods, landslides, and storm surges.



- Vehicles and Vessels may be classified as debris if they block public access and critical facilities and are abandoned.
- Putrescent debris is any debris that will decompose or rot, including animal carcasses and other fleshy organic matter.
- Infectious waste consists of materials with the potential to spread disease such as contaminated animal waste, human blood, or discarded medical instruments. Clearance, removal, and disposal of these wastes may be the authority of Federal or State agencies.
- Chemical, biological, radiological, and nuclear-contaminated debris is highly regulated by federal statutes, regulations, and policies.



Why Plan for Debris Management?

- Debris management costs account for approximately 27% of the total costs of a given disaster. (FEMA, 2007)
- Every one-million cubic yards of debris would lessen a landfill's life by about 5 years. (EPA, 2008)



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(Source: Troxler, 2021)

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Module 2: Slide 16

Slide 16: Why Plan for Debris Management?

Debris management can be costly because it often requires external labor and equipment if the community is overwhelmed. Some types of debris require special disposal practices that are often costly. Debris management costs account for approximately 27% of the total costs of a given disaster.

Hurricane Katrina generated over 100 million cubic yards of disaster debris across a 90,000-square-mile disaster area (Luther, 2008). Debris Management Sites (DMS) are used to save landfill space and time. Every one-million cubic yards of debris would lessen a landfill's life by about five years. This will be discussed further in Module 3.



Why Plan for Debris Management? (cont.)

- Often overwhelms local capacities
- Less expense for local jurisdiction
- Greater reimbursement if incident becomes Stafford Act declaration



(Source: Department of Homeland Security/Tara Mollie, 2020)



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Module 2: Slide 17

Slide 17: Why Plan for Debris Management? (cont.)



Key Point: Debris clearance, removal, and management are instrumental to beginning the response and recovery phases after a disaster and a plan is necessary to successfully manage debris operations.

Communities with a debris management plan are better prepared to restore public services and ensure the public health and safety in the aftermath of a disaster, and they are better positioned to receive the full level of assistance available to them from FEMA and other participating entities.



Communities with Pre-disaster Debris Management Plans...



Removed more cubic yards of debris per day



Recycled almost twice as much of their debris than counties without plans



Received over three times as much Public Assistance from FEMA than communities without plans



Reported significantly higher level of perceived preparedness for future debris management challenges



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Module 2: Slide 18

Slide 18: Communities with Pre-disaster Management Plans...

A research study by Crowley (2017) surveyed counties in the United States who received major disaster declarations between 2012 and 2015. Respondents were asked if they had debris management plans in place before their most recent declarations. Additional survey questions compared different aspects of the debris management process between the two groups.

Counties with pre-disaster debris management plans recycled an average of 46.63% of their total debris, while counties without such plans only recycled an average of 26.07% of their total debris.

Counties with pre-disaster debris management plans received an average of \$152,058,234.00 in Public Assistance funding, while counties without such plans only received an average of \$42,946,980.10 in Public Assistance funding.

Counties were given the statement, "If another major disaster affects the county, I feel confident that the county will be prepared to handle the debris management challenges." Results indicate that counties with pre-disaster debris management plans felt significantly more prepared to handle future debris management challenges than counties without disaster debris management plans.

Counties with pre-disaster debris management plans removed significantly more cubic yards of debris per day than counties without plans.



Participant Note: For more information on this study, see Crowley, J. (2017). A Measurement of the Effectiveness and Efficiency of Pre-Disaster Debris Management Plans. *Waste Management*, 62 (C), 262-273.



Who Plans?

- Who would be included on your debris management planning team?
- Who else do you need input from?



(Source: DHS/Z. Hupp, 2021)



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Module 2: Slide 19

Slide 19: Who Plans?

Who should you include on your debris management planning team?



Whole Community

Everyone plays a role in
debris management...



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(FEMA, 2023)

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Module 2: Slide 20

Slide 20: Whole Community



Key Point: Community engagement is an important element of activating the community and building community resilience. The Whole Community is also a key concept in FEMA policy and practice.

By engaging and involving the Whole Community and considering the needs of all individuals, resilience is increased. Ideally, we will see:

- Greater awareness of hazards and risks: Not only can individuals better understand the concerns of community planners; planners can learn from the local and Indigenous knowledge of residents. For example, a neighborhood can inform planners that a particular storm drain is always clogging and leading to flooding during storm events.
- Greater self-reliance: As residents become empowered and aware of threats, they can better prepare for natural hazard events and become more self-reliant during and immediately after these hazard events. This allows responder resources to focus on high impact areas and individuals who may need assistance to address functional needs. Increased self-reliance also helps to maintain or restore normal conditions more rapidly.
- Greater community involvement: If residents feel like their voices are being heard and their input is accepted, they may be more willing to get involved in their community. This can lead to more volunteering, better attendance at public meetings, and better voter turnout, all of which contribute to the community's social community systems. Greater community involvement and empowerment could also lead to more entrepreneurship and productivity that could contribute to the economic community system.



Roles and Responsibilities

Federal	State, Tribal, Territorial	Local	Private and NGOs
<ul style="list-style-type: none">• Awards grants to SLTT and eligible NGOs• Lead ESF	<ul style="list-style-type: none">• Applies for disaster declaration• Receives and administers grant funds• Provides resources if requested and available.	<ul style="list-style-type: none">• Write and maintain debris management plan• Assess and manage response• Appeal for state and federal funding	<ul style="list-style-type: none">• Support and assist SLTT and federal response



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Module 2: Slide 21

Slide 21: Roles and Responsibilities

All disaster management starts at the local level. Debris management is no different. Local jurisdictions will work with contractors, private entities, and non-governmental organizations to manage debris operations in their communities, under the jurisdiction's established Incident Command System (ICS) structure. This structure should already be established in the jurisdiction's emergency response or disaster recovery plan (or both). Local government will write and manage the debris management plan as an annex or appendix to its base plans and will coordinate the response unless further help is requested and administered by the State or federal governments. States and territories may provide assistance in the form of planning or resources if requested and if assets are available. Note that direct federal assistance is not the norm and most debris removal operations are handled entirely at the local level.

Local governments will provide the state with data to support a disaster declaration. The State will work with the locals to assess the damage and request a federal disaster declaration when eligible and activation of Public Assistance.

The federal government will receive the assistance request from the State and determine if they will enact the Stafford Act which opens up funding opportunities for state and locals.



Overview of a Debris Management Operation

Sandy @ Five



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(Source: FEMA, 2017)

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Module 2: Slide 22

Slide 22: Overview of a Debris Management Operation

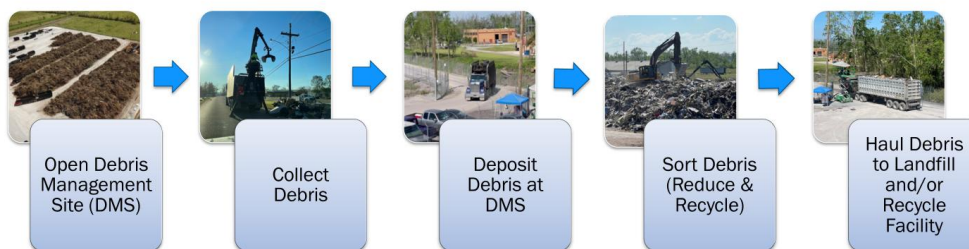
This video demonstrates some of the concepts we have talked about so far such as types of debris and the importance of planning for debris management. It also gives a broad overview of what entails a debris management operation. This is a good overview of the topics we will discuss throughout the day.



Video: Play video. Approximately 3 minutes



Debris Collection and Deposition Process



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Module 2: Slide 23

Slide 23: Debris Collection and Deposition Process



Key Point: A well-organized debris management process not only accelerates community recovery but also promotes environmental preservation through effective sorting, reduction, and recycling efforts.

This slides provides an overview of the debris collection and deposition process. A good debris management will outline the process and the critical task with each step. This slide provides a good overview for students to visualize the process in its entirety.



Typical Debris Removal Equipment



Grapple Truck



Front End Loader



Excavator



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Module 2: Slide 24

Slide 24: Typical Debris Removal Equipment

Debris management equipment may vary based on the specific needs and scope of the operation but typically includes task specific equipment such as grapple trucks, front-end loaders, and excavators to handle various types of debris efficiently. It's important for communities to consider the types of debris and their geographic area to determine the best equipment to assist in the removal of debris.



Debris Forecasting

- Forecasting the type and quantity of debris to expect from a disaster event is an effective planning strategy.
- Debris forecasts enable the local debris management staff to plan:
 - Response and recovery resources.
 - Number and size of debris storage and reduction sites.
 - Final disposition of disaster-related debris.
- A realistic debris forecast may be generated by studying the impact of previous disaster events.



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Module 2: Slide 25

Slide 25: Debris Forecasting

Forecasting the type and quantity of debris expected from a disaster helps local debris management staff effectively plan response personnel and recovery resource requirement. Studying the debris impacts from similar threats and hazards in other communities is crucial for vetting and assessing the accuracy of planners' forecast assumptions. This comparative analysis helps ensure that the debris management plans will be both realistic and effective.



Disaster Debris Profile

- Communities have a unique set of hazards and debris which together create a debris profile.
- Planners should assess the types of materials and wastes that will likely make up disaster debris based on the characteristics and features of their communities and the types of disasters that are likely to happen in their communities.
- Planners should develop debris profiles based upon the type of hazard and the likely debris created.
- A debris profile should be created for the types of hazards that are most likely to occur and pose the greatest risk to a community.



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Module 2: Slide 26

Slide 26: Disaster Debris Profile



Key Point: Tailoring debris management plans to a specific hazards may naturally overlap other hazards.

Communities have a unique set of hazards and debris that form a community specific debris profile. Planners need to evaluate the types of materials and wastes that will likely constitute disaster debris and developing debris profiles based on specific hazards to help in preparing for the most likely and highest-risk events.



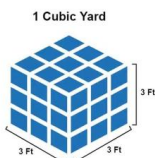
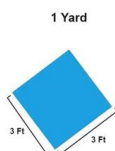
Example: Forecasting for an ice storm debris event may also apply to straight-line wind events due to the natural overlap in the types of debris and response strategies, enhancing overall preparedness and resource efficiency



Debris Terms

Terms:

- **Volume** – Typically measured in cubic yards. Most common unit of measurement for vegetative debris
- **Weight** – Typically measured in tons. Typically used for final deposition in the landfill



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Module 2: Slide 27

Slide 27: Debris Terms

Two primary measurement terms that are crucial to debris management are volume and weight.

Volume is typically measured in cubic yards. This is the most common unit of measurement for vegetative debris.

Weight is typically measured in tons. This is most commonly used for final debris deposition into a landfill.

They are used in the planning, response and recovery efforts particularly in disaster scenarios where large amounts of debris must be cleared and managed.



Activity 1 – Part 1: Debris Profile

- Work in groups to complete the activity handout
 - Considering a likely event for your community, create a debris profile.
 - Determine the types of debris that could be generated by a percentage.
 - 10 minutes
 - Example: High wind event
 - Vegetative 50%
 - Construction and Demolition 25%
 - Household Hazardous Waste 24%
 - Other 1%



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Module 2: Slide 28

Slide 2822: Activity 1- Part 1: Debris Profile

Participants will work in small groups. Participants should list disasters that their communities are likely to experience and the types of debris that will likely be generated.

Participants will have 10 minutes to complete this activity, then debrief with the class.



Estimating Debris on the Ground

- Ground Measurements

- To estimate the amount of debris on 1 acre of ground (43,560 sq ft) and that is 10 feet high, multiply 43,460 sq ft by 10 feet, then divide by 27. This converts to 16,133 CY

$$\frac{\text{Square Feet X Debris Pile Height}}{27} =$$



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Module 2: Slide 29

Slide 29: Estimating Debris on the Ground

Accurately estimating debris is critical for efficient disaster response and recovery operations.

The formula for Ground Measurements is square feet of debris times debris pile height divided by 27. Example: one acre of debris (43,560 sq feet) 10 feet high converts to 16,133 cubic yards.



Estimating Single Family Residence

- Length and Width must be in feet
- S = number of stories in the building
- 0.20 = a constant based on the study data
- VCM = a vegetative cover multiplier

$$\text{Length} \times \text{Width} \times S \times 0.20 \times \text{VCM} = \text{CY}$$



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Module 2: Slide 30

Slide 30: Estimating Single Family Residence

This slide focuses on estimating the amount of debris generated by single family residences, particularly after disasters like hurricanes, floods or tornadoes.

The formula is Length times Width time S(number of stories in the building) times 0.20 times VCM (vegetative cover multiplier) = CY (Cubic Yards).



Vegetative Multiplier

- Light = 1.1 multiplier
 - Includes new home developments where more ground is visible than trees and canopy cover is sparse.
- Medium = 1.3. multiplier
 - Generally has a uniform pattern of open space and tree canopy cover, and is the most common description for vegetative cover.
- Heavy = 1.5 multiplier
 - Found in mature neighborhoods and woodlots where the ground or houses cannot be seen due to the tree canopy cover



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Slide 31: Vegetative Multiplier

Different areas have varying levels of vegetation, which impacts the volume of debris generated. This multiplier helps account for these differences.

- Light = 1.1 multiplier
 - Includes new home developments where more ground is visible than trees and canopy cover is sparse.
- Medium = 1.3. multiplier
 - Generally has a uniform pattern of open space and tree canopy cover, and is the most common description for vegetative cover.
- Heavy = 1.5 multiplier
 - Found in mature neighborhoods and woodlots where the ground or houses cannot be seen due to the tree canopy cover



Examples of Vegetative Multiplier

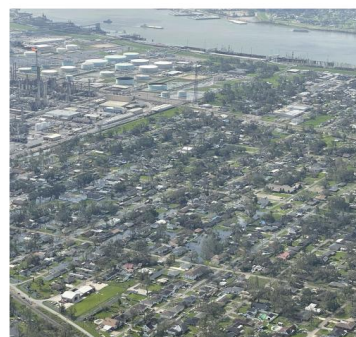
Light: 1.1 multiplier



Medium: 1.3 multiplier



Heavy: 1.5 multiplier



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Slide 32: Examples of Vegetative Multiplier

- Light (1.1 multiplier): Sparse canopy cover, more visible ground.
- Medium (1.3 multiplier): Uniform pattern of open space and tree canopy cover.
- Heavy (1.5 multiplier): Dense tree canopy cover, ground or houses not visible.



Activity Examples

- Single family homes:
 - A neighborhood has 15 single-story homes, each 2,000 square feet, in an area with medium vegetative cover.
 - Base debris per house: 400 cubic yards (CY)
 - Vegetative debris: $400 \text{ CY} \times 1.3$ (medium multiplier) = 520 CY per house
- Multi-story homes:
 - A neighborhood has 10 two-story homes, each 2,000 sq ft (per story), in an area with heavy vegetative cover.
 - Base debris per house: $400 \text{ CY} \times 2 = 800 \text{ CY}$
 - Vegetative debris: 400×1.5 (heavy multiplier) = 600 CY per house
 - Total debris: 10 houses \times (800 CY + 600 CY) = 14,000 CY



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Slide 33: Activity Examples

This explains how to use the provided values for single-wide and double-wide mobile homes.



Example: Single Family Homes: A neighborhood has 20 single-wide mobile homes and 10 double-wide mobile homes.

- **Single-wide debris:** $20 \times 290 \text{ CY} = 5800 \text{ CY}$
- **Double-wide debris:** $10 \times 415 \text{ CY} = 4150 \text{ CY}$
- **Total debris:** $5800 \text{ CY} + 4150 \text{ CY} = 9950 \text{ CY}$

Multi-Story Homes: Multi-story homes: A neighborhood has 10 two-story homes, each 2,000 sq ft (per story), in an area with heavy vegetative cover.

- Base debris per house: $400 \text{ CY} \times 2 = 800 \text{ CY}$
- Vegetative debris: 400×1.5 (heavy multiplier) = 600 CY per house
- Total debris: 10 houses \times (800 CY + 600 CY) = 14,000 CY



Activity 1 – Part 2: Estimating Disaster Debris

- Work individually to fill out the activity handout for Part 2
 - Use the information and formulas provided to estimate the amount of debris generated by a disaster
 - The instructor will demonstrate an example
 - 20 minutes



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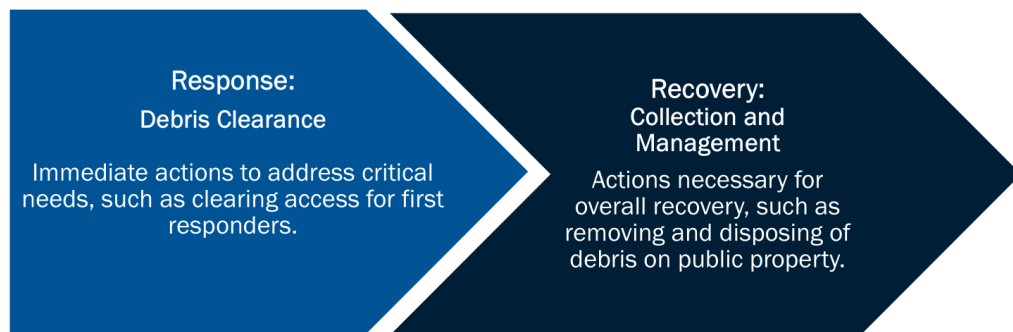
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Slide 34: Activity 1- Part 2: Estimating Disaster Debris



Debris Operational Phases

Debris management priorities



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Slide 35. Debris Operational Phases



Key Point: It is important to note that there is no clear-cut start or stop between these phases; they often overlap as immediate response efforts transition into longer-term recovery activities.

Debris management priorities include activities related to response and recovery. The main priority of the response phase is debris clearance. This includes immediate action to address critical needs, such as clearing access for first responders. The main priority of recovery is collection and management of the debris. This includes actions necessary for overall recovery, such as removing and disposing of debris on public property.



Response Activities

- Activation of Debris Management Plan
- Clearing high-priority roads, critical facilities, and infrastructure
- Opening Debris Management Sites (DMS) for temporary storage
- Address legal, health, and safety issues
- Documentation of costs, personnel, equipment
- Debris removal by force account labor (employees) and contractors



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Slide 36. Response Activities

Specific response activities include:

- Activation of Debris Management Plan
- Clearing high-priority roads, critical facilities, and infrastructure
- Opening Debris Management Sites for temporary storage
- Address legal, health, and safety issues
- Documentation of costs, personnel, equipment
- Debris removal by force account labor (employees) and contractors



Recovery Activities

- Removal of debris from private property and rights-of-way
- Hauling debris to DMSs
- Recycling or reducing debris
- Hauling non-recyclable debris to permanent landfills
- Final disposal of all debris
- Closing DMS or other collection sites



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Slide 37. Recovery Activities

Specific recovery activities include:

- Removal of debris from private property and rights-of-way
- Hauling debris to DMSs
- Recycling or reducing debris
- Hauling non-recyclable debris to permanent landfills
- Final disposal of all debris
- Closing DMSs or other collection sites



Disaster Declarations

- **Stafford Act** provides the legal authority for the federal government to provide assistance to states during **declared major disasters and emergencies**
- **Emergency Declaration**
 - Any emergency or occasion when federal assistance may be needed, as determined by the President.
- **Major Disaster Declaration**
 - Any natural event the President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond.
 - **FEMA Public Assistance (PA) Program**
 - Awards Federal grants to State and local governments, federally recognized tribes or tribal organizations, and eligible private nonprofit organizations for Presidentially declared disasters



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Slide 38: Disaster Declarations



Key Point: Presidential Emergency Declarations are limited in scope and duration but provide direct federal assistance to an area in a very timely manner. They are often used prior to a large incident, such as a hurricane, in order to preposition federal assets in areas likely to be hardest hit by the disaster. Major Disaster Declarations typically take longer to declare because they required a damage assessment and certain dollar thresholds to be met by the impacted state. They provide much more expansive services, for a much longer length of time, than an Emergency Declaration does.



Participant Note: The Public Assistance program provides funds and other assistance to public agencies and certain qualified non-profits. It **DOES NOT** provide assistance to individuals or private businesses. The program that provides assistance to individuals and private businesses is called the Individual Assistance Program.

According to the Stafford Act, “All requests for a declaration by the President that a major disaster exists shall be made by the Governor of the affected State.”

There are two types of disaster declarations provided for in the Stafford Act: emergency declarations and major disaster declarations. Both declaration types authorize the President to provide supplemental federal disaster assistance.

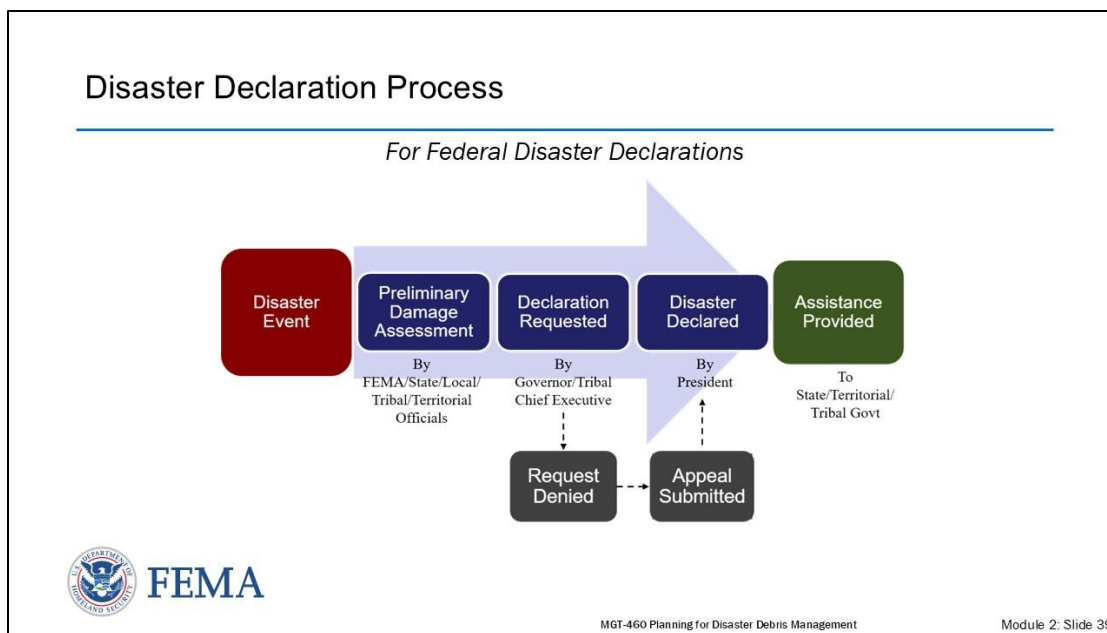
Emergency Declarations: The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.



Major Disaster Declarations: The President can declare a major disaster for any natural event, including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, or, regardless of cause, fire, flood, or explosion, that the President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

Through the Public Assistance Program, FEMA provides supplemental federal disaster grant assistance for debris removal, life-saving emergency protective measures, and the repair, replacement, or restoration of disaster-damaged publicly owned facilities, and the facilities of certain PNP organizations. The PA program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

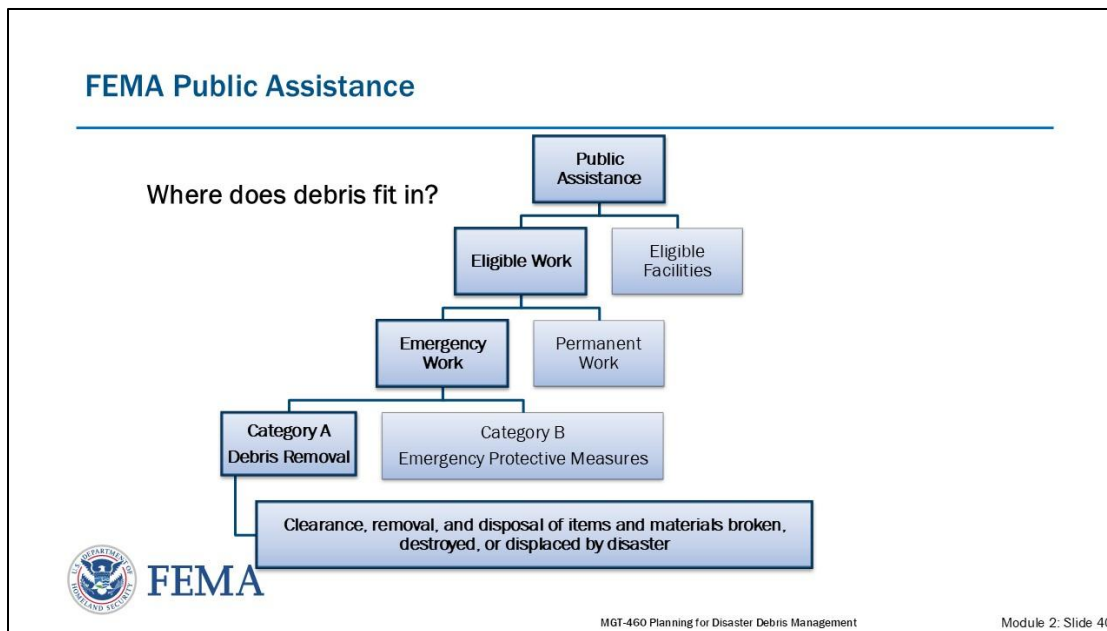
The federal share of assistance is not less than 75 percent of the eligible cost. The Recipient (usually the state) determines how the non-federal share (up to 25 percent) is split with the subrecipients (eligible applicants).



Slide 39: Disaster Declaration Process

Major disaster declarations are granted after a detailed process. First, the disaster strikes. If the local government is overwhelmed, they will reach out to mutual aid partners to provide assistance. If mutual aid partners are unable to assist, assistance can be requested directly from the state/territory. If the state/territory is unable to provide resources, states and some territories may request assistance from other states and territories via the Emergency Management Assistance Compact (EMAC). Eventually, a damage assessment is conducted to determine local losses and recovery needs. Next, it will be up to the Governor to request a major disaster declaration. If this request is made, FEMA will evaluate the request and recommend action to the White House. Then it will be up to the President to approve the request. If the request is approved, FEMA will inform the Governor and the disaster will be eligible to receive Federal aid. FEMA will then establish a presence in the state and possibly at the local jurisdiction.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, 42 U.S.C. § 5121, et seq. (hereinafter referred to as the Stafford Act), authorizes the FEMA Public Assistance Program to award Federal funding to State and local governments, federally recognized tribes, and eligible private non-profit organizations in order to assist them in their disaster response and recovery activities. Specifically, the Program provides assistance for debris removal, implementation of emergency protective measures, and permanent restoration of eligible facilities and infrastructure.



Slide 40: FEMA Public Assistance



Key Point: Debris removal is only authorized for reimbursement during the time that Emergency Work is authorized under the Public Assistance program. Each declaration will include the authorized dates (which are nearly always backdated to the start of the disaster). Students also often ask about other categories, including Emergency Work Category B (emergency protective measures) and under Permanent Work (categories C-G).

Public Assistance is divided into two categories, Eligible Work and Eligible Facilities. Debris Removal falls under Eligible Work. Eligible Work is also divided into two categories, Emergency Work and Permanent Work. Debris removal is considered Emergency Work. Emergency Work consists of Category A and Category B. As you can see, Debris Removal is Category A work.

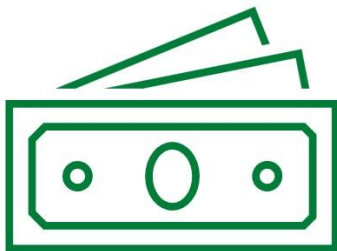
Only Categories A (debris removal) and B (emergency protective measures) may be authorized under an emergency declaration. Categories C-G (permanent work) are not available under an emergency declaration. This assistance is generally provided on a 75% federal, 25% non-federal cost sharing basis, with some states subsidizing the 25% local match.

Eligible work accomplished with an applicant's own labor, equipment, and materials may be funded under the Public Assistance Program. An applicant's employees' labor and an applicant's equipment are called force account labor and force account equipment, respectively.

It is important for the applicant's staff to document hours worked and equipment used to complete the eligible work. NIMS provides extensive information on resource management best practices, which should be adopted into your base emergency operations and/or disaster recovery plans.



Eligible Costs



- Overtime for force account labor (your employees)
- Costs for force account equipment (your equipment)
- Cost for contract labor and equipment



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Slide 41: Eligible Costs



Note that generally, the only three things that are eligible for reimbursement are:

- Overtime for force account labor (your employees),
- Costs for force account equipment (equipment that you own),
- Cost for contract labor and equipment. Note that equipment costs are calculated using a specific formula that is updated by FEMA on a continuing basis.

Contracted labor and equipment must follow both local contracting rules and state/federal rules in order to be considered an eligible cost.

Alternative procedures will be covered in the next slide.

Alternative Procedures

FEMA Public Assistance Guidelines:

- Only overtime force account labor is eligible for reimbursement for debris removal tasks.

Alternative Procedures Option:

- By opting into FEMA's Public Assistance Alternative Procedures, both straight-time and overtime force account labor are eligible for reimbursement.
- To opt-in, include straight-time labor costs in your Category A project claims and ensure proper documentation is maintained.

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Slide 42: Alternative Procedures



Key Point: Understanding the eligibility criteria for force account labor ensures jurisdictions can maximize cost recovery while maintaining compliance with FEMA regulations. Opting into FEMA's Alternative Procedures offers additional flexibility, but requires meticulous documentation and proactive planning. Encourage participants to evaluate this option during their disaster preparedness activities.

This slide explains the eligibility of straight-time force account labor costs under FEMA's Public Assistance Program and clarifies the distinction between standard eligibility and the additional options provided through FEMA's Alternative Procedures.

- **Standard FEMA Public Assistance Eligibility:**
 - Under FEMA's traditional Public Assistance guidelines, only overtime force account labor costs are reimbursable for debris removal.
 - Overtime labor is defined as hours worked beyond an employee's regular schedule, necessary for emergency work, such as clearing roads or addressing immediate public safety hazards.
- **Alternative Procedures for Debris Removal:**
 - FEMA's Public Assistance Alternative Procedures (PAAP) provide a more flexible option for jurisdictions to recover costs.
 - Under this program, jurisdictions can claim reimbursement for both straight-time and overtime force account labor costs associated with debris removal tasks.
- **Eligibility Requirements:**
 - Jurisdictions must opt-in to FEMA's Alternative Procedures for debris removal to be eligible for straight-time labor reimbursement.



- This option must be specified in the jurisdiction's Category A project claims during the application process.
- Documentation Standards:
 - It is important to maintain proper documentation for all labor costs to meet FEMA's requirements.
 - Documentation should include:
 - Employee timesheets (detailing hours worked and tasks performed).
 - Equipment logs.
 - Supporting justifications for activities classified as eligible debris removal work.

Practical Examples:

- Straight-time labor might include tasks such as:
 - Monitoring contractor operations.
 - Operating jurisdiction-owned equipment for debris removal.
 - Direct collection and transportation of debris.



Module 2 Summary

Module 2 Summary

- Identified the different types of debris
- Outlined the benefits of debris management planning
- Described key terms and concepts in disaster debris planning and operations



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Slide 23: Module 2 Summary

In this module, we identified the different types of debris, outlines the benefits of debris management planning, and described key terms and concepts in disaster debris planning.



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Module

3

Disaster Debris Management Plan Components



Module 3 Administration



Slide 24: Module 3: Disaster Debris Management Plan Components

Duration

150 minutes

Scope Statement

In this module, participants will be provided with detailed descriptions of the range of components that comprise a debris management plan. Participants will also learn how to apply for emergency funding to assist with debris operations following a disaster. Participants will work together to discuss the plan components and collect information to complete an outline of their plan.

Terminal Learning Objective (TLO)

By the end of this module, participants will be able to outline key components of a debris management plan.



Module 3 Enabling Learning Objectives

#	Objective
3-1	Evaluate specific debris management plan components
3-2	Draft a debris management plan outline and identify sources to collect further information to complete the plan



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Slide 25: Module 3 Enabling Learning Objectives

Enabling Learning Objectives (ELOs)

By the end of this module, participants will be able to:

1. Evaluate specific debris management plan components
2. Draft a debris management plan to outline and identify sources to collect further information to complete the plan



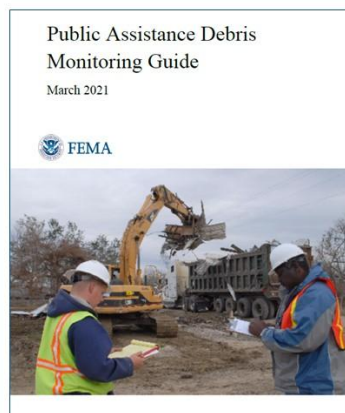
Module 3 Content

Plans & Guides

- Many different templates, formats, and Job Aids
 - FEMA
 - USACE
 - EPA
 - State
 - Others
- Use a template or format that works best for your organization



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Slide 26: Plans & Guides

There are many different debris management templates and examples available. Some of the more popular ones are the FEMA model (which this course is based on), the U.S. Army Corps of Engineers model, the Environmental Protection Agency model (for which they provide a template that is listed in the sources for this course), state approved templates, and many others. Overall, you need to pick a plan design that works for your organization and that is compliant with all applicable laws.



Participant Note: FEMA used to approve debris removal plans in advance, however, they no longer do. The sections contained in this model plan are items that need to be done correctly in order to receive FEMA reimbursement, but a plan is NOT required in order to receive reimbursement.

FEMA Debris Monitoring Guide -

https://www.fema.gov/sites/default/files/documents/fema_debris-monitoring-guide_sop_3-01-2021.pdf

USACE Debris Missions Overview -

https://www.usace.army.mil/Missions/Emergency-Operations/emergency_support/debris/

EPA – Disaster Debris Planning Site - <https://www.epa.gov/large-scale-residential-demolition/disaster-debris-planning>



Plan Components

1. Debris Management Overview
2. Incidents and Assumptions
3. Debris Collection and Removal Plan
4. Temporary Debris Management Sites and Disposal Locations
5. Debris Removal from Private Property
6. Force Account Labor or Contracted Resources and Procurement
7. Monitoring of Debris Operations
8. Health and Safety Requirements
9. Environmental Considerations and Other Regulatory Requirements
10. Public Information



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Slide 27: Plan Components

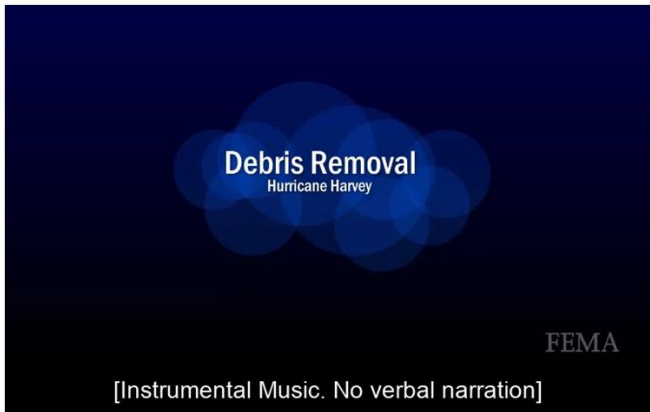


Key Point: There is no single standard for a debris management plan, though there used to be. These 10 components represent best practices and areas required for successful Public Assistance applications.

1. Debris Management Overview
2. Incidents and Assumptions
3. Debris Collections and Removal Plan
4. Temporary Debris Management Sites and Disposal Locations
5. Debris Removal from Private Property
6. Force Account Labor or Contracted Resources and Procurement
7. Monitoring of Debris Operations
8. Health and Safety Requirements
9. Environmental Considerations and Other Regulatory Requirements
10. Public Information




Debris Removal, Hurricane Harvey



[Instrumental Music. No verbal narration]

(Source: FEMA, 2017)

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Slide 28: Debris Removal, Hurricane Harvey

This video begins to answer the question, “where does debris go once it leaves the curb.” Scenes of debris management sites for different types of debris area highlighted.



Video: Play video. Approximately 3 minutes.



1. Debris Management Overview

- Purpose and Objectives of the Debris Management Plan
- Example: To expedite recovery efforts, to promote the welfare and safety in the impacted area, to facilitate and coordinate the removal and disposal of debris
- Page 2 or Example Handout



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Slide 29: 1. Debris Management Overview

The overview section sets the stage for the entire plan and should be discussed both in the plan's early development and reiterated throughout the debris management process. It should clearly state the purpose of the plan and provide a list of clear objectives that address the specific tasks taken to achieve the plan's purpose. Some common objectives for debris management plans include:

- To expedite recovery efforts.
- To promote the welfare and safety in the impacted area.
- To facilitate and coordinate the removal and disposal of debris.



2. Incidents and Assumptions



(Source: FEMA.gov, 2013)



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- Debris forecast and profiles.
- Types and severity of most likely incidents
- Types and amount of possible debris
- Description of general terrain, land use, and accessibility for areas most likely to be affected.
- Pages 3 – 4 of Example Handout

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Slide 30: 2. Incidents and Assumptions

The incidents and assumptions section should provide information on the types of anticipated quantities of debris. The plan should state what types of disasters the community is susceptible to and the types of debris that could be generated by those disasters. A forecasting method should also be used to forecast debris figures. Debris forecasting methods will be described in the next two slides.

Understanding the types and anticipated quantities in advance can strengthen other elements of the debris management planning process. Some examples include, but are not limited to, how much space should be provided for Debris Management Sites (DMSs) and what disposal practices should be used.



Participant Note: Forecasting refers to anticipated debris quantities before a disaster, while estimating refers to anticipated debris quantities after a disaster strikes.



Tools to Identify Threats and Hazards

- Hazardous Mitigation Plans Section 4 Risk Assessments - A risk assessment is a robust, data-driven analysis. It explains what might happen. It also finds where the local jurisdiction is vulnerable to hazards.
- The Threat and Hazard Identification and Risk Assessment (THIRA) is a three-step risk assessment process that helps communities understand their risks and what they need to do to address those risks by answering the following questions:
 - What threats and hazards can affect our community?
 - If they occurred, what impacts would those threats and hazards have on our community?
 - Based on those impacts, what capabilities should our community have?

(Source: FEMA.gov, 2018)



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Slide 31: Tools to Identify Threats and Hazards

The Threat and Hazard Identification and Risk Assessment is a tool that allows a jurisdiction to understand its threats and hazards and how the impacts may vary according to time of occurrence, season, location, and other community factors. It is important for jurisdictions to conduct THIRAs and update them to best plan for likely scenarios that could affect their communities. Many jurisdictions, including states, have THIRAs already completed. This is a good starting point to begin your assessment of how to plan for disaster debris management. Once you know what hazards and threats you are vulnerable to you can start to estimate what types and how much debris could be generated.



Forecasting Methods

- **Historical Data** - Examples of historical data include contract and force account records for routine solid waste activities and debris clearance, removal, reduction, and recycling, as well as landfill disposal records.
- **Data from neighboring or similar jurisdictions** - include assumptions that may be made based on the experience of other jurisdictions.
- **Aerial and/or satellite mapping and similar information** - may be used alone or in combination with targeted field surveys to forecasting amounts and types of disaster debris.



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Slide 32: Forecasting Methods



Key Point: Combining multiple forecasting methods increases accuracy and reliability, enabling more precise planning and efficient deployment of resources during disaster response and recovery.

This slide focuses on various forecasting methods used to predict the amount and type of debris that a community might face after a disaster. Accurate debris forecasting is essential for effective planning and resource allocation in disaster response and recovery.

Historical Data:

Highlight the importance of using historical data, such as contract and force account records from routine solid waste management and past debris clearance, removal, reduction, and recycling activities. These records provide a baseline for understanding the typical volume and types of debris generated under normal conditions or from previous disaster events. Landfill disposal records are also valuable to estimate the capacity needed for future events.

Data from Neighboring or Similar Jurisdictions:

Explain how using data from neighboring communities or those with similar characteristics and hazards can help fill gaps where local historical data may be limited. Emphasize that this data can help develop assumptions based on the experiences and lessons learned by other jurisdictions, particularly for rare or unprecedented events.

Aerial and/or Satellite Mapping:

Describe how aerial or satellite imagery can be used to assess potential debris amounts and types over large areas, especially immediately after an event. These tools can be used alone or combined with targeted field surveys to improve the accuracy of debris forecasts, providing a comprehensive view of the impacted area, which helps prioritize response efforts and resource allocation.



Forecasting Methods Continued

- **USACE modeling tools** – USACE has developed a model for estimating potential amounts of hurricane-generated debris.
- **FEMA HAZUS-MH software** - FEMA has developed a forecasting tool for the impacts of flood, hurricane winds, and earthquake events.
- **Third party vendor services and tools** - Some private vendors offer services that include debris forecasting tools and support.



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Slide 33: Forecasting Methods Continued



Key Point: Using a combination of government-developed models, like those from USACE and FEMA, along with third-party tools, provides a robust, multi-layered approach to debris forecasting, enhancing preparedness and ensuring a more efficient response.

This slide continues to explore additional tools and methods for forecasting disaster debris, focusing on specialized models and software developed by government agencies and third-party vendors.

USACE Modeling Tools:

The U.S. Army Corps of Engineers (USACE) has developed a specialized model specifically designed to estimate the potential volume and types of debris generated by hurricanes. This model uses data from past hurricanes and factors in variables such as storm intensity, size, and landfall location to provide accurate debris forecasts, which are crucial for pre-positioning resources and planning debris management strategies.

FEMA HAZUS-MH Software:

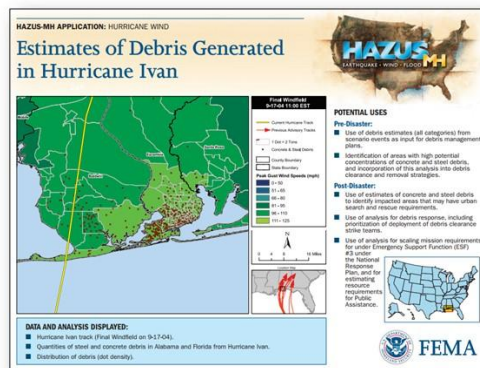
FEMA's HAZUS-MH (Hazards U.S. Multi-Hazard) software is a powerful tool for forecasting the impacts of various disaster scenarios, including floods, hurricane winds, and earthquakes. It uses Geographic Information System (GIS) technology to analyze hazard data and estimate potential debris quantities, helping communities to better understand their risks and prepare appropriate debris management plans.

Third-Party Vendor Services and Tools:

Private vendors also offer a range of debris forecasting tools and support services. These third-party services may provide specialized software, real-time data analytics, or on-site expertise to assist communities in developing accurate debris forecasts tailored to their specific needs and circumstances.

Estimation Tools

- HAZUS-MH
 - Free software from FEMA
 - Predicts debris generation based on census tract and disaster type
 - Hurricane model accounts for trees
- USACE Impact Models
 - Hurricanes only
 - Posted in advance



(Source: FEMA.gov, 2014)

MGT-460 Planning for Disaster Debris Management

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Slide 34: Estimation Tools

HAZUS-MH is a FEMA software that provides loss estimates including the following debris functions:

- Predicting debris generations for earthquakes, floods, and hurricanes.
- Hazus considers building debris by census tract, but this does not include the contents of the buildings.
- The earthquake and flood models do not account for tree debris; only the hurricane model provides this function.

FEMA offers the software and training to use the tool for free. Hazus training courses provide instruction in the application of the four Hazus modules: Hurricane, Flood, Tsunami, and Earthquake, as well as specialized instruction for application by floodplain and emergency managers.

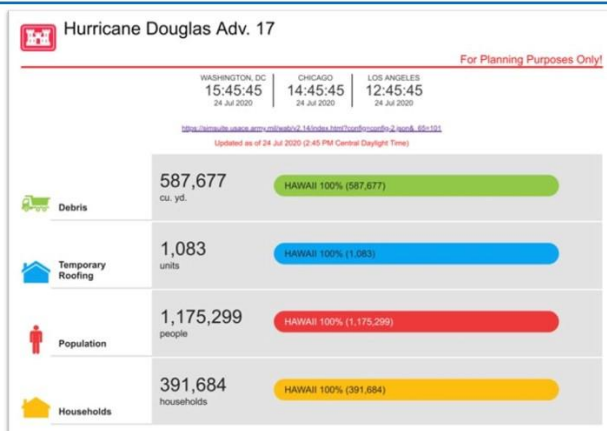
Students are instructed in all steps of the loss estimation process, from data management and inventory verification and improvement, to running a loss analysis, as well as useful GIS concepts. Emergency managers, GIS specialists, geologists, state and local planners, consultants and all those involved in risk assessment activities benefit from Hazus training.

Regularly scheduled Hazus training classes are held at FEMA's Emergency Management Institute (EMI).

U.S. Army Corps of Engineers uses SimSuite to predict quantities of debris that could be generated from hurricanes. The model also examines other types of damage, makes estimates for the types of commodities that may be needed, and provides other useful information. USACE posts these models three days prior to a hurricane making landfall. Another source of predicting debris generation post disaster are Local Hazard Identification and Vulnerability Analyses. These will inform on what the most relevant threats are for your community, as well as the potential impact which can assist with debris predictions.



Example: USACE Sim Suite



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Slide 35: Example: USACE Sim Suite

The U.S. Army Corps of Engineers (USACE) model is often used to forecast the quantities of debris in a given area for hurricanes. It is generally posted approximately 72 hours before a hurricane makes landfall. The model also estimates the amount of temporary housing that will be needed after landfall.



Participant Note: The model is based on actual data from Hurricanes Frederic, Hugo, and Andrew. The quantities produced by the model have a predicted accuracy of $\pm 30\%$. For planning purposes, the worst-case scenario should be used for the subject area.



3. Debris Collection and Removal – Part 1

- List priorities
- Collection method
 - Curbside
 - Collection centers
- Separation by type
 - Hazardous waste
 - White goods
- Monitoring Staff
- Pages 5 – 6 of Example Handout



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(Source: FEMA.gov, 2008)

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Slide 36: 3. Debris Collection and Removal – Part 1



Key Point: The two main types of debris collection strategies include curbside collection and collection centers. During curbside collection, residents are instructed to place their debris at the curb or public rights-of-way for the applicant to collect. Residents should also be instructed on how to properly separate their debris in order to promote efficiency. Collection centers usually require residents to transport their debris.

This component addresses debris removal in terms of priorities. Debris removal should be divided into two phases: response and recovery.

Response operations primarily focus on emergency access routes and main arterials. It is recommended that the planning staff identify which roads and streets are essential to emergency operations for them to be able to manage and direct local resources. Extricating people and providing access to health care facilities is the top priority prior to and after a disaster. To allow this, major arterial routes for the emergency services staff are given first priority for debris removal.

The second priority is typically for emergency operations infrastructure like the emergency operations center and supply distribution centers.

The third priority is usually for other infrastructure such as water, wastewater, and utilities.

A debris management plan should provide maps that show specific streets, roads, buildings, hospitals, and addresses as well as specific labor assignments so that emergency staff understand their roles.

The recovery phase focuses on collecting the remaining debris, reducing/recycling, and final disposal.



Debris collection refers to the method of picking up debris. The two main types of debris collection strategies include curbside collection and collection centers. During curbside collection, residents are instructed to place their debris at the curb or public rights-of-way for the applicant to collect. Residents should also be instructed on how to properly separate their debris in order to promote efficiency.

Collection centers usually require residents to transport their debris. Household waste collection centers can be co-located with other collection centers to make it easier for residents. This method can also include the use of large roll-off bins on public rights-of-way or public property for residents to bring their debris for collection. Separate bins can be designated for types of debris. The planning staff's legal counsel should investigate the potential liability issues of the collection center especially if debris is being dropped off and handled by the jurisdiction's residents. Collection centers are better suited for rural, sparsely populated areas or logistically difficult locations like hilly neighborhoods where curbside collection is not feasible.

The two most common types of debris that will need special handling are hazardous waste and white goods. Applicants should host Household Hazardous Waste (HHW) collection center events after a disaster for residents to legally dispose of HHW to avoid the co-mingling of the hazardous waste with other disaster-related debris. This in turn limits the amount of contaminated waste and reduces the overall disposal cost of the debris. To avoid releases of refrigerants or oils, the collection of white goods should be carried out with caution by manually placing the appliance on trucks, or with the use of lifting equipment that will not damage the elements that contain the refrigerants or oils.

These also can be ongoing community events to lower the need for collection and reduce the burden after an event.

This is where the Public Information Officer (PIO) is really needed. Residents need a clear understanding of what should be placed where, how should it be readied curbside, and when they can expect this to be picked up.



3. Debris Collection and Removal – Part 2

- Roles and responsibilities of various functions involved
 - Public Works
 - Finance
 - Solid Waste Departments
- Pages 7 – 8 of Example Handout



(Source: FEMA.gov/Edahl, 2005)



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Slide 37: 3. Debris Collection and Removal – Part 2



Key Point: Laying out the roles and responsibilities in advance in the debris management plan and coordinating with the groups throughout the planning phase and also into the response and recovery phases, can promote effective and efficient debris management. When possible, contracts should be in place before an incident. Many states do not have provisions for just-in-time contracts unless the vendor is already an approved state vendor.



Participant Note: Most citizens do not believe recovery is happening until the debris from the event is removed from their immediate area. Therefore, communication is critical. Elected officials will appear to be lacking in leadership/recovery efforts if debris management is slow.

Communities should designate a debris project manager to act as the primary decision maker. The debris project manager is also responsible for coordinating efforts and ensuring communication between planning and implementation sections.

General debris management planning responsibilities include:

- Administration
- Contracting and procurement
- Legal
- Operations
- Engineering/planning

Debris management plans should describe the role and responsibilities in detail. Organizational charts are also helpful. In addition, departments or individuals should be assigned to each of the responsibilities. It is important to list relevant debris management contacts in your plan. This



includes authorities involved from the above list of functions, as well as any pre-identified contractors, and any other individuals or entities important to your debris management operations. Remember to keep contact lists updated.



Listing of Debris Removal Priorities

- Examples of specific response phase debris removal activities that should be identified and prioritized in the debris management plan include:
 - Fire, police, and ambulance service routes
 - Access routes to hospitals, trauma centers, and critical care units
 - Major arterial routes
 - Access to critical government facilities such as emergency operations centers and facilities involved in debris operations
 - Routes to emergency supply distribution centers
 - Communication towers and utility locales
 - Routes to shelters, assisted care facilities, etc.



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Slide 38: Listing of Debris Removal Priorities



Key Point: Prioritizing debris removal on these routes and areas ensures that life-saving and critical services remain operational, facilitates efficient emergency response, and supports overall community resilience and recovery.

This slide highlights the key debris removal priorities during the response phase that should be clearly identified and prioritized in the debris management plan. These priorities ensure that essential services are restored quickly, and that critical infrastructure remains accessible:

Fire, Police, and Ambulance Service Routes: Emphasize the need to clear routes for emergency responders to ensure they can quickly reach incident sites, provide medical assistance, and maintain public safety.

Access Routes to Hospitals, Trauma Centers, and Critical Care Units: Stress the importance of prioritizing debris removal on routes to medical facilities to guarantee that patients, medical personnel, and supplies can move freely and without delay.

Major Arterial Routes: Explain that clearing major arterial routes is crucial for maintaining overall mobility, facilitating evacuation, and allowing the movement of response and recovery personnel and supplies throughout the affected area.

Access to Critical Government Facilities: Discuss the importance of ensuring access to facilities involved in emergency response and debris management, such as emergency operations centers (EOCs) and debris management sites, to maintain effective coordination and operations.

Routes to Emergency Supply Distribution Centers: Highlight the need to prioritize routes leading to locations where food, water, and other emergency supplies are distributed to the public to maintain access for resupply and distribution activities.



Communication Towers and Utility Locales: Point out that access to communication towers and utility locations is essential for restoring power, water, communications, and other critical services.

Routes to Shelters, Assisted Care Facilities, etc.: Emphasize the importance of clearing routes to shelters and facilities housing vulnerable populations, such as assisted care facilities, to ensure their safety, security, and continued access to essential services.



Debris Cleanup a Team Effort in Alabama



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(Source: FEMA, 2013)

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Slide 39: Debris Cleanup a Team Effort in Alabama

This video shows some examples of different options for debris collection and removal.



Video: Play video. Duration 1 minute and 45 seconds.



4. Temporary Debris Management Sites (DMSs) and Disposal Locations

- Where will debris be:
 - Hauled
 - Segregated
 - Recycled
 - Reduced
 - Disposed
- Establish site selection during planning to obtain permits prior to a disaster
- Pages 9-10 of Example Handout



(Source: FEMA.gov, 2007)



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Slide 40: 4. Temporary Debris Management Sites (DMSs) and Disposal Locations



Key Point: DMSs allow for debris to be removed off the street quickly. Establishing a recycling procedure also helps a community with recovery efforts by saving landfill space and allowing for the potential for the community to retain revenues that can be applied to recovery operations.

Communities are encouraged to recycle and reduce as much debris as possible before hauling it off to a landfill to save space. A common practice for achieving this involves the development of Debris Management Sites (DMSs) where debris is dropped off and sorted. Such sites often include incinerators, grinders, and household hazardous waste (HHW) storage containers. The cost to lease these properties is eligible for FEMA Public Assistance if a major disaster declaration is granted to the county.

It is highly recommended that site selection be established in the planning phase. Permits are often required to operate DMSs and it can be extremely difficult to obtain such permits in the post-disaster environment.

Site selection should be based on the following criteria:

- Ownership
 - It is recommended that communities use public lands before resorting to private lands since renting the latter will likely be more costly.
- Size
 - Communities should consider their debris forecasts in the “Incidents and Assumptions” section of their debris management plans when determining the required size of a DMS.



- Historic disasters suggest that it takes about 100 acres of land to process one million cubic yards of debris. The USACE estimates that 60 percent of the area will be used for roads, buffers, burn pits, HHW disposal areas, etc.
- Other Uses
 - It is important to consider what other disaster uses a particular site may have. Large flat pieces of empty land are often slated into other plans for staging areas, mass care sites, and command posts.
 - Ensure that your debris management plan is cross walked with other plans to ensure there is no overlap (or there's a system to determine land use priority).
- Location
 - The DMS location should allow for easy ingress and egress, reliable lighting, and not be located too close to residential properties.
 - Communities should consider MOUs with other communities to utilize their disposal locations. Many times, local disposal sites cannot handle the large increase in materials.
- Environmental and Historic Concerns
 - A DMS should not be established in an environmentally or a historically sensitive area like wetlands, critical animal and plant habitats, sole source aquifers, freshwater well fields, historic districts, or archeological sites.
 - A baseline data collection study allows the debris management team to determine the feasibility of the site as well as potential environmental concerns.



Debris Management Site Selection Criteria

- Sufficient in size with appropriate topography and soil type
- Located an appropriate distance from potable water wells and rivers, lakes, and streams
- Not located in a floodplain or wetland
- Have controls in place to mitigate storm water runoff, erosion, fires, and dust
- Free from obstructions, such as power lines and pipelines
- Have limited access with only certain areas open to the public, such as areas to drop off debris
- Located close to the impacted area, but far enough away from residences, infrastructure, and businesses that could be affected by site operations
- Preferably on public lands because approval for this use is generally easier to obtain. Private lands may be convenient and logistically necessary for temporary debris storage sites.



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Slide 41: Debris Management Site Selection Criteria

- Sufficient in size with appropriate topography and soil type
- Located an appropriate distance from potable water wells and rivers, lakes, and streams
- Not located in a floodplain or wetland
- Have controls in place to mitigate storm water runoff, erosion, fires, and dust
- Free from obstructions, such as power lines and pipelines
- Have limited access with only certain areas open to the public, such as areas to drop off debris
- Located close to the impacted area, but far enough away from residences, infrastructure, and businesses that could be affected by site operations
- Preferably on public lands because approval for this use is generally easier to obtain. Private lands may be convenient and logistically necessary for temporary debris storage sites.



Debris Management Sites: Hurricane Ida (2021)

Grapple truck unloads at a debris management site in Luling, LA following Hurricane Ida.



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Slide 42: Debris Management Sites: Hurricane Ida (2021)

Debris management sites (DMS) are temporary locations designated for sorting, processing and staging of debris before final disposal or recycling. The picture in this slide is from a debris management site in Luling, LA following Hurricane Ida, a Category 4 storm making landfall in Louisiana in 2021.



Separation and Recycling of Debris

Parish President
Matt Jewell
explains the
operations of a
debris
management site
in St. Charles
Parish Louisiana
following
Hurricane Ida



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Slide 43: Separation and Recycling of Debris



Video: Play video. Approximately one and a half minutes.

The video is from a debris management site in Luling, LA following Hurricane Ida, a Category 4 storm making landfall in Louisiana in 2021. St. Charles Parish President Mathew Jewell explains the sorting and processes at the debris management site in Luling LA.

Note the width of the drives and lanes needed to accommodate large vehicles, trailers, and loading and turning radius needs.



5. Debris Removal from Private Property

- Authority and processes for private property debris removal

- Circumstances
- Enabling laws
- Obtaining permission
- Approved by FEMA in advance

- Documentation that may be needed

- Verification of ownership
- A right-of-entry form
- Building official assessment
- Verification of insurance information

- Pages 11-12 of Example Handout



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(Source: Troxler, 2021)

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Slide 44: 5. Debris Removal from Private Property



Key Point: It is important to note that even if private property is addressed in the plan, specific written permission from FEMA must be obtained before the jurisdiction does debris removal on private property.



Participant Note: Each state and local community has laws that govern rights of the property owner. There should be an awareness of these laws before a disaster.

Private property debris removal is usually the responsibility of the individual property owner and their insurance company. However, in rare instances, FEMA may determine that private property debris removal is eligible for Public Assistance. FEMA makes this determination by evaluating whether the impacts of debris on private property affect the general public in the affected community, and whether the applicant (the State) has the legal authority to perform the private property debris removal.

In some cases, private property requires demolition after a disaster (i.e., a damaged house is at risk for toppling over and leaving debris on an adjacent public land). It is not uncommon in these types of situations for the property owners to not be present. There is a procedure that the applicant must follow for these cases to enter the private property and apply for Public Assistance for private property debris removal and demolition. The following is a list of documentation that may be included in a debris management plan for the condemnation and private property debris removal process. Note that the right-of-entry form is particularly important because it allows the building official to enter the property to complete the assessment.



- Verification of ownership
- A right-of-entry form
- Building official assessment
- Verification of insurance information
- Archeological review
- Environmental review
- SHPO (State Historic Preservation Office) Review
- Photos

Sometimes partnering with community organizations who can themselves assist private property owners in clean-up and access to the debris removal system (curb side or DMS) is also a successful strategy.



Activity 2

- In your small group, use the *Example Handout* and the *FEMA Public Assistance Handbook* to fill in your Debris Management Plan outline
- Sections 1 through 5.
 - If you cannot fill in the information, document how you can obtain the missing information and who you can get it from?
- 45 minutes total
 - 30 minutes to work on the activity in your groups
 - 15 minutes for report outs



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Module 3: Slide 65

Slide 45: Activity 2

Participants should each have a copy of the Example Handout which gives examples from existing plans for each section of the Debris Management Plan outline.

Instructors will provide the Activity 2 handout to each participant. Each group should share copies of the FEMA Public Assistance Handbook.

Each group will have 30 minutes to work on sections 1 through 5 of the Plan Outline. If participants cannot complete any section of the Outline due to missing information, instead note where they believe the information can be found after the conclusion of the course. After 30 minutes, groups will report out what they found in the process of completing this portion of their plan outline.



6. Force Account Labor or Contracted Resources and Procurement – Part 1

- Type of work staff (Force Account Labor) will perform
- Type of work contracted services will perform
- Identify at least one prequalified debris contractor
- Pages 13 – 15 of Example Handout



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Slide 46: 6. Force Account Labor or Contracted Resources and Procurement – Part 1

Force account labor refers to the work performed by the applicant's permanent, full time, or temporary employees, as well as volunteers. It is important for the applicant's staff to document the hours worked and equipment used to complete the eligible work. Force account employee costs are reimbursed based on the Public Assistance Program's labor cost policies for emergency work. The Alternative Procedures allows the reimbursement of straight time for force account labor.

The monitoring of the debris removal contractors is often done by a community's force account labor. However, it is important to keep in mind that the magnitude of the disaster and quantity of debris could overwhelm local capacities and require that the community bring in a monitoring firm. Therefore, it is important that force account labor be included in the plan, and that the initial tasks it will accomplish be described. Some states utilize contracts with other organizations to share the burden of force account labor.

Force account labor is especially crucial for the response phase of a disaster as local employees are typically on the ground right away responding to the debris removal priorities. In addition, force account labor is familiar with the area, so it is likely they understand where the critical infrastructure is as well as priority debris removal areas for promoting public health and safety.

It is not uncommon for local capacities to be overwhelmed by the quantity of debris after a disaster. It might therefore be necessary for the community to activate prequalified contracts that are set up in advance. Activating these contracts would allow contractors to bring extra labor and equipment to finish the entire debris management process. Major debris contracting companies are generally familiar with FEMA's policies for receiving Public Assistance. It is important for communities to describe the specific operations the debris removal contractors will be in charge of in their debris management plans. Possible contracted services include:

- Collection, including clearance, during response phase



- Reduction or recycling
- Hazardous waste handling, processing, and disposal
- Hauling to final disposition
- DMS activities
- Demolition
- Monitoring
- Environmental studies
- Project management

It is important to note that pre-qualification must meet specific legal requirements that differ by state. This should be researched within your individual state.



6. Force Account Labor or Contracted Resources and Procurement – Part 2

- Process and procedure for acquiring competitively procured contracted services
- Contract requirements
- Contractor qualifications
- Page 16 of Example Handout



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(Source: Troxler, 2021)

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Slide 47: 6. Force Account Labor or Contracted Resources and Procurement – Part 2



Key Point: It is imperative that jurisdictions undertake a competitive procurement process for debris removal services that is compliant with both state/territorial and federal law. This is a complex process and should involve procurement/contracting and/or legal staff from the jurisdiction, as well as consultation from the State Public Assistance Officer. Every state has different legal requirements, so there is no simple answer to “how do we do this.”

Prequalified debris removal contractors should be acquired after determining the types of debris management services that will be contracted and going through the competitive procurement process. At least one prequalified contractor should be identified in the plan as well as their contact information.

Having a prequalified contract for debris removal in place before a disaster protects critical infrastructure by ensuring there is enough labor and equipment to remove debris in the response phase of a disaster. Finally, such prequalified contracts promote efficiency by laying out costs and the scope of work before the disaster, which minimizes the chance of disputes between the applicant and the contractor, thus helping to bring a community back to its pre-disaster state.

Applicants are required to comply with Federal procurement standards in order to receive Public Assistance funding for contract costs that were used for eligible debris operations.

Tribes, local governments, and private non-profits must follow the following Federal standards when conducting procurement transactions:

- Provide full and open competition
- Conduct all necessary affirmative steps to ensure the use of minority businesses, women's business enterprises, and labor surplus area firms when possible



- Exclude contractors that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals from competing for such procurements to ensure objective contractor performance and eliminate unfair competitive advantage
- Maintain written standards of conduct covering conflicts of interest and governing the performance of employees who engage in the selection, award, and administration of contracts
- Maintain records sufficient to detail the history of the procurement. These records will include, but are not limited to:
 - Rationale for the method of procurement
 - Selection of contract type
- Contractor selection or rejection
- The basis for the contract price

Following the correct procurement procedures helps to ensure that communities with major disaster declarations receive Public Assistance for eligible debris operations that are performed by contractors. These procedures also help to protect the community from common contractor misconceptions.

Again, it is always advisable to contact the state Public Assistance office to learn about requirements that may be specific to their state.



Participant Note: Participants should refer to the latest edition of FEMA's Public Assistance Program and Policy Guide (PAPPG) for specific contractor procurement standards.



Pre-Qualified Debris Contractors

Benefits:

- Speeds up response time
- Ensures cost predictability with pre-negotiated rates
- Aligns with FEMA Public Assistance requirements
- Provides scalability for large-scale disasters
- Reduces administrative burden during emergencies

Best Practices:

- Follow competitive procurement processes
- Clearly define contract scope and tasks
- Pre-vet contractors for experience and compliance
- Update contracts annually to meet current needs
- Coordinate terms with state and FEMA requirements



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Slide 68. Pre-Qualified Debris Contractors



Key Point: Prequalified debris management contracts are vital for reducing response times, ensuring cost predictability, and maintaining compliance with FEMA regulations. Encourage jurisdictions to implement competitive procurement processes, vet contractors thoroughly, and regularly update contracts to enhance their disaster resilience. Integrating these contracts into overall debris management planning ensures smoother operations and a faster return to pre-disaster conditions.

Prequalified debris management contracts are essential tools for jurisdictions to enhance their disaster preparedness and recovery operations. These contracts streamline the procurement process, ensuring that debris management services are activated efficiently and effectively during emergencies. By addressing logistical, financial, and operational challenges in advance, prequalified contracts help jurisdictions focus on recovery efforts and maintain compliance with FEMA regulations.

Benefits:

- **Speeds Up Response Time**
 - Prequalified contracts eliminate the need to initiate time-consuming procurement processes during an emergency. Contractors can be activated immediately, accelerating the start of debris removal operations.
- **Ensures Cost Predictability with Pre-Negotiated Rates**
 - With pre-negotiated rates, jurisdictions have a clear understanding of costs, reducing the risk of disputes or delays. This also facilitates accurate budgeting for debris management activities.
- **Aligns with FEMA Public Assistance Requirements**



- Contractors familiar with FEMA's Public Assistance Program and Policy Guide (PAPPG) ensure that debris management activities are conducted in compliance with federal requirements, which is critical for reimbursement eligibility.
- **Provides Scalability for Large-Scale Disasters**
 - Prequalified contracts allow jurisdictions to scale operations based on the disaster's magnitude, ensuring sufficient labor and resources are available for extensive debris removal efforts.
- **Reduces Administrative Burden During Emergencies**
 - By having contracts in place before an event, jurisdictions can reduce the administrative workload during a disaster, allowing staff to focus on managing the overall response and recovery.

Best Practices:

- **Follow Competitive Procurement Processes**
 - Adhere to local, state, and federal procurement regulations to ensure transparency and eligibility for FEMA reimbursement. Include a documented rationale for the procurement method used, contractor selection criteria, and pricing.
- **Clearly Define Contract Scope and Tasks**
 - Specify the scope of work, including collection, reduction, recycling, hazardous material disposal, monitoring, and final disposal. This clarity minimizes confusion and ensures contractors understand their responsibilities.
- **Pre-Vet Contractors for Experience and Compliance**
 - Select contractors with proven experience in disaster debris management. Ensure they meet local licensing requirements and have a record of compliance with environmental and safety regulations.
- **Update Contracts Annually to Meet Current Needs**
 - Review and update contracts regularly to account for changes in local regulations, FEMA requirements, and evolving operational needs. This ensures contracts remain relevant and effective.
- **Coordinate Terms with State and FEMA Requirements**
 - Align contract terms with FEMA guidance and state-specific requirements to streamline the approval process. This coordination helps avoid delays in obtaining reimbursement and ensures operational efficiency.



7. Monitoring of Debris Operations



(Source: Troxler 2021)

- How will contractors be monitored
 - Pickup sites
 - Debris Management Sites
 - Final disposal
- Who will monitor
- Documentation
- Pages 17 – 18 of Example Handout



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Slide 69: 7. Monitoring of Debris Operations

The monitoring of debris removal contractors is crucial. Monitors must make sure that trucks are fully loaded. Exact amounts of eligible debris must be documented to receive Public Assistance from FEMA. Monitors sit at towers at the entrance of Debris Management Sites (DMS) to track the trucks coming in. Such monitoring can be accomplished through force account labor and/or monitoring firms. It is recommended that contracts be set up in advance with monitoring firms if force account labor forces are overwhelmed by the magnitude of the disaster and quantity of debris. However, to avoid a conflict of interest, the monitoring firm cannot have a previous relationship with the community's debris removal contractor.

Applicants should develop a debris monitoring report to make all reporting documents consistent regardless of who performs the work. Monitoring forms include:

- Load ticket
- Tower monitor log
- Roving monitor report
- Daily issue log
- Truck certification form



Participant Note: Participants should refer to the latest edition of FEMA's Public Assistance Debris Monitoring Guide for the most recent information on debris monitoring requirements



Load Tickets

The image displays two examples of DebrisTech e-Ticket forms. Both tickets are for 'HURRICANE IDA DEBRIS REMOVAL' in 'ST. CHARLES PARISH'. The left ticket is for a 'C & D' debris type, and the right ticket is for 'Vegetative' debris. Both tickets include fields for project, prime, owner, contract, road, zone, truck number, and various measurement and disposal details. Each ticket also features three photographs of debris collection sites and the names of the personnel involved.



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Slide 70: Load Tickets

Load tickets are essential tools used in debris management to track and document the removal and disposal of debris following a disaster. Each load ticket typically includes information such as:

- Date and time of the debris pickup
- Location where the debris was collected
- Type of debris being hauled
- Vehicle identification (e.g., truck number)
- Driver's name
- Debris Management Site (DMS) or final disposal site where the debris is taken
- Weight or volume of the debris load

The primary purposes of load tickets are to ensure accurate record-keeping, facilitate reimbursement from federal and state agencies, and maintain accountability and transparency in debris management operations.

How Load Tickets are Used:

- **Issuance:** Load tickets are issued to debris removal crews when they begin their collection route.
- **Completion:** The crew fills out the load ticket with relevant details at the collection site and retains a copy.
- **Verification:** Upon arrival at the DMS or final disposal site, the ticket is verified, and the debris is weighed or measured.
- **Documentation:** A copy of the completed and verified load ticket is kept by both the debris removal crew and the site operator for records.



Variations Across Jurisdictions: Each jurisdiction may have slightly different procedures and formats for load tickets based on local requirements and practices.



Debris Pick-up in Minot



We have a contractor doing that.



FEMA

(Source: FEMA, 2011)

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Slide 71: Debris Pick-up in Minot

This video describes the monitoring of contractors by the U.S. Army Corps of Engineering during debris removal.



Video: Play video. Duration 2 minutes.

8. Health and Safety Requirements

- How workers and the public will be protected
- Specific measures for adherence to safety rules and procedures
- Pages 19 – 22 of Example Handout



(Source: FEMA, 2011)



FEMA



(Source: FEMA, 2013)

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Slide 72: 8. Health and Safety Requirements

A health and safety strategy should be included in the debris management plan for applicants and contractors in order to avoid accidents during debris recovery operations and to protect workers from exposure to hazardous materials. This plan must, at a minimum, comply with all applicable local, state, and federal health and safety laws. The plans should outline how to incorporate health and safety requirements into the jurisdiction's activated NIMS Command and Coordination components. Minimum safety standards should also be established for the applicant and contractor personnel to follow.

This component discusses the specific measures for adhering to the safety rules and procedures. To facilitate cooperation between the applicant and contractor employees, the health and safety strategy should:

- Specify how the applicant will disseminate safety information to all emergency workers.
- Specify how the applicant will monitor compliance with the minimum safety standards.
- Include specific corrective actions to be taken if workers do not comply with the minimum safety standards.
- Ensure Health and Safety requirements are included in the activated community's response and support structures.



9. Environmental Considerations and Other Regulatory Requirements



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(Source: FEMA, 2012)

- Identify all debris operations that will trigger compliance with environmental and historic preservation laws, regulations, and Executive Orders
- How will compliance be achieved?
- Pages 23-25 in Example Handout

MGF-460 Planning for Disaster Debris Management

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Slide 73: 9. Environmental Considerations and Other Regulatory Requirements

FEMA will review each Public Assistance project to ensure that the debris management operations comply with applicable Federal environmental laws, their implementing regulations, and applicable executive orders. It is recommended that communities acknowledge the need for compliance with such regulations in their plans. The plan should have reference to an individual or office like the State EPA to ensure compliance with such environmental regulations.

However, debris management stakeholders might not be able to get in touch with this contact in the hectic post-disaster environment that might require immediate action on emergency debris management operations. It is therefore extremely important that they list out the specific regulations with descriptions of how they can impact debris operations. It is also a good idea to list the State counterpart regulations since those are often stricter than the Federal regulations. In very unusual circumstances, waivers can be obtained, but it is most important for communities to be aware of these regulations and executive orders and discuss how they will abide by them in their plans.



Examples

- Clean Water Act
- Resource Conservation and Recovery Act
- National Historic Preservation Act
- Executive Order 11988 (Floodplain Management)



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Slide 74: Examples

Environmental regulations and executive orders that are applicable to debris management are as follows:

- National Environmental Policy Act
- Endangered Species Act
- Clean Water Act
- Clean Air Act
- Coastal Barrier Resource Act
- Migratory Bird Treaty Act
- Resource Conservation and Recovery Act
- Coastal Zone Management Act
- Farmland Protection Policy Act
- Fish and Wildlife Coordination Act
- Wild and Scenic Rivers Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Executive Order 11988, Floodplain Management
- Executive Order 11990, Protection of Wetlands

There are also federal regulations that establish requirements to preserve the Nation's historic and prehistoric resources. FEMA will also review each Public Assistance project to ensure that the debris management operations comply with applicable Federal historic preservation laws.



The National Historic Preservation Act is the main Federal regulation that pertains to historic preservation for debris management. This should be described in the debris management plan as well as applicable counterpart regulations. The plan should also provide the contact of an office that can help ensure historic preservation compliance like the State Historic Preservation Officer (SHPO).

As in the case of environmental regulations, complying with the Federal regulations for historic preservation also promotes a faster recovery because noncompliance can delay operations and result in legal troubles, which can delay and even stop communities from receiving Public Assistance.



10. Public Information

- Strategy to ensure receipt of timely and accurate information on:
 - Health and safety issues
 - Locations and times for debris collection
 - Separating debris
- Methods of dissemination
 - Television
 - Fliers
 - Internet & Social Media
- Pages 26 – 27 of Example Handout



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Slide 75: 10. Public Information

The goal of the public information strategy is to ensure that the residents are given accurate and timely information. A lack of quickly distributed information can cause rumors and misinformation to spread.

The information should include the parameters, rules, and guidelines of debris operations so residents can begin their personal recovery activities. Topics that should be included within the public information strategy include collection and debris management sites. There should also be a distribution strategy that should address methods for disseminating the prepared information to the general public. A Public Information Officer (PIO) should be assigned to oversee the public information strategy, pursuant to the jurisdiction's emergency operations or disaster recovery plan.

The improper separation of debris by the public can harm critical infrastructure and public health and safety as a common type of debris is Household Hazardous Waste (HHW). This component therefore protects both critical infrastructure and public health and safety. Proper debris separation also speeds up the recovery process, which helps to return the community back to its pre-disaster state.



Residential Debris Removal

The thumbnail shows a blue background with the FEMA logo at the top left and the text 'FEMA' in large white letters. Below this, the title 'Residential Debris Removal' is centered in white. At the bottom left of the thumbnail is a smaller FEMA logo. To the right of the thumbnail, the text '(Source: FEMA, 2017)' is visible. At the bottom of the slide, the text 'MGT-460 Planning for Disaster Debris Management' and 'Module 3: Slide 76' are displayed.

(Source: FEMA, 2017)

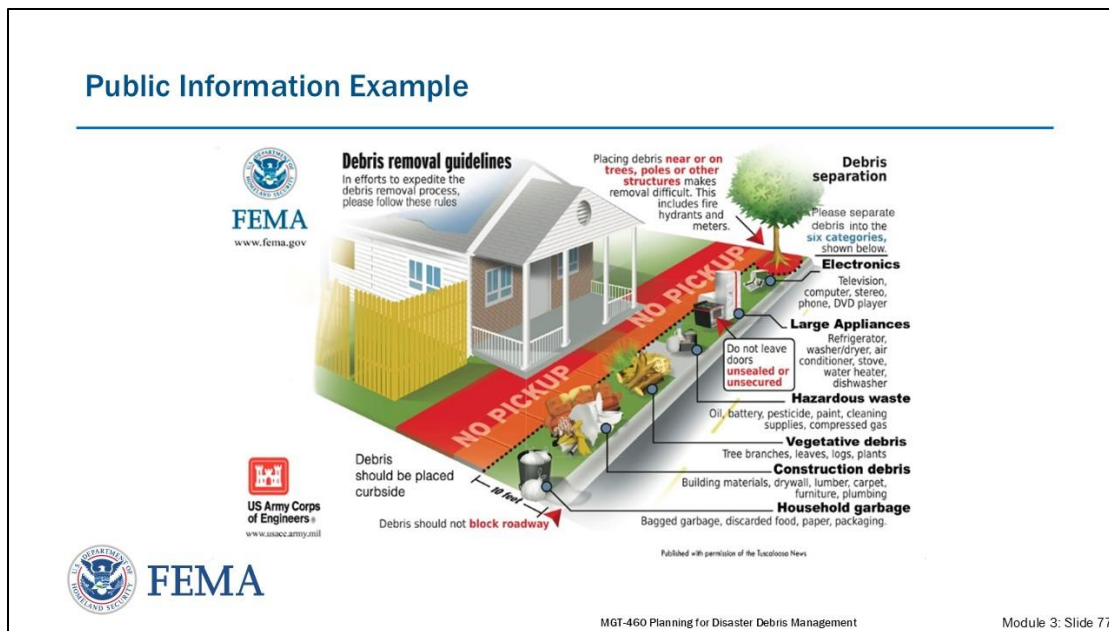
MGT-460 Planning for Disaster Debris Management Module 3: Slide 76

Slide 76: Residential Debris Removal

This video highlights the residential debris removal process after Hurricane Harvey in Texas. It is an example of an educational video for the public on how to separate their debris and what to do with it.



Video: Play video. Duration 1 minute.



Slide 77: Public Information Example

A diagram of debris removal guidelines to assist survivors in their cleanup effort. This is an example of how to communicate with the public on how to separate their debris and what is appropriate for pick up. Each jurisdiction and each disaster could require tailored messages on how to manage debris.



Activity 2 (cont.)

- In your small group, use the *Example Handout* and the *FEMA Public Assistance Handbook* to fill in your Debris Management Plan outline
- Sections 6 through 10.
 - If you cannot fill in the information, document how you can obtain the missing information and who you can get it from?
- 45 minutes total
 - 30 minutes to work on the activity in your groups
 - 15 minutes for report outs to the class



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Slide 78: Activity 2 (cont.)

Participants have 30 minutes to work on sections 6 through 10 of the Plan Outline. If participants cannot fill in any of the information, note where they can find the information after the conclusion of the course. After 30 minutes, have participants report out to the group what they found when completing this portion of their plan outline.



Resources for Debris Management Planning

- FEMA
 - IS-632 Intro to Debris Operations
 - IS-633 Debris Management Plan Development
 - E202 Debris Management Planning for STTL
 - HAZUS-MH software and training
 - Public Assistance Debris Management Guide
- EPA
 - Planning for Natural Disaster Debris Guide
 - I-WASTE tool
- OSHA Disaster Site Worker Outreach Training Program
- Other SLTT Debris Management Plans



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Slide 79: Resources for Debris Management Planning

This list of other resources is not exhaustive. FEMA offers an independent study course on Debris Operations. The HAZUS_MH software is also available for free from FEMA. Training is also available on HAZUS software. And the Public Assistance Debris Management Guide is a resource provided by FEMA as well. It can be found online.

The EPA offers a debris management planning guide that is a good all-around guide with more in-depth information on environmental considerations when planning for debris management. The Incident Waste Decision Support Tool (I-WASTE) helps with making debris disposal decisions for major incidents. It can be used to access a waste material estimator and guidance and regulatory document, as well as assist with creating response records.



Module 3 Summary

Module 3 Summary

- Evaluated specific debris management plan components
- Drafted a debris management plan outline and identified sources to collect further information to complete the plan



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Module 3: Slide 80

Slide 80: Module 3 Summary

During this module, participants:

- Evaluated specific debris management plan components
- Drafted a debris management plan outline and identified sources to collect further information to complete the plan



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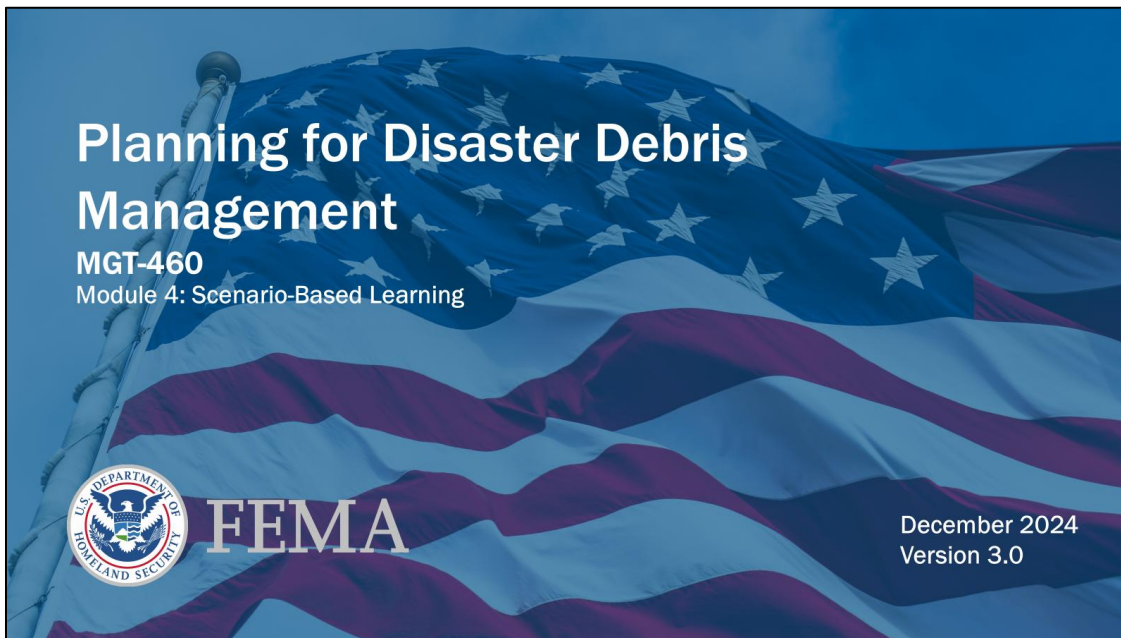
Module

4

Scenario-Based Learning



Module 4 Administration



Slide 81: Module 4: Scenario-based Learning

Duration

50 minutes

Scope Statement

In this module, participants will review debris operations from a variety of past disasters and discuss special considerations encountered during those disasters. They will also identify which best practices and considerations are applicable to their communities and how to incorporate strategies to tackle those issues into their debris management plan.

Terminal Learning Objective (TLO)

Participants will be able to apply strategies for special considerations encountered during debris management operations to plan outlines.



Module 4 Enabling Learning Objectives

#	Objective
4-1	Discuss recent natural disasters that required complex debris management operations
4-2	Analyze common debris management special considerations and apply solutions to your debris management plan



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Slide 82: Module 4 Enabling Learning Objectives

Enabling Learning Objectives (ELOs)

By the end of this module, participants will be able to:

1. Discuss recent natural disasters which required complex debris management operations
2. Analyze common debris management special considerations and apply solutions to a debris management plan

Module 4 Content

Hurricane Ian – Overview of Debris Management

- Category 4 hurricane making landfall near Cayo Costa, Florida, on September 28, 2022.
- Widespread destruction across over 20 counties, with Lee County severely impacted.
- One of the costliest hurricanes in U.S. history with total damages exceeding \$113 billion.
- Over 5 million cubic yards of debris generated in Lee County alone.



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Module 4: Slide 83

Slide 83. Hurricane Ian – Overview of Debris Management



Key Point: Hurricane Ian demonstrated the critical need for thorough debris management planning, including prequalified contracts, robust interagency coordination, and effective recycling strategies to manage large-scale disasters.

Overview of the Storm:

- Hurricane Ian made landfall as a Category 4 storm on September 28, 2022, near Cayo Costa, Florida.
- The storm caused widespread destruction across more than 20 counties, with Lee County experiencing some of the most significant impacts.
- Ian ranks as one of the costliest hurricanes in U.S. history, with total damages exceeding \$113 billion.

Debris Totals:

- In Lee County alone, Hurricane Ian generated over 5 million cubic yards of debris, demonstrating the immense scale of the disaster.
- Types of debris included:
 - Vegetative debris: Downed trees, broken branches, and uprooted landscaping.
 - Construction and Demolition (C&D) debris: Structural remains from destroyed homes, businesses, and public infrastructure.



- Hazardous materials: Household chemicals, damaged fuel storage, and e-waste (electronics).

Key Challenges:

- **Coordination Across Jurisdictions:** The sheer volume of debris required multi-agency collaboration to manage removal and recycling efficiently.
- **Prequalified Contracts:** Jurisdictions that had prequalified debris management contractors in place were able to respond more quickly, emphasizing the importance of preparedness.
- **Recycling and Environmental Concerns:** Recycling over 90% of vegetative debris into mulch and biomass helped reduce landfill use and environmental impact.
- **Diverse Debris Types:** Proper separation and handling were essential to manage the variety of debris safely and effectively.



2023 Maui Wildfires

- The August 2023 Maui wildfire disaster damaged or destroyed more than 2,000 Maui properties and requires a coordinated fire debris removal cleanup. The County of Maui will oversee priorities during the fire cleanup while working in partnership with state and federal agencies who are here to support the community with this process. The cleanup process included two phases:
- **Phase 1:** Hazardous Material Inspection and Removal
- **Phase 2:** Consolidated Debris Removal Operations



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Slide 84: 2023 Maui Wildfires



Key Point A structured, phased approach ensures that debris removal is conducted safely and efficiently, reducing health risks and paving the way for the community's recovery and rebuilding efforts.

This slide provides an overview of the coordinated fire debris removal process following the devastating August 2023 Maui wildfires, which damaged or destroyed over 2,000 properties.

Maui Wildfire Impact:

The scale of the disaster necessitates a large-scale cleanup effort to safely remove debris and restore the affected areas. Over 2,000 properties were impacted, demonstrating the significant scope of the cleanup operation.

Coordination and Oversight:

The County of Maui is leading the cleanup efforts, prioritizing activities and coordinating with state and federal agencies, such as FEMA and the U.S. Environmental Protection Agency (EPA). This collaboration ensures that local needs are met while leveraging the expertise and resources provided by federal partners.

Two-Phase Cleanup Process:

Phase 1: Hazardous Material Inspection and Removal: The first phase involves inspecting and removing hazardous materials like chemicals, paints, asbestos, and other dangerous substances to protect public health and safety. This phase must be completed before any further debris removal can begin.

Phase 2: Consolidated Debris Removal Operations: Once hazardous materials have been cleared, the second phase focuses on the removal of all remaining fire-related debris. This includes ash, charred structures, and other non-hazardous materials to facilitate the recovery and rebuilding process.



2023 Maui Wildfires Debris Removal



MAUI WILDFIRE DISASTER RESPONSE Consolidated Debris Removal Program

Cultural Monitors Will Be On-Site During This Process

Phase 1: Hazardous Materials

Phase 2: Consolidated Debris Removal Program



Hazardous Materials Removal & Infrastructure Assessments

The U.S. Environmental Protection Agency removes hazardous materials like paints, solvents, oils, batteries and pesticides from fire impacted properties. Building inspectors will determine whether a building is safe to enter.

Public Access

Community members will be permitted to return to their properties and retrieve items once it is deemed safe by officials.

Enrollment

Maui County collects right-of-entry forms from property owners and provides them to the U.S. Army Corps of Engineers to access private properties.

Ash and Fire-Damaged Material Removal

The U.S. Army Corps of Engineers will remove approved fire-damaged materials from private property upon approval from the property owner.

Environmental Testing

Environmental testing will be completed to ensure a property is safe to rebuild.



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Slide 85: 2023 Maui Wildfires Debris Removal

The slide outlines the **2023 Maui Wildfires Debris Removal Program** with two phases:

- Hazardous Materials Removal:**
The EPA removes hazardous materials from fire-impacted properties, while building inspectors assess structural safety.
- Consolidated Debris Removal:**
 - **Public Access:** Safe return for residents to retrieve belongings.
 - **Enrollment:** Maui County gathers right-of-entry forms for debris removal by the U.S. Army Corps of Engineers.
 - **Debris Removal:** The Corps removes fire-damaged materials from approved properties.
 - **Environmental Testing:** Ensures properties are safe for rebuilding.



2024 California Wildfires

- In 2024, California experienced a significant wildfire season, with over 7,800 wildfires burning approximately 1,044,126 acres.
- These wildfires resulted in the destruction of approximately 1,680 structures and caused at least one fatality.
- The combination of abundant vegetation from previous wet seasons and extreme heat waves created ideal conditions for these fires to spread rapidly.



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Module 4: Slide 86

Slide 86. 2024 California Wildfires

In 2024, California experienced a significant wildfire season, with over 7,800 wildfires burning approximately 1,044,126 acres.

These wildfires resulted in the destruction of approximately 1,680 structures and caused at least one fatality.

The combination of abundant vegetation from previous wet seasons and extreme heat waves created ideal conditions for these fires to spread rapidly.

The destruction of almost 4,000 structures and related hazmat incidents underscores the importance of proactive debris management planning.



Scale of the Challenge

- Over 10 million acres affected by wildfires in 2024.
- Enormous quantities of ash, burned vegetation, and structural debris.
- Complexity due to mixed hazardous materials (e.g., asbestos, lead paint).
- Impact on local ecosystems and waterways.



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Slide 87. Scale of the Challenge

Over 10 million acres affected by wildfires in 2024.

Large quantities of mixed debris (Ash and hazardous materials like asbestos) complicate cleanup from structural, vegetative, and hazardous sources.

With over 10 million acres of wildfire-affected areas nationwide (acreage is fire directly impacted acres and post fire flooding acres indirectly) - this requires careful and extensive planning with state and regional partners to ensure effectiveness of plans and resource availability assumptions.

The fires have long-term environmental impact on water sources and ecosystems which underscores the importance of separating debris types and identifying landfill capacity.



Operational and Logistical Barriers

- Limited landfill capacity for safe disposal of toxic materials.
- Coordination challenges among federal, state, and local agencies.
- Resource shortages: workforce, equipment, and funding.
- Balancing rapid cleanup with long-term environmental restoration.



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Slide 88. Operational and Logistical Barriers

- Limited landfill capacity for safe disposal of toxic materials.
- Coordination challenges among federal, state, and local agencies.
- Limited resources during simultaneous disasters (wildfires plus other events) stretch capabilities.
- Balancing rapid cleanup with long-term environmental restoration is critical.



Debris Management Special Consideration #1

Access issues

- Isolated communities
- Difficult to get equipment in
- Difficult to get debris out



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(Source: Hurricane Irma, monroecounty-fl.gov, 2018)



(Source: NIST.gov report Technical Discussion 041)

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Slide 89: Debris Management Special Consideration #1

Access issues can be prevalent anywhere after a disaster. Disasters can transform previously connected communities into isolated islands cut off from assistance. Hurricanes Irma and Maria highlighted the issues that can occur when already isolated communities get hit by a natural disaster. The Florida Keys were heavily hit by Hurricane Irma. There is only one road to access the keys and several bridges. When the roads or bridges are compromised, there is no way to get the equipment in or out to collect and manage the debris. Additionally, there is limited property to set up debris management sites due to the small land masses surrounded by water. Puerto Rico shared the same complications from Hurricane Maria. When the ports are compromised by storms, supplies and equipment cannot be brought to the island, and debris cannot leave the island. These are only a few of the access issues encountered during the 2017 Atlantic Hurricane season.



Debris Management Special Consideration #2

Separation of debris by public

- People do not separate debris by specified categories/types
- Poses health and safety risks
- Hinders debris removal



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(Source: Troxler 2021)

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Slide 90: Debris Management Special Consideration #2

Separation of debris is extremely important for management operations to run smoothly. As discussed previously, it is important to roll out a strong public information campaign to inform the public on proper separation and disposal of their debris. However, often residents do not receive the information quickly enough, or they do not have the resources to separate their debris properly, or they assume someone else will do it. Debris gets piled outside their houses or taken to dumpsters and mixed together in one big heap. This poses great health and safety hazards as well as hindering the debris management operations. Vegetative debris cannot be put through a chipper to break it down into mulch if it is mixed with chemicals or electronics, for example. Debris cannot be recycled properly if it is not sorted properly, and this leads to the need for more equipment to collect, more truckloads to haul, and more space to store the debris.



Debris Management Special Consideration #3

Competing Interests and Resource Availability

- Simultaneous disasters cause resource strain
- Contractors may leave one site for higher paying work at another site
- Not enough resources and equipment due to high demand



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Slide 48: Debris Management Special Consideration #3

The 2021 hurricane season highlighted this situation, but this is a common issue experienced in communities during disaster operations. With multiple hurricanes hitting geographically close areas in succession, resources were difficult to commandeer. This applies to all resources, from human capital to equipment to financial resources. When one disaster strikes, most resources get used for that relief operation. When another disaster strikes nearby, there could either be not enough resources left to respond, or contractors and resources could abandon the operation to move to where they could get paid more for their services.



Debris Management Special Consideration #4



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(Source: FEMA, 2018)

Personal Property Reunification

- Personal property scattered far
- High volume of boats and RVs
- Storage issues
- Many abandoned items due to damage

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Slide 92: Debris Management Special Consideration #4

Personal property gets scattered and lost during most disasters, whether it is a hurricane, tornado, flood, tsunami, etc.

During the 2021 hurricane season, coastal communities saw many displaced boats and mobile homes. During these types of events, many residents leave and later do not know where to find their personal property that has been dispersed. It may be a function of the local jurisdiction to find a way to reunite community members with their personal property that has been scattered and possibly gathered and moved to a location for storage or reunification. After the SR 530 landslide in Washington State, a warehouse was set up to consolidate found property, clean it, store it, and reunite it with survivors and next-of-kin. This effort was a partnership between the county, the state, and the state archivist, who provided instructions and guidance on item preservation.

Debris Management Special Consideration #5

Marine Debris

- Include fishing gear, vessels, and other debris
- May come from disasters far away
- May have invasive species attached
- Complex laws



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(Source: Johnson,
NOAA Corps 2008)



(Source: Officers, crew, and scientists of
NOAA Ship NANCY FOSTER, 2016)



(Source: Boland, NOAA/NMFS/PFDF/ESOD 2010)

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Slide 93: Debris Management Special Consideration #5

Marine debris creates special challenge for coastal communities. It can include typical marine debris, such as fishing gear and vessels, but it can also contain non-typical debris such as motor vehicles, parts of buildings, hazardous materials, and other items.

Marine debris may also arrive in coastal areas that were not directly impacted by the disaster. The Japan earthquake and tsunami of 2011 caused debris to wash up all along the West coast, where special hotlines and cleanup crews were put in place to deal with it. Marine debris from other areas runs a high risk of bringing non-native invasive species with it, which can lead to localized environmental disasters if not properly contained and dealt with.

Finally, there are complex laws surrounding marine debris, particularly when that debris involves vessels (boats) and/or debris that was generated outside of the United States.



Activity 3

- Instructor Lead Discussion
- For each of the Special Considerations answer the following questions for your community:
 - What are some possible solutions to this issue?
 - How or where would you incorporate this into your plan?
- 15 minutes; use the worksheets provided



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Slide 94: Activity 3

Participants should divide into small groups with those who are planning for similar communities or from similar jurisdictions or organizations and answer the questions below for each special consideration.

Participants should keep in mind that they are providing possible solutions for their community, not the ones used in the examples. This activity will be broken up into two sections. Each section will consist of providing possible solutions for two special consideration scenarios.



Module 4 Summary

Module 4 Summary

- Discussed recent natural disasters that required complex debris management operations
- Analyzed common debris management complications and how to incorporate solutions into debris management planning



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Module 4: Slide 95

Slide 95: Module 4 Summary

In this module, participants:

- Discussed recent natural disasters that required complex debris management operations and
- Analyzed common debris management complications and how to incorporate solutions into debris management planning.



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Module

5

Course Summary and Administration



Module 5 Administration



Slide 96: Module 5: Course Summary and Administration

Duration

40 minutes

Scope Statement

In this module, instructors will lead a short discussion to review the course goal and content. Participants will complete an objectives-based post-test. Participants must score at least 70 percent to receive a Certificate of Completion. Participants will complete a course evaluation form and provide feedback on the course instruction, content, and materials. Additional information will be provided about other FEMA training opportunities.

Terminal Learning Objective (TLO)

Not applicable

Enabling Learning Objectives (ELOs)

Not applicable



Module 5 Content

Course Summary

This course enabled participants to outline a disaster debris management plan and recognize special considerations when planning for debris management after a disaster.



FEMA

MGT-460 Planning for Disaster Debris Management

Module 5: Slide 97

Slide 97: Course Summary

This course enabled participants to outline a disaster debris management plan and recognize special considerations when planning for debris management after a disaster.



Slide 98: National Domestic Preparedness Consortium

The National Domestic Preparedness Consortium (NDPC) is a professional alliance sponsored through the Department of Homeland Security/FEMA National Preparedness Directorate.


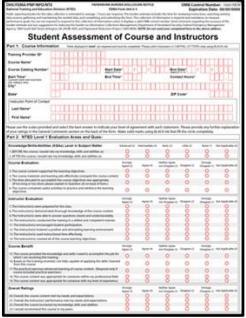
The NDPC membership includes:

- University of Hawai'i: National Disaster Preparedness Training Center (NDPTC);
- Louisiana State University's Academy of Counter-Terrorist Education: National Center for Biomedical Research and Training;
- Texas A&M: National Emergency Response and Rescue Center;
- The New Mexico Institute of Mining and Technology: Energetic Materials Research and Testing Center;
- Center for Domestic Preparedness (CDP);
- US Department of Energy Nevada Test Site: Counter-Terrorism Operations Support; and
- Transportation Technology Center, Inc./Security and Emergency Response Training Center.

Each member brings a unique set of assets to the domestic preparedness program.



Course Evaluation and Post-test



- Electronic
 - Log in to account at ndptc.hawaii.edu/training
 - Click on My Deliveries and the course name to see Delivery Checklist
 - Complete and submit Post-test and Evaluation
- Hard Copy
 - Provider ID: UH-NDPTC
 - Instructor will provide course info

MGT-460 Planning for Disaster Debris Management Module 5: Slide 99

Slide 99: Course Evaluation and Post-test

Participants are asked to provide constructive feedback on the course material and instruction through a Course Evaluation. Participants will have approximately 10 minutes to complete the Course Evaluation.

This course concludes with a post-test, which allows the instructors to evaluate participant knowledge on the topics addressed in the course. The post-test provides participants with an opportunity to demonstrate mastery of the Terminal Learning Objectives and is similar in design and content to the pre-test that participants completed at the beginning of the course. Participants' pre-test and post-test scores will be compared to measure the benefit of the course and identify the knowledge and skills participants gained during their attendance.



Unlike the pre-test, every question should be answered. Participants must not leave any answers blank. Participants will have 10 minutes to complete the post-test and should work independently.

Participants who completed their Course Registration and Pre-test online should complete the Course Evaluation and the Post-test electronically. Participants can access the Course Evaluation and Post-test by accessing their Delivery Checklist:

- Log in to their account at <https://ndptc.hawaii.edu/accounts/login/>
- Select the course delivery under My Deliveries or Past Deliveries to access the Delivery Checklist



Thank you for attending!



FEMA

Contact us:

National Disaster Preparedness Training
Center

NDPTC.Hawaii.edu

[Course Catalog](#)

[Delivery Schedule](#)

808-956-0600

MGT-460 Planning for Disaster Debris Management

Module 5: Slide 100

Slide 100: Thank you for attending!

This concludes NDPTC's MGT-460 Planning for Disaster Debris Management Planning training course. Thank you for attending!



Module 5 Reference List

National Domestic Preparedness Consortium (NDPC). 2022. NDPC Website.
<https://www.ndpc.us>



Appendix

A

Glossary



AWR:	Awareness
CDP:	Center for Domestic Preparedness
DHS:	Department of Homeland Security
DMS:	Debris Management Site
ELO:	Enabling Learning Objective
EMRTC:	New Mexico Tech's Energetic Materials Research and Testing Center
FEMA:	Federal Emergency Management Agency
IG:	Instructor Guide
NCBRT:	National Center for Biomedical Research and Training
NCERST:	The Transportation Technology Center's National Center for Emergency Response in Surface Transportation
NERRTC:	National Emergency Response and Rescue Training Center
NDPC:	National Domestic Preparedness Consortium
NDPTC:	National Disaster Preparedness Training Center
NIMS:	National Incident Management System
NTS-CTOS:	Nevada Test Site/Counter-Terrorism Operations Support
NWS:	National Weather Service
PG:	Participant Guide
TLO:	Terminal Learning Objective



Appendix

B

Activity Handouts



Activity 1 - Part 1. Debris Profile

Introduction:

Participants should be divided into small groups to complete this activity. Groups should be based on geographic location whenever possible.

Action to be Completed:

1. In small groups, discuss the most likely disasters that can happen in your area (refer to your existing disaster plans if possible).
2. In small groups, determine the types of debris that could be generated by each of the disasters by percentage. Use the example as a guide.
3. Compile and summarize findings by your group. Be prepared to give a brief summary of your answers to the class.

Rationale:

This exercise will help participants determine the most likely types of debris that will be generated in their communities following a disaster.

Time Necessary to Complete:

10 minutes

Resources:

Activity 1 Handout

Seat Time:

10 minutes



Activity 1- Part 1. Debris Profile Questions

1. What types of debris generating disasters are likely to occur in your community?

2. A What types of debris would they generate? Remember the types: Vegetative, Construction/Demolition, Hazardous Wastes, Household Hazardous Waste, Electronic Waste, White Goods (appliances), Soil/mud/sand, Vehicles/Vessels, Infections waste/Putrescent, Chemical/biological/radiological/nuclear.

B. Estimate what percentage each type of debris would be. Example: High wind event. Vegetative = 50%, Construction & Demo = 25%, Household Hazardous Waste = 24%, Other = 1%.



Activity 1 – Part 2: Estimating Disaster Debris

Practical Activity Statement:

This activity helps participants to estimate the volume of disaster debris, including vegetative debris, using FEMA's Vegetative Cover Multipliers (VCM) and guidelines for various types of homes and debris.

Action To Be Completed:

Utilizing FEMA Vegetative Cover Multipliers and Table for Single Family, Single-Story Homes. Estimate the cubic yards of debris.

Rationale:

Explain the importance of estimating disaster debris for effective disaster response and recovery. Introduce the concept of Vegetative Cover Multipliers (VCM) and how they are used to adjust debris estimates based on the density of vegetation.

Time Necessary to Complete:

The exercise with instructor examples should be completed in 20 minutes.



Activity Resources

FEMA Vegetative Cover Multipliers (VCM):

- **Light (1.1 multiplier):** Sparse canopy cover, more visible ground.
- **Medium (1.3 multiplier):** Uniform pattern of open space and tree canopy cover.
- **Heavy (1.5 multiplier):** Dense tree canopy cover, ground or houses not visible.

Table for Single Family, Single-Story Homes:

Typical House (Square Feet)	None (CY)	Light (1.1) (CY)	Medium (1.3) (CY)	Heavy (1.5) (CY)
1000 SF	200	220	260	300
1200 SF	240	264	312	360
1400 SF	280	308	364	420
1600 SF	320	352	416	480
1800 SF	360	396	468	540
2000 SF	400	440	520	600
2200 SF	440	484	572	660
2400 SF	480	528	624	720
2600 SF	520	572	676	780

Practice Problems (Students Complete):

Problem 1:

A neighborhood with 12 single-story homes, each 1800 square feet, in an area with light vegetative cover. Calculate the total debris volume.

Problem 2:

A neighborhood has 8 two-story homes, each with 1600 square feet per story, in an area with medium vegetative cover. Calculate the total debris volume.

Problem 3:

A mobile home park with 30 single-wide mobile homes. Calculate the total debris volume.



Activity 2 - Debris Management Plan Initial Outline

Introduction:

Participants should begin identifying information they will need to fill out the debris management plan outline provided in this handout. They will use the Examples Handout which provides excerpts from existing Debris Management Plans from various communities and the FEMA Public Assistance Debris Management Plan Workshop Student Handbook. The activity will be broken up into two segments and completed as the Module progresses.

Action to be Completed:

1. Review the criteria categories in the debris management plan outline using the community you selected in Activity 1 as your guide.
2. Identify any missing information and determine the individual(s) in your community who might have the missing information.
3. Refer to the Plan Examples handout for excerpts from existing Debris Management Plans to use as guides if needed.
4. Divide into groups and discuss debris management plan outlines.

Rationale:

This exercise allows participants to identify the needed information to complete a disaster debris management plan and begin the first steps of developing a debris management plan outline for their communities.

Time Necessary to Complete:

90 minutes split into two 45-minute segments. Each 45-minute segment will consist of 30 minutes of group discussion and 15 minutes of report out to the class.

Resources:

Activity 2 Handout, Examples Handout, Debris Plan Template Handout, FEMA Public Assistance Debris Management Plan Workshop Student Handbook

Seat Time:

90 minutes



Activity 2. Debris Management Initial Outline Handout

For each criteria category, **fill in as much information as you can**. For sections which you do not have the information, identify what information you will need and where you will get that information or who you will get it from. You can also use the Debris Plan Template Handout to fill in the information.

1. Debris Management Overview

- a. Describe the plan's purpose and objectives:

2. Incidents and Assumptions

- a. What types of disasters is your community susceptible to?

- b. What types of debris might be generated from these disasters?



- c. Provide debris forecasts for your community or list forecasting methods/tools you will use:

- d. Describe the general terrain, land use, and accessibility for areas in your community most likely to be affected:

3. Debris Collection and Removal Plan

- a. What are the priorities for clearance and removal?



- b. Describe the plan's debris collection strategy and what methods will be used to remove debris:

- c. Describe the roles and responsibilities of the various functions involved (Public Works, Finance, and Solid Waste Departments, etc.):

4. Temporary Debris Management Sites and Disposal Locations

- a. Where will the disaster debris be segregated, reduced, and disposed? Will it be hauled to a recycler?



5. Debris Removal From Private Property

- a. What is the process for private property debris removal?



6. Force Account Labor or Contracted Resources and Procurement

a. What types of work will force account labor accomplish?

b. What types of debris management services will be contracted?



c. Identify at least one debris contractor that you have prequalified.

d. Describe the process and procedure for acquiring competitively procured contracted services.

7. Monitoring of Debris Operations

a. How will debris removal contractors be monitored at pickup sites, Debris Management Sites, and final disposal?



- b. Who will monitor contractors?

8. Health and Safety Requirements

- a. How will workers and the public be protected?

- b. What specific measures will be taken to adhere to safety rules and procedures?



9. Environmental Considerations and Other Regulatory Requirements

- a. Which debris operations will trigger compliance with environmental and historic preservation laws, regulations, and Executive Orders?

- b. How will compliance of such environmental and historic preservation laws be attained?

10. Public Information

- a. What is your community's public information strategy to ensure that residents receive accurate and timely information about debris operations?

- b. How will you disseminate the information? Updates?



Activity 3 Problem Solving for Special Considerations

Introduction:

Instructor will lead a discussion on special considerations for different communities represented by the class participants.

Action to be Completed:

1. Follow instructors guidance on discussion topics.
2. Answer the Activity 3 Questions included on the following pages.

Rationale:

This exercise allows participants to discuss special considerations during a debris management operation and determine what solutions are possible for their community and how to incorporate those solutions into their debris management plan.

Time Necessary to Complete:

15 minute discussion

Resources:

Activity 3 Handout



Activity 3. Problem Solving for Special Considerations Handout

Which of the following special considerations exist in your community? Are there others?

Special Consideration #1: Access Issues

Consider:

- What are unique access issues that could hinder debris management operations in your community?
- What are some possible solutions to this issue?
- How or where would you incorporate these solutions into your plan?

Special Consideration #2: Debris Separation by Public

Consider:

- What are the unique debris separation issues you might encounter in your community?
- What are some possible solutions to this issue?
- How or where would you incorporate these solutions into your plan?



Special Consideration #3: Competing Interests and Resource Availability

Consider:

- What are some unique challenges in your community?
- What are some possible solutions to those challenges?
- How or where would you incorporate those solutions into your plan?

Special Consideration #4: Personal Property Reunification

Consider:

- What are some unique challenges for your community?
- What are possible solutions for those challenges?
- How or where would you incorporate those solutions into your plan?



Special Consideration #5: Marine Debris

Consider:

- What types of marine debris might you encounter?
- Where/how will you store and dispose of it?
- How will you coordinate with specialized legal advice on this?

Other Special Considerations

Consider:

- What other special considerations exist in your community and how will you address them?