14. Emergency Response

The focus of emergency response is on saving lives, protecting property and protecting the environment, in that order. Five key principles form all response doctrine:

1) engaged partnerships,
2) tiered response,
3) scalable, flexible and adaptable operational capabilities,
4) unity of effort through unity of command, and
5) readiness to act.

(*FEMA, 2008*)

Typically, the response phase of emergency management starts upon notification that an incident has occurred. Ideally, it would begin slightly earlier when monitoring has detected indications that an incident is imminent and public warning and response actions can be initiated. Response actions continue until life safety actions are complete, the scene is stabilized, an initial damage assessment is underway and critical services have been restored. Response to landslides follow this established emergency response framework.

Preparedness

Preparedness actions are those general measures taken before a response is mounted. Thoughtful and effective preparation always make responses much more effective. The twin objectives of preparedness are 1) to avoid an emergency when possible, and 2) to maintain a state of readiness in order to take rapid, appropriate and effective actions to save lives, prevent property losses and reduce environmental damage.

Planning

Responses to complex events, such as landslides, make planning critical. To ensure unity of effort and command, plans use the National Incident Management System (NIMS) and its sub-component the Incident Command System (ICS). In compliance with Minnesota emergency management rules, Hennepin County has an Emergency Operations Plan (EOP). Each city in Hennepin County also has an EOP that integrates with the county EOP. Jurisdictional landslide response planning should comply with that jurisdiction's EOP and be attached as a hazard annex to that document.

Resource Acquisition

Hazard assessments use worst-case landslide scenarios for each jurisdiction. Landslide response will require the use of specialized resources. Emergency response to landslides requires specialized training and capabilities. Jurisdictions with landslide hazards should obtain or identify response assets that are able to quickly respond to a local landslide incident. Important landslide response resources may include:

- geological and geotechnical specialist expertise
- heavy rescue units and collapsed structure specialists
- area search personnel and resources
- helicopter rescue assets
- unmanned aerial vehicles and systems (UAV/UAS)
- equipment for earth moving, debris clearance and dewatering.

Training and Exercises

To ensure emergency response readiness, landslide-specific training can be used when an assessment indicates landslides are a particularly significant hazard to a jurisdiction. Training ranges from awareness-level classroom training to more complex hands-on field training. Exercises test and verify the adequacy of prior planning and personnel training, and reveal gaps in plans, training and resources.

Contingency Actions

Transition from the preparedness to response phase is made when a landslide happens, or when deteriorating conditions provide clear indications that the chances of a landslide have significantly increased.

1) **Alerts.** In an ideal situation, alerts provide responders and the public with early awareness about a rising landslide risk condition before slides actually occur. Early alerts enable people to either avoid landslides or prepare for their consequences. Refer to the Indications and Alerts section of this atlas for additional information.
2) **Activation.** During threatening extreme weather events, the Hennepin County Situation Monitoring Station (SMS) is active in advance of storm arrival as a contingency measure to obtain information and provide situational awareness. The SMS becomes the Situation Unit upon an Emergency Operations Center (EOC) activation. Real-time sensor data and damage reporting helps to build situational awareness.
3) **Expertise.** If certain landslide precursor conditions exist, a geologist may be requested in the SMS/EOC. Under National Incident Management System (FEMA NIMS) organization, the geologist is a Technical Specialist assigned to the Situation Unit of the Planning Section assessing changing conditions and initial slide incident reports. Geologists will work in tandem with Hennepin County and/or National Weather Service meteorologists and will be prepared to deploy to a field site if required.

General Indications and Alerts

Continuous hazard monitoring is part of preparedness. When suitable evidence is detected that provides indications of an increased landslide threat, an alert can be issued. The response phase starts when indications reveal an imminent threat of landslides in a particular area during a specified timeframe.

Indications

Indications are specific factors that help confirm or deny models about the landslide threat. Landslides often do not provide clear indications before they happen at a particular site. Usually the best expectation is to determine that overall conditions have worsened, making landslides more likely across a large area. Rockfalls are even more difficult to foresee. In Hennepin County, sensors continuously monitor for some of the factors associated with landslides (hennepinwestmesonet.org). Indications are a heads-up for technical experts and responders to pay closer attention to worsening conditions and increasing landslide probability.

Advisories, Alerts and Warning

- Advisories are notices to emergency officials regarding a developing situation that may result in an elevated landslide threat condition across the county.
- Alerts are messages to the public provided when conditions have reached a point that landslides are possible across the county.
- Warnings are an urgent notice of site-specific danger that is imminent or in progress and that requires immediate action to save lives at specific locations. No sites in or around Hennepin County are currently capable of providing landslide warning.

For additional information on indications and alerts, refer to the section Indications and Alerts in this atlas.

Incident Notification and Reporting

Landslides frequently go unreported. Sometimes reports mischaracterize landslides as fallen trees on a road or as a downed power line issue. Reporting failures result in under-reporting, which fails to grasp total incident magnitude and misses opportunities to detect minor slides that provide early indications of the start of a more significant event. Another problem is that slide reporting may be compartmentalized within a single organization and thus unavailable as an element of general situational awareness in a jurisdiction. Railroads, highway departments, electric utilities, pipeline operators and other organizations often handle landslide incidents on their own. In these cases, emergency management agencies are often unaware that a landslide incident occurred. The long-term consequences of reporting failures are less accurate landslide hazard assessments, and the short-term consequences are an incomplete situational awareness of current slide activity.

Emergency managers tracking landslide activity must be able to receive notification from a variety of sources. In some cases, reporting links should be cultivated prior to emergencies to increase the odds of getting valuable information when it is needed most. Notification may come from these and other sources:

a. Public Safety Answering Points (PSAP)—"911 Call Centers"

b. government units, such as transportation or parks departments

c. private industry, such as railroads and utilities

d. news media

e. social media

f. calls or emails from the public.

For additional information on incident notification and reporting, refer to the section titled Landslide Reporting in this atlas.

In some urban and suburban environments, precise location descriptions needed to direct responders to landslides are a common capability gap. Landslides often occur away from definitive street addresses. Confused location reports can dangerously delay response. Following the fatal 2013 Lillydale Park landslide, the City of Saint Paul installed a series of location markers for use by 911 callers to guide responders to incidents in undeveloped parklands. These markers rely on information from the United States National Grid (USNG).

Incident Size-Up

First responders dispatched to a landslide conduct an incident size-up before starting response operations. The size-up identifies critical factors that must be addressed for a safe and successful response. Leaders will collect as much information as possible while enroute to the incident. Following the initial size-up, situational awareness must be updated and revised as new information becomes available.

There are many methods of scene size-up used by fire services, law enforcement, emergency medical responders and public works officials. Response agencies should use their own established size-up procedures. However, they should understand how their procedures would apply to landslide incidents. Common considerations of most size-ups include:

Urgency

This aims to set the degree of urgency required for the response at this incident. Understanding the urgency helps set the level of risk that response leaders will accept during response operations. Urgency (or stakes) are dynamic and adjusted throughout the timeline of the incident.

1) **Life safety.** Determine the actual and potential immediate impact of the slide on human lives. Were people in the landslide zone? Were they in structures, vehicles or on foot? Are there people currently in areas that need evacuation or other protective measures? Are there evacuated landslide survivors who require life-saving assistance, such as medical treatment? Are there additional life-safety threats from ruptured gas lines, downed power lines or hazardous materials leaks that the landslide has triggered?

2) **Property.** Is critical infrastructure involved? Is transportation affected? Has the slide destroyed, damaged or threatened structures, facilities or sites? Is public property involved? Are temporary stabilization actions needed to prevent further property damage?

3) **Environment.** Are there ongoing threats to the environment from the landslide, including sediment into waterways or releases and spills of industrial substances?

Complexity

The complexity of an incident determines response organization, resources required, and the time needed for response and recovery. Complexity factors include, but are not limited to:

1) high-stakes life safety situations including injured, trapped or missing people, public evacuations or related circumstances
2) potential for secondary hazards from hazardous materials, critical infrastructure failure and transportation disruptions
3) human remains recovery
4) multiple jurisdictions and/or agencies involved in emergency response
5) specialized response resources needed
6) sensitive or unique cultural, historic or habitat areas involved.

Response environment

All emergency response operations take place within a context of transient conditions and circumstances. These conditions include, but are not limited to:

1) current and forecast weather and its impact on hazards and response
2) time of day and illumination
3) potential for additional slide activity at the incident scene
4) other nearby but separate landslides that may split response resources
5) special political, social or media contexts
6) responder safety hazards (water, gas leaks, energized power lines, hazardous materials, confined spaces, falling debris, etc.).

Operational considerations

Safe and effective landslide response requires addressing important operational considerations. These include, but are not limited to:

1) availability of technical expertise (geologists, engineers, technical rescue, etc.)
2) availability of special response units/equipment (heavy rescue, aviation, etc.)
3) personal protective equipment (PPE) for responders
4) safety zones and primary and alternate routes of ingress and egress.

Site Boundaries

An important part of the incident size-up is setting site boundaries. Site boundaries primarily ensure the safety of emergency responders and the public. They also help to properly locate vital processes, facilities and equipment. Especially when landslides are large and complex, response uses the same basic concept as urban search and rescue (USAR) and hazardous materials (HAZMAT) site boundary criteria. As site conditions change, boundaries will change as needed. For landslide response, site boundaries should be set with the assistance of a geologist or engineer when possible. Boundaries may include the following:

a. **Exclusion Area (Hot Zone)**. The danger present in this area requires specialized training and equipment to enter under direction of the incident commander. The area must be clearly identifiable either by physical features or by cones, tape or other barrier materials in order to help prevent unintentional entry. The exclusion area is where the majority of the rescue and initial medical response activities take place.

b. **Transitional Area (Warm Zone).** The transitional area forms a barrier between the exclusion zone, which is the most restrictive operational area, and the support area, which is the least restrictive. This is the area is where any decontamination or clean-up occurs as well as donning and doffing responder personal protective gear takes place. This is also the area where any contingency response teams are located that can rapidly assist responders on the landslide debris pile.

c. **Support Area (Cold Zone).** The support area is where the Incident Command Post (ICP) is located, along with the logistics, communications, medical and other functions needed to support the incident.

d. **Outer Perimeter.** Establish an outer perimeter that encloses the three control zones (exclusion, transitional and support). The perimeter is controlled by law enforcement in order to prevent unauthorized entry.

e. **Staging Area.** Staging areas are established at safe sites near the incident scene to account for and manage arriving incident resources. Proximity allows the resources to quickly deploy as required at the scene.

Scene Stabilization

An important part of the response phase is scene stabilization. Scene stabilization is achieved when the immediate threat to life-safety and property damage at a scene has been stopped. In a typical incident this means extinguishing fires, stopping hazardous material leaks, de-energizing electric lines and shutting off gas lines. At a landslide scene, scene stabilization also means identifying the immediate threat of additional sliding and the actions needed to lessen or eliminate the immediate threat so that recovery work can begin to bring the area back to a sense of normalcy.

A rapid engineering study of the landslide is essential in order to gauge the ongoing threat and to identify measures to quickly stabilize the slope. FEMA will fund this study in a Stafford Act disaster as an eligible emergency protective measure (www.fema.gov/appeal/218683). In landslide response and recovery, is important to note the difference between an emergency protective measure and permanent restoration work. FEMA generally will not fund permanent restoration work on landslides.

Note that scene stabilization is somewhat different than incident stabilization. The latter is focused on stabilizing community lifeline services following a disaster. In catastrophic disasters, landslides may disrupt community lifeline services such as energy and transportation. During such disasters, emergency managers will prioritize the re-establishment of critical services that have a community-wide impact.