STATE OF TENNESSEE

COMMUNICATIONS AND WARNING PLAN ANNEX

December 2018

Department of Military | TEMA

EMERGENCY MANAGEMENT
EMAP Accredited
ACCREDITATION PROGRAM

RECORD OF PLAN CHANGES

All changes made within the Communications and Warning Plan Annex are to be tracked and recorded in the below summary table by the TEMA Planning Branch. Section 6 of this Annex outlines the schedule and methodology for the Record of Changes.

	Date	Section of Plan	Summary of Change	Made By
1	10/5/2018	Entire Plan Annex	Complete Rewrite and Reorganization of Plan Annex	J. Wickham
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1 - Introduction

1.1 Purpose

The foundation of emergency management is built upon the ability to coordinate between partners before, during, and after emergencies. In order to effectively coordinate, partners must be able to communicate with each other and the public under all circumstances and emergency conditions. The State of Tennessee Communications & Warning Plan's purpose is to outline the principle systems and the secondary backup systems used to alert, notify, warn, and communicate with the partners and citizens of Tennessee.

1.2 Scope

The Communications & Warning Plan is a Functional Annex to the Tennessee Emergency Management Plan (TEMP). The Communications & Warning Plan's primary scope is to identify the State's principle and secondary communication systems based on hazard assessments, interoperability requirements, and redundancy/backup factors. Additional the Communications & Warning Plan Annex establishes the State's testing schedule to ensure these systems remain functional. Detailed outlines of interoperability radio channels and groups fall outside the scope of this plan.

1.3 Authority & References

The authority to administer the State of Tennessee Communication & Warning Plan is authorized under T.C.A. § 58-2-106. This code designates the Tennessee Emergency Management Agency (TEMA) as the responsible entity for maintaining Tennessee's comprehensive statewide emergency management program and authorizes TEMA to "provide for a comprehensive communication plan."

The Communications & Warning Plan Annex adheres to all federal guidelines and requirements to ensure nationwide consistency among emergency management partners. This includes adhering to the National Incident Management System (NIMS), the National Response Framework (NRF), and the FEMA Region IV Regional Emergency Communications Plan.

The primary references utilized in developing and maintaining this plan are:

- T.C.A. § 58-2-106, Emergency Management Responsibilities & Powers in Tennessee
- T.C.A. § 58-2-108, Designation of Emergency Service Coordinators (ESC)
- T.C.A. § 58-2-116, Emergency Management
- National Incident Management System, October 2017
- National Response Framework, Third Edition, June 2016
- CPG 101- Developing and Maintaining Emergency Operations Plans, Version 2, November 2010
- EMAP Emergency Management Standard, 2016
- FEMA Region IV Regional Emergency Communications Plan, Tennessee Emergency Communications Annex
- Tennessee Statewide Communication Interoperability Plan (SCIP)

2 – Communications and Warning Systems

2.1 Identification of Tennessee Systems

In early 2018 a steering committee was created of communications experts to develop the *State of Tennessee Communications and Warning Plan*. The first goal of the committee was to identify the State's primary systems used for emergency communications and warnings. The committee identified twenty-two (22) systems as part of this process. To ensure this comprehensive listing of systems would provide the capabilities needed before, during, and after emergencies, the committee defined three (3) groupings of capabilities to assign each of the systems to:

A. **Communication Capabilities**- the ability for provide interoperability communication between various partners and stakeholders before, during, and after emergencies. Communications can be defined as the ability to exchange information in a back and forth manner. *[EMAP Standard 4.7.1]*

B. **Mass Stakeholder Alert & Notification Capabilities**- the ability to send a mass alert and/or notification to various partners and stakeholders through a single disseminated message before, during, and after emergencies. *[EMAP Standard 4.7.2]*

C. **Mass Public Warning Capabilities**- the ability to send a mass alert and/or warning to the public regarding the emergency situation, protection actions to take, and/or preparedness actions to consider. *[EMAP Standard 4.7.3]*

Table 1 provides a listing of the twenty-two (22) systems identified and the assignment of each system to the three (3) groupings of needed capabilities. Additionally Table 1 organizes the similarities between certain systems into functional categories for ease of understanding.

Table 1: Tennessee Communication & Warning Systems and Capabilities

Functional Category	Systems	Communication Capabilities	Mass Stakeholder Alert/Notification Capabilities	Mass Public Warning Capabilities
Phone Functions	**1.** Landline Phones	✓	✓	
	2. Cell Phones	✓	✓	
	3. Satellite Phones	✓	✓	
	4. Fax Machines	✓	✓	

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Functional Category	Systems	Communication Capabilities	Mass Stakeholder Alert/Notification Capabilities	Mass Public Warning Capabilities
Data Functions	**5.** Email	✓	✓	
	6. WebEOC	✓	✓	
	7. NWS Chat	✓	✓	
	8. ReadyOp		✓	
	9. DNAWAS	✓	✓	
Radio Functions	**10.** TMAC *(800 MHz Conventional)*	✓	✓	
	11. TACN *(VHF,700/800 MHz p25 Digital)*	✓	✓	
	12. TEMA High Band *(VHF)*	✓	✓	
	13. Winlink *(HF)*	✓	✓	
	14. HAM Radio *(primarily UHF)*	✓	✓	
	15. Federal Interoperability Channels	✓	✓	
	16. State Mutual Aid Channels	✓	✓	
	17. FNARS	✓	✓	
Mass Public Warning Functions	**18.** EAS through IPAWS			✓
	19. WEA through IPAWS			✓
	20. Social Media, Website, & App	✓		✓
	21. Press Releases & Media Coordination			✓
	22. TVA Sirens			✓

2.2 Description of Tennessee Systems

Each of the identified communication and warning systems has differing abilities, strengthens, and weaknesses. Section 2.2 provides an overview description of the twenty-two primary systems.

1. **Landline Phones**

   A landline telephone is a phone that uses a metal wire or optical fiber telephone line for transmission. When compared to cell phones, landline telephones can be more resilient during power outages because power is sent to the phones through the phone line from the phone companies. The phone companies have battery backup and backup generators so that their operations can continue for well over a week during a power outage. Cell phone tower backup power is substantially less than that of landline; reported averages for cell tower backup power is between 4 to 8 hours. If power is lacking in a particular area an emergency worker and/or citizen may have more time to communicate on a landline phone versus a

mobile phone while attempts to restore power are made. This is advantageously unless there is physical damage to the telephone lines caused by wind, downed trees, ice accumulation, etc., which is the issue in many cases. Landline phones and networks are still a formidable communication system for both public and private enterprise, including emergency management, despite the growing trend of individuals and organizations relying solely on cell phones. All TEMA employees and many emergency partners within Tennessee can utilize landline phones as a communication method when necessary.

2. **Cell Phones**

A cell phone is a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area. Currently less than 50% of households have a landline phone in their homes and over 92% own a cell phone (77% of that 92% own a Smart cell phone). Private sector efforts are on their way to better addressing backup power needs for cell phone towers and major cellular providers have mobile equipment capabilities that can be brought in to alleviate areas with one or more cell towers that are down. While these efforts are helping with the resiliency of the cell phone network, the cell phone user must also be prepared for emergencies and power outages by ensuring they charge their cell phone regularly, have a phone adaptor that can draw charging power from their car, and have portable backup power supplies available.

When we think of emergency management communications, we tend to think of radio communication platforms for Fire, Police, EMA, and EMS, however many emergency "whole community" partners do not have access to radios. The upcoming FirstNet initiative is gearing up to be able to integrate emergency partners with only cell phones into the response communication network. When events or emergencies take place, cell phone networks can be overwhelmed and FirstNet's dedicated network may decrease the likelihood of emergency communications being delayed. With this and other technology advances, cell phones will likely be the primary method of emergency management communications for quite some time.

While the future of communications is in cell phones and cloud management, the complexity of phones and networks will always be subject to technical and cyber failures that will require backup forms of communications for emergency management programs. All TEMA employees and all emergency partners within Tennessee have cell phones as a primary method for communications.

3. **Satellite Phones**

A satellite phone is a type of mobile phone that connects to orbiting satellites. A satellite phone that uses geostationary orbit (stationary satellites) allows for higher bandwidth however it may require a more tactful location, even with open sky, to connect and overcome obstacles such as steep hills and forest. Adversely a satellite phone that uses low earth orbit systems (moving LEO satellites) will have lower bandwidth but will be able to reestablish and maintain connection with less tactful locations as the phone/user can wait a few minutes until another satellite passes overhead. Most cell phone networks operate close to capacity during normal times, and large spikes in call volumes caused by widespread

emergencies often overload the systems when they are needed most in addition to being vulnerable to damage from disasters. Satellite phones are not damaged from earthly natural disasters and may be a great alternative when a cell phone network is down or congested, however their own networks are still prone to congestion. Satellite phones may eventually become more main stream with multiple levels of emergency personnel having them as primary phones but currently they are primarily used as backups to other communication methods and are usually assign to a limited number of individuals and/or sites. TEMA Headquarters and the three TEMA Regional Officers all have satellite phones as a backup method for communicating other emergency partners.

4. **Fax Machines**

Fax is the telephonic transmission of scanned printed material (both text and images), normally to a telephone number connected to a printer or other output device. Fax, in its simplicity, is a solid secure communication medium despite its antiquity and serves as a great primary or alternate method of ensuring a recipient gets the message. Faxes have been sent over radio, telephone, personal computer and satellite transmission and many emergency management officials receive information and notifications through a Fax Machine. While there are many ways to send a fax without a fax machine, the standalone fax machine is still found in home and work environments across the globe. TEMA Headquarters and the three TEMA Regional Offices all have multiple standalone fax machines as a communication method to other emergency partners.

5. **Email**

Email is a method of exchanging messages between people using electronic devices. Today's email systems are based on a store-and-forward model where email servers accept, forward, deliver, and store messages. Emergency management officials spread knowledge and resources through email as well as sending alerts and notifications to partners and officials. A sponsored 2010 study on workplace communication found 83% of U.S. knowledge workers felt email was critical to their success and productivity at work while other studies reveal information overload as a factor leading to loss of productivity. One major downfall realized from email is the lack of uniformity with differing organizations selecting what size they will limit their attachment to- which creates a situation where some information may not be transmitted as intended because the file size is too large. While email allows an organization to deliver efficient information it also contends with the ever increasing spam and scam environment. Proper cyber education may thwart some threats however it also stifles communication leaving a cyber educated recipient to question the validity of any incoming email; false information can be received and acted upon while legitimate information can be ignored or deleted due to perceived threat. With the ever increasing use of cell phones and alternative workplace implementations (work from home situations) email will continue to be a leading method of communication used by working emergency management professionals and their associated partners. All TEMA employees and all emergency partners within Tennessee have email accounts as a primary method for communications.

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6. **WebEOC**

WebEOC is a web-based information management system that provides a single access point for the collection and dissemination of emergency related information. This program was designed to create a "virtual" Emergency Operations Center (EOC) environment for users. WebEOC delivers real-time information provided by emergency support personnel that can be utilized during the planning, mitigation, response and recovery phases of any emergency. The system allows for sharing of information in a variety of ways including messaging, document and photo uploading, GIS mapping, and dashboard tracking. The system is customizable and flexible based on the program's needs.
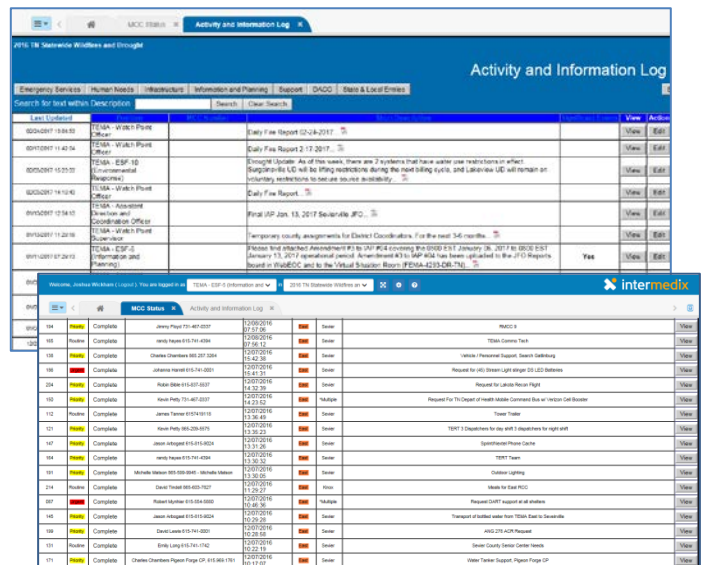
Many federal, state, local, and private sector partners use WebEOC software to manage real world events and exercises thus making it the most used crisis information management software throughout the emergency management enterprise. Like email, WebEOC can create information overload however constant moderation and effective use can curb the overload. WebEOC relies on participants having internet access and an account and requires dedicated administrators and support personnel to maintain functionality. WebEOC is the primary information management system used by the State Emergency Operations Center (SEOC) in Tennessee. All 95 counties within Tennessee have access to the SEOC's WebEOC system.

7. **NWS Chat**

NWS Chat is an Instant Messaging program utilized by National Weather Service (NWS) personnel to share critical warning decision expertise and other types of significant weather information essential to the NWS's mission of saving lives and property. This information is exchanged in real-time with the media and emergency response community, who in turn play a key role in communicating the NWS's hazardous weather messages to the public. NWS partners, including local emergency management agencies in

Tennessee and TEMA's Watch Point, use NWS Chat as an efficient means of seeking clarifications and enhancements to the communication stream originating from the NWS during a fast-paced significant weather or hydrologic event.
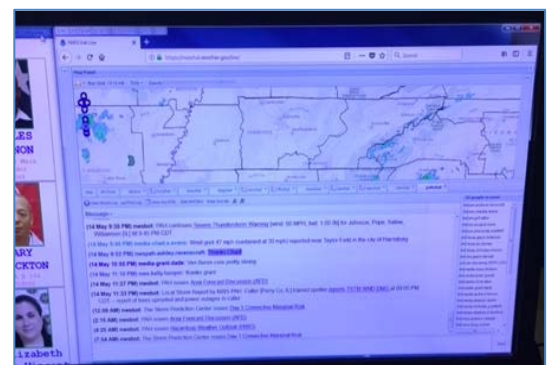
8. **ReadyOp**

ReadyOp is a notification program that TEMA's Watch Point utilizes to distribute mass alert and notifications to select groups of stakeholders. This flexible program allows the Watch Point to send expedited notifications through pre-identified organizational groups or through the establishment of new real-time organizational groups based on the emergency needs at hand. Some of the pre-identified notification groups established by TEMA's Watch Point include TEMA Staff, Local Emergency Management Directors, Mayors, TN Valley Authority (TVA) emergency partners, U.S. Department of Energy (DOE) emergency partners, State Parks, State Rescue Groups, and State Emergency Service Coordinators (ESC) Partners among others. The program allows for the delivery of mass notifications through three primary mediums: mobile texts, emails, and phone calls. TEMA's Watch Point delivers mass notifications to stakeholders, both during exercises and real-world events, using all three of these mediums to ensure messages are received. ReadyOp also provides the ability for stakeholders to acknowledge that they received the notification thus providing receipt confirmation to the TEMA Watch Point.
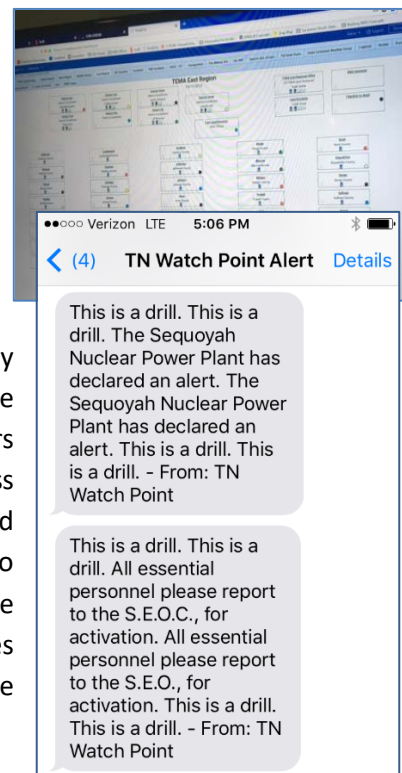
9. **DNAWAS**

Digital National Warning System (DNAWAS) is the title TEMA coined to describe the State's EMnet system. The title was devised to describe the similarities and the differences between the EMnet system and the National Warning System (NAWAS). As for similarities both EMnet and NAWAS provide a dedicated communication line, which is separate from everyday communication networks, for sending mass alerts and notifications to Emergency Operation Centers (EOC) and Public Safety Access Points (PSAPs/911-Dispatch). What makes EMnet different than NAWAS is the "digital" redundancy factor. While NAWAS was built around a now degrading cooper line party phone system from the 1950s, EMnet/"DNAWAS" uses internet protocol with satellite backup capabilities to ensure messages can be communicated to EOCs and PSAPs.
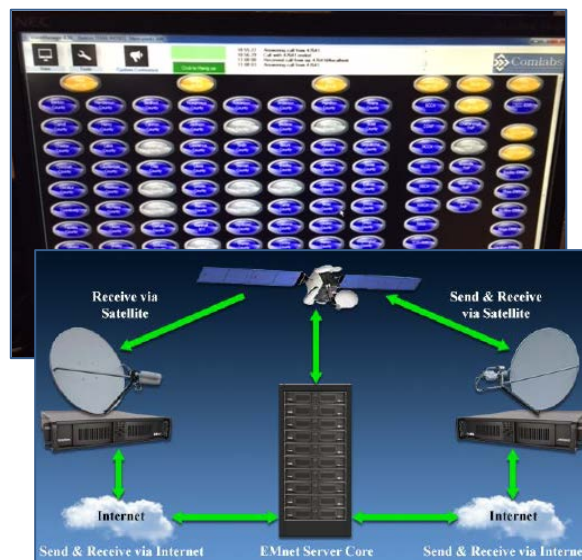
In 2012 TEMA secured a substantial federal grant to allow EOCs, PSAPs, and other primary emergency coordination facilities in Tennessee to have DNAWAS infrastructure installed, including the installation of backup satellite equipment. Through this initiative managed by TEMA, the State of Tennessee now has

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approximately 135 sites with DNAWAS access and automatic satellite backup capabilities if internet protocol goes down. This includes dedicated DNAWAS equipment within the primary Local Government EOC and/or PSAP for every county in Tennessee. **Map 1** provides a spatial overview of all Tennessee DNAWAS site locations.

Map 1: DNAWAS Sites w/ Backup Satellite Capabilities in Tennessee, 2018
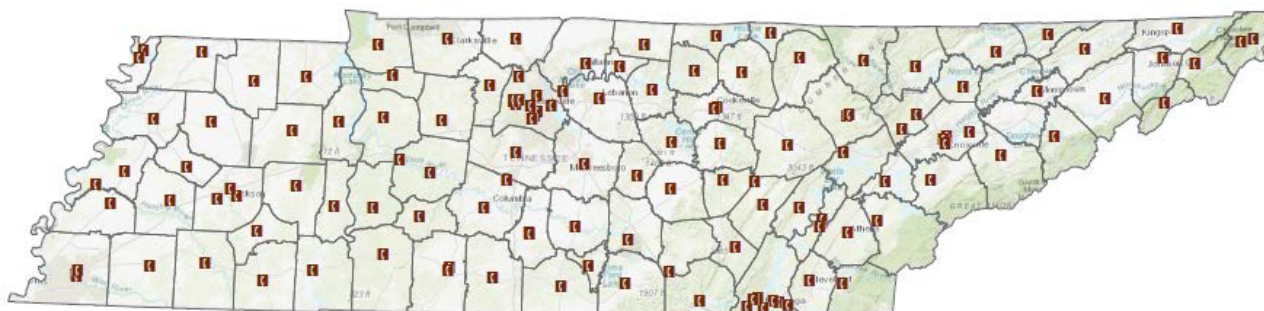
10. TMAC *(800 MHz Analog Conventional)*

The Tennessee Mutual Aid Channel (TMAC) is the State of Tennessee's 800 MHz analog conventional system for Land Mobile Radio (LMR) communications. TMAC is managed by TEMA and establishes the primary radio connection between the State Emergency Operations Center (SEOC) and local, state, federal, & non-governmental entities statewide. TMAC replaced TEMA's former Low Band VHF interoperability system and is monitored 24/7 by TEMA's Watch Point. TMAC consists of 11 different 800 MHz frequency control stations and 66 repeater sites; a single control station is located within each of the 11 state homeland security districts. Each control station, along with its repeaters, provides radio coverage for the counties within that respective homeland security district. **Map 2** provides the locations of TMAC control stations, repeater sites, and homeland security districts.

Map 2: TMAC Control Station, Repeater Sites, and Districts

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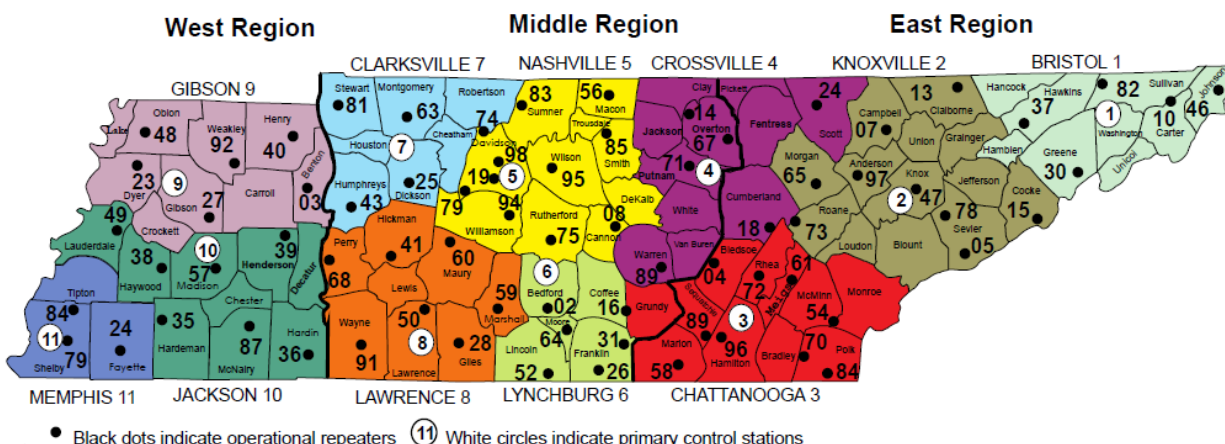
11. **TACN** *(VHF, 700/800 MHz P25 Digital Trunked)*

The Tennessee Advanced Communications Network (TACN) was launched in 2015 as the State of Tennessee's digital trunked network for Land Mobile Radio (LMR) communications. TACN is built to the Association of Public Safety Communications Officials (APCO) P25 standards [phase 2] for public safety interoperability radio communications and runs off a hybrid combination of VHF, 700 MHz, and 800 MHz radio frequency bands. TACN is overseen and managed by the Tennessee Highway Patrol (THP) under the TN Department of Safety & Homeland Security (TDOSHS) and service partners include the TN Department of Correction (TDOC), TN Department of Transportation (TDOT), TN Wildfire Resources Agency (TWRA), TN Emergency Management Agency (TEMA), TN National Guard (TNG), and other state and local government agencies. Tennessee municipalities and public safety entities can be become a member of TACN by paying a service subscription fee and by following the guidelines established in Tennessee Rule 1340-03-08.

TACN is engineered by Motorola Solutions and Buford Goff & Associates; the State of Tennessee has an infrastructure/software maintenance contract with Motorola valid to year 2023. TACN consists of three master server sites that divides the system into three zones: Zone 1 provides coverage for the Eastern Tennessee region and northwest Georgia, is owned by the Tennessee Valley Regional Communications System (TVRCS), and houses its server and Regional Network Operations Center (NOC) in Chattanooga; Zone 2 provides coverage for the Middle Tennessee region, is owned by the TN Department of Correction (TDOC), and houses its server and Regional NOC in Nashville; and Zone 3 provides coverage for the Western Tennessee region, is owned by the Tennessee Highway Patrol (THP) under the TN Department of Safety & Homeland Security (TDOSHS), and houses its server and Regional NOC in Jackson. Additionally a fourth zone was recently added based out of Knoxville. TACN provides public safety partners the ability to communication on mobile radios across the entire state from border to border thus allowing statewide talk groups and a 98% statewide mobile radio reliability. This statewide interoperability network is based upon the use of 125 radio tower repeater sites as seen in **Map 3**.

Map 3: TACN Radio Tower Repeater Sites
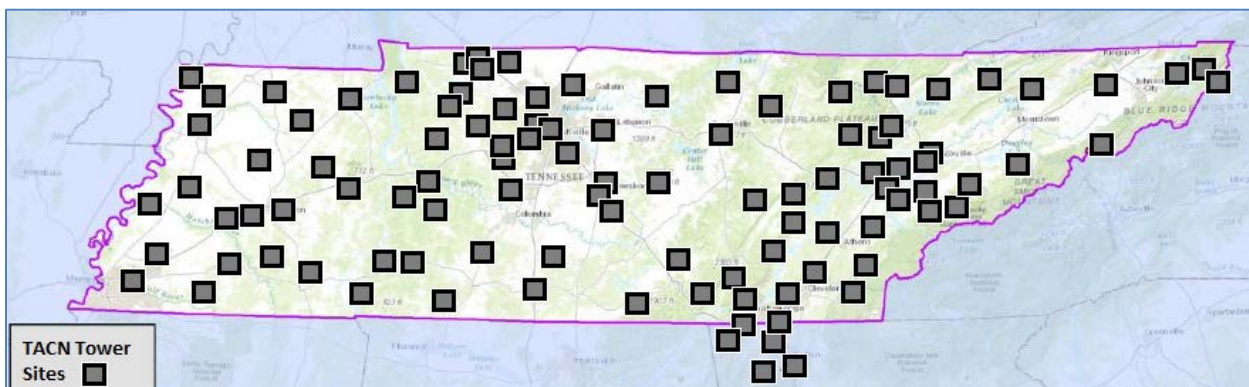
One of the primary differences between the TMAC system and the TACN network for radio communications is that TMAC is an analog conventional radio system, which requires users to manually select the radio channels to be used based on pre-identified assignments, and TACN is a digital trucked

system, which automatically assigns radio channels to a user through computer server technology. One of the main advantages of a digital trucked system like TACN is that users don't have to wait for other users to get off a channel and/or don't have to manually search for an open channel, digital trucked systems take care of the process of finding an open channel automatically for users and typically within millisecond increments.

While TACN's Regional Network Operations Centers (NOCs) have the capability to provide backup services and while Motorola monitors the network remotely, the complexity of a statewide digital trucking network will always be subject to technical and cyber failures. This makes the conventional TMAC system a great alternative backup for public safety mobile radio communications.

12. **TEMA High Band** *(VHF)*

TEMA High Band represents the conventional radios and infrastructure that fall into the Very High Frequency (VHF) range of 30 MHz to 300 MHz. High Band VHF radios have the advantage of traveling farther and providing more coverage than radios with higher frequencies, such as those tailored to UHF and 700/800 MHz channels. This makes High Band VHF radios advantageous in rural wildernesses, mountainous terrain, and in areas with limited radio repeaters to utilize. A single VHF repeater site may provide the same area coverage that would take multiple 800 MHz repeater sites to replicate. A key disadvantage to High Band radios and VHF channels is that they are usually more susceptible to interference and limited/crowded channels than shorter wavelength UHF and 700/800 MHz channels. Additionally VHF frequencies are much less able to penetrate through metal and concrete structures than UHF and 700/800 MHz frequencies.

Within Tennessee there are 9 VHF control sites and 45 VHF repeater sites. TEMA High Band radios are currently setup for internal communications between TEMA employees only but the radios can be provided to requesting local and state partners during emergencies if the need exist. TEMA High Band radios have coverage across the State and are set up for the user to have quick communication access with the State Emergency Operations Center (SEOC) and/or the three Regional Coordination Centers (RCC) of TEMA.

13. **Winlink** *(HF)*

Winlink technology provides the State of Tennessee a radio "email" service. Winlink can provide its users emails with attachments, position reporting, weather bulletins, emergency relief communication, and message relays over radio frequencies even when internet connections are not working. TEMA owns 8 Winlink drop kits; 1 in TEMA East Region Office, 1 in TEMA Middle Region Office, 1 in TEMA West Region Office, 1 in TEMA Command Bus, and 4
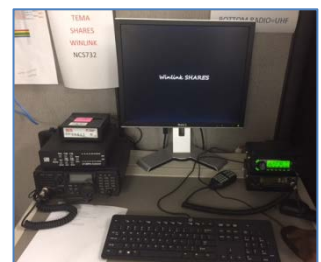
in the TEMA Communications Shop near the State Emergency Operations Center (SEOC) that can be requested by local and state entities during emergencies. Each drop kit includes a radio, Winlink modem, laptop computer, and HF antenna. Winlink is a great backup to standard Internet Protocol and email servers.

14. **HAM Radio** *(primarily UHF)*

HAM radio, also known as amateur radio, is the use of designated radio frequencies as an interest, hobby, and/or mission that doesn't generate monetary compensation or other rewards. While HAM radio can cover a full range of radio frequencies, TEMA and emergency partners across Tennessee typically use Ultra High Frequency (UHF) channels when supporting emergency operations. Within Tennessee there are 23 UHF repeater sites with 13 of them being owned by TEMA. TEMA purchased the 13 UHF repeaters in 2010 in support of a partnership with the Middle Tennessee Amateur Radio Service (MTARS). MTARS is a partner with the State Emergency Operations Center (SEOC) and their volunteers support TEMA's mission by providing HAM radio communication support during emergencies. In addition to volunteer partnerships, TEMA and a few other local & state entities have their own HAM infrastructure to use as backup communications.
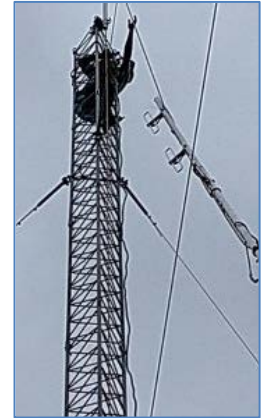
15. **Federal Interoperability Channels**

The Federal Communications Commission (FCC) has set aside a series of radio channels, known as the Federal Interoperability Channels, to be held executively for land mobile radio (LMR) interoperability use during emergencies or disasters. These channels were created to allow local, state, and federal partners the ability to communicate with their federal public safety counterparts during high radio traffic emergency responses and was established to fill a communications gap that was identified during the response to the 9/11 terrorist attack. The State of Tennessee has access to five (5) VHF Federal Interoperability Channels, five (5) UHF channels, five (5) 800 MHz channels, and fifteen (15) 700 MHz channels. The purpose of the Federal Interoperability Channels is to allow the federal government the ability to communicate with stakeholders; meaning state and local governments won't use these channels unless a federal entity is involved. If a federal entity wants to communicate with Tennessee on these channels they will contact *ESF-2: Communications* within the State Emergency Operations Center (SEOC) to assist with the setup.

16. **State Mutual Aid Channels**

In addition to the Federal Interoperability Channels, several land mobile radio (LMR) channels have been set aside to establish interoperability between local and state entities during emergencies or disasters. The State of Tennessee has access to three (3) VHF channels, three (3) UHF channels, and two (2) 800 MHz channels for state mutual aid efforts. The *ESF-2: Communication* Leader makes the determination of when to establish the state mutual aid channels and who is assigned to what channels.

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17. **FNARS**

The FEMA National Radio System (FNARS) is a High Frequency (HF) radio system that provides FEMA a backup platform for communicating with State Emergency Operation Centers (SEOC) and other critical emergency coordination centers. FNARS was initially created in the 1960's and currently over 80 sites across the U.S. have FNARS infrastructure and access. The State of Tennessee's FNARS system and infrastructure in located at the TEMA Middle Region Office in Nashville. FNARS provides a decent last-resort backup system for TEMA to communicate with other State Emergency Operation Centers (SEOC), FEMA Region IV and FEMA Headquarters.

18. **EAS through IPAWS**

The Emergency Alert System (EAS) is a national public warning system that requires TV and radio broadcasters, television systems, satellite broadcasters, and others to allow governmental entities to broadcast public alerts and warnings over radio and television outlets for emergency purposes. EAS became effective in 1997 and is jointly coordinated by FEMA, the Federal Communications Commission (FCC), and the National Oceanic & Atmospheric Administration (NOAA). While EAS was designed to give the President of the United States a mechanism to warn the citizens of this county about emergency conditions, authorized governmental entities (such as the TEMA) are able to disseminate and coordinate emergency warning messages targeted to a specific area through EAS by means of the Integrated Public Alert & Warning System (IPAWS).

The Integrated Public Alert and Warning System (IPAWS) is a network that unifies the United States' public warning systems under a single platform. This includes the integration of the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), National Warning System (NAWAS), and NOAA Weather Radio. The establishment of IPAWS was direct by President George W. Bush through Executive Order 13407 following the public warning issues that came from the government's response to Hurricane Katrina. IPAWS became live in 2010 and is overseen by FEMA.

TEMA is authorized to use IPAWS to send EAS warnings over television and radio outlets to the citizens of Tennessee. TEMA's IPAWS infrastructure is integrated into WebEOC (primary delivery method) and DNAWAS (backup delivery method). The State Emergency Information Director (SEID) is the individual in charge of drafting the warning message and transmitting the message. All messages must be approved by the Director of TEMA who will in turn coordinate with the Governor's Office. If time allows the SEID will also provide advanced awareness to the TN Association of Broadcasters network prior to transmitting the EAS message. EAS messages are tested monthly by all participating EAS stations.

19. **WEA through IPAWS**

The Wireless Emergency Alert (WEA) system is a national public warning system that allows governmental entities to issue emergency alert and warning messages over cellular phones and other mobile devices. WEA was launched in 2012 through a public/private partnership between FEMA, FCC, and the wireless

industry. WEA enables authorized governmental entities the ability to send targeted text-like emergency alerts to specific geographic areas by means of the Integrated Public Alert & Warning System (IPAWS).

TEMA is authorized to use IPAWS to send WEA warnings over cellular phones and other mobile devices to the citizens of Tennessee. TEMA's IPAWS infrastructure is integrated into WebEOC (primary delivery method) and DNAWAS (backup delivery method). The State Emergency Information Director (SEID) is the individual in charge of drafting the WEA warning message and transmitting the message. All messages must be approved by the Director of TEMA who will in turn coordinate with the Governor's Office. If time allows the SEID will also provide advanced awareness to Verizon, AT&T, and other cellular networks prior to transmitting a WEA message. On September 1, 2016 the State of Tennessee was the first state in the nation to test a statewide WEA message.

WEA is one of the most powerful tools for alerting the public during emergencies because 92% of U.S. citizens own a cellular phone that they usually keep nearby. While the successes of WEA are widely noted, so are the failures which are usually caused by human error or negligence. False alarms (such as the mistakenly issued emergency alert warning of a ballistic missile inbound to Hawaii in January 2018) and the potential for hacking attacks (such as the zombie scenario broadcasted in Indiana in February 2017) makes it imperative for warning issuers to have clear procedures, be properly trained, and to have validation/concurrence processes in place prior to releasing a WEA message.

20. **Social Media, Website, & App**

The recent phenomenon of social media is changing how citizens receive news and situation updates. According to the latest statistics, 77% of U.S. citizens have social media accounts that they periodically and/or regularly check. While social media doesn't replace the traditional emergency methods for communicating with the public, it is imperative for emergency management agencies to utilize social media as a viable public communication and warning mechanism. The Tennessee Emergency Management Agency (TEMA) uses 2 primary social media platforms (Facebook & Twitter) and 5 secondary platforms (Tumblr, Pinterest, Flickr, Instagram, & LinkedIn) to communicate with the public. When emergency situation updates are posted by TEMA on social media accounts they are usually linked back to a full report on TEMA's news page (www.tn.gov/tema) or the State of Tennessee' news page (www.tn.gov/news).
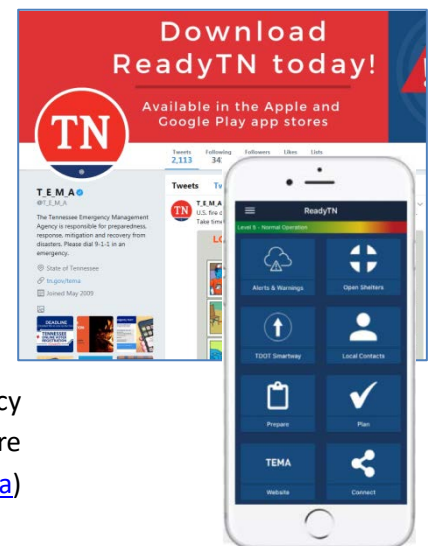
TEMA also hosts the popular free phone app (Ready TN) which provides real time weather and emergency alert messages, maps of open shelters, real time traffic conditions, local emergency management

contacts, information on Tennessee's hazards of prime concern, emergency plan checklists for a variety of scenarios, and connections to TEMA's website and social media accounts.

21. **Press Releases & Media Coordination**

One of the most traditional and dependable avenues for providing emergency warnings to the public is through media outlet coordination. TEMA's External Affairs Office and the State Emergency Information Director (SEID) work closely with media outlets to ensure warnings and situational updates are provided to the public. This is done primarily through the creation of Flash Reports and formal Press Releases which the SEID emails to the following groups for dissemination.

   a. **Major TV Stations email group**
   b. **Daily Newspapers in TN email group**
   c. **Weekly Newspapers in TN email group**
   d. **Broadcast Radio Stations with News Segments email group**
   e. **Broadcast Radio Stations without News Segments email group**
   f. **Capitol Media email group**

Depending on the severity of the emergency, the SEID may also organize press conferences, media interviews, and/or establish a Joint Information Center (JIC) to ensure the public is getting the information they need.
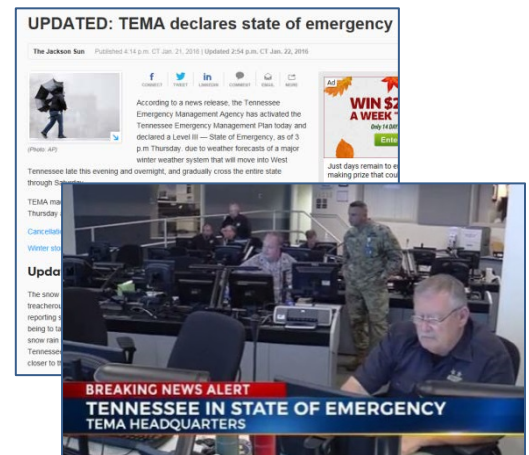
22. **TVA Sirens**

The State of Tennessee is home to two (2) nuclear power plants that are owned and operated by the Tennessee Valley Authority (TVA): Watts Bar and Sequoyah. The State of Tennessee has an agreement with TVA that if a radiological plume release goes offsite then TEMA will coordinate the offsite response and protective action efforts. As part of the preparation for such a scenario, outdoor sirens were installed around both nuclear power plants. Two entities have the ability to sound these sirens: the Risk Counties and TEMA through the State Watch Point. Two dedicated and secure computer consoles are permanently positioned in the State Watch Point to be used for sounding the TVA sirens. The procedures of when to sound the sirens are outlined in the TVA Multi-Jurisdictional Radiological Emergency Response Plan Annexes (MJRERPs). **Map 4** provides the location of the outdoor sirens for the two nuclear plants.

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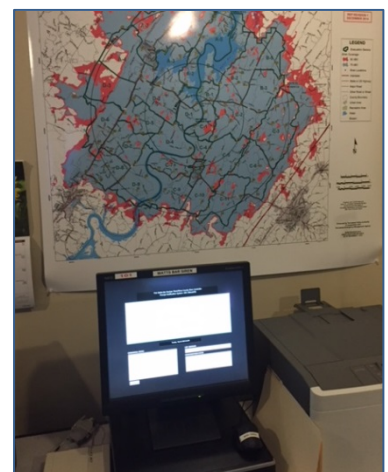
Map 4: Location of TVA Outdoor Sirens
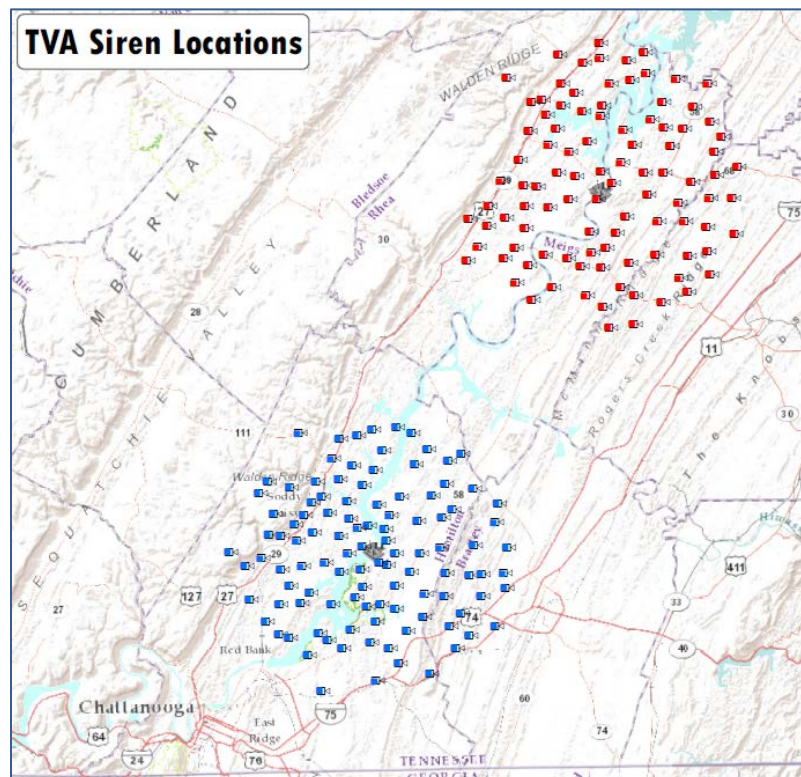
2.3 Primary Coordination Entity of Tennessee Systems

The following entities are designated as the lead coordinators for the three groupings of emergency system capabilities.

A. **Communication Capabilities**

The lead coordination entity for emergency communication support is *ESF-2: Communications* led by the TEMA Communications Section. While every emergency partner is expected to communicate effectively and regularly to develop situational awareness and to coordinate the delivery of emergency support, ESF-2's main task is to ensure the primary communication systems across the state are in working order for emergency partners to utilize. This effort requires ESF-2 to coordinate with wireless phone carriers, radio groups, IT support personnel, and other communication entities to ensure communication infrastructure and services are in working order, being fixed, and/or being temporarily replaced with another effective communication method/system. For more information on ESF-2 and communications please see the Base Plan of the Tennessee Emergency Management Plan (TEMP) and the ESF-2: Communications Annex to the TEMP.

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B. **Mass Stakeholder Alert & Notification Capabilities**

The lead coordination entity for mass stakeholder alert and notification efforts is TEMA's State Watch Point. The State Watch Point acts as the State of Tennessee's 24 hour, 365 day a year alert and notification center for emergency incidents, activities, and events. The Watch Point receives notifications from stakeholders and then distributes alerts/notifications to relevant stakeholders in an effort to initiate operational readiness, situational awareness, and emergency coordination actions. The Watch Point delivers these notifications and alerts using mass notification platforms to included ReadyOp, email groups, and DNAWAS.

The Watch Point is usually the first and primary state government entity that local governments contact when they identify threats, report emergency events, and request state emergency support assistance. The State Watch Point allows local governments in Tennessee to have a one-stop contact to access all state emergency support resources instead of local governments having to make multiple calls to different state government entities. The Watch Point is also the primary coordination center for the low probability event of an off-site radiological plume release from the Tennessee Valley Authority's (TVA) two nuclear power plants in Tennessee and has the capability of sounding sirens within the communities surrounding the power plants if warranted.

In addition the State Watch Point also serves as the lead for detecting and monitoring potential threats or cascading events within Tennessee. Operations Officers within the Watch Point are constantly monitoring traditional news media outlets, social media outlets, weather forecasts, TDOT transportation incident monitors, earthquake monitors, and numerous other informational sources in an effort to detect potential threats early. TEMA makes efforts to continuously educate stakeholders on reporting potential threats or cascading events to the Watch Point. When the Watch Point receives potential threat notifications they take the necessary alert/notification efforts to make sure all key stakeholders are aware.

The State Watch Point is managed and staffed by TEMA Operations Officers 24 hours a day, 365 days a year. For more information on State Watch Point and alert/notification please see the Base Plan of the Tennessee Emergency Management Plan (TEMP).

C. **Mass Public Warning Capabilities**

The lead coordination entity for mass public alert and warning efforts is the State Emergency Information Director (SEID) and TEMA's External Affairs Office. Some of the primary public alert and warning efforts addressed by the SEID and TEMA's External Affairs Office includes:

- Providing emergency information to the public through the development of Flash Reports and/or Press Releases.

- Providing public information updates through social media and traditional media sources, responding to news media inquiries, coordinating news conferences, addressing rumor control

efforts, monitoring social and traditional news media, coordinating intergovernmental affairs, and ensuring that emergency information is being provided to at-risk populations through a variety of tailored formats.

- Establishing, managing, and staffing a Joint Information Center (JIC) when necessary to serve as a focal point for the coordination and dissemination of emergency incident information to the public and media.

- Ensuring Public Information Officers (PIO) are conducting emergency messaging in a coordinated effort within an established Joint Information System (JIS).

- Directing overall coordination of the state warning system by activating Emergency Alert System (EAS) notifications over broadcast networks and Wireless Emergency Alerts (WEA) over mobile devices if necessary and appropriate.

- Coordinating, writing, approving, and transmitting messages to be broadcasted over EAS and WEA.

- Coordinating with broadcasters and/or mobile phone carriers before and after transmitting emergency notifications to provide situational awareness on EAS and WEA messages from TEMA.

For more information on SEID role and public warning please see the Base Plan of the Tennessee Emergency Management Plan (TEMP).

3 – Integrated Public Alert & Warning System

Critical to the TEMA's mission is the dissemination of emergency instructions and information in disasters and emergencies. The primary system TEMA uses for its *Public Alert and Warning* function is the Federal Emergency Management Agency's (FEMA) Integrated Public Alert and Warning System (IPAWS). IPAWS allows TEMA to issue public alerts and warnings through the Emergency Alert System (EAS) via broadcast media (radio and television stations) and through Wireless Emergency Alerts (WEA) direct to mobile devices connected to telecommunications data networks.

3.1 IPAWS Governance

TEMA's use of IPAWS further adheres to protocols contained in the *Tennessee Statewide Emergency Alert System Plan*, Revised January 2013, and in the *Memorandum of Agreement*, signed May 11, 2012, between TEMA and FEMA for the use of IPAWS. FEMA designates TEMA as both a Collaborative Operating Group (COG) and the State reviewer for all IPAWS applicants within the State of Tennessee.

Under the TEMA Director, an IPAWS Governance Committee is established to make recommendations on procedures and use to the Director regarding public alerts and warnings, and on matters regarding IPAWS development and use. The TEMA Director will choose the Committee members from within the following TEMA functions: Communications, Operations, Planning, and Public Information.

TEMA adopts the following principles governing the use of IPAWS to issue public alerts and warnings in the State of Tennessee:

1. IPAWS allows the President of the United States to speak directly to the American people under all emergency circumstances including situations of war, terrorist attack, natural disaster or other matters of national hazards or impacts.

2. IPAWS allows the Governor of the State of Tennessee to speak directly to the Citizens of the State for all-hazard emergency circumstances, as defined in the Tennessee Emergency Management Plan (TEMP), and as necessary to protect the public before, during, and after emergencies.

3. TEMA will adhere to the IPAWS interoperability framework established with the Common Alerting Protocol (CAP).

4. IPAWS integrates with the National Oceanic and Atmospheric Administration (NOAA) for issuing alerts and warnings through national networks.

5. Under NOAA, the National Weather Service has responsibility for transmitting weather watches, statements, and warnings via IPAWS at the local and state levels.

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6. The Tennessee Bureau of Investigation has responsibility for transmitting Amber Alerts or Child Abduction Emergency alerts in the State of Tennessee via IPAWS.

7. TEMA maintains a 24-hour Warning Point for the State of Tennessee and is responsible for issuing emergency communications, watches, warnings, and alerts to warning points at the county jurisdictional level, or on behalf of local jurisdictions when certain criteria are met.

3.2 Approved Users

The TEMA Director determines who may use IPAWS on behalf of the agency to distribute EAS and WEA messages to the public. Only those receiving the TEMA Director's permission may use IPAWS for official agency business.

TEMA's use of IPAWS shall conform to protocols contained or referenced in this guidance, or contained and referenced in policies and procedures applicable to the State of Tennessee, Tennessee Department of Military. TEMA's use of IPAWS further adheres to protocols contained in the *Tennessee Statewide Emergency Alert System Plan*, Revised January 2013, and in the *Memorandum of Agreement*, signed May 11, 2012, between TEMA and FEMA for the use of IPAWS.

The TEMA Director has authorized the following staff to use IPAWS in an official agency capacity:

1. All Operations Officers III in TEMA's 24-hour Watch Point
2. Executive Officer for External Relations
3. Planning Division Representative as Backup User
4. Communication Section Representative as Backup User
5. IT Section Representative for Testing, Software Upkeep, etc.

The TEMA Director delegates the following IPAWS responsibilities to authorized users.

1. TEMA Watch Point Officers

    a) Issue alerts and warnings to the public at the request of the TEMA Director and in coordination with the Executive Officer for External Relations;

    b) Coordinate issuing alerts and warnings at the request of local jurisdictions, following established protocol;

    c) Facilitate issuing special alerts and warnings to the public as necessary with National Weather Service Offices and Tennessee Bureau of Investigation;

    d) Participate in IPAWS after-action reviews;

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    e) Draft copy for alerts and warnings as necessary, and in coordination with the Executive Officer for External Relations;

    f) Conduct IPAWS training for internal TEMA users; and,

    g) Coordinate periodic testing of IPAWS with agency personnel and external contacts.

2. Executive Officer for External Relations:

    a) Issues alerts and warnings to the public at the request of the TEMA Director and in coordination with TEMA's Watch Point Officers;

    b) Develops the IPAWS policies and strategies for TEMA;

    c) Provides oversight for all IPAWS activities for the agency;

    d) Coordinate and manage IPAWS use in the agency;

    e) Serves as IPAWS liaison and subject matter expert;

    f) Reviews IPAWS applications from local jurisdictions requesting access and provides recommendations to the TEMA Director on approvals;

    g) Participates in IPAWS after-action reviews;

    h) Drafts copy for public alerts and warnings;

    i) Conducts IPAWS training for external users; and

    j) Coordinates periodic testing of IPAWS with agency personnel and external contacts.

3. IT Section Representative

    a) Liaison for software and technical updates with TEMA's IPAWS platform vendor;

    b) Ensures TEMA's digital certificate is up-to-date for access to IPAWS;

    c) Serves in a back-up capacity to issue public alerts and warnings at the request of the TEMA Director;

    d) Assists in IPAWS tests and demonstrations; and

    e) Provides technical assistance to the agency on IPAWS troubleshooting.

4. TEMA's Planning and Communication section representatives serve in back-up capacities to issue public alerts and warnings at the request of the TEMA Director.

5. Additional users will be allowed to use IPAWS for official TEMA business at the TEMA Director's discretion.

All authorized TEMA users will receive training on IPAWS and are required to complete FEMA Independent Study Course IS-247, *Integrated Public Alert and Warning System*, online at https://training.fema.gov/is/courseoverview.aspx?code=is-247.a.

3.3 IPAWS Management

FEMA provides TEMA access to IPAWS, via the previously referenced MOA, for the purpose of issuing alerts and warnings to protect the public when conditions, emergencies, disasters, incidents and threats that may impact lives and property.

TEMA uses IPAWS to broadcast EAS messages and WEA messages when immediate public protective actions are required, or there is a need to communicate emergency public information to the public.

Guidelines for EAS activation are contained in the *Tennessee Statewide Emergency Alert System Plan*, revised January 2013, and in accordance with Federal Communications System (FCC) rules governing the appropriate use of EAS. The FCC and FEMA have established WEA guidelines with cellular service providers to allow alerting authorities to send non-subscription, 90-character text messages to cell phones in geo-targeted areas to alert or warn individuals facing an imminent threat.

The TEMA Director, acting either before, during, or after a disaster or emergency can and may issue alerts and warnings to the public at discretion given the provisions in (TCA) 58-2-106 (b) (1) (F). Except for the Governor for the State of Tennessee, or the Governor's designee, TEMA is not obligated to issue public alerts and warnings on behalf of any other entity or individual in the State of Tennessee.

TEMA may transmit EAS and WEA messages to the public using the following Event Codes:

> Administrative Message (ADR)
> Avalanche Watch (AVA)
> Avalanche Warning (AVW)
> Blue Alert (BLU)
> Civil Danger Warning (CDW)
> Civil Emergency Message (CEM)
> Earthquake Warning (EQW)
> Evacuation Immediate (EVI)
> Fire Warning (FRW)
> Hazardous Materials Warning (HMW)
> Law Enforcement Warning (LEW)
> Local Area Emergency (LAE)
> Nuclear Power Plant Warning (NUW)
> Radiological Hazard Warning (RHW)
> Shelter In-Place Warning (SPW)
> 911 Telephone Outage Emergency (TOE)

Required Monthly Test (RMT)
Required Weekly Test (RWT)
Volcano Warning (VOW)

As indicated in the Statewide EAS Plan, the National Weather Service (NWS) has the responsibility for issuing weather watches, statements and warnings through IPAWS. The Tennessee Bureau of Investigation (TBI) has responsibility for issuing Amber Alerts in Tennessee through IPAWS.

3.4 IPAWS Guidelines for Local Jurisdictions

TEMA will approve only one IPAWS alerting entity per county, normally a county's 24-hour warning point, as identified in the county's Basic Emergency Operations Plan (BEOP), in keeping with the TEMP and other TEMA disaster plans and procedures.

TEMA may approve additional IPAWS alerting entities within Tennessee counties who may have a need to alert their populations. These populations may include residents of municipal jurisdictions, university populations, or military facilities.

Public alerts and warnings issued by a county's 24-hour warning point via IPAWS will be limited to events only contained within the county's borders. This limitation also applies to IPAWS alerting entities as defined in the above Jurisdiction Exceptions.

TEMA will issue public alerts and warnings for events which impact two or more counties.

County alerting entities must submit their public alert and warning policies in writing to TEMA. The county's alert and warning policy should specify what agency within the county is authorized to issue an alert, what specific types of alerts the county will issue, what specific events will trigger an alert, and how the county will maintain records of alerts. This requirement also applies to IPAWS alerting entities as defined in the above Jurisdiction Exceptions.

County alerting entities should inform the TEMA 24-hour Watch Point each time they issue a public alerts or warning via IPAWS, regardless of type, event, or location. This requirement also applies to IPAWS alerting entities as defined in the above Jurisdiction Exceptions.

A county issuing a public alert or warning via IPAWS is solely responsible for the content of the alert or warning. The county must ensure the alert or warning information is accurate, timely, and consistent, and uses proper IPAWS formatting, tags, and language. This requirement also applies to IPAWS alerting entities as defined in the above Jurisdiction Exceptions.

3.5 TEMA Review Process for IPAWS Alerting Authority Applications

TEMA establishes the following principles and process for assisting local jurisdictions, either county or municipal, to apply to become authorized IPAWS users with FEMA.

1. The applying local jurisdiction (applicant) must select its own IPAWS-compatible software. FEMA provides free access to IPAWS. However, to send an EAS or WEA alert or warning via IPAWS, an applicant must procure its own software to interface with IPAWS.

2. The applicant will submit a request to FEMA to generate the MOA governing system protocols, responsibilities, and security. The MOA application process is detailed at: https://www.fema.gov/how-sign-ipaws.

3. The applicant will complete the FEMA *Application for IPAWS Public Alerting Authority* (IPAWS application) and submit the application to the TEMA Director for signature. The IPAWS application requires the applicant to define the specific types of alerts they intend to issue and the extent of the geographic warning area. The applicant must submit the IPAWS application to TEMA for review.

4. Along with its IPAWS application, the applicant will provide to TEMA its public alert and warning policies and procedures. TEMA will review the applicant's policies and procedures and suggest changes or updates. Applicants must make any suggested changes or updates, or provide rationale for not accepting the changes, before the TEMA Director will sign the IPAWS application.

5. Once reviewed and approved, the TEMA Director will return the IPAWS application to the applicant for submission to FEMA.

6. FEMA requires applicant to complete its Independent Study Course IS-247*, Integrated Public Alert and Warning System* before granting permission to use IPAWS. The course is free and offered online at https://training.fema.gov/is/courseoverview.aspx?code=is-247.a.

7. After receiving an applicant's IPAWS application with the TEMA Director's signature, FEMA will generate the MOA and return to the applicant's authorized representative for signature. When the applicant signs the MOA and returns to FEMA, FEMA will then issue a digital certificate to the applicant, along with the executed documents. At this point, the applicant is authorized to issue public alerts and warnings via IPAWS.

8. TEMA requests approved IPAWS applications to provide the agency with a copy of the signed FEMA MOA.

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3.6 Public Warnings on Behalf of Local Jurisdictions

It is the responsibility of officials in local jurisdictions, county or municipal, to keep their populations informed of what actions to take to protect themselves in disasters and emergencies. These actions could include: evacuation orders, location of points of distribution (for food, water, medicine, etc.), move to higher ground, shelter in place guidance, etc.

Because local officials have a better understanding of the situation, the proximity of the incident, the immediate actions needed, and potential adverse impacts of the incident, it is incumbent upon local officials to rapidly and effectively communicate emergency public information to the public.

In order to successfully accomplish this task, local jurisdictions should have structures in place to transmit emergency alerts and warnings to the public, taking the following into consideration:

1. Have an alert and warning plan in place that identifies local emergency notification procedures and responsibilities.

2. Designate no fewer than three individuals who will be the local jurisdiction's alerting authorities for issuing emergency alert messages to the public.

3. Have redundant systems in place for issuing alerts and warnings to the public.

4. Conduct training and exercises to practice public alert and warning procedures.

5. Establish relationships with local broadcast entities in the county's jurisdiction to understand their emergency alert system activation procedures and responsibilities.

TEMA may refuse any request from a local jurisdiction to issue a public alert or warning:

1. If the requestor lacks legal authority to make the request;

2. The alert or warning contains incomplete information;

3. The requestor cannot verify the accuracy of the instructions or protective measures contained in the alert;

4. The threat contained in the alert or warning cannot be verified;

5. Communications disruptions will result in the alert or warning not reaching the intended recipients; or,

6. Issuing the alert would further endanger the public.

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TEMA and the local jurisdiction will observe the following criteria when a local jurisdiction requests TEMA to transmit a public alert and warning message through IPAWS, whether the message is an EAS message or a WEA message, on the jurisdiction's behalf:

1. TEMA will issue public alerts and warnings at the county boundary level only.

2. TEMA will not transmit public alerts or warnings to any defined geographic boundaries within a county's borders, this includes municipal jurisdictions.

3. If a municipal jurisdiction within a county's borders requires a public alert and warning to be issued to its population, the municipal jurisdiction's officials should work with officials at the county level, namely the county emergency management agency, for the transmission of any public alert or and warning.

4. Either a county mayor or the county mayor's designee, preferably the director of the county emergency management agency, must request TEMA transmit a public alert or warning via IPAWS to the county's population.

5. TEMA will transmit the requested public alert and warning on the county's behalf under one of the following EAS and WEA Event Codes only:

> Avalanche Watch (AVA)
> Avalanche Warning (AVW)
> Civil Danger Warning (CDW)
> Civil Emergency Message (CEM)
> Earthquake Warning (EQW)
> Evacuation Immediate (EVI)
> Fire Warning (FRW)
> Hazardous Materials Warning (HMW)
> Local Area Emergency (LAE)
> Nuclear Power Plant Warning (NUW)
> Radiological Hazard Warning (RHW)
> Shelter In-Place Warning (SPW)
> 911 Telephone Outage Emergency (TOE)
> Volcano Warning (VOW)

6. A designated official of the requesting county jurisdiction is responsible for drafting the exact alert and warning message to be transmitted and must provide an electronic version, either in email or text message, of the message to be transmitted to TEMA.

7. TEMA will accept a faxed copy of the requested message to be transmitted. However, if the message does not meet technical criteria (e.g., formatting and space requirements) or TEMA personnel cannot decipher a portion of the message, TEMA will re-write the message and send back an electronic draft of the message to the requesting official for approval.

8. A designated county official with authorized access to TEMA's instance of WebEOC may draft and submit the message to be transmitted for review in WebEOC's Press Release/EAS message board. However, the designated official must provide written authorization electronically, in either an email or a text message, to TEMA to transmit the message.

9. TEMA may draft the public alert or warning for a designated county official requesting transmission of an EAS or WEA message. The requesting officials MUST be able to receive an electronic version of the drafted message and MUST return approval of the message to TEMA electronically.

10. TEMA as a practice, does not accept verbal approvals to transmit either EAS or WEA messages. The approval to transmit must be in written format and communicated from the requesting county official electronically. An exception may be granted by the Director of TEMA if emergency or disaster conditions on the ground impact the availability of communications and technology.

4 – Communications & Warning Assessments

To ensure the State of Tennessee is utilizing communication & warning systems that are deemed interoperable, statewide accessible, and usable during difficult emergency conditions, to is imperative that periodic system assessments are conducted to validate assumptions and to identify gaps needing to be corrected. Section 3 of this plan annex profiles the results of five (5) communication & warning system assessments conducted in 2018:

1) **Hazard Assessment**
2) **Infrastructure Assessment**
3) **Plan Requirements and Operational Environment Assessment**
4) **Partner Interoperability Assessment**
5) **Vulnerable Populations Assessment**

The accumulation of results for these five assessments is what determines the order of principal and secondary communication, alert & notification, and public warning systems outlined in Section 4.

4.1 Hazard Assessment

Numerous hazard and threat events have the potential to impact communication and warning capabilities within the State of Tennessee. To identify the greatest risks to each system, the plan's steering committees reviewed the State's Hazards of Prime Concern List as outlined in the State of Tennessee Hazard Mitigation Plan. The Hazards of Prime Concern List profiles thirteen (13) principal hazards that have or could cause severe impacts within Tennessee: 1. Drought, 2. Earthquake, 3. Extreme Temperature, 4. Wildfire, 5. Flood, 6. Geologic, 7. Severe Weather, 8. Tornado, 9. Communicable Disease, 10. Dam/Levee Failure, 11. Hazardous Material, 12. Terrorism, and 13. Infrastructure Incident. This listing encompasses threats across all primary classification groupings: natural hazards, technological/accidental hazards, and human-caused hazards. The State of Tennessee Hazard Mitigation Plan documents a detailed statewide risk and vulnerability assessment for each of these hazards which includes geographical areas of hazard risk, threat probabilities, plausible vulnerabilities to people and properties, stakeholder risk perceptions, and possible hazard impact estimates. The State of Tennessee Communications & Warning Plan, its standard operating guidelines/procedural elements, and the systems themselves have been designed for all potential hazards with focus on the thirteen (13) Hazards of Prime Concern.

To recognize risks to each system, the plan's steering committee identified the three (3) greatest hazard/threats that may impact the usability of each system based on the Hazards of Prime Concern List. **Table 2** provides a summary of the committee's findings for each of the twenty-two systems.

Table 2: Systems Hazard Assessment

Category	Systems	Greatest Identified Hazards/Threats to Systems		
Phone Functions	1. Landline Phones	**Earthquake** (phone infrastructure damages)	**Flood** (power supply disruptions to phone infrastructure)	**Tornado** (phone infrastructure damages)
	2. Cell Phones	**Terrorism** (cyber attack)	**Tornado** (significant cell tower damages)	**Earthquake** (microwave dishes out of alignment)
	3. Satellite Phones	**Severe Weather** (cloud cover impacts satellite)	**Terrorism** (cyber attack)	**Extreme Temperature** (heat = short radio waves)
	4. Fax Machines	**Earthquake** (phone infrastructure damages)	**Flood** (hampers power supply to phone infrastructure)	**Tornado** (widespread phone infrastructure damages)
Data Functions	5. Email	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
	6. WebEOC	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
	7. NWS Chat	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
	8. ReadyOp	**Terrorism** (cyber attack)	**Tornado** (significant cell tower damages)	**Earthquake** (microwave dishes out of alignment)
	9. DNAWAS	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
Radio Functions	10. TMAC *(800 MHz Conventional)*	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	11. TACN *(p25 Digital)*	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	12. TEMA High Band *(VHF)*	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	13. Winlink *(HF)*	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	14. HAM Radio *(primarily UHF)*	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	15. Federal InterOp Channels	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	16. State Mutual Aid Channels	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
	17. FNARS	**Earthquake** (radio tower damages)	**Tornado** (significant radio tower damages)	**Severe Weather** (reduces radio freq. distance)
Mass Public Warning Functions	18. EAS through IPAWS	**Earthquake** (significant infrastructure damages)	**Tornado** (significant infrastructure damages)	**Terrorism** (cyber attack)
	19. WEA through IPAWS	**Terrorism** (cyber attack)	**Tornado** (significant cell tower damages)	**Earthquake** (microwave dishes out of alignment)
	20. Social Media, Website, App	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
	21. Media Coordination	**Terrorism** (cyber attack)	**Earthquake** (data infrastructure damages)	**Severe Weather** (power disruptions, infra impact)
	22. TVA Sirens	**Severe Weather** (ice in siren impacts sound)	**Tornado** (significant siren damages)	**Earthquake** (siren damages)

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4.2 Infrastructure Assessment

As identified during the hazard assessment process, the type of communication infrastructure the system runs off of largely determines what hazards the system will be most susceptible to. In recognizing this trend it is important to do an infrastructure assessment and compare the results to the hazard assessment. **Table 3** provides the results of the infrastructure assessment to the twenty-two (22) systems. This basic infrastructure assessment generalized each system around four infrastructure categories: Line/Fiber, Cellular, Radio, and Satellite.

Table 3: Systems Infrastructure Assessment

Functional Category	Systems	Line / Fiber	Cellular	Radio	Satellite
Phone Functions	**1.** Landline Phones	✔	✔		
	2. Cell Phones		✔		
	3. Satellite Phones				✔
	4. Fax Machines	✔	✔		
Data Functions	**5.** Email	✔	✔		
	6. WebEOC	✔	✔		
	7. NWS Chat	✔	✔		
	8. ReadyOp	✔	✔		
	9. DNAWAS	✔	✔		✔
Radio Functions	**10.** TMAC *(800 MHz Conventional)*			✔	
	11. TACN *(VHF,700/800 MHz p25 Digital)*			✔	
	12. TEMA High Band *(VHF)*			✔	
	13. Winlink *(HF)*			✔	
	14. HAM Radio *(primarily UHF)*			✔	
	15. Federal Interoperability Channels			✔	
	16. State Mutual Aid Channels			✔	
	17. FNARS			✔	
Mass Public Warning Functions	**18.** EAS through IPAWS	✔	✔	✔	✔
	19. WEA through IPAWS	✔	✔		✔
	20. Social Media, Website, & App	✔	✔		
	21. Press Releases & Media Coordination	✔	✔	✔	✔
	22. TVA Sirens	✔	✔		

In reviewing the Hazard Assessment and the Infrastructure Assessment, the line/fiber and cellular categories, which are the State of Tennessee's primary forms of communication, are most susceptible to earthquake,

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terrorism (cyber-attacks), severe weather, tornado, and flood impacts. While on the other hand, the radio category of infrastructure seems to be less prone to terrorism (cyber-attacks) & flood impacts and the satellite category seems to be less prone to earthquake and flood impacts. In recognizing where these strengths lie in the radio and satellite infrastructure categories it is essential for the State of Tennessee to ensure that all communication, alert/notification, and warning methods include backup systems with radio and satellite infrastructure in the principle and secondary orders profiled in Section 4 of this plan annex.

4.3 Plan Requirements and Operational Environment Assessment

As identified in Section 4.4 of the Tennessee Emergency Management Plan's (TEMP) Base Plan, there are numerous coordination centers that emergency management operations are conducted from. The primary coordination centers for the State of Tennessee are the State Emergency Operations Center (SEOC), the West Regional Coordination Center (RCC) *[which also serves as the Alternate SEOC]*, the Middle RCC, the East RCC, and the Joint Information Center (JIC). All of these key coordination centers were deliberately designed to provide access to the primary communication and warning systems. This was done to ensure each coordination center can implement all operational components described in the TEMP, the State of Tennessee Recovery Plan, and all other supplemental plan annexes and standard operating procedures/guidelines.

Table 4 outlined the operational environments where each of the twenty-two systems can be utilized. While not all systems are accessible during field operations, table 4 demonstrates that field personnel statewide should have access to all primary systems and numerous redundancy backups. Section 2.2 of this plan annex provides additional information regarding which systems work best under various field conditions.

Table 4: Plan Requirements & Operational Environment Assessment

Functional Category	Systems	SEOC	West RCC (Alt SEOC)	Middle RCC	East RCC	JIC	Other Coordination Sites	Field Operations (statewide)
Phone Functions	**1.** Landline Phones	✓	✓	✓	✓	✓	✓	
	2. Cell Phones	✓	✓	✓	✓	✓	✓	✓
	3. Satellite Phones	✓	✓	✓	✓	✓	✓	✓
	4. Fax Machines	✓	✓	✓	✓	✓	✓	
Data Functions	**5.** Email	✓	✓	✓	✓	✓	✓	✓
	6. WebEOC	✓	✓	✓	✓	✓	✓	✓
	7. NWS Chat	✓	✓	✓	✓	✓	✓	✓
	8. ReadyOp	✓	✓	✓	✓	✓	✓	✓
	9. DNAWAS	✓	✓	✓	✓			

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Functional Category	Systems	SEOC	West RCC (Alt SEOC)	Middle RCC	East RCC	JIC	Other Coordination Sites	Field Operations (statewide)
Radio Functions	**10.** TMAC *(800 MHz Conventional)*	✓	✓	✓	✓	✓	✓	✓
	11. TACN *(p25 Digital)*	✓	✓	✓	✓	✓	✓	✓
	12. TEMA High Band *(VHF)*	✓	✓	✓	✓	✓	✓	✓
	13. Winlink *(HF)*	✓	✓	✓	✓	✓	✓	✓
	14. HAM Radio *(primarily UHF)*	✓	✓	✓	✓			
	15. Federal Interoperability Channels	✓	✓	✓	✓	✓	✓	✓
	16. State Mutual Aid Channels	✓	✓	✓	✓	✓	✓	✓
	17. FNARS			✓				
Mass Public Warning Functions	**18.** EAS through IPAWS	✓	✓	✓	✓	✓	✓	
	19. WEA through IPAWS	✓	✓	✓	✓	✓	✓	
	20. Social Media, Website, & App	✓	✓	✓	✓	✓	✓	✓
	21. Press Releases & Media Coordination	✓	✓	✓	✓	✓	✓	✓
	22. TVA Sirens	✓						

4.4 Partner Interoperability Assessment

Interoperability is the key ingredient needed for successful emergency management communications and operations. Interoperability is the ability to communicate with all internal and external stakeholders through a variety of platforms before, during, and after emergencies. To ensure the State of Tennessee has interoperable communications with higher (federal partners), lower (local partners), and lateral (state partners) stakeholders/emergency personnel, TEMA periodically conducts a partner interoperability assessment.

Table 5 provides the results of the 2018 partner interoperability assessment for communication capabilities and mass alert/notification capabilities. Mass public warning capabilities are not a part of interoperability assessments which focus on communications between emergency partners to emergency partners, therefore system numbers 18, 19, 21, and 22 are not profiled in this assessment.

The partner interoperability assessment is divided in three categories which document how well TEMA can communicate with and alert/notify **1)** local partners/responders through their county emergency management agencies, **2)** state partners/responders through the Emergency Services Coordinators (ESC) for each state department and agency (as well as through volunteer organization coordinators and all internal TEMA employees), and **3)** federal partners through FEMA Region IV's Warning Point and Liaison Officer(s). In cases where all partners in a category can be communicated with and alerted/notified through a specific system, then

the designation of "Full Capability" is profiled in that box. In cases where some partners but not all partners in a category can be communicated with and alerted/notified through a specific system, then the designation of "Limited Capability" is profiled. In cases where no partners in a category can be communicated with and alerted/notified through a specific system, then the designation of "No Capability" is profiled.

Table 5: Partner Interoperability Assessment

Functional Category	Systems	Local Partners	State Partners	Federal Partners
Phone Functions	**1.** Landline Phones	Limited Capability	Limited Capability	Full Capability
	2. Cell Phones	**Full Capability**	**Full Capability**	**Full Capability**
	3. Satellite Phones	Limited Capability (but can receive sat calls on cells)	Limited Capability (but can receive sat calls on cells)	Full Capability
	4. Fax Machines	Limited Capability	Limited Capability	Full Capability
Data Functions	**5.** Email	**Full Capability**	**Full Capability**	**Full Capability**
	6. WebEOC	**Full Capability**	**Full Capability**	**Full Capability** (linked to FEMA LNO)
	7. NWS Chat	Limited Capability	Limited Capability	Limited Capability
	8. ReadyOp	**Full Capability**	**Full Capability**	**No Capability** (not linked w/ FEMA)
	9. DNAWAS	**Full Capability**	Limited Capability	Limited Capability
Radio Functions	**10.** TMAC *(800 MHz Conventional)*	Limited Capability	Limited Capability	Limited Capability (only when within TN borders)
	11. TACN *(p25 Digital)*	Limited Capability	Limited Capability	Full Capability
	12. TEMA High Band *(VHF)*	**No Capability** (internal to TEMA only)	**No Capability** (internal to TEMA only)	**No Capability** (internal to TEMA only)
	13. Winlink *(HF)*	Limited Capability	Limited Capability	Full Capability
	14. HAM Radio *(primarily UHF)*	Limited Capability	Limited Capability	Full Capability
	15. Federal Interoperability Channels	Limited Capability	Limited Capability	Limited Capability
	16. State Mutual Aid Channels	Limited Capability	Limited Capability	Limited Capability
	17. FNARS	**No Capability** (only for TEMA/FEMA communication)	**No Capability** (only for TEMA/FEMA communication)	Full Capability
	20. Social Media, Website, & App	Limited Capability	**Full Capability**	**Full Capability**

4.5 Vulnerable Populations Warning Assessment

Whereas the Partner Interoperability Assessment provides an overview of which communication and alert/notification systems can be used between partners, a Vulnerable Populations Warning Assessment provides an overview of which mass public warning systems can deliver warnings and/or alerts to persons in areas of known threat concern and how susceptible those systems are to impacts during the actual threat event.

Utilizing the Hazards of Prime Concern List and the risk assessment studies within the State of Tennessee Hazard Mitigation Plan, six (6) primary hazard zones have been identified where the potential issuance of mass warnings may be critical to saving lives.

Table 6 profiles the identified hazards and threat zones against the State of Tennessee's five (5) primary mass warning systems. Boxes titled "higher" are those warning systems that have a greater probability of being impacted and not delivering the alert or warning to the vulnerable population during a threat event. Boxes titled "lower" have a lesser chance of being impacted but impacts are still possible. As seen in Table 6, damage estimate studies expect severe impacts to all communication and warning systems during a large-scale New Madrid earthquake event.

Table 6: Vulnerable Populations Warning Assessment

Selected Hazards of Prime Concern	Threat Zones with Vulnerable Populations	18. EAS	19. WEA	20. Social Media, Website, App	21. Media Coordination	22. TVA Sirens
Earthquake	Primarily Western TN around the New Madrid Seismic Zone	Higher	Higher	Higher	Higher	
Wildfire	Primarily Eastern TN around wildland/urban interfaces	Higher	Higher	Lower	Lower	
Flood	Statewide around floodplains and areas susceptible to flooding	Lower	Lower	Lower	Lower	
Dam/Levee Failure	Statewide downstream of dams/levees	Lower	Lower	Lower	Lower	
HazMat- TVA	Risk Counties to the two TVA nuclear power plants	Lower	Lower	Lower	Lower	Lower
HazMat -DOE	Risk Counties to the DOE Oak Ridge Reservation	Lower	Lower	Lower	Lower	**

** While the State of Tennessee doesn't have direct access & control of the DOE Oak Ridge Reservation Sirens, TEMA can request DOE to sound them

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5 – Communications & Warning System Order

Through the completion of the five (5) communications & warning system assessments profiled in Section 3, the State of Tennessee is able to create an effective order of principle and secondary systems to be used before, during, and after emergencies. This ordering is based upon utilizing the systems that had the greatest strengths and the greatest redundancy/backup capabilities across all 5 assessments.

"Principle" systems are the top 3 systems that the State of Tennessee uses to communicate, alert/notify, and warn. As identified in the Partner Interoperability Assessment (Section 3.4), not all local partners, state partners, or federal partners have access to the same systems, so it is imperative that all system orders highlight this factor.

"Secondary" systems are the redundancy/backup systems in case principle systems fail. Based on the Hazard Assessment (Section 3.1) and the Infrastructure Assessment (Section 3.2), it is essential that identified secondary (or principle) systems have a satellite infrastructure option and a radio infrastructure option, in case line/fiber or cellular infrastructure fails.

Unlike the principle systems, not all partners have access to secondary systems. If an emergency event requires the use of secondary systems, (radios and/or satellite phones), partners may request the resource through the State Emergency Operations Center's (SEOC) Mission Coordination Center (MCC) or State Watch Point. The request will be assigned a MCC number in WebEOC and will be sent to *ESF-2: Communications* to coordinate. ESF-2 has the ability to obtain communication equipment from TEMA, TN Department of Safety, TN National Guard, and other partners. If the emergency event requires an extraordinary level of radio and/or satellite phone needs, the request may be submitted to the Procurement Unit under the SEOC Logistics Branch to make emergency purchases.

The following provides an overview of principle and secondary systems for communications, stakeholder alert & warnings, and public alert & warnings.

5.1 Principle & Secondary Order for Communication Systems

Table 7 outlines the principle and secondary systems that all internal and external emergency partners are to utilize before, during, and after emergency events. As assumed, cell phone and email are the primary methods for communicating with all emergency partners and should be used as the primary method until cell phone or email systems fail.

If cell phone and/or email systems fail, either ESF-2, TEMA Support Services, or Strategic Technology Solutions (STS) will contact the State Watch Point through an alternative means to notify them of the failure. The State Watch Point will then notify relevant emergency partners about the system failure through an alternative means as outlined in Section 4.2 (Table 8). In the notification the State Watch Point will tell all relevant emergency

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partners what form of communication system to utilize, per the options identified in Table 7, until the situation is resolved. ESF-2, TEMA Support Services, or Strategic Technology Solutions (STS) will work with staff and/or vendors until the communication system failure is resolved. Once the system is back up and running, the State Watch Point will then notify all relevant emergency partners that normal communication systems have been restored.

Table 7: Principle & Secondary Order for Communication Systems

Systems	Local Partners	State Partners	Federal Partners
Cell Phones	Principle *(1)*	Principle *(1)*	Principle *(1)*
Email	Principle *(2)*	Principle *(2)*	Principle *(2)*
DNAWAS	Principle *(3)*	Principle *(3)*	n/a
FNARS	n/a	n/a	Principle *(3)*
TMAC (800 MHz Conventional)	Secondary *(4)*	Secondary *(4)*	Secondary *(5)*
TACN (p25 Digital)	Secondary *(5)*	Secondary *(5)*	Secondary *(6)*
Satellite Phones	Secondary *(6)*	Secondary *(6)*	Secondary *(4)*

5.2 Principle & Secondary Order for Stakeholder Alert/Notification Systems

Table 8 outlines the principle and secondary systems that the State Watch Point utilizes to initiate, receive, and relay mass alerts and notifications to key decision makers and emergency personnel before, during, and after emergency events. The primary notification systems the State Watch Point utilizes is ReadyOp (for local & state partners) and email groups. The State Watch Point is to use these as the primary methods for notifications until ReadyOp or email systems fail.

If the ReadyOp and/or email systems fail, the State Watch Point will send alert and notifications through an alternative means as outlined in Table 8. If the State Watch Point has to use a secondary system that doesn't have the capability to reach as many individuals at once, then the Watch Point will create a notification tree on paper and will assign specific Operations Officers to deliver notifications to specific individuals and/or groups as identified by the Watch Point Administrator.

The State Watch Point will inform ESF-2, TEMA Support Services, and/or Strategic Technology Solutions (STS) of the notification system failure as soon as possible. ESF-2, TEMA Support Services, and/or STS will coordinate with staff and/or vendors until normal notification systems have been restored.

Table 8: Principle & Secondary Order for Stakeholder Alert/Notification Systems

Systems	Local Partners	State Partners	Federal Partners
ReadyOp	Principle *(1)*	Principle *(1)*	n/a
Email	Principle *(2)*	Principle *(2)*	Principle *(1)*
DNAWAS	Principle *(3)*	n/a	n/a
WebEOC	n/a	Principle *(3)*	n/a
Cell Phone (Notification Tree)	Secondary *(4)*	Secondary *(4)*	Principle *(2)*
FNARS	n/a	n/a	Principle *(3)*
TMAC (800 MHz Conventional)	Secondary *(5)*	Secondary *(5)*	Secondary *(5)*
TACN (p25 Digital)	Secondary *(6)*	Secondary *(6)*	Secondary *(6)*
Satellite Phones	n/a	Secondary *(7)*	Secondary *(4)*

5.3 Groupings for Public Warning Systems

For both communication processes and partner alert/notification processes it is important for stakeholders to know what specific system(s) to utilize and which ones not to, but when it comes to public warning the general notation is the more methods to alert/warn the public the better. Because of this the principle systems of **Table 9** are organized into two groups: *Group A-* Emergency Alert System (EAS) & Wireless Emergency Alert (WEA), and *Group B-* Social Media, Website, App, and Press Releases, Media Coordination. During severe emergency events the State of Tennessee will want to utilize both groups for public warning at the same time, but one group can serve as an alternative backup for the other if systems are experiencing difficulties.

Table 9 outlines the systems that the State Emergency Information Director (SEID) and TEMA External Affairs Office utilizes to disseminate emergency alerts and warnings to the public. The SEID is the State of Tennessee's lead for these systems with the exception of TVA Outdoor Sirens, which is led by the State Watch Point. The SEID works with the Director of TEMA to determine when to send public alerts/warnings and what should be stated in the alert/warning message. All messages are to be approved by the TEMA Director prior to dissemination.

Table 9: Groupings for Public Warning Systems

Systems	Ordering
EAS through IPAWS	Principle *(Group A)*
WEA through IPAWS	Principle *(Group A)*
Social Media, Website, App	Principle *(Group B)*
Press Releases & Media Coordination	Principle *(Group B)*
TVA Outdoor Sirens	TVA Emergency Only

If for some reason the SEID is not able to disseminate an IPAWS warning *(Group A: EAS & WEA)* due to technical difficulties, the SEID will contact other established IPAWS partners to release the warning on behalf of the State

of Tennessee. The partner redundancy/backup order for IPAWS issuance in Tennessee is: **1)** National Weather Service (NWS) Nashville, Memphis, &/or Morristown Offices; **2)** primary EAS stations to issue the warning directly, and **3)** FEMA's IPAWS Division. If cellular towers and broadcast centers are down *Group B* systems can be considered a redundant alternative to *Group A*, and if email servers are down *Group A* systems can be considered a redundant alternative to *Group B*. To fix technically difficulties for *Group A* systems the SEID will contact FEMA's IPAWS Division staff and to fix technically difficulties with *Group B* systems the SEID will contact Strategic Technology Solutions (STS).

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6 – Communications & Warning System Testing

6.1 System Testing Schedule

The regular testing of communication, alert/notification, and warning systems is critical to ensuring the State of Tennessee is able to communicate during times of emergencies and disasters. To maintain this capability a testing schedule has been established in **Table 10**.

Table 10: System Testing Schedule

Functional Category	Systems	Type of Testing	Testing Schedule	Testing Conducted By
Phone Functions	**1.** Landline Phones	Indirect	Weekly	All TEMA Divisions
	2. Cell Phones	Indirect	Weekly	All TEMA Divisions
	3. Satellite Phones	Direct	Quarterly	Satellite Outfitters
	4. Fax Machines	Indirect	Weekly	All TEMA Divisions
Data Functions	**5.** Email	Indirect	Weekly	All TEMA Divisions
	6. WebEOC	Indirect	Weekly	State Watch Point
	7. NWS Chat	Indirect	Weekly	State Watch Point
	8. ReadyOp	Direct	Monthly	State Watch Point
	9. DNAWAS	Direct	Monthly	State Watch Point
Radio Functions	**10.** TMAC *(800 MHz Conventional)*	Indirect	Weekly	ESF-2 (TEMA Comms)
	11. TACN *(p25 Digital)*	Indirect	Weekly	ESF-2 / Safety / Motorola
	12. TEMA High Band *(VHF)*	Indirect	Weekly	ESF-2 (TEMA Comms)
	13. Winlink *(HF)*	Direct	Monthly	ESF-2 (TEMA Comms)
	14. HAM Radio *(primarily UHF)*	Direct	Monthly	ESF-2 (TEMA Comms)
	15. Federal Interoperability Channels	Direct	Monthly	ESF-2 (TEMA Comms)
	16. State Mutual Aid Channels	Direct	Monthly	ESF-2 (TEMA Comms)
	17. FNARS	Direct	Monthly	EF-2 (TEMA Comms)
Mass Public Warning Functions	**18.** EAS through IPAWS	Direct	Monthly	Participating EAS Stations
	19. WEA through IPAWS	Direct	3 Years	SEID & TEMA External Affairs
	20. Social Media, Website, App	Indirect	Weekly	SEID & TEMA External Affairs
	21. Press Releases & Media Coordination	Indirect	Monthly	SEID & TEMA External Affairs
	22. TVA Sirens	Direct	Monthly	State Watch Point

Table 10 is organized into three (3) main categories: type of testing, testing schedule, and testing conducted by. The type of testing category profiles two (2) testing types: indirect and direct. Indirect testing is defined as the systems that don't require a formal testing due to their regular day-to-day use needed to complete business objectives. Systems titled "indirect" are typically utilized daily by TEMA and the State of Tennessee partners so

issues with these systems are reported and fixed immediately in an effort to continue business functions. Direct testing is defined as the systems that require a formal testing process due to not being utilized as a regular day-to-day business communication method.

The second category in Table 10 establishes the testing schedule as weekly, monthly, quarterly, or every 3 years. This testing schedule sets the minimum timeframe for how often a system test should occur. While most of these systems are tested more regularly than their established schedules, the testing schedule provides easy to remember benchmarks. The third category in Table 10 establishes who is to test the systems.

6.2 System Testing Results

As systems are tested their results should be noted for future reference. The tracking of test results is important for maintaining workable redundant/backup orders for systems and for budgeting communication prioritizes. **Table 11** provides a compilation overview of system testing results between September 2016 and September 2018. The majority of overall test results in Tennessee are considered "successful." *Successful* is defined as system tests that proved workable and/or systems tests where an issue identified in one testing is completely fixed by the second testing per the test schedule in Table 10. Within this two year period the only *unsuccessful* series of testing was the FNARS radio system which was damaged by a lighting strike in 2017 and required FEMA to secure funding to fix the system. Currently the FNARS radio system is fully operational.

Table 11: Compilation of System Test Results, 2016-2018

Functional Category	Systems	Compilation of Overall Test Results over Last 2 Years
Phone Functions	**1.** Landline Phones	Successful
	2. Cell Phones	Successful
	3. Satellite Phones	Successful
	4. Fax Machines	Successful
Data Functions	**5.** Email	Successful
	6. WebEOC	Successful
	7. NWS Chat	Successful
	8. ReadyOp	Successful
	9. DNAWAS	Successful
Radio Functions	**10.** TMAC *(800 MHz Conventional)*	Successful
	11. TACN *(p25 Digital)*	Successful
	12. TEMA High Band *(VHF)*	Successful
	13. Winlink *(HF)*	Successful
	14. HAM Radio *(primarily UHF)*	Successful
	15. Federal Interoperability Channels	Successful
	16. State Mutual Aid Channels	Successful

	17. FNARS	System was down due to lighting strike in July 2017; System was replaced and fixed in 2018
Mass Public Warning Functions	**18.** EAS through IPAWS	Successful
	19. WEA through IPAWS	Successful
	20. Social Media, Website, App	Successful
	21. Press Releases & Media Coordination	Successful
	22. TVA Sirens	Successful

When issues are identified during system usage and testing, the following entities should be alerted based on the functional categories identified on Table 11:

- Phone Functions- TEMA Support Services Division

- Data Functions- Strategic Technology Solutions (STS)

- Radio Functions- TEMA Communications Section

- Mass Public Warning Functions- TEMA External Affairs Office

6.3 System Advancements

In addition to ensuring the systems are continuously working during the testing process, it is also critical to identify ways the systems could function even better. **Table 12** provides a compilation overview of system improvements between September 2016 and September 2018. This table identifies improvements addressed within the last two years and improvements identified to be completed in the near future.

Table 12: Compilation Overview of System Improvements, 2016-2018

Systems	Compilation of Improvements Addressed over Last 2 Years	Compilation of Improvements to make in the Future
1. Landline Phones	*n/a*	*n/a*
2. Cell Phones	In 2018 all TEMA employees issued GETS Cards	*n/a*
3. Satellite Phones	In 2018 established quarterly Satellite Phone checks with Satellite Outfitters	*n/a*
4. Fax Machines	*n/a*	*n/a*
5. Email	In 2017 TEMA & SEOC migrated to a more secure STS server	*n/a*
6. WebEOC	In 2017 transitioned to WebEOC 8.4	*n/a*
7. NWS Chat	*n/a*	*n/a*
8. ReadyOp	In 2018 created pre-built notification	*n/a*

	boards for TVA and DOE offsite emergencies	
9. DNAWAS	In 2018 surveyed & geocoded all Tennessee DNAWAS sites	Install, fix, and move some DNAWAS equipment at local sites
10. TMAC *(800 MHz Conventional)*	Between 2016 -2018, increased TMAC awareness and training with local governments	*n/a*
11. TACN *(p25 Digital)*	In 2018 added a TACN fourth zone and server	*n/a*
12. TEMA High Band *(VHF)*	The most resilient form of communications during the 2016 Gatlinburg Wildfires	Address radio noise
13. Winlink *(HF)*	A RMS center was established in the State Watch Point that connects to 133 centers worldwide	Address cost expenses
14. HAM Radio *(primarily UHF)*	In 2017/2018 completed the VHF & UHF upgrade in the State Watch Point	*n/a*
15. Federal Interoperability Channels	*n/a*	Need more channels and coverage in rural areas
16. State Mutual Aid Channels	*n/a*	Need more channels and coverage in rural areas
17. FNARS	In 2018 FEMA replaced the State of Tennessee's FNARS system	Would like to move FNARS to State Watch Point but the signal strength would degrade the TN National Guard's radio frequencies/channels
18. EAS through IPAWS	In 2016 conducted a statewide EAS and WEA public message test during Preparedness Month	Need to update the State's EAS Plan
19. WEA through IPAWS	In 2016 conducted a statewide EAS and WEA public message test during Preparedness Month. This event allowed Tennessee to be the first state in the nation to test a statewide WEA message.	TEMA will need to prepare for upcoming FCC rule changes for WEA and prepare to educate stakeholders on upcoming changes
20. Social Media, Website, & App	In 2018 TEMA rehired a full-time social media coordinator and in 2018 TEMA relaunched the "ReadyTN" phone app	*n/a*
21. Press Releases & Media Coordination	In 2017 email migration to the new State system allowed the streamlining of media distributions through list serves	*n/a*
22. TVA Sirens	In 2018 streamlined SEOC coordination process of agreeing on protective actions (e.g. what sirens to sound)	*n/a*

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7 – Plan Development and Maintenance

This section establishes a plan update cycle to ensure the Communications & Warning Plan Annex and its associated Watch Point & Public Information standard operating guidelines/procedures, remain living documents that can grow and adapt to constant changing conditions. **Table 13** provides an overview of the Communications & Warning Plan's maintenance, revision, and evaluation process.

Table 13: Overview of Communications & Warning Plan Update Schedule & Approvals

Update Components	Maintenance	Revision	Evaluation
Update Schedule	Continuously with Annual Checks	At least once every 5 years	Annually
Update Approvals	1. Planning Branch Administrator, TEMA 2. Assistant Director of Preparedness, TEMA	1. Planning Branch Administrator, TEMA 2. Assistant Director of Preparedness, TEMA 3. Director of TEMA	*see maintenance and revision process*

7.1 Maintenance Process

The purpose of the Communications & Warning Plan's maintenance process is to ensure all content is being kept current. This is done by conducting regular reviews of the plan annex/procedures and by making minor updates within the plan as necessary. While the Communications & Warning Plan's revision process is designed to address major updates and stakeholder engagement efforts, the maintenance process is focused on addressing minor updates such as correcting grammatical errors, documenting newly developed capabilities, and updating basic procedural elements associated with the plan. Because of this lesser degree of efforts, the maintenance process requires less signature approvals than the revision process and the maintenance process doesn't require changing the date on plan's cover page.

Minor updates are defined as organizational, procedural, or situational changes that constitute less than 20% of the total content needing updates within the reviewed Communications & Warning Plan Annex. If during the maintenance process it is discovered that the necessary updates go beyond the definition of a minor update, then the plan revision process is to be followed. Additionally, if during the maintenance process it is determined that no updates are needed to be made within the reviewed Communications & Warning document, then no additional actions are necessary.

The maintenance process for the Communications & Warning Plan will consist of TEMA Planning Branch representatives reviewing the entire document annually to see if any minor updates are necessary. If portions of the plan require minor updates then the TEMA Planning Branch will make the necessary changes and will document those updates within the "Record of Changes" box at the beginning of the Plan Annex. All minor updates are to be approved by the TEMA Planning Branch Administrator and the TEMA Assistant Director over the Preparedness Division, in that order. The updated plan will then be added to the Share Drive as the most current document to be referenced.

7.2 Revision Process

The purpose of the Communications & Warning Plan's revision process is to offer an opportunity for numerous stakeholders to provide input into improving the content, organization, and strategic direction of the plan. While the Communications & Warning Plan's maintenance process is designed to address minor updates, the revision process is focused on engaging stakeholders and addressing major updates such as the inclusion of new systems and a reordering of system redundancy. Because of this increased degree of efforts, the revision process requires more signature approvals than the maintenance process and requires changing the date on the annex's cover page.

If during the revision process participating stakeholders identify that the needed updates fit the classification of a minor update instead of a major update, or that no update in content is required at all, then the plan revision process is still to be followed with the appropriate signatures of approvals and the date change on the annex's cover page.

The revision process for the Communications & Warning Plan will consist of TEMA Planning Branch representatives establishing meetings with stakeholders to review and gather input regarding needed updates or improvements to the plan/procedures. This revision process is to occur at least once every five (5) years and at a minimum should include stakeholder representation from the State Watch Point, the State Emergency Information Director (SEID), SEOC ESF-2: Communications, and Strategic Technology Solutions (STS).

If portions of the Communications & Warning Plan require updates then the TEMA Planning Branch will make the necessary changes and will document those updates within the "Record of Changes" box at the beginning of the Annex and will change the effective month/year throughout the annex. All updates are to be approved by the TEMA Planning Branch Administrator, the TEMA Assistant Director over the Preparedness Division, and the Director of TEMA in that order. The updated plan will then be shared with all involved stakeholders and will added to the Share Drive as the most current document to be referenced.

7.3 Evaluation Process

The purpose of the Communication & Warning Plan's evaluation process is to ensure the State is incorporating external efforts into the plan updates. This is done primarily through identifying and incorporating lessons learned and corrective actions from exercises or real-world events that tested the plan, but can also be done by

identifying and incorporating recognized best practices, completed initiatives, changing authorities, and new agreements.

The evaluation process begins by reviewing an evaluation source(s) to identify if any planning corrective actions can be derived that relate to the plan. This evaluation process can be conducted simultaneously with the Communication & Warning Plan's maintenance and revision process, or can be conducted separately, such as following a large scale disaster event or a major authority change, to ensure planning corrective actions are addressed in a timely manner.

The evaluation process for the Communications & Warning Plan Annex is to be conducted annually by TEMA Planning Branch representatives. After identifying planning corrective actions from the evaluation source(s), the incorporation of the corrective actions should follow either the maintenance procedures outlined in Section 6.1 or the revision procedures outlined in Section 6.2, based on whether the incorporation meets the definition of a minor update or major update to the document.