

Montgomery County, Maryland
Office of the County Executive
Office of Internal Audit



9-1-1 Service Interruption:
Investigative Services

November 15, 2016

Highlights

Why MCIA Did this Audit

The accounting firm of SC&H, under contract with the County's Office of Internal Audit (MCIA) and with assistance from the National Emergency Number Association (NENA), performed an investigation into the factors contributing to the County's Emergency Communications Center (ECC) 9-1-1 service interruption that occurred on July 10 – 11, 2016. The ECC is the primary link between a citizen, who reports an emergency via 9-1-1, and the police, fire and rescue personnel and equipment, who respond to an incident scene. The ECC operates primarily from the Public Safety Communications Center (PSCC) located in Gaithersburg, MD. The ECC also maintains and occasionally operates at an Alternate ECC (AECC) located in Rockville, MD. At the time of the service interruption the ECC was operating at the Rockville facility because of a phone system (and other renovations) underway at the Gaithersburg PSCC. On Sunday, July 10, 2016, at approximately 11:08pm, the ECC experienced an interruption in its ability to receive 9-1-1 emergency calls. 9-1-1 services were restored at approximately 12:45am on Monday, July 11, 2016. In the wake of the service interruption (hereinafter referred to as the "incident"), the Montgomery County Executive Isiah Leggett directed the conduct of an investigation into the incident to understand what happened and to identify steps that need to be taken to ensure that 9-1-1 services are not interrupted in the future.

What MCIA Recommends

MCIA is making 19 recommendations to the County and the five departments that played a role in either the events leading up to the incident, the County's efforts to restore 9-1-1 service; or for actions designed to enhance the County's management of its programs or similar situations in the future.

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9-1-1 Service Interruption: Investigative Services

What MCIA Found

The investigation confirmed that the incident was the result of a confluence of a number of factors – affecting the incident and its duration, as well as the ability to timely notify the public of the service interruption and alternative courses of action (i.e., contacting the nearest police or fire station) by the public in the event of an emergency. MCIA identified the need to address several underlying factors that allowed the events associated with the incident to occur, as well as opportunities to make organizational and management improvements that could enhance the County's management of 9-1-1 operations and similar situations in the future, including the following:

- Improved asset management of County-operated (particularly mission-critical) facilities.
- Improved risk management at the ECC, including more robust continuity of operations planning and exercises that use "events-based" scenarios and involve partners that support incident response and management.
- Improved coordination and pre-planning of public messaging concerning such incidents, and examination of other public messaging channels through which information can be sent to better inform and guide the public.
- Application of best practices in supporting the timely and effective transition of the ECC to its consolidated operations model.

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Background

The Emergency Communications Center (ECC) serves as the Public Safety Answering Point (PSAP) and dispatch point for all 9-1-1 emergency calls in Montgomery County, and is responsible for the emergency communications relating to police, fire, rescue, or emergency medical incidents. The ECC is the primary link between a caller, who reports an emergency via 9-1-1, and the police, fire and rescue personnel and equipment, who respond to an incident scene. The ECC operates primarily from the Public Safety Communications Center (PSCC) located in Gaithersburg, MD. The ECC also maintains and occasionally operates at an Alternate ECC (AECC) located in Rockville, MD. The ECC operates 24 hours per day, seven days per week.

On Sunday, July 10, 2016, at approximately 11:08pm, the ECC experienced an interruption in its ability to receive 9-1-1 emergency calls¹. 9-1-1 services were restored at approximately 12:45am on Monday, July 11, 2016. In the wake of the service interruption (hereinafter referred to as the “incident”), the Montgomery County Executive Isiah Leggett directed the conduct of an investigation into the incident to understand what happened and to identify steps that need to be taken to ensure that 9-1-1 services are not interrupted in the future.

The County provided an initial briefing on the incident to the County Council on August 2, 2016; and acknowledged that the County had initiated an investigation into the incident and would report on the findings and recommendations resulting from that investigation. The County assigned responsibility for conducting the investigation to the Office of Internal Audit (MCIA). MCIA undertook the investigation with the assistance of the SC&H Group, a contractor that provides internal audit services to the County. The SC&H Group received support in the early stages of the investigation from the National Emergency Number Association (NENA)².

Objectives

The investigation had the following objectives:

- Identify the specific events contributing to the incident, and the underlying factors that allowed these events to occur;
- Determine the impact of the incident on the County’s provision of 9-1-1 services;
- Assess the effectiveness of the County’s response to the incident; and
- Identify what steps need to be taken to ensure that services of the 9-1-1 system are not interrupted in the future.

¹ At the time of the service interruption the ECC was operating at the Rockville facility because of a phone system upgrade (and other renovations) underway at the Gaithersburg PSCC.

² The National Emergency Number Association (NENA) a professional organization with significant expertise regarding 9-1-1 operations. NENA is the premiere association comprised of 9-1-1 professionals dedicated to developing standards, white papers, conducting advocacy, issuing guidance, and providing education materials to the 9-1-1 community.

This report summarizes the investigative approach, and the resultant findings and recommendations for County action.

Methodology and Approach

The investigation was conducted in two primary phases. During the first phase, background information concerning the incident and relevant policies and procedures was collected from five departments (Montgomery County Police Department (MCPD), Montgomery County Fire & Rescue Service (MCFRS), Department of General Services (DGS), Department of Technology Services (DTS), and Office of Emergency Management and Homeland Security (OEMHS)), that were determined to have a role either in the events leading up to the incident, the County's efforts to restore 9-1-1 services, or in short-term risk-mitigation actions designed to address issues identified by County personnel either during or immediately following the incident. This information was used by SC&H and NENA to conduct an initial fact-finding ("Hot Wash") review with a limited set of key personnel from these departments to better understand the incident events, and factors and underlying risks associated with the incident and the County's response. This initial fact-finding (which included brief tours of the PSCC and AECC) was conducted on August 10, 2016.

Using the information gathered from the first phase of the investigation, more detailed questions and lines of inquiry were identified; and used to conduct additional interviews and information collection necessary to be able to meet the objectives of the investigation. This second phase of the investigation, which also included the development of preliminary findings and recommendations, was largely completed by September 12, 2016. Additional information collection to determine specific actions taken or initiated by departments to address the report findings and recommendations continued through October 31, 2016, and is reflected later in this report.

Overview of ECC Operations

The ECC is jointly-operated by the Montgomery County Police Department (MCPD) and the Montgomery County Fire & Rescue Service (MCFRS). Based on a decision made by the County in 2014, the ECC is in the process of transitioning to a consolidated operation, under the direction of MCPD. The current Director (and Deputy Director) of the ECC are both MCPD managers, assigned full-time to the ECC. There are Operations Managers and ECC Supervisors for both MCPD and MCFRS who oversee 9-1-1 call-taking and dispatch operations (and staff) for their respective departments. As of August 13, 2016, the ECC has 242 authorized positions (MCPD – 157; MCFRS – 85), and is operating with 187 full-time employees (MCPD – 124; MCFRS – 63) covering the multiple shifts required to support 24/7 ECC operations.

At the time of the incident, a replacement phone system (Motorola/Intrado system) for receiving 9-1-1 calls (and supporting dispatch operations) was being installed at the Gaithersburg PSCC (with the new phone system having been installed earlier this year at the

Rockville AECC). While the new system is a “geodiverse” system (i.e., designed to allow calls to be routed to one or the other of the ECC locations as long as the phone servers at one of the sites is operational), at the time of the incident, the new system was only installed (and operational) at the Rockville AECC. The ECC has back-up phone capabilities should the primary (Intrado) phone system go down. These back-up phone capabilities include plain old telephone service (POTS) lines and the County’s private branch exchange (PBX) system. At the time of the incident, only the County PBX 9-1-1 system was available at the Rockville AECC as a back-up to the Intrado system. In addition to the Intrado system, the ECC utilizes the Computer Aided Dispatch (CAD) system to record, document, and facilitate all calls and dispatching of police, fire and medical personnel by MCPD and MCFRS.

As a critical partner supporting ECC operations, the County’s Department of General Services (DGS), specifically the Division of Facilities Management (DFM) provides facilities management services to both the PSCC and AECC buildings (and other County-operated facilities). DFM is charged with providing (either directly or through contracts) routine and preventive maintenance services, as well as emergency building repairs to County-operated building systems (such as heating, ventilation, air conditioning (HVAC) systems; and power and electric systems) as required 24/7.

Overview of Incident

Based on the information gathered through the interviews conducted and documents provided, we are providing the following overview of the relevant events surrounding the incident: events leading up to the incident, events during the incident, and events occurring after ECC operations resumed on July 11, 2016. The intent of this overview is not to provide a detailed chronology of events, but rather to provide an overview of the incident to better understand the context for the findings and recommendations discussed below.

Events Leading Up to the Incident

- | | |
|----------------------|--|
| May 26, 2016 | In preparation for the activation of ECC Operations at the Rockville AECC facility, DGS performed preventive maintenance services on building systems at the AECC facility. |
| June 22, 2016 | ECC operations were relocated from the Gaithersburg PSCC facility to the Rockville AECC facility in order to allow installation of a new phone system (and other renovations) to be performed at the PSCC. |
| July 2 – 8 | The building automation system (BAS) used to monitor conditions of key building systems (e.g., temperatures) at County buildings (including the AECC) was experiencing instability (intermittent outages) in its providing routine notifications to DGS personnel of building conditions. DGS involved DTS (to determine if there were County network problems contributing to the instability) and system vendor (Siemens) personnel to help diagnose and |

correct the problems. DTS could find no network issues. The vendor could not identify any specific causes for the instability, but installed a temporary server on July 8 to support the BAS. This temporary server seemed to correct the BAS instability.

July 9 – 10 Instability in the BAS reoccurred, with no clear solution.

July 10 At an unknown time, the HVAC unit that cools the Uninterruptable Power Supply (UPS) that provides battery and power surge protection at the AECC “froze up” and was no longer cooling the UPS room. Without cooling, the UPS room reached temperatures in excess of 120 degrees. In order to protect itself and the building, the UPS as designed went into “by-pass” mode at 9:13pm. [NOTE: In by-pass mode, the UPS was no longer drawing battery power to smooth out the power coming into the facility from PEPCO and protect against power anomalies/fluctuations.]

Events During the Incident

July 10 (11:08pm) A power anomaly occurred. With the UPS in by-pass mode, the power anomaly was passed through to the Power Distribution Units (PDUs) throughout the building. These PDUs support systems critical to 9-1-1 operations, including servers supporting the Intrado phone system, as well as the individual workstations. All workstations on the operations floors as well as the 9-1-1 phone system servers shut down³. Breakers on the PDUs supporting the 1st floor (where CAD workstations are located) and the 2nd floor (where the servers supporting the Intrado phone system are located) tripped, and would require manual resetting. The breaker on the 3rd floor PDU did not remain “tripped” because it had been programmed to “Automatic Reset⁴” mode. The duration of the power anomaly appears to have been momentary, and was not long enough to cause the generators supporting the AECC to come on (these generators come on if power to the building is disrupted for 10 seconds or more).

July 10: ECC personnel take incident response actions, including the following:
11:09pm - - On-duty ECC Supervisors distributing portable radios and cell phones to dispatchers to support manual dispatch operations.
July 11:
12:44am - Contacting the Deputy ECC Director, who directed that staff begin to Mobilize at Gaithersburg PSCC site in an attempt to re-establish 9-1-1

³ The CAD system continued to operate, because it is supported by servers operating at the Gaithersburg PSCC site.

⁴ In the “Automatic Reset” mode, the circuit breaker keeps cycling on and off until the overload is removed. For ease of reference, we have used the term “tripped.”

Operations in a dual-center mode (both the AECC and PSCC) pending clarity and resolution of AECC operational issues.

- Contacting ECC IT staff to identify and re-establish 9-1-1 (Intrado) phone system operability at AECC, and POTS lines capabilities at PSCC. The ECC IT staff subsequently contacted the Intrado phone system support contractor to obtain assistance in re-establishing phone system and workstation operability at AECC.
- Contacting DGS Facility Management staff to identify and manage source of power disruption. The DGS Facility Management staff subsequently re-set breakers on 1st and 2nd floor PDUs. Facility management staff began to diagnose and address source of HVAC failure.
- Contacting Public Information Officers (PIOs) and OEMHS to manage public notification process; and contacting MCPD and MCFRS management to advise them of 9-1-1 service interruption and status. PIOs and OEMHS subsequently began public notification process (PIOs through social media messages; OEMHS⁵ through AlertMontgomery).

July 11: 9-1-1 phone system at AECC was back online (first 9-1-1 call was
12:45am received through Intrado system) and 9-1-1 call-taking resumed at AECC.

Events Following Resumption of 9-1-1 Operations

July 11: Post-incident response actions were initiated, including the following:
12:46am -
5:00pm

- PIOs and OEMHS continued public notification of status and return to operations.
- DGS Facility Management staff continued repair work on HVAC unit, including adding refrigerant to roof-top condenser and replacing motor. Once HVAC unit was stabilized (and the UPS room temperature was cooled down to an appropriate temperature) UPS vendor staff was brought into bring UPS back online.
- ECC IT staff disengaged failsafe loop (at approx. 8:54am) to allow POTS system/lines at PSCC to be operational.
- Full Facility and Systems restoration at AECC was completed (5:00pm).

⁵ The Office of Emergency Management and Homeland Security (OEMHS) is the administrator of AlertMontgomery, the official emergency communications service for Montgomery County Government provided by Everbridge, a third party vendor. During a major crisis or emergency, OEMHS officials can send event updates, warnings and instructions directly to the public through OEMHS. In order for the public to receive the messages, citizens must register their device with OEMHS.

July 11: Final social media and AlertMontgomery messages were sent out
7:19pm - advising public of restoration of normal 9-1-1 operations.
7:32pm

Impact of Incidents on Emergency Services to County

During the service interruption (from 11:08pm July 10 to 12:45am July 11), 26 calls for service were responded to Countywide: 17 police-dispatched events (including Takoma Park), and nine MCFRS-dispatched events. Telephone calls regarding the nine MCFRS-dispatched events were initially received by one of the following:

- Montgomery County Police stations, the Takoma Park Police Department, the Rockville City Police Department⁶; or
- Montgomery County Fire Station.

One of the nine events was a fire event, with the call received initially by the Takoma Park Police Department. Eight (8) of the events were for emergency medical services (EMS), with six of the EMS calls being received initially by a Montgomery County Police Department station. The remaining two EMS events were characterized as “true emergencies” by MCFRS, with fatalities involved. These two events are discussed below, referenced by the Fire Station that responded to the event.

Fire Station 40

The initial EMS call was received by the Fire Station at approximately 11:39pm:

- 11:39pm approx.: EMS personnel⁷ self-dispatched; Fire Station personnel notified ECC of the event and that EMS personnel were en route⁸
- 11:42:38pm: Event created in Caller-Assisted Dispatch system (CAD) at ECC
- 11:45:15pm: EMS personnel arrived on scene
- 11:50:50pm: EMS personnel left the scene

The patient was found by relatives to have been unresponsive, prompting the call for EMS. Upon arrival, MCFRS assessed the patient, and saw no obvious signs of life (no breathing and no pulse). The patient was pronounced dead on scene, and was not transported for care. MCFRS left the scene after the patient was pronounced dead.

⁶ After taking the call, the Montgomery County Police stations and Takoma Park and Rockville City Police Departments would have then contacted (via telephone) the ECC directly (through the ECC cell phones at the PSCC) and the closest Montgomery Fire Station for response.

⁷ “EMS personnel” referenced herein are all MCFRS Fire Station personnel responding to events. While other MCFRS personnel may also have responded, we have focused only on EMS personnel.

⁸ Following notification of each event, ECC personnel entered event information into caller-assisted dispatch (CAD) system (at PSCC site, during dual-center operation).

Fire Station 23

The initial EMS call was received by the Rockville City Police at approximately 12:02am⁹, with Fire Station 23 being contacted at somewhere between 12:04 and 12:08am¹⁰:

- 12:09 approx.: EMS personnel self-dispatched, and notified ECC (via radio), of the event and that they were en route.
- 12:09:59am: Event created in CAD at ECC
- 12:11:17am: EMS personnel arrived on scene
- 12:57:38am: EMS personnel arrived back at the station

Upon arrival, the EMS personnel assessed the patient, and saw no obvious signs of life (no breathing and no pulse). Attempts to resuscitate the patient were not successful; the patient was pronounced dead at 12:28am. EMS personnel left the scene after the patient was pronounced dead.

Review of the Two Incidents

As required by COMAR Title 30, part of Montgomery County's Emergency Medical Services Operational Program is a quality assurance/improvement (QA/QI) process, under the oversight of the County's EMS medical director. This QA/QI process focuses on the medical care aspects of both Emergency Medical Dispatchers (EMDs; the 9-1-1 call takers who operate at the ECC, and who are required to be licensed by the Maryland Institute of Emergency Medical Services Systems) and Emergency Medical Technicians (EMTs)/Paramedics. The part of the EMD's job functions considered to be the practice of medicine is the "caller interrogation/questioning" and the post-dispatch/pre-arrival instructions ("dispatch life support") given to the caller.

Within the ECC, MCFRS conducts QA/QI activities with respect to EMDs through a number of formal committees, including the Dispatch Review Committee and Medical Review Committee, as well as through routine retrospective call reviews. MCFRS advised us that they did not conduct any formal QA review of the two events discussed above for the simple reason that no EMD ever had contact with a 9-1-1 caller, since the Fire Stations received the calls directly (from the 9-1-1 caller in the case of Fire Station 40; and from Rockville City Police Department in the case of Fire Station 23). Therefore, no EMD was involved with the provision of medical care in these events.

The County's (MCFRS) EMS Section also conducts QA/QI processes with respect to the medical care provided by MCFRS EMTs/Paramedics. While the EMS Section, as part of their routine retrospective review process, did look at the incident and patient care reports for the two

⁹ According to Rockville City Police, the caller stated they had tried for 20 minutes to call 9-1-1 before calling the Rockville City Police.

¹⁰ Rockville City Police indicated they called Fire Station 23 at approximately 12:04am; Fire Station 23 indicated they received the phone call from Rockville City Police at approximately 12:08am.

events, no issues were identified regarding the medical care provided to the patients that caused additional, more formal reviews by the QA Officer.

Post-Incident Response by County

In parallel with the investigation being conducted by MCIA, the five departments advised us that they initiated actions designed to address risks they had identified as a result of the incident. We have not attempted to independently verify these actions, but are summarizing them for information.

ECC (MCPD & MCFRS):

- Updated emergency (Continuity of Operations Plan – COOP) Plan with additional plan for emergency relocation from AECC to PSCC.
- Phones to support back-up phone system back-up capability at AECC have been expanded and relocated to the call-taker workstations on the 3rd floor.
- 9-1-1 ECC Supervisor staff have been equipped and are being trained in the use of a mobile app on their cell phones to speed up notification process to OEMHS (and subsequent notification to the public).

DGS (in consultation with ECC and DTS):

- A new HVAC system (with redundancy through two HVAC units configured in a “lead-lag” design) is in the process of being installed to replace the aged HVAC unit at the AECC.
- The main logic board for the UPS that was subjected to high temperature (approximately +120°) was replaced at the AECC.
- The breakers serving the 1st and 2nd floor PDUs at the AECC were programmed to “auto reset” mode.
- A redundant building monitoring system is being installed at the AECC and PSCC. This second BAS will provide redundancy to the existing Siemens system and provide for additional monitoring points and signal transmission through a different network path.
- A local, visual alarm system with annunciator panels visible to operations staff is being installed at the AECC and PSCC to allow for any building systems failures to be notified directly to onsite supervisors at the sites.

DTS and DGS:

- Diagnosis of the Siemens BAS instability continues to be managed jointly by DTS and DGS, with direct vendor involvement. Non-mission-critical facilities have been dropped from the BAS to provide greater stability; as well as isolation of the BAS on a separate server environment to provide for more direct monitoring and greater stability. [NOTE: To date, no conclusive cause for or solution to the instability has been identified.]

OEMHS (in collaboration with MCFRS and MCPD):

- To facilitate more expedited and coordinated public messaging regarding 9-1-1 service situations, procedures to provide more timely OEMHS notification of such situations and template messages for AlertMontgomery and social messaging notifications to the public are being developed to address various 9-1-1 operational scenarios.
- To complement the AlertMontgomery public notification (since this is a voluntary enrollment system), OEMHS is continuing to pursue the use of the federal Emergency Alert System (EAS) – which is currently used by NOAA’s National Weather Service for emergency notifications of weather-related threats – and the Wireless Emergency Alert (WEA) system to notify the public of local area emergencies (such as a disruption or degradation of 9-1-1 services).

Summary of Findings & Recommendations

Both SC&H Group and NENA were impressed with and want to acknowledge the commitment, responsiveness, and cooperation evidenced by Montgomery County management and staff during the conduct of the incident investigation. The investigation confirmed that the incident was the result of a confluence of a number of factors – affecting the incident and its duration, as well as the ability to timely notify the public of the service interruption and alternative courses of action (i.e., contacting the nearest police or fire station) by the public in the event of an emergency. The investigation findings and recommendations for action by the County are presented in the following tables. [NOTE: “Management Action Plan” information contained in the following tables is inclusive of actions reported through October 31, 2016. Actions have been taken to close five (5) of the 19 recommendations.]

EVENT-BASED FINDINGS

We identified findings that were directly related to specific events that occurred during the time leading up to the 9-1-1 service interruption, or during the interruption as the County attempted to restore normal 9-1-1 operations. These findings and associated recommendations are discussed below.

Incident Event (with <i>Contributing Factors</i>)	Finding/Weakness (with <i>associated Risks</i>)	Recommendations (with <i>Management Action Plan</i>) ¹¹
EVENTS CONTRIBUTING TO SERVICE INTERRUPTION		
The AC unit cooling the Uninterruptable Power Supply (UPS¹²) Room (3rd floor of AECC) “froze” and stopped working. Contributing Factors: - Age: Single 3-ton residential unit manufactured in 1994; 22 years old; median life expectancy = 15 years¹³ - Refrigerant: When unit was serviced on July 11, 2016, following unit failure, refrigerant level on roof condenser unit was found to be low.	1. The AC system supporting the UPS room provided no redundancy/back-up - Risk: <i>Absence of redundancy in AC system allowed a single point-of-failure, increasing risks to operations.</i> 2. DGS relies generally on a “break and fix” approach to building maintenance, and does not maintain a comprehensive inventory of building systems (age, life expectancy, service history), either for mission-critical facilities or other facilities. - Risk: <i>Absence of an asset management/inventory system hinders the ability to</i>	1. DGS should replace the existing AC unit with an optimally sized and configured commercial AC system that provides adequate redundancy and capacity. <i>Management Action Plan:</i> Existing residential AC unit is being replaced with two (2) 3-ton commercial units (configured in a “lead-lag” configuration to provide redundancy). [Existing unit was tested and serviced on July 11, 2016, following incident.] Work began on September 23; with installation of one unit having been completed and installation of final system expected to be completed by November 15, 2016 [delayed by rain, week of September 26-30; and production/delivery of fire damper]. 2. DGS should identify best practices for effective asset management and implement a more structured asset management process (and system) that would enable comprehensive inventorying of building systems (including their age, life expectancy, service schedule and history, and planned replacement schedule), effective/timely preventive maintenance, and planning/budgeting for asset replacement prior to asset failure. Assessment of alternative system solutions, including the potential for adoption/development

¹¹ We have been advised by the involved Departments (MCPD, MCFRS, DGS, DTS, and OEMHS), referenced here and throughout this analysis, of actions they have taken or have underway relevant to specific Recommendations. We have attempted to acknowledge these actions in the discussion here, without attempting to verify the actions independently.

¹² UPS units are designed to provide battery and power surge protection.

¹³ ASHRAE Equipment Life Expectancy Chart. ASHRAE is the industry organization that sets the standards and guidelines for most all HVAC-R (heating, ventilation, air conditioning and refrigeration) equipment: http://www.culluminc.com/wp-content/uploads/2013/02/ASHRAE_Chart_HVAC_Life_Expectancy%201.pdf

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
The AC unit cooling the Uninterruptable Power Supply (UPS¹⁴) Room (3rd floor of AECC) “froze” and stopped working. [Cont’d]	<i>effectively plan, budget, and replace aging building systems.</i> - <u>Risk:</u> <i>Failure to identify aging building systems and replace timely increases risk of system failure and impact to operations.</i>	of an enterprise asset management system for the County, should be conducted in conjunction with DTS, and be subject to the County’s IT review process. <u>Management Action Plan:</u> <i>The current Work Order Management System used by DGS does not provide for asset inventorying beyond a first tier level (i.e. the building itself). To achieve DGS’ mission, an asset management system that allows for asset’s component inventorying and tracking needs to be developed. DGS has taken the initial step to facilitate the eventual implementation of an asset management system. The Department is currently developing the Facilities Information Management System (FIMS), a search engine built on a SharePoint platform that allows the users to easily locate facility-related documentation. FIMS is in the pilot stage, adding the information for the newer facilities is straight-forward, but older facilities require a significant amount of effort to locate and record data, as well as digitize all record documents. The implementation of an asset-management system will be labor intensive and require a separate fund allocation. This service will need to be outsourced to ensure consistency and efficiency.</i> <u>Estimated Implementation Date:</u> <i>FIMS will be operational (available for data population) by December 2016, after which it is estimated that a minimum of 12-months will be needed to locate and digitalize available information. FIMS will provide for documentation gathering and searching, but it will not provide the asset management tools described above. The deployment of an enterprise asset management system is dependent on funding sources, if approved, it is estimated that full implementation will take three (3) years from fund assignment to project completion. Due to the multi-year nature of this effort, mission-critical facilities (such as the PSCC and AECC) will be prioritized first in project implementation.</i>

¹⁴ UPS units are designed to provide battery and power surge protection.

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
	3. Servicing of the AC unit had been performed on May 26, 2016, prior to deployment to the AECC. However, the refrigerant level on the roof condenser unit was not checked (via a pressure check) at that time. - Risk: <i>Incomplete maintenance checks on critical equipment supporting mission critical operations can result in undiagnosed issues and impact the ability to operate and serve the public.</i>	3. DGS should identify best practices requiring the use of formal checklists for building system servicing, particularly for mission-critical facilities, and implement appropriate changes in policies and procedures; to include appropriate documentation and review of service performed. The checklist should be aligned to address and adhere to manufacturer recommended checks and maintenance schedules (if applicable). Management Action Plan: COMPLETE. <i>DGS maintains formal checklists for services provided under contract; but we had not used formal checklists for services provided by in-house personnel. To resolve this, Standard Operating Procedures (SOPs) for HVAC Preventive Maintenance Requirements have been issued and personnel trained.</i>
The temperature in the UPS Room rose to +120°. The UPS, as designed, went into “by-pass” mode because of the excessive temperature. As a result, the UPS no longer drew power from batteries to smooth out PEPCO power. This allowed any power anomaly to be passed through to the power distribution units (PDUs) at the AECC. Contributing Factors: - <i>No redundancy to single AC unit that failed.</i> - <i>Building automation system (BAS) designed to monitor and notify DGS staff of problems with building systems did not send notifications of conditions.</i> - <i>Absence of visual alarms to alert ECC Staff.</i> - <i>Absence of risk mitigation actions in response to BAS instability.</i>	- See Finding #1 above 4. When DGS identified the BAS instability in early July, DGS took actions during the week prior to the service interruption in an attempt to address the BAS instability (as noted above in report). DGS should have implemented back-up risk mitigation actions for mission-critical facilities (e.g., AECC) in response to the BAS instability.	- See Recommendation #1 above 4. DGS, DTS and ECC should continue efforts to diagnose and correct BAS stability issues, and should effect their planned actions to provide redundant monitoring of building system conditions, including the following: - Continue regular physical monitoring of AECC, including UPS room temperatures. - Continue planned installation (in coordination with DTS as appropriate) of redundant BAS at AECC and PSCC to provide additional monitoring points and signal transmission through a different network path.

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
The temperature in the UPS Room rose to +120°. The UPS, as designed, went into “by-pass” mode because of the excessive temperature. As a result, the UPS no longer drew power from batteries to smooth out PEPCO power. This allowed any power anomaly to be passed through to the power distribution units (PDUs) at the AECC. [Cont’d]	DGS’ current process for monitoring building conditions at mission-critical facilities (including AECC) could be improved to provide more effective risk management at these facilities. The BAS is configured to send routine notification messages only once a day (@ noon), not more frequently to allow more real-time system monitoring of BAS operations. The existing visual alarms (UPS lights) were not prominently visible to staff working on 1st and 3rd floors of AECC. No practice existed within ECC to require a designated supervisor/ personnel to conduct physical check of facility/systems at time of shift change and during shift. - <i>Risk:</i> <i>Failure to follow best practices in design/installation of BAS for mission critical facilities to provide routine/regular system monitoring increased risk of undetected problem at AECC. Furthermore, the lack of a prominent visual notification alarm at the AECC, increased the risk of undetected problems.</i>	c. Continue DTS efforts, partnering with DGS and the BAS vendor, to monitor, diagnose and correct the BAS performance issues. In addition, the ongoing role/ responsibility of DTS with respect to the BAS system (and any associated resource implications) should be agreed to and documented between DGS and DTS given the importance of this BAS across the County enterprise. d. Continue planned installation of prominent visual notifications at AECC on 1st and 3rd operations floors to provide alerts to ECC management/staff of key building systems’ conditions. e. ECC should institute procedures requiring checklist of facility areas/conditions that must be physically checked at the start and midpoint of each shift; designate individual(s) required to conduct/document these checks in a centrally-available/maintained log, and verify that procedures are being followed. <u>Management Action Plan:</u> a. <i>ECC operations are currently being conducted from the Gaithersburg PSCC site. The ECC will conduct regular physical monitoring of the AECC during times when ECC operations are transferred to the Rockville AECC site, up until the time that the redundant BAS is installed and operational at the Rockville site (see “b”).</i> b. <i>Work to install a redundant BAS at the AECC commenced on September 15 and is scheduled to be completed by November 30, 2016. A similar redundant BAS will be installed at the Gaithersburg PSCC site following completion at the AECC, with work scheduled to be completed by the end of December.</i> c. <i>After the incident, DGS in collaboration with DTS and Siemens focused on monitoring overall reliability while interim and long term solutions were put into place. DGS removed all non-critical sites from the BAS and added them back with a controlled approach</i>

Incident Event (with <i>Contributing Factors</i>)	Finding/Weakness (with <i>associated Risks</i>)	Recommendations (with <i>Management Action Plan</i>) ¹¹
The temperature in the UPS Room rose to +120°. The UPS, as designed, went into “bypass” mode because of the excessive temperature. As a result, the UPS no longer drew power from batteries to smooth out PEPCO power. This allowed any power anomaly to be passed through to the power distribution units (PDUs) at the AECC. [Cont’d]	5. DGS did not alert program officials (in this case, ECC) of the BAS instability condition. - <u>Risk:</u> <i>Failure to communicate BAS connection issues with the mission critical process owners increases the risk of undetected problems and negative impact to operations.</i>	<i>designed to ensure system stability. Currently, 22 out of 87 sites (less critical sites, requiring modem connections) remain to be connected by December 2016. A BAS software patch was applied August 29, 2016 and system performance has been stable since with alarms and notifications operating as designed. A new server with the next version of BAS that includes further system hardening was deployed in a dedicated network segment on September 28, 2016. All sites will be transferred from the existing server to the new server methodically to maintain operational stability. All sites are expected to be moved to the new server by February 2017.</i> d. <i>DGS has completed the system requirements for the physical annunciator (visual notification) panels to be installed at AECC and PSCC and a notice to proceed has been issued. The equipment is being manufactured, with installation of the panels at both the AECC and the PSCC currently scheduled for completion by the end of December 2016.</i> e. <i>ECC will be initiating physical checks of key operations areas and equipment rooms at the occupied center at the beginning of each shift, effective November 1, 2016.</i> 5. DGS should develop and implement procedures that require DGS staff to notify program officials when risk conditions at a facility increase risks to operations, and should coordinate with program officials the procedures for physical monitoring of facility conditions as warranted. <u>Management Action Plan:</u> <i>COMPLETE. An internal process to be followed by DGS staff has been reviewed, staff trained, and procedures implemented. This process was formalized through the issuance of and staff training on Standard Operating Procedures (SOPs) for Monitoring and Notification Requirements.</i>

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
Use of POTS (plain-old telephone system) for 9-1-1 call-taking at AECC was not an option. Contributing Factors: - POTS phones were not available at AECC.	6. The AECC was not equipped with POTS phones; POTS phones were only an option at the PSCC. - Risk: Unavailability of POTS phones at AECC eliminated a potential back-up at the AECC when the 9-1-1 system went down, impacting the ability to operate and serve the public.	6. ECC should deploy back-up phones (which may include POTS phones) at AECC site as a back-up should the 9-1-1 system go down. Management Action Plan: COMPLETE. In September, the ECC deployed back-up PBX Phones at each call taker workstation on the third floor at the AECC. These are line powered devices with power being supplied through the COB power systems.
EVENTS AFFECTING DURATION OF SERVICE INTERRUPTION		
A power anomaly occurred¹⁵. The breakers on PDUs serving the 1st floor (where Computer Assisted Dispatch (CAD) workstations are located) & 2nd floor (where the 9-1-1 phone system server room is located) tripped, causing loss of power. The breaker on the 3rd floor PDU did not remain “tripped¹⁶” because it was programmed to “Automatic Reset” (“auto reset”). However, the momentary power anomaly caused a momentary loss of power to the 3rd floor CAD and 9-1-1 call-taking workstations. Contributing Factors: - With the UPS in “by-pass” mode, the power anomaly was passed through to the power distribution units (PDUs; three PDUs) throughout the AECC. - When the breaker for the PDU (2nd floor) tripped, the servers supporting the 9-1-1 phone system lost power.	7. The breaker for the PDU serving the 3rd floor had been replaced on April 1, 2016, and was programmed to “auto reset” mode, allowing power to be restored to the 3rd floor workstations quickly. The two PDUs serving the 1st and 2nd floors were not programmed to “auto reset” mode. Therefore, these breakers were not reset until DGS arrived and diagnosed/corrected the issue. [NOTE: Having the PDU breakers programmed for “auto reset” would not have prevented the 9-1-1 phone system outage, but may have shortened the duration of the outage.] - Risk: Failure to program the PDU breaker setting to “auto reset” mode for all PDUs at the AECC at the time of servicing, may have increased the duration of the service interruption and negatively impacted operations.	7. DGS should program breakers on all PDUs at the AECC to be in “auto reset” mode, and should ensure that DGS Technicians receive appropriate training on the availability and use of this feature. DGS should also identify other facilities where use of this breaker feature should be implemented and take appropriate steps to program the breakers to this mode. Management Action Plan: COMPLETE. On August 8, 2016, the breakers on all three (3) PDUs at the AECC were programmed to “auto reset” mode. We have confirmed that the PDUs at the Gaithersburg PSCC facility are programmed in “auto reset” mode. Training of DGS technicians is scheduled to be completed by December 2016.

¹⁵ We were advised that the County checked PEPCO’s webpage for the report of any outages around this time; no information was recorded. Therefore, we are unclear of the specific cause or nature of the power anomaly. The power anomaly appears to have been momentary, based on the characterization that the lights at the AECC “flickered.”

¹⁶ In the “Automatic Reset” mode, the circuit breaker keeps cycling on and off until the overload is removed. For ease of reference, we have used the term “tripped.”

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
Use of the POTS at PSCC as a back-up for call taking operations was delayed (following deployment of 9-1-1 staff to PSCC) Contributing Factors: - <i>The POTS system would have worked at PSCC (and POTS phones were available there); however, a failsafe loop that is designed to prevent inadvertently transferring POTS calls from the PSCC to the AECC was not disengaged. Failsafe loop was not disengaged until July 11 at @8:54am.</i>	8. The COOP procedures, and specifically the procedure regarding activation of POTS lines, were written assuming 9-1-1 operations were being shifted from PSCC to AECC; not transferring operations from the AECC to the PSCC in an emergency situation. Disengagement of the failsafe loop was not part of the COOP in the event the AECC was serving as the primary site. As a result, there was a delay in activation of the POTS lines at the PSCC until this issue was identified and resolved (9 hours and 14 minutes later). - Risk: Failure to plan and document procedures for transferring operations from the back-up facility to the primary facility, negatively impacted operations and the ECC's ability to serve the public.	8. ECC should revise COOP procedures to be able to mobilize from either site to the "alternate" site effectively, including timely activation of the back-up phone lines at either the PSCC or AECC, as required. Management Action Plan: COMPLETE. <i>The ECC Emergency Action and Evacuation Plan (COOP) was updated (end of July) to include additional procedures for an emergency return to the PSCC from the AECC.</i>
When power was restored to the servers on the 2nd floor (thereby restoring the 9-1-1 phone system), initial attempts to log the individual workstations back into the system were not successful. Contributing Factors: - <i>There was a lack of familiarity with the recently-installed new phone system at the AECC, and no written/documented protocols for ECC management/staff/IT staff on what steps to take (other than contacting service provider) when system went down.</i>	9. When the ECC IT staff person contacted the service provider (West Corporation) for the phone system (Intrado), there were initial delays in diagnosing and correcting the situation at the AECC. There were two servers supporting the phone system and they needed to be brought up in sequence (vs. simultaneously, which is what happened when the power was restored). In addition, workstations could not connect reliably to the phone system until the servers were correctly brought back up. Therefore, any workstation that had re-booted prior to the two servers being brought up correctly, needed to be re-booted again. The ECC IT staff person subsequently manually re-booted each workstation in order for each workstation to be able to log-in to the 9-1-1 phone system. There were no documented procedures in place and	9. ECC (with vendor – and DTS support as needed) should create appropriate documented protocols regarding steps that should be taken should similar events (interruption/loss of power to phone system servers and/or call-taking workstations) occur under the current (new Intrado) phone system. ECC management/staff and IT staff should be trained on these protocols, and these protocols should be readily available to all staff who must take action. ECC should also address any vendor-related issues that may have contributed to initial delays in diagnosing and correcting the situation at the AECC. Management Action Plan: <i>The new Motorola/Intrado 9-1-1 Phone System is being installed using a phased approach tied to the new Premiere-One CAD System. The current configuration is an interim step. The client side of the system will be changed out at the time the new CAD is implemented. Call Flow protocol procedures will be co- developed by Motorola and the ECC and will then be added into existing</i>

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
When power was restored to the servers on the 2nd floor (thereby restoring the 9-1-1 phone system), initial attempts to log the individual workstations back into the system were not successful. [Cont'd]	training was not provided for server outage troubleshooting. - Risk: The lack of a documented protocol and training (for both ECC management/staff and the ECC IT staff) for how to re-establish server operability and workstation connectivity following an "outage" adversely impacted the ability to restore 9-1-1 call-taking operations at the AECC. 10. During the investigation, ECC staff advised the audit team that the current phone system which had recently been installed at the AECC, but whose installation was still underway at the PSCC, is a "geodiverse"¹⁷ system. - Risk: Since this was not the situation on July 10-11, when the new phone system was installed/operational at only one site (AECC), when the AECC phone servers went down, this was a single point of failure at that time.	COOP plans. Interim updates to the COOP plan have already been made to reflect the interim state. The intent of the additional protocol development is to allow the ECC to triage non-critical issues in a manner that expedites the resolution process by directly accessing the support agency, based on the ECC experience. Following the joint development of these procedures and the inclusion of them into the ECC COOP plan, which is already accessible to all ECC employees on a shared drive, as well as with printed versions at supervisor positions, ECC Operations Management staff will be trained on their application through regular in-service training as well as table-top exercises. <u>Estimated Implementation Date:</u> Ongoing with full implementation by the end of March 2017. 10. ECC and the phone system vendor should conduct appropriate testing to ensure that call system routing can be easily transferred without impact to operations in the event the phone servers at one location go down (e.g., due to interruption/loss of power or other event). The goal of testing is to ensure the redundancy works and to develop any associated protocols for ECC staff. <u>Management Action Plan:</u> The design of the County Wide Area Network (WAN) and the Motorola/West CPE VIPER system is to support automatic failovers should any critical infrastructure component fail. The CPE redundancy was initially tested by Motorola and West during the installation of the new redundant CPE system. Ongoing recertification of the VIPER CPE and exercising of seamless failover for redundant critical infrastructure components will be added to the CPE Administrator's duties as a preventive maintenance process.

¹⁷ A geodiverse system essentially allows calls to be routed to one or the other ECC locations as long as the phone servers at one of the sites is operational.

Incident Event (with Contributing Factors)	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan) ¹¹
When power was restored to the servers on the 2nd floor (thereby restoring the 9-1-1 phone system), initial attempts to log the individual workstations back into the system were not successful. [Cont'd]		In addition to these VIPER CPE preventative maintenance tasks, ECC staff will exercise the PSCC and AECC Verizon network call re-direct systems no less often than quarterly. The transfer from the AECC back to the PSCC on July 28, 2016 did, in fact, test this capability. Testing will continue through full recertification of the VIPER CPE by the end of March 2017; with ongoing quarterly exercising of the call re-direct systems thereafter.
ECC staff notified DGS facilities of the situation at the AAEC at 11:34pm (26 minutes after the “outage” occurred; a delay in notification to facilities). An Operations Manager for MCPD was present during the incident (being cross-trained on MCFRS-dispatch operations.¹⁸) This individual assumed on-site responsibility for incident management, until the off-duty ECC Deputy Director responded and arrived at the PSCC. Contributing Factors: - During the incident, no on-duty manager was designated to be in charge of ECC operations and/or incident response management.	11. When an incident occurs, multiple decisions and notifications need to occur as contemporaneously as possible – including notifications to DGS facilities staff. Absent the presence of an on-duty Operations Manager to quickly coordinate this decision-making/notification, delays can occur. Per existing ECC COOP procedures, a call to notify DGS was noted as Step #1 when there is a primary UPS failure, and as Step #5 when there is a PDU failure. More timely notification to DGS may have shortened duration of service interruption. - Risk: Failure to schedule and structure shifts to be staffed with an Operations Manager to be staffed at all times, can result in inefficiencies in incident response and delayed notifications.	11. ECC should ensure that an Operations Manager is on duty during all shifts of ECC operations to coordinate decisions and notifications. <u>Management Action Plan:</u> Under the ECC Consolidation Plan, a 24/7 ECC Operations Manager position was programmed and will be in place as of February 2017. If an Operations Manager is not present, an acting Operations Manager will be designated from among the on-duty ECC Supervisors. As of September 2016, one of the on-duty supervisors is serving as the ECC ‘Person in Charge (PIC)’ for each shift. This designation is being made at the beginning of each shift and recorded on a daily log.

¹⁸ This person happened to be on-duty the night of the incident, but was in a training status at the time of incident. We were advised by MCPD personnel that if this person had not been there the night of the incident, the other MCPD on-duty ECC supervisors would have “worked out” who would take the lead as onsite incident manager.

Incident Event (with <i>Contributing Factors</i>)	Finding/Weakness (with <i>associated Risks</i>)	Recommendations (with <i>Management Action Plan</i>) ¹¹
EVENTS AFFECTING PUBLIC AWARENESS		
Initial public notification of service outage occurred nearly 1-hour after start of outage – Social (passive) messaging: MCFRS PIOs at 12:18am; MCPD PIOs at 12:26am; and AlertMontgomery (active) at 1:10am. Contributing Factors: - Delay in notification to OEMHS (notification only from MCPD) - Delay in communication to MCPD PIO - Delay in issuance of AlertMontgomery message by the vendor (Everbridge)	12. The notification to OEMHS of the incident was delayed. Furthermore, the details and messaging content (alternative numbers for the public to contact) were not readily available or provided, resulting in additional delays. - Risk: <i>The absence of pre-planned messages/scripts to provide public notification of this type of event, can adversely impact the public’s understanding and ability to take appropriate action in the event of an emergency requiring MCPD/MCFRS response.</i> 13. The third party public messaging (AlertMontgomery) provider experienced delays in the issuance of the AlertMontgomery message and failed to notify OEMHS of the issues/delays. AlertMontgomery messages are sent only to individuals who opt in (“subscribe”) to the service. - Risk: <i>The provider’s delay in issuance of the messages, and the limitation of AlertMontgomery to only those who “subscribe” to the service can adversely</i>	12. OEMHS, MCPD, and MCFRS should continue their efforts to develop more coordinated messages across social media and other public messaging channels. These efforts must include development of pre-planned messages/scripts, and improved processes for timely notification to/involvement by OEMHS of incident/facts. Management Action Plan: <i>OEMHS, MCPD and MCFRS have completed the necessary actions to ensure timely notification to and involvement by OEMHS in any future ECC incidents, including early notification as part of the ECC incident response protocols and development of an ECC phone app to expedite notification. In addition, message templates have been completed for existing AlertMontgomery and social media public notification channels for 9-1-1 service incidents. Similar templates are planned for completion by mid-November for the Emergency Alert System (EAS) and Wireless Emergency Alerts (WEA). OEMHS is conducting ongoing coordination meetings with PIOs.</i> 13. OEMHS should also continue their efforts to improve the outreach, timeliness and quality of information communicated through other public notification channels; including the use of (a) Wireless Emergency Alert system and (b) Emergency Alert System as messaging channels, either as alternatives to or in parallel with AlertMontgomery, in the future.¹⁹ OEMHS should also work with the AlertMontgomery vendor to address delays in issuing messages. Management Action Plan: <i>OEMHS has addressed the delays experienced by the AlertMontgomery vendor (Everbridge)</i>

¹⁹ We would encourage that OEMHS conduct appropriate research (including “best practices”) to determine when such notifications should occur and the appropriate message content. Appropriate caution has been raised on this issue by the National Emergency Number Association (NENA) in its “Hot Wash” report: “The process of expecting citizens to know another number (or numbers) to call is both unrealistic and unnecessary in many cases.” [p. 4 of Appendix A]

Incident Event (with <i>Contributing Factors</i>)	Finding/Weakness (with <i>associated Risks</i>)	Recommendations (with <i>Management Action Plan</i>) ¹¹
Initial public notification of service outage occurred nearly 1-hour after start of outage – Social (passive) messaging: MCFRS PIOs at 12:18am; MCPD PIOs at 12:26am; and AlertMontgomery (active) at 1:10am. [Cont'd]	<i>impact the public's understanding and ability to take appropriate action in the event of an emergency requiring MCPD/MCFRS response.</i>	<i>related to issuance of the public notifications, following meetings with the vendor and corrective actions being taken by the vendor. [We learned that the vendor was operating a background software process that delayed the start of message dissemination by 10 minutes. Once it started, it took its normal full cycle processing time of roughly 12 minutes, which is within the expected time of dissemination. The vendor has committed additional hardware support for any period in which similar background processes are operating to prevent delays in initiating the message dissemination.] In addition, the vendor is installing hardware and software upgrades by the end of January 2017 to further improve the speed of message dissemination.</i> <i>OEMHS has completed DHS/FEMA certification, enabling transmission of Wireless Emergency Alerts²⁰ (WEA) and Emergency Alert System²¹ (EAS) alerts; has finalized the protocol for sending WEA/EAS Alerts; and has completed initial formal DHS training on uses of the WEA/EAS Alerts. These messaging channels are fully operational as of 10/31/2016. Additional staff training is continuing.</i>
Council members (and mayors) were initially notified of incident only as part of social messaging or AlertMontgomery communications. <u>Contributing Factors:</u> - <i>Current practice does not provide for specific notifications to Council members and mayors</i>	14. Council members at the August 2, 2016 hearing expressed concern regarding the timeliness of notification to Council members and mayors. - <u>Risk:</u> <i>Not receiving timely and targeted communication on this type of event can adversely impact Councilmembers' ability to respond to constituents' inquiries and concerns.</i>	14. The CAO should establish a policy/practice regarding any enhanced levels of notification to Council members and mayors regarding such incidents. <u>Management Action Plan:</u> <i>The CAO has initiated discussions with Council staff on improving notification and updates to Councilmembers on incidents such as the 9-1-1 service interruption and the Silver Spring fire. A process is being developed to ensure that Council members and staff (and mayors) are notified regarding such incidents and are kept informed of current status, somewhat similar to the process that has been in place for major weather events. This process is expected to be in place by the end of November.</i>

²⁰ Wireless Emergency Alerts – notifies all cellular devices (made after 2011) with a 90-character message. Uses cellular towers and does not require registration.

²¹ Emergency Alert System – sends message to radio and TV control rooms for broadcast over participating station airways.

OTHER OBSERVATIONS

In addition to the findings identified as a result of specific events (discussed above) that occurred during the time leading up to the 9-1-1 service interruption, or during the interruption as the County attempted to restore normal 9-1-1 operations, additional observations were identified and are discussed below. While the following observations cannot be linked to a specific event or outcome that occurred during the service interruption, they do concern both organizational and management improvements that could enhance the County's management of similar situations in the future.

Observation	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan)
While the ECC has a robust Continuity of Operations Plan (COOP) plan and conducts scheduled (roughly quarterly) re-deployments to/from the alternate site ("bug-outs"), COOP drills are not regularly conducted within the ECC, do not include other partners (e.g., DGS, OEMHS), and are not "event" or "scenario" structured. The last COOP drill was apparently conducted sometime in 2015.	15. The effectiveness of COOP plans to manage incidents and mitigate impacts is affected by the quality and attention given to COOP drills and table-top exercises. Best practices call for "event-based" or "scenario-based" drills that include partners who are critical to incident response/recovery. Conducting such table-top exercises that are structured around "if this happens, what do you do" scenarios with relevant partners participating increases the success of real incident management situations. No such drills were evidenced or documented at the ECC within the past 12 months. This observation is supported by NENA's observations during the "Hot Wash" and is included in their recommendations. - Risk: Lack of continuous and appropriately structured training and emergency drills, reduces the likelihood of informed and prepared staff or a smooth transition.	15. The ECC should ensure that appropriate "event-based" COOP table-top exercises are planned and conducted, and should ensure relevant incident-response partners (e.g., DGS, DTS, OEMHS) are identified and participate in the exercises. OEMHS, given their role and experience in emergency response planning and incident management, should take a more active role in assisting ECC management in planning and monitoring the conduct of such exercises. <i>Management Action Plan:</i> OEMHS, MCPD and MCFRS have initiated this process, with a tabletop exercise conducted with Verizon on 9/27/2016. A planning meeting between OEMHS and ECC was conducted on October 7 to develop a schedule and begin development of specific 'event-based' COOP exercises, including participation by other incident-response partners. The next ECC/OEMHS COOP exercise is scheduled for February 15, 2017; the ongoing schedule for such exercises will be developed.
Facility responsibilities (for building maintenance, service, etc.) for the PSCC and the AECC are currently split between two DGS property managers.	16. DGS assigns property manager responsibilities based on geographic location of a facility within the County. - Risk: Mission critical facilities (e.g., PSCC/AECC, County Data Center, Public Safety HQ) have particular sensitivities including response and service needs that differ from other facilities. Operations at these facilities could be adversely impacted if	16. DGS should consider establishing a "mission critical facility team" that would be responsible for facility maintenance and services at the PSCC/AECC, Data Center, PSHQ (and potentially 3-1-1 center). Specific service level expectations should be established for these facilities between DGS and the management of the programs at each facility. <i>Management Action Plan:</i> DGS recognizes the potential benefits of establishing a "mission critical facility team" as one

Observation	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan)
Facility responsibilities (for building maintenance, service, etc.) for the PSCC and the AECC are currently split between two DGS property managers. [Cont'd]	<i>there is not a common property manager responsible for overseeing maintenance and service.</i>	<i>potential solution to enhance the facility management support level for mission-critical facilities. The implementation of this recommendation is contingent on the assignment of additional resources to DGS/DFM. DGS will pursue the requisite resources as part of its FY18 budget formulation. In the interim, DGS will ensure that service level expectations with the programs supported at these facilities are regularly reviewed with the appropriate department officials to ensure that facility needs are being met.</i>
The initial "Hot Wash" phase of the investigation included a one-hour site visit to the AECC which identified potential infrastructure/building issues. These issues include potential grounding capacity, hardening of windows, unprotected roof-mounted condensers, and temperature setting adjustments in equipment rooms.	17. Based on the infrastructure/buildings concerns identified during the "Hot Wash," a more extensive facility assessment would be prudent to identify all facility and equipment capacities that need to be addressed. [NOTE: NENA noted that since these facilities were not purposely built to be an ECC, there may be difficulty in meeting the latest applicable and relevant standards. The planned assessment would facilitate more informed planning for short-term and long-term actions regarding these facilities.] - <i>Risk:</i> <i>Absent a more complete infrastructure assessment, additional risks not identified during the brief "Hot Wash" tour may exist; such risks, if left uncorrected could affect future ECC operations.</i>	17. MCIA should conduct a more extensive Infrastructure assessment of the AECC and the PSCC facilities using best practices and applicable standards to identify all current areas of risks and deficiencies. <i>Management Action Plan:</i> <i>On October 13, MCIA awarded a task order with SC&H Group, a contractor supporting the County's internal audit program, and its subcontractor Winbourne Consulting, to complete this infrastructure assessment. MCIA expects completion of the assessment by early January 2017.</i>
Transition to consolidated 9-1-1 operations at ECC has been actively underway since 2015 (with pre-planning in 2013-2014). The transition is not currently being managed as a major project within the County, with the normal management controls and processes associated with major projects: dedicated project manager, integrated project team, integrated project schedule with regular project/progress assessments	18. The existing structure for managing/supporting the transition, under which managers responsible for managing day-to-day ECC operations (including implementation of new systems/ technologies such as the new CAD and phone systems, 9-1-1 texting emergency/ incident planning and management) AND managing the transition project, is not optimal for successful and timely completion of the consolidation project. In addition, continued	18. MCIA should conduct an assessment, including the use of best practices and benchmarking, of the current transition project (current status of transition, challenges with completing consolidation, and support that may be needed to successfully complete the transition timely), and provide the resulting recommendations to County leadership for decision and action. The County should designate this as a major project, and implement best practices for effective/timely project implementation and completion.

Observation	Finding/Weakness (with associated Risks)	Recommendations (with Management Action Plan)
to senior County officials. There has been a recent retirement of an MCPD Captain who was supporting the transition. Optimal ECC operations will not be achieved until the consolidation is completed.	operation of the ECC under a dual-management structure (MCPD and MCFRS) is not optimal for effective and efficient operations – particularly during emergency incidents. This observation has been supported by NENA’s observations during the “Hot Wash” and included in their recommendations. - Risk: <i>The transition of the ECC to a Consolidated Operations model is a complex project, with multiple stakeholders (including MCPD, MCFRS, DGS, Office of Human Resources, among others). Failure to apply best practices in project management (for major projects) may adversely impact the timing and success of the transition.</i>	<u>Management Action Plan:</u> <i>On September 21, MCIA awarded a task to SC&H Group and its subcontractor Winbourne Consulting to conduct an assessment of the County’s Transition Plan to a consolidated 9-1-1 operations model. The assessment is designed to (1) Confirm that the transition is moving forward timely and efficiently; (2) Identify major risks that would need to be addressed to ensure the success of the consolidation underway; (3) Determine if the current transition effort/plan needs to be modified/enhanced in any way so as to optimize the likelihood of successful and timely transition to the consolidated center; and (4) Propose adjustments to the schedule and planned actions. This assessment is expected to be completed by early January 2017.</i>
Should events impact the ability of both ECC facilities (primary and back-up) to be fully functional, a back-up plan does not currently exist	19. NENA has identified this as an area of concern in their “Hot Wash” report and included in their recommendations. - Risk: <i>While the likelihood of both ECC facilities being unavailable may be small, given the critical nature of 9-1-1 services in serving public safety needs, the absence of a contingency plan in the event that both facilities are unavailable poses a risk to ongoing 9-1-1 services to the County.</i>	19. ECC should assess alternatives for a secondary back-up COOP plan (which could include exploring assistance from regional partners to assist in call-taking/dispatching; or educating/directing the public to contact police/fire stations directly). <u>Management Action Plan:</u> <i>The ECC has initiated discussions with another county in the region regarding the possibilities of creating the desired back-up capability. Additionally, with the implementation of Next Generation 9-1-1 in the next few years, additional opportunities for regional failover will be possible. Either of these may present a good long term option. In the interim, ECC is exploring the used of emerging technologies that would provide a “virtual” secondary back-up capability.</i> <u>Estimated Implementation Date:</u> <i>An update on the discussions with a regional county partner should be available by June 2017.</i>

A Review of the 9-1-1 Operations of Montgomery County Maryland

The National Emergency Number Association

August 23, 2016

Prepared for: SCH Group

Introduction

In response to a request from Montgomery County Maryland and the auditing firm of SCH, the National Emergency Number Association provided a team of 9-1-1 subject matter experts to conduct an initial review and “hot wash” of events surrounding a 9-1-1 system disruption which occurred at The Montgomery County Secondary Emergency Communications Center in July of 2016. The purpose of this activity was to provide support and guidance to the county and their auditing agencies regarding areas of immediate and near-term improvement, as well as basic issues to further research in order to ensure future effectiveness of the 9-1-1 system.

It should be noted that the scope of these efforts was very limited and that NENA will not be engaged in a long term relationship regarding these efforts. Further, in no manner did the National Emergency Number Association provide consulting services, conduct or lead a formal investigation. Actions consisted of conversations which were held with several Montgomery County Employees and site visits to the primary and back-up Emergency Communications Centers. Both were informational and informal in nature. No statements were taken from employees nor were conversations recorded in any manner other than cursory notes. The purpose of the conversations was to provide background information and inform the suggested initial steps recommended in this document.

Process

The team visits to the secondary and primary Montgomery County 9-1-1 communications facilities were to observe operations and identify relevant conditions and equipment as well as observe firsthand the layout and conditions of the facilities. Based on these initial conversations and site observations, NENA provided an initial list of time sensitive recommendations to SCH and Montgomery County at the conclusion of the site visit. This report contains our full and complete suggested next steps for Montgomery County and represents the best educated opinions of the team based on our conversations and observations. It should be noted that these suggestions are a result of limited exposure and only cursory conversation and review. It should be noted we only conducted site visits of one hour at each of the facilities and our observations are reflective of that limited time. Therefore, our comments should not be construed as all-inclusive or comprehensive and should serve only as a starting point for future discussions and possible activities on the part of Montgomery County.

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Summary

In summary, based on our observations, the NENA Team recommends that Montgomery County should take further steps in several key areas:

1) Improve the technical and equipment capacities of their primary and secondary communications centers to ensure that both facilities meet accepted best practices and applicable standards.

During our survey of both sites, there were significant concerns with the back-up site and moderate concerns with the primary site.

At the back-up site, the most apparent issues included:

- The building is not equipped with a sprinkler system;
- The dispatch operations are split between two non-adjacent floors;
- Very little redundancy exists for building HVAC systems;
- The Grounding capacity of the building was unclear and requires review;
- There are no force protections around the site and the building is close to both the sidewalk and the street (a significant security concern);
- The windows on the dispatch floor and in the equipment room appeared to be non-hardened;
- There is no security fencing or other protection around the second set of generators on the north side of the facility;
- There is no apparent containment capacity in the event of a generator fuel spill;
- The roof mounted condensers for the HVAC system appear to be unprotected

At the primary site, the issues include:

- Lack of a perimeter force protection fence;
- Vertical clearances are not conducive to a full height platform floor which increases operational complexity;
- The building was not purpose built as an emergency communications center and therefore may have difficulty meeting the latest applicable and relevant standards

2) Develop a formalized plan for training 9-1-1 personnel on critical operational conditions (such as equipment failures) which focuses on simple, easy to follow checklists to ensure critical operations are maintained during periods of disrupted operations. Relevant personnel from other county agencies and department responsible for systems in the communications facilities should be included in the development and testing of these plans—which should be done on a random basis several times a year.

It became apparent during the conversations with Montgomery County personnel that:

- Additional training on the topic of “irregular operations” would be incredibly beneficial. Dispatch personnel did not apparently follow a prescribed checklist, nor did they communicate well within the center. In essence, despite the co-location, fire and 9-1-1/PD functioned as a Primary (9-1-1/PD) and secondary (Fire) PSAP instead of having a shared or joint approach to the 9-1-1 operation.
- The understanding of responsibilities between various agencies could be improved
- Dispatch personnel should be more aware of the systems in their buildings and possible immediate actions that could be taken to lessen the impact of a system or equipment failure
- There should be regular training on all building systems for those in supervisory roles
- An emphasis should be placed on interagency coordination and cooperation
- One possible tool for this mission may be the 9-1-1 governance board, which could be re-emphasized as a governing body and given increased responsibilities over the 9-1-1 operation.

This speaks to the issue of governance:

- Which could apparently be improved at both the operational and administrative levels

3) Develop policies, procedures and capacities to ensure 9-1-1 calls are answered by trained personnel in the event of a 9-1-1 outage without the need for the public to utilize a myriad of direct dial numbers to local police or fire stations. This should include as a part, efforts to improve resiliency and coordination/cooperation with surrounding agencies.

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- The county should consider it a priority to establish a “roll-over” plan for 9-1-1 calls to ensure they are pointed to an alternate 9-1-1 answering point whenever there is a 9-1-1 failure.
- The process of expecting the citizens to know another number (or numbers) to call is both unrealistic and unnecessary in many cases
- The only time that a local dispatch from police and fire facilities should be considered is if there is a facility failure that renders the county unable to use either the primary or back-up PSAP
- Regional partners should be considered to assist with this endeavor, possibly to answer calls pending the restoration of phone service or stand-up of a back-up site. This process may require radio relay of incidents for dispatch and/or other operational complexities, however it is better than the alternative.

Whatever the end result is:

- All county stakeholders should be engaged in the planning and coordination of such a plan, along with the regional partners designated as back-ups
- In addition, the emergency messaging provided to the public should be centralized, pre-determined, and conducted utilizing the full spectrum of emergency notification resources
- The Office of Emergency Management is a likely leader in this effort—however the governance and ownership of that process must be more clearly defined.

4) Develop a formalized plan regarding consolidation, with emphasis on change management, leadership, and supervision training and the command structure that will oversee 9-1-1 operations at all phases of the transition.

Like many counties in the United States, Montgomery County is in the process of a 9-1-1 consolidation. This can be an incredibly challenging process for any 9-1-1 center—and the facility challenges inherent in Montgomery County will only make it more difficult.

It is our recommendation that the County explore obtaining long-term support for the consolidation process that will focus on human factors, operational impacts, and regional approaches to ensure reliability and resiliency of the 9-1-1 system. These efforts would go beyond the facility related work that will be required if the

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county explores constructing a new Communications Facility which may be advisable given the deficiencies revealed by even a casual observation of the existing back-up site.

CONCLUSIONS

The NENA team was impressed by the dedication and passion of every person that we spoke with and encountered during this process. The personnel of the county are its greatest asset as the county faces future challenges such as new technology and consolidation. The most apparent need is to ensure that these personnel are given the tools, technology and facilities that they need to do the job well. This starts with effective facility design using established best practices for 9-1-1 Center and Emergency Operations Center Design. Although these can be funding intensive, the fact that Montgomery County lies within the Capital Region not only highlights the even more critical role that is played by this center and its personnel, but also potential funding sources that may help alleviate the financial burdens associated with improvements.

Lastly, the most important changes in any organization are human: how people work together and the culture that they work within. Every effort should be made to ensure that attempts to address technological or facility issues do not degrade the organizational culture but, instead, permit it to flourish.

In even the most advanced and capable 9-1-1 centers, there are still issues. The majority of the time they are minor—but some can be and are major with the potential to have serious consequences for the 9-1-1 operation, responders, and the public. The personnel working at that time in the center and on the part of partner county departments will likely determine whether the incident is successfully mitigated or cascades into something much more consequential. Doing everything possible to ensure the best outcomes of these events is the goal of the recommendations we have provided and, we hope, the foundation of the county's future 9-1-1 related efforts.