Parker County

Emergency Services District 1

Parker County, Texas

December 2020

Fire-Rescue LONG-RANGE MASTER PLAN

Emergency Services Consulting International

Providing Expertise & Guidance that Enhances Community Safety

CONTENTS

ACKNOWLEDGMENTS

Emergency Services Consulting International (ESCI) wishes to extend its sincere appreciation to all those who lent their time and assistance to this project.

Our sincere appreciation is extended to each of you…

Stephan Watson
Fire Chief

David Pruitt
Assistant Fire Chief

Kenneth Moore
Battalion Chief

Liz Giles
Administration Manager

April Baldwin
Communications Supervisor

Mark Jack
Commissioner-Board President

Ben Overholt
Commissioner

Saxon Bailey
Commissioner

Brandon Tatarevich
Commissioner

Shawn Scott
Commissioner

…and the rest of the employees and volunteers of Parker County Emergency Services District 1, who selflessly serve their citizens and visitors with honor and distinction.

INTRODUCTION

Parker County Emergency Services District 1 (PCESD1) engaged Emergency Services Consulting International (ESCI) in January 2020 to conduct a long-range Master Plan study, with the intent of assessing the community demographics, associated risks, historical growth of the District, current District operations and service delivery, and projected future population changes. Based on this analysis, recommendations and implementation strategies were developed.

During the winter and spring of 2020, ESCI representatives performed a comprehensive analysis of all aspects of the PCESD1 administration and operation. This analysis included a review of administrative and financial business practices, deployment of personnel, temporal analysis of emergency operations workload and response time performance, assessment of support services delivery, and evaluation of capital apparatus and facilities.

Near the end of the project, ESCI was unable to conduct an in-person site visit due to the COVID-19 pandemic. As a result, representatives interviewed key stakeholders by telephone in an attempt to validate the information previously gathered and analyzed, and learn more about the nuances of the community and fire department operations and challenges. Tours of the fire stations were conducted via FaceTime video service. However, ESCI was able to conduct two community in-person citizen stakeholder meetings to understand their priorities and expectations for their fire district. In addition, a confidential online survey was conducted to allow all department members to provide insights, opinions, and ideas about the current status of the District and its needs.

ESCI's analysis of the communities within the PCESD1 service area, District operations, resource allocation, and community risk revealed several key realities, as summarized in the following list.

- The District and surrounding Parker County area is experiencing sustained growth in residential and commercial development, with associated growth in population.
- The lack of an adopted Fire Code has resulted in unrestrained development that likely impacts the District's ability to respond rapidly and effectively into some District areas.
- The District has had to spend significant time and resources in addressing the growth challenges, resulting in little time to conduct long-range planning.
- The District has excellent equipment, much of it configured to address its unique wildfire vulnerabilities.

- Continued expansion of District emergency response capacity and capabilities, along with coordination with adjacent fire agencies, will be necessary to meet the challenges related to growth.
- The District needs to place additional emphasis on training, fire prevention, and Fire Code enforcement.
- The Parker Fire Alarm Communications Center infrastructure and staffing need to be bolstered.

These realities and more are discussed in detail in this report, and short, mid, and long-term recommendations are offered, with the intent of ensuring the District can continue to provide reliable, safe, and efficient life safety services well into the future.

ORGANIZATION OVERVIEW

The following section consists of an overview of Parker County, Parker County Emergency Services District 1 (PCESD1), and the various components that comprise the emergency services delivery system.

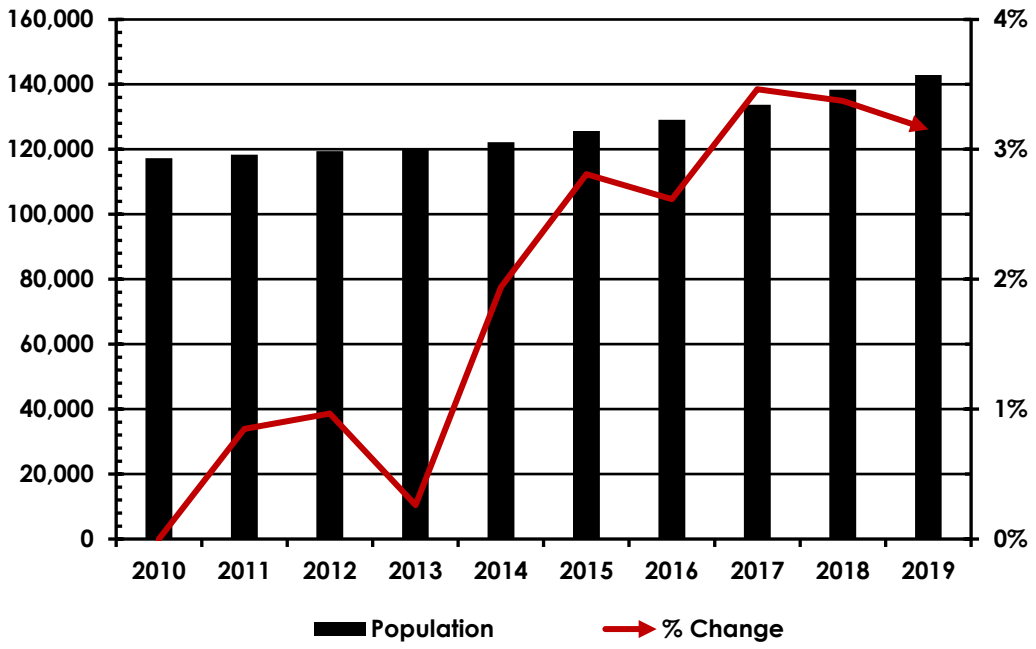
Parker County

Parker County, Texas, is located approximately 15 miles west of downtown Fort Worth, and is approximately 910 square miles in area. The county seat is the City of Weatherford, located in the middle of the county, northwest of the PCESD1 service area. The county has an estimated population of 138,371 of July 1, 2018.[1]

Community Demographics

Overall, the County's population has grown by approximately 18 percent since 2010, with an increase of just over 21,000 new residents. The following figure illustrates resident population growth since 2010:

Figure 1: Parker County Population, 2010–2018[2]



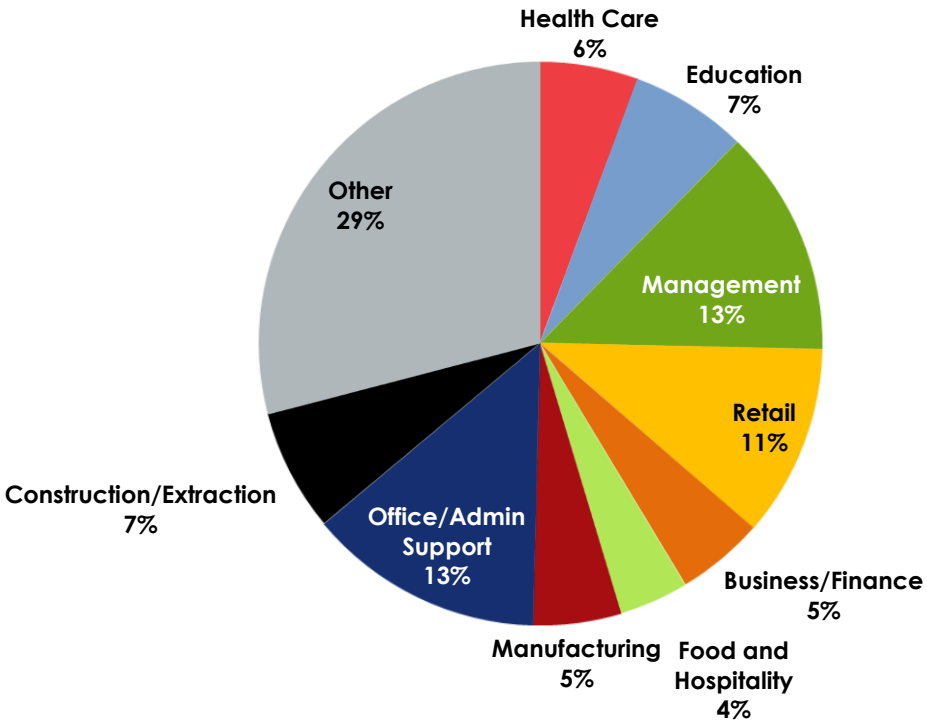
[1] *U.S. Census Bureau Quick Facts, 2020.*

[2] *Texas Demographic Center.*

Economic & Employment Information

The Parker County labor market primarily supports the following economic sectors: Health care and education, trade/transport/utility services, leisure and hospitality services, manufacturing, and business/professional services.[3] The following figure summarizes the various job sectors as of 2017, per the United States Census Bureau's American Community Survey (ACS) 5-year estimate.

Figure 2: Percentage of Job Classifications, Parker County, 2017[4]



Select Demographics

Select demographics for the County—age, sex, ethnicity, poverty level, primary language, education, and health are summarized in the following figures.

[3] *U.S. Department of Labor—Bureau of Labor Statistics.*

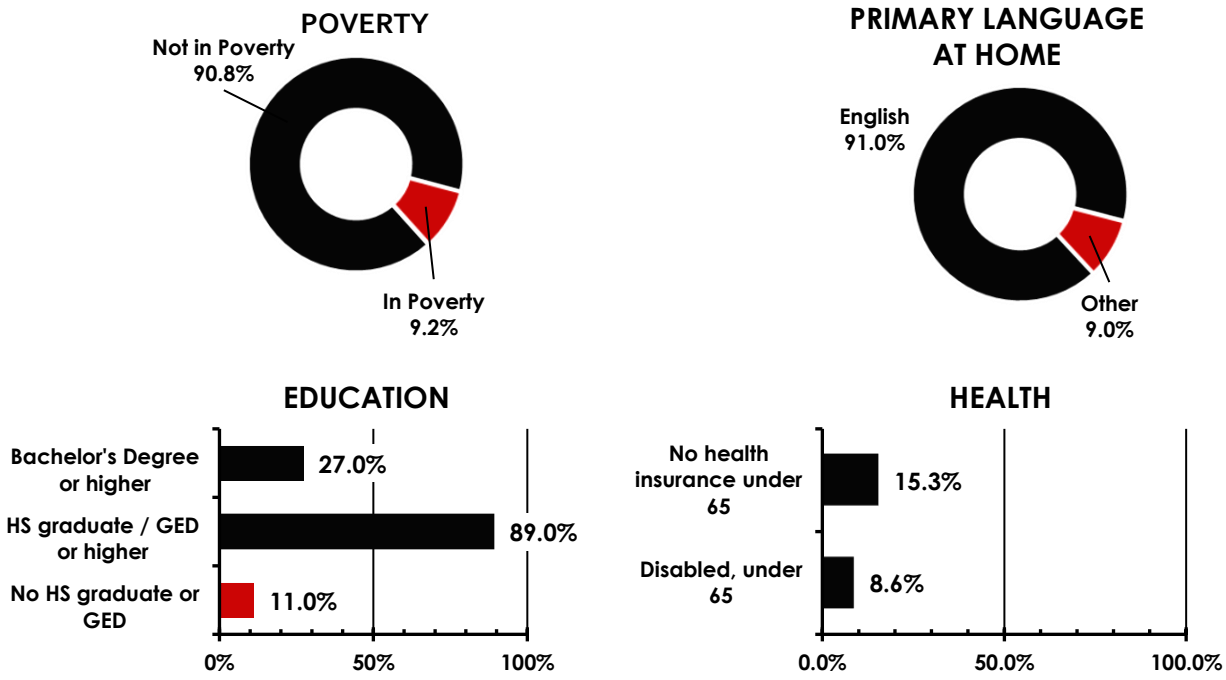
[4] *DataUSA.IO.*

Figure 3: Age & Sex Demographics, Parker County

White is the predominant race in Parker County (82.9%), followed by Hispanic/Latino (12.8%) population. Asian and African Americans comprise 2.3 percent of the population, followed by Hawaiian and Native Americans (under 2%).[5]

The following figures summarize economic, health, and ethnic factors that may impact how emergency services are delivered.

Figure 4: Select Demographics, Parker County



[5] *United States Census Bureau, Quick Facts, 2018.*

Demographics Discussion

In addition to the distribution of the population in Parker County, population demographics can affect the nature of risk and emergency service demand.

An October 2019 NFPA research report, *Home Structure Fires,* cited a study by Gilbert and Butry that determined population "frailty," defined by age- and gender-adjusted natural cause mortality rates, can identify populations vulnerable to fire death but not those vulnerable to non-fatal injuries. The NFPA report revealed that more than half (54%) of the fatal home fire victims were 55 and over, and one-third (34%) were at least 65 years old. One of every five fatal home fire victims was between 55 and 64 years of age. More than two-thirds (69%) of the people who were non-fatally injured were between 35 and 64 years of age. In urban cities, several factors have been identified that place certain groups of people at higher risk of being injured or killed in a fire. Fifty-six percent were male, as were 54 percent of those non-fatally injured.

These segments of the population are also more likely to use fire department services, especially EMS, than other population groups. EMS incidents in 2019 represented just over one-half (52%) of overall service demand in the District. Below is a further explanation of these special risk groups and their impact on emergency services.

Age: The elderly may have difficulty escaping from fire due to physical limitations and diminished sensory perception (primarily hearing and vision). Quality of life issues, chronic illness, and the proliferation of assisted living/nursing home facilities also increase emergency medical services demand. The very young also represent a vulnerable population, as they do not have the ability to appropriately and quickly recognize and react when faced with an immediate and dangerous situation.

Lack of Health Insurance: People under 65 years of age with no health insurance are more prone to chronic illness or exhibit poor physical condition simply because they do not seek prompt treatment. Over 15 percent of Parker County's population under age 65 does not have health insurance, which likely results in higher demand on the EMS system.

Disabilities: People under 65 years of age with disabilities comprise almost 9 percent of the overall County population and may be incapable of quickly recognizing an emergency and reacting appropriately.

Language Barrier: Segments of the population may have cultural differences or language barriers that inhibit their ability to call for help when needed, or effectively communicating their needs and concerns. According to the NFPA, "Language barriers, cultural differences, and inexperience with unfamiliar home technologies are factors that mark the challenges of helping newcomers live safely from the threat of fire in the home."[6] Almost 5 percent of the county's population is foreign-born, and 9 percent of the population speak a language other than English at home.

Low-Income: Those with low incomes use fire and EMS services more often than those with higher incomes. Over 9 percent of the County's population lives below the poverty level.[7] Low income is often combined with other factors such as education or work status.

[6] *Serving immigrant and refugee populations, National Fire Protection Association, 2017.*

[7] *The U.S. Census Bureau 2018 poverty threshold is defined as $13,064 for an individual, $25,554 for a family of four.*

Parker County Emergency Services District 1

PCESD1 is one of six Emergency Service Districts in Parker County. As the largest of the six, PCESD1 encompasses approximately 312 square miles of incorporated and unincorporated land directly west of the City of Fort Worth. The estimated population within PCESD1 is estimated at 60,000, and includes over 24,000 housing units.[8] The two largest cities in the PCESD1 service area are Springtown (population 3,049) and Aledo (population 4,674).[1]

Figure 5: Parker County

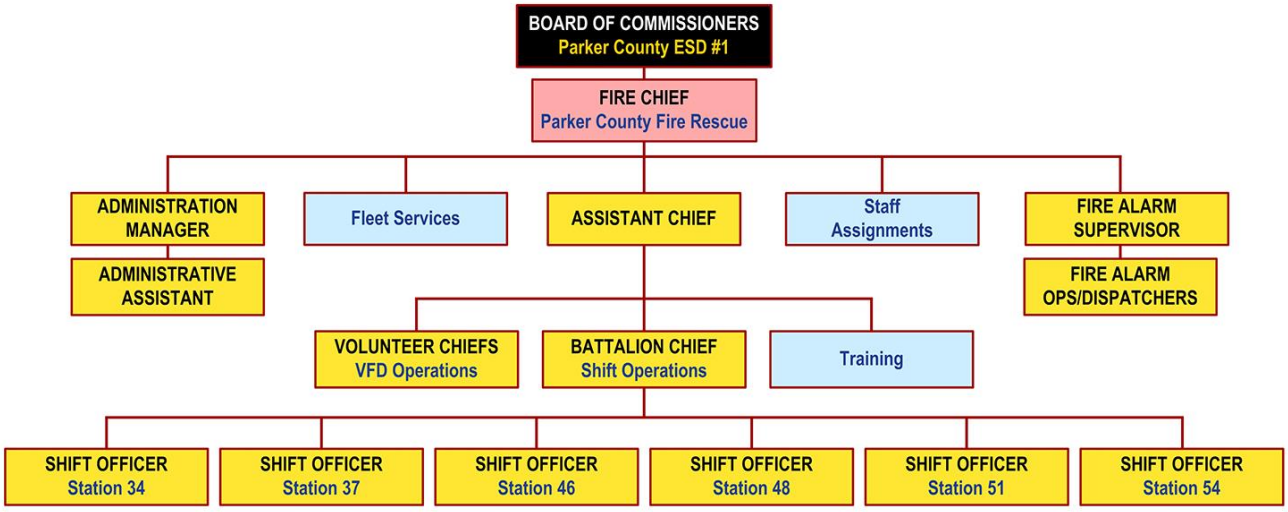
Over the past 20 years, the western Fort Worth suburban area underwent tremendous growth. As a result, the fire departments in the area also underwent a dramatic change, culminating in the formation of the Parker County Emergency Services District 1 in 2001, approximately three years after the formation of a Rural Fire Prevention District (RFPD) in the Springtown Volunteer Fire Department service area. Between 2006 and 2015, the service areas of the five fire departments were annexed into the ESD 1 service area, and personnel services contracts were signed with each department. At the same time, the incremental hiring of full-time firefighters and administrative chief officers occurred. By 2016, five fire stations were staffed 24/7 with two full-time firefighters. In 2017, one fire station was relocated to a new facility, another new station was added, and more full-time employees were hired. In 2018–2019, nine additional firefighters were hired, new fire apparatus was purchased, and property was purchased for a future training center.

[8] *2018 Parker County Appraisal Records.*

Governance & Oversight

A five-person elected Board of Commissioners governs the District. The District is managed by a Fire Chief, who is an at-will employee. The Fire Chief is responsible for overall department operations, including administrative support services. The position oversees an Assistant Chief, who is responsible for operations and training services and career and volunteer personnel, and the Parker Fire Alarm Communications Center Supervisor. A 40-hour assigned Battalion Chief manages the daily activities of all Operations-assigned employees. The Parker County Fire Marshal is responsible for fire code compliance and inspections within the District. The following figure illustrates the organizational chart of PCESD1 as of 2020.

Figure 6: PCESD1 Organizational Structure



Emergency Operations & Deployment

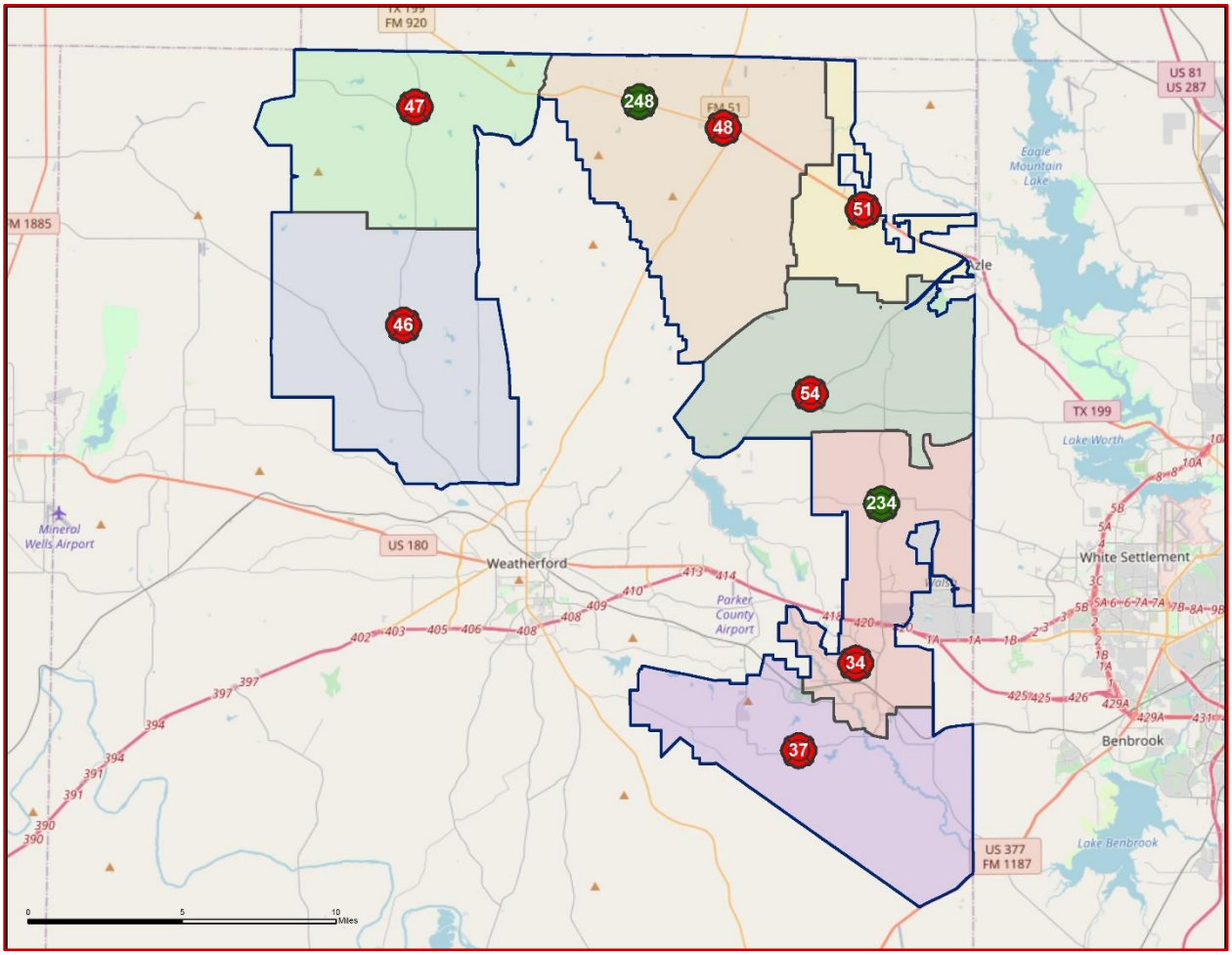
PCESD1 deploys apparatus and personnel from 9 fire stations strategically located throughout the District. Six of the stations are staffed with full-time personnel, and two are staffed by volunteers. One station is staffed from 7 a.m. to 7 p.m. with two firefighters.

PCESD1 is considered a "combination" department, as defined by the National Fire Protection Association (NFPA), deploying both career firefighters and volunteers. As of January 2020, the District employed 46 career personnel (including three administrative support staff, two mechanics, and 11 Emergency Communications Center employees); and 132 volunteer and part-paid firefighters. The District has one single role emergency medical responder as well.

PCESD1 provides traditional fire department services, including all forms of fire suppression and Basic Life Support (BLS) medical first-response (MFR) and some rescue related services. Other technical operations, including limited water rescue capability available through mutual aid request. Hazardous materials responses, and other specialized technical rescue services are provided upon mutual aid request by the Fort Worth Fire Department and Lockheed Martin. The District also staffs the Parker County Fire Alarm Communications Center, which is owned and equipped by Parker County. The Center, located in Weatherford, is funded and overseen by an intergovernmental board comprised of representatives from the six Emergency Services Districts, the City of Willow Park, and Parker County.

The following figure is a GIS illustration showing the project study area.

Figure 7: Study Area



Protection Class Rating

The following Public *Protection Class* (PPC) grades were assigned by the Insurance Services Office (ISO) to various communities within the District's service area.

Figure 8: ISO Protection Class Ratings

Community	PPC Grade
Aledo	2/5
Annetta	3/5
La Junta	3
Peaster	5
Poolville	5
Silver Creek	5
Springtown	3

The PPC system is a nationwide classification rating system used by the Insurance Services Office (ISO) to reflect a community's local fire protection capabilities for property insurance rating purposes. The public fire protection of a city, town, or other area is graded using ISO's Fire Suppression Rating Schedule (FSRS) to develop the community's classification.

In Texas, ISO classifies communities from 1 (the best) to 10 (the worst) based on how well they score on the ISO's FSRS, which evaluates protection components such as water distribution systems, fire department equipment and its workforce, and fire alarm capabilities. ISO field representatives use the schedule when surveying a community's fire protection capability, and score the various components. This score is then translated into a public protection classification. A perfect score in Texas is 104.26. It consists of 50 points for fire department capabilities, 40 points for water supply and distribution, 10 points for receiving and handling fire alarms, and up to 4.26 points for "Texas Exceptions" that give extra credit for compressed air foam systems, certified volunteers, and attending or teaching at the annual firemen's training school at Texas A&M University.[9]

Because of the distribution of population, buildings, and infrastructure throughout the PCESD1 service area, the PPC scores vary between the different communities. The greatest variation in the scores is due to a lack of water systems to support the required fire flows for the building types in the various communities.

[9] *Texas Department of Insurance.*

Components of the Emergency Services System

Fire departments rely on and work with other organizations and personnel that comprise the overall emergency services delivery system. This is particularly true in EMS, which consists of several elements working together to achieve the best patient outcomes.

Ambulance Services

All pre-hospital basic life support (BLS) and advanced life support (ALS) ground ambulance transports in Parker County are performed by *Life Care EMS®,* which is a division of the Parker County Hospital District. The service staffs eight ambulances and one EMS supervisor 24/7 with two paramedics per ambulance. The service also staffs an EMS dispatch center with *Medical Priority Dispatch®* trained dispatchers, who triage and prioritize EMS incidents and provide pre-arrival medical care instructions.

Air medical transport is also available in Parker County. Two air ambulance services provide rotary-wing transport of critically ill or injured patients to medical facilities located in the Fort Worth area.

Emergency Communications

There are three 911 Public Safety Answering Points (PSAPs) in Parker County. They are operated by the City of Weatherford Police Department, Parker County Sheriff's Office, and the City of Springtown Police Department. PCESD1 staffs and operates a fire dispatch center, known as Parker County Fire Alarm (PCFA). The center is located in the Parker County Office of Emergency Management building in Weatherford and provides fire and EMS phone and radio communications services for 7 fire agencies throughout Parker County. Two dispatchers are scheduled during peak weekday times, and one dispatcher works off-peak weekday times. Dispatchers work 8-hour shifts. EMS call triage and dispatching are provided by the private ambulance provider, *LifeCare®*, who closely coordinates with PCFA dispatchers when fire units are needed on EMS incidents.

ESCI noted that during off-peak times, only one dispatcher is scheduled to work. This means that at any time the dispatcher is away from the console for bathroom or meal breaks, they must take a cordless phone and portable radio with them to be able to answer 911 calls and communicate on the radio.

NFPA 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems* Chapter 7.3.1 states that a fire communications center should have a minimum of two dispatchers on duty at all times. While the U.S. Department of Labor's Fair Labor Standards Act (FLSA) or Texas law does not require meal breaks for employees, the emergent nature of a dispatcher's duties should compel a communications center to have a dispatcher immediately available at the dispatch console at all times to answer 911 calls and dispatch units in a timely manner.

MANAGEMENT COMPONENTS

Effectively managing a fire department is a complex task, often impacted by financial constraints, political pressures, and demanding community expectations. Today's fire department must address these complexities by ensuring an efficient and flexible organizational structure, adequacy of response, maintenance of competencies and a qualified workforce, and financial sustainability.

In the following section, ESCI examines PCESD1's current efforts to manage the organization and recommends changes and best practices for the future.

Foundational Management Tenants

The effective management of a fire department needs to be grounded in the creation and adoption of a strong mission, vision, and values. The District has the following established Mission Statement that is posted in all stations:

To passionately protect the lives and property of our citizens, through training, preparedness, dedication, professionalism, and integrity.

The District also has established values that follow the acronym **B.E.S.T.**: ***B****rotherhood,* ***E****xcellence,* ***S****ervice,* ***T****eamwork*. District goals have been established as part of the budget process. However, an inclusive and formal strategic planning process has not been conducted. This process is critical in ensuring everyone in the organization and the community understands why PCESD1 exists, the level of services provided, vision for the department over the next three to five years, and the goals and objectives to get there. ESCI understands that over the past several years, the District has been challenged by simply trying to keep up with growth and resulting service demand.

A successful Strategic Planning process and outcomes should result in organizational improvements in policies and procedures, internal and external communications practices, operational deployment, recordkeeping, and sustainable financial practices, just to name a few. For mission statements, visions and values, and strategic planning to be effective, they must be part of a "living" process, consciously evolving as the department grows and changes.

Management Documents & Processes

For any public organization, documentation of activities is not only required to meet the organizational mission, it also is a legal requirement. Policy and procedure development and maintenance is critical to ensuring a stable, effective, and cohesive organization. It also provides a formal method for memorializing organizational decisions and processes. The District does not have a formally adopted capital facilities plan. Apparatus are placed on a 10-year replacement schedule. However, the District has been aggressively purchasing fire engines and brush trucks to standardize the fleet as the various volunteer fire departments have been absorbed into the District. These purchases are secured via loans that are repaid with ad valorem revenues.

Documents & Processes Discussion

PCESD1 has not updated its policies and procedures since 2018 due to limited administrative staff time and availability. ESCI recommends reviewing and updating the entire document as soon as possible, along with setting up an annual review process of portions of the document, with the goal of the entire document being reviewed in a three-year time frame. The personnel in the review process should include those most familiar with the policy/procedures being assessed, along with a chief level officer, providing overall policy guidance and expertise. Another option for consideration is outsourcing the review and creation of policies and procedures. For example, *Lexipol®,* an online subscription policy maintenance company, provides customized policies and periodic review services to fire departments around the country.

Likewise, the District should expend considerable effort in creating a capital facilities plan, especially given the continued growth in the District's service area. Increased population and buildings will not only result in increased emergency service demand but may also shift call density away from currently located stations. In addition, changes in building safety codes and NFPA standards should be referenced and incorporated into capital facilities planning to ensure a safe working and living environment for firefighters and staff.

Internal Assessment of Critical Issues & Future Challenges

The Fire Chief identified five critical issues facing PCESD1:

- Insufficient staffing, especially at outlying stations.
- Insufficient administrative support and internal communications.
- Lack of established fire code and water supply in unincorporated county areas.
- Uncertain future of sustainable funding.
- Development encroachment into the wildland urban interface.

Interviews with the Fire Chief revealed the above significant challenges are primarily related to community growth and development. These challenges are compounded by the lack of adoption and enforcement of a Fire Code in the unincorporated areas of Parker County. Furthermore, the District is not formally notified or consulted during new construction/development permitting in the unincorporated service areas. Consequently, monitoring property assessment records is the only way the District can identify and monitor construction and development in its service area.

ESCI considers this as a critical issue for the District, as once a building and development are constructed, it forever becomes the responsibility of the fire district, and as additional similar growth occurs, it compounds the life safety response challenges for the District.

Internal & External Communications

In today's "hyper speed" world of communication, the public expects strategic, frequent, responsive, and caring communication from government agencies. Likewise, employees expect the same when disseminating internal messages. Without it, public and employee confidence in the organization can be severely damaged, and informal communication channels may be created to spread false and misleading information throughout the community and organization. ESCI noted that the District does not have a formal assigned Public Information Officer position. Instead, the Chief or designee manages public information statements. Additionally, the various volunteer departments integrated into the District have non-department sanctioned social media accounts.

Specific to internal communications, ESCI noted PCESD1 administration holds routine staff and shift meetings. However, these meetings do not routinely include the volunteers or part-time employees. Information is routinely disseminated to department members through email, memos, communications with company officers, and the District's internal newsletter, *Maltese Crossing*.

Community newsletters, media coverage, websites, and social media are the means most used by fire departments to deliver fire and life safety messages, and information about current political or fiscal issues.

PCESD1 has a website; however, the links are broken, and there is little substantive content. ESCI understands the District has engaged a public relations firm to improve the website, which is still ongoing at this study's publication.

ESCI also noted the District has a Facebook® page and routinely posts photographs and videos of district activities and emergency responses. Over 6,600 people follow the account, and it includes a link to send private messages to the District. The District does not maintain a Twitter® account.

The District also participates in and hosts several community events each year, including pancake breakfasts, food drives, barbeques, and parades. They also engage businesses through the Parker County Economic Development Council, and two local Chamber of Commerce groups.

Communications Discussion

The rapid growth of the District, and integration of the various volunteer fire departments into the District, likely poses significant challenges in ensuring routine and effective communication with internal and external stakeholders. Additionally, lack of administrative support and processes can exacerbate communication gaps, leading to misunderstandings, lack of trust (internally and externally), and lack of support for District programs and needs.

Many emergency response agencies are now using interactive social media tools like Twitter, Facebook, Instagram, and more. These tools are now engrained in the fabric of our society. PCESD1 should explore expanding its social media presence on additional platforms like Twitter and Instagram.

Internal communications are likely constrained by the physical distance between stations and assigned personnel, along with the relative isolation of part-time and volunteer staff. This presents a significant barrier to frequent face-to-face communication and coordination.

Record Keeping & Document Control

In any organization, routine documentation and archiving of activities is a critical function. Sound management decisions cannot be made and supported without accurate data, and organizational transparency to the public will be lost if the department cannot explain and justify its activities.

PCESD1 has a sound process for document control. Hard copy records are secured by lock and key in file cabinets and locked offices. Access to the locked administrative offices is facilitated by personal assigned codes or radio frequency identification (RFID) cards. Electronic files are secured by passwords assigned to users with rights to appropriate documents and backed up on an external hard drive and a cloud-based server. This security results in a three-layer barrier to accessing confidential and sensitive records. These are sound practices in the fire service industry.

Public records requests are fulfilled upon completion of an official Open Records Request form and are responded to within ten days. These requests may result in a copying fee, consistent with state public disclosure rules.

Facility Security & Financial Controls

Significant station security (security cameras and centralized electronic access control) is in place at six of the nine fire stations, the administrative building, and the fleet maintenance facility. Entry into these facilities requires swiping of an individually assigned RFID card key or entering a uniquely assigned personal identification number on a keypad, which is then electronically logged and archived. Stations 47, 234, and 248 only have manual keypad locks. None of the stations have intruder alarms.

Capital and minor equipment and supply inventories are maintained in the District's RMS and inventoried annually. Requests for routine station supplies are received and filled by a firefighter who is responsible for stocking and maintaining a central supply storeroom. There are no inventory controls in place for valuable equipment and supplies. Small capital items—tools and office equipment, for example—are inventoried only on an "as needed" basis.

Certain District employees are issued credit cards that require the use of an assigned personal identification number. The Administrative Manager and Fire Chief oversee all purchasing. Purchasing limits are assigned by rank, and all purchase orders are obtained through the Administrative Manager. The District maintains a petty cash account. However, accessing this cash requires the approval and signature of two Board Members.

Two Board Members also must pre-approve all submitted payroll records prior to the issuance of paychecks. The Administrative Manager or Fire Chief must approve additional payment amounts. Non-budgeted expenses greater than $2,000 must be pre-approved by the Board. Payments and financial records are audited by an outside certified public accounting firm hired by the District.

Security & Financial Controls Discussion

The District appears to have enough financial control and security policies in place, and a sufficient capital equipment inventory process in place as well. Consideration should be given to conducting a capital equipment inventory more frequently to ensure timely reporting and replacement of missing equipment. This should be easy to accomplish depending on the frequency and level of detailed station and apparatus inspections routinely performed.

Citizen Stakeholder Forums

Gathering input from key community stakeholders was an important part of this Master Planning process. The District is keenly aware that the success of the District in maintaining or enhancing future service delivery hinges in no small part on the perceptions, opinions, and support of the various communities, neighborhoods, and businesses. The District and ESCI hosted two community forums on June 12, 2020, in different areas of the District, with a total of 14 participants.

Each session started with a presentation by the PCESD1 Fire Chief, who provided an overview of the District's administration and budget, services provided, past response time performance, and current organizational challenges. Next, ESCI administered a survey to learn more about:

- Community priorities related to the District's overall operation.
- Community priorities related to the specific services provided by the District.
- Opinions on the adequacy of staffing, response performance, and cost of services.
- Specific concerns and opinions related to community expectations of the District.

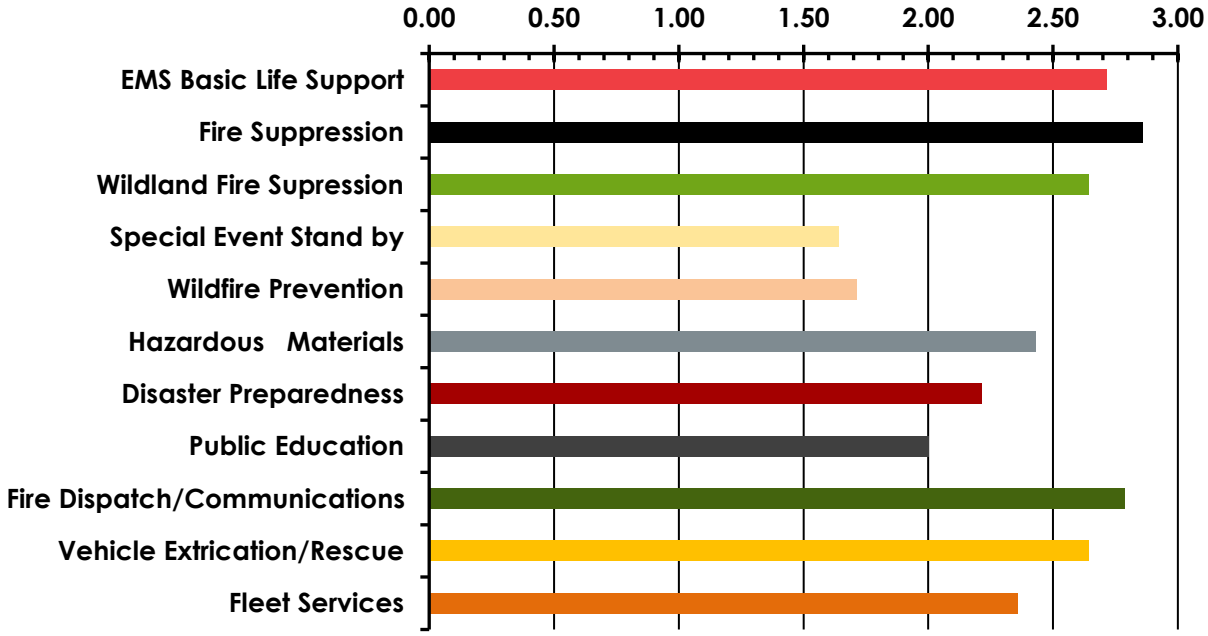
Citizen Service Priorities

The participants were asked to prioritize the following PCESD1 services.

- EMS Basic Life Support
- Fire Suppression
- Wildfire Suppression
- Special Events Standby
- Wildfire prevention
- Hazardous Materials Response
- Disaster Preparedness
- Public Education
- Fire Dispatch/Communications
- Vehicle Extrication/Rescue
- Fleet Services

The following figure summarizes the ranked priorities from both meetings. A "3" on the grading scale equals very important, "2" equals important, and "1" equals not important.

Figure 9: Citizen Service Priorities



As noted in the preceding figure, Fire Suppression, EMS Basic Life Support, Fire Dispatch/Communications, and Wildfire Suppression garnered the highest priority from the participants, and Wildfire Prevention and Special Events Standby were listed as the lowest priorities.

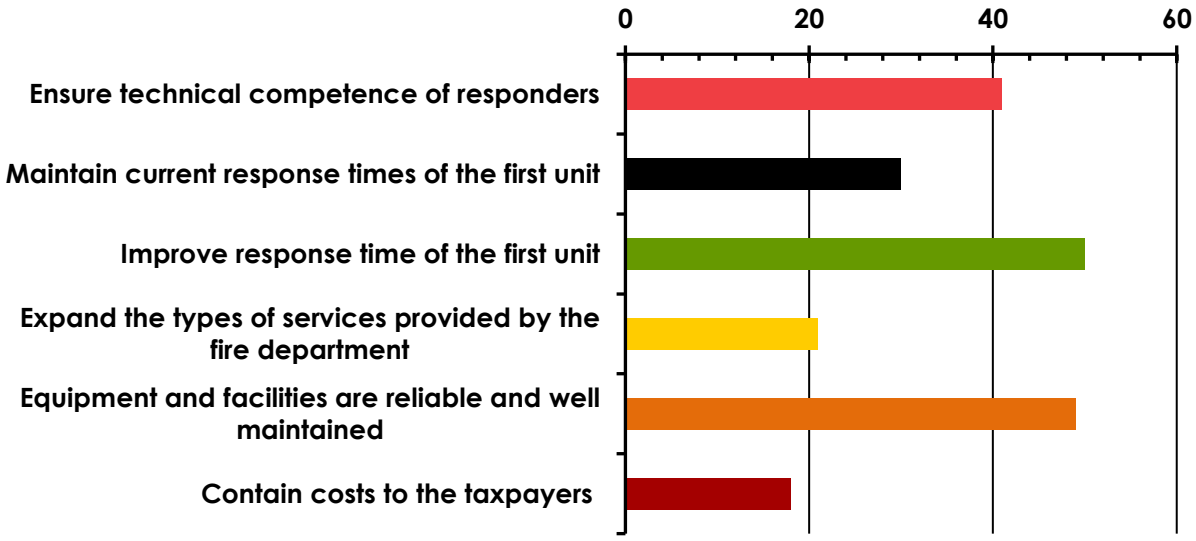
Citizen Planning Priorities

Next, the participants were asked to prioritize the planning priorities common in most fire departments. These priorities include:

- Ensure technical competence of responders.
- Maintain current response times of the first arriving unit.
- Improve response times of the first arriving unit.
- Expand the types of services provided by the District.
- Ensure that equipment and facilities are reliable and well maintained.
- Contain costs to the taxpayers.

The following figure summarizes the participants' planning priority rankings on a sliding scale, with 60 points equaling the highest priority.

Figure 10: Citizen Planning Priorities



Improving response time performance and ensuring facilities and equipment are well-maintained and reliable were viewed as the most important planning priorities. Surprisingly, cost containment was viewed as the lowest priority by the participants.

Opinions on Staffing, Response Performance & Cost

The participants were also asked to make one of three choices of the following three categories.

Staffing	*Overstaffed, Appropriate, Understaffed*
Response	*Too slow/Light, Appropriate, Too Heavy*
Cost	Expensive, Appropriate, Underfunded

The following three figures summarize the participants' judgments in each category.

Figure 11: Staffing Levels

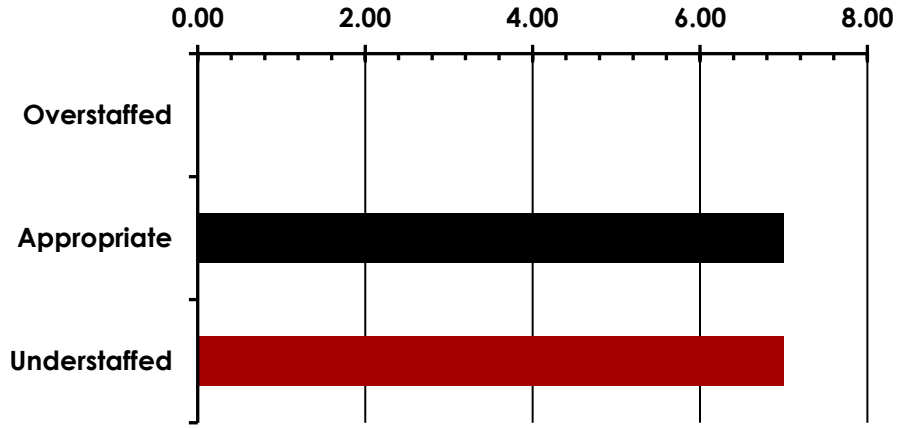


Figure 12: Response Levels

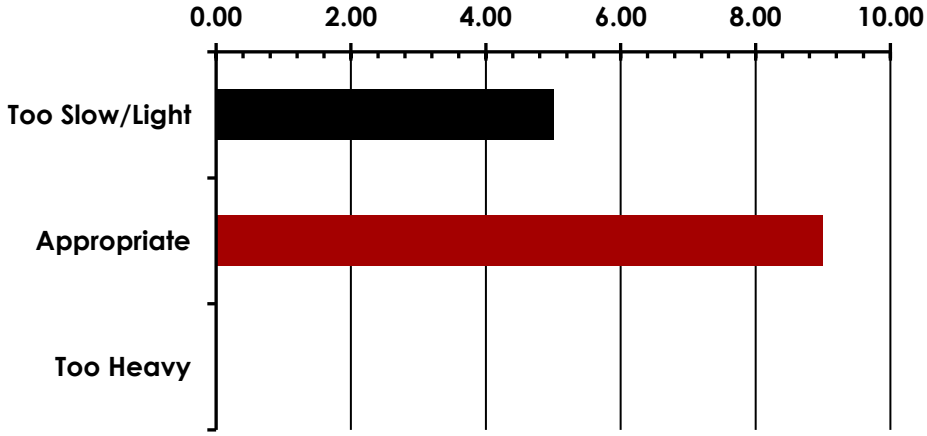
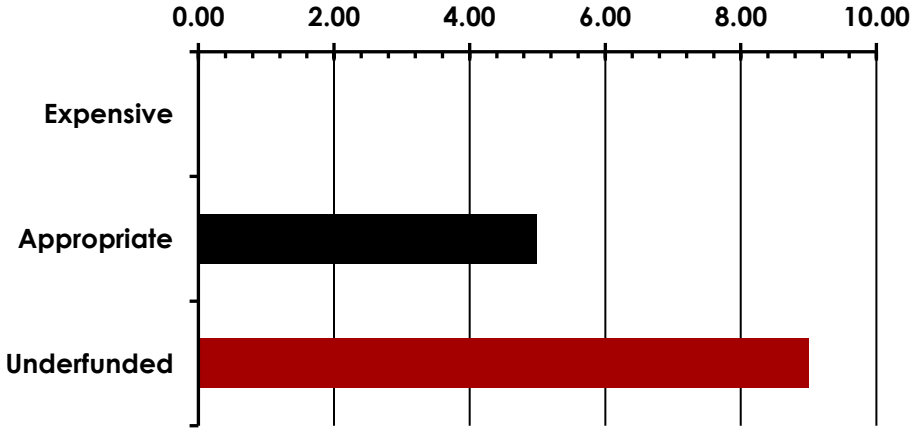


Figure 13: Cost of the Service



The three preceding figures revealed that the participants were fairly evenly split in feeling that the district has enough staff to deliver services. The majority of participants felt that the number of units and staff that arrive on an emergency incident is appropriate, and that the District is likely underfunded. This finding appears to be consistent with the previous finding on cost containment being lesser of a concern as long as alternative and innovative revenue sources can be secured.

Response Time Expectations

Lastly, the participants were queried about their response time expectations. Eighty-six percent of the respondents did not expect the same response time speed throughout the service area. One-hundred percent of the respondents indicated that a unit should arrive on the scene within 8 minutes. Only 14 percent felt that a unit should arrive within 4 minutes, and 56 percent felt that a unit should arrive within 6 minutes.

Citizen Forum Summary

ESCI was impressed with the level of engagement, understanding, and realistic expectations of PCESD1 by the meeting participants. Additional comments shared in the meetings noted the professionalism, competency, and leadership of the organization. They also shared concerns related to lack of road access to many of the new developments in the District, ensuring financial sustainability in the face of continued significant growth, and maintaining response capability and capacity into the future.

FINANCIAL ANALYSIS

The financial health and sustainability of Parker County ESD 1 are critical for ensuring that the District can continue to provide fire services at an acceptable level to the community. To assist Parker County ESD 1 in determining how financial policies have impacted the District's financial sustainability, a data-driven model was developed to represent these policies fairly and consistently. The purpose of modeling is to neutralize normal differences typically found in unilateral financial practices and to identify and account for any financial abnormalities. This allows for a transparent representation of the costs of providing services and a means to measure financial sustainability under status quo conditions. The modeled budget provides a baseline estimate of the current and projected costs of services.

In this section, background information provided by Parker County ESD 1 is used to describe the historical and current financial condition of the District. Understanding of the fire service financial resources and costs within the overall study area begins with an overview of the current operating conditions, including analysis and discussion of the financial structure for the District. This includes a multi-year historical review of revenues and expenses followed by a status quo financial forecast from FY 2020 through FY 2024 utilizing historical trend data and key assumptions about future trajectory. This analysis relies on the financial documentation provided by District staff and includes actual and proposed budgets. Additionally, external annual financial audits as required by Texas General Laws Chapter 775, Section 775.0825(b), for the years 2014 through 2019, were available from the District's external auditor.

The District was originally established on May 2, 1998, by public election to form the Parker County Rural Fire Protection District No. 1, under the provision of Section 48-d of Article III of the Constitution of Texas. On September 13, 2001, the District formally changed its name to Parker County Emergency Services District No. 1 and converted to an emergency services district in accordance with the Texas Health and Safety Code Ann. 794.100 as amended by H.B. #1824. The District has one governmental fund, the General Fund (GF), which is its principal operating and administrative fund used for day-to-day operations and to account for the receipt of ad valorem, sales tax, and other revenues and expenditures.

The District uses a modified accrual basis of accounting in its only major governmental fund with a spending or financial flow measurement focus. Retirement benefits are provided to the District's full-time employees through a nontraditional defined benefit pension plan via the Texas County and District Retirement System (TCDRS). Parker County ESD 1 provides fulltime fire and rescue services throughout the District, and has contracts with Springtown Volunteer Fire Department, La Junta Volunteer Fire Department, Peaster Volunteer Fire Department, Silver Creek Volunteer Fire Department, Aledo Volunteer Fire Department, and Poolville Volunteer Fire Department, augmented by a cadre of volunteer firefighters throughout the District.

The District's primary funding source is ad valorem taxes, with additional revenues via sales tax, fees for services, grants, and investments. The District's millage rate remained flat at the 1.0 mill ($1/$1,000 taxable value or $.10/$100) maximum authorized by District voters, while property values steadily increased by approximately 12.6 percent from 2017. Figure 14 illustrates that the property tax rate of 1 mill raised approximately $4.5 million in 2018 and is projected to increase through 2020. The District operates on a fiscal year which runs from October 1 through September 30 of the following calendar year.

Figure 14: Parker County ESD 1 Ad Valorem Summary 2018

Component	Description
Fiscal Year	Oct 1–Sept 30
Adjusted Taxable Valuation (2018)	$4,484,333
Approximate Ad Valorem Tax Levy	$4,953,999,517
Millage Rate	1.0000

Beginning October 1, 2017, District voters approved the imposition of a ½ cent sales tax and realized an additional $524,882 in revenue for FY 2018 and $782,247 in FY 2019.

The following historical financial analysis and status quo projections represent a snapshot for Parker County ESD 1 and, assuming no changes in organizational structure and working conditions occurred, sets the stage for modeling various alternatives to the status quo should the District wish to do so in the future. The status quo projection utilizes a series of revenue and expenditure assumptions based upon historical trajectory and known or expected future conditions in the community.

Historical Revenue & Expense

Revenue

In Figure 15, the actual revenues for the Parker County ESD 1 General Fund are illustrated for the period 2015 through 2019. Revenues are divided into recurring and non-recurring. Recurring revenues are those such as ad valorem ("maintenance") and sales taxes, other taxes, rentals/leases, and investment/interest income that are reasonably predictable in many cases and expected to continue on a year-to-year basis. Non-recurring revenues, on the other hand, are more sporadic and difficult to predict, such as grant funds, insurance proceeds, donations, sales of surplus property and equipment, transfers, and miscellaneous sources. Bond or loan proceeds, when applicable, are considered non-recurring revenue sources.

Figure 15: Parker County ESD 1 Revenues (2015–2019 Actual)

Revenue	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Actual
Recurring Revenue					
Property Tax	$3,385,253	$3,866,769	$3,928,871	$4,484,333	$4,803,420
Sales Tax	-	-	-	$524,882	$782,247
Charges for Services	$99,292	$33,750	$204,423	$260,806	$230,172
Investment Earnings	$1,142	$1,794	$1,912	$3,279	$8,259
Other Income	$2,097	$38,312	$10,452	$4,540	$34,130
Total	**$3,487,784**	**$3,940,625**	**$4,145,658**	**$5,277,840**	**$5,858,228**
Non-Recurring Revenue					
Operating Grants & Contrib.	$1,789,890	$745,669	$82,145	$156,749	$511,588
Sale of Assets	-	($27,256)	$11,325	$134,072	40,928
Total	**$1,789,890**	**$718,413**	**$93,470**	**$290,821**	**$552,516**
TOTAL REVENUE:	**$5,277,674**	**$4,659,038**	**$4,239,128**	**$5,568,661**	**$6,410,744**

Recurring revenue for the District has increased at an average annual rate of approximately 13.8 percent between 2015 and 2019, and comes from several sources outlined in the following:

- **Ad Valorem (Property Tax)**—Has been based upon a static millage rate of 1.0000 mills (the maximum allowed by the voter-approved tax levy) for the period 2015–19 and which remains at its current capped rate for 2020. Total ad valorem revenue ranged from $3,385,253 in 2015 to $4,803,420 in 2019; a 41.9 percent increase over the period. This represents an average annual increase of approximately 8.4 percent, which has been driven by growth and rising property values in the District.

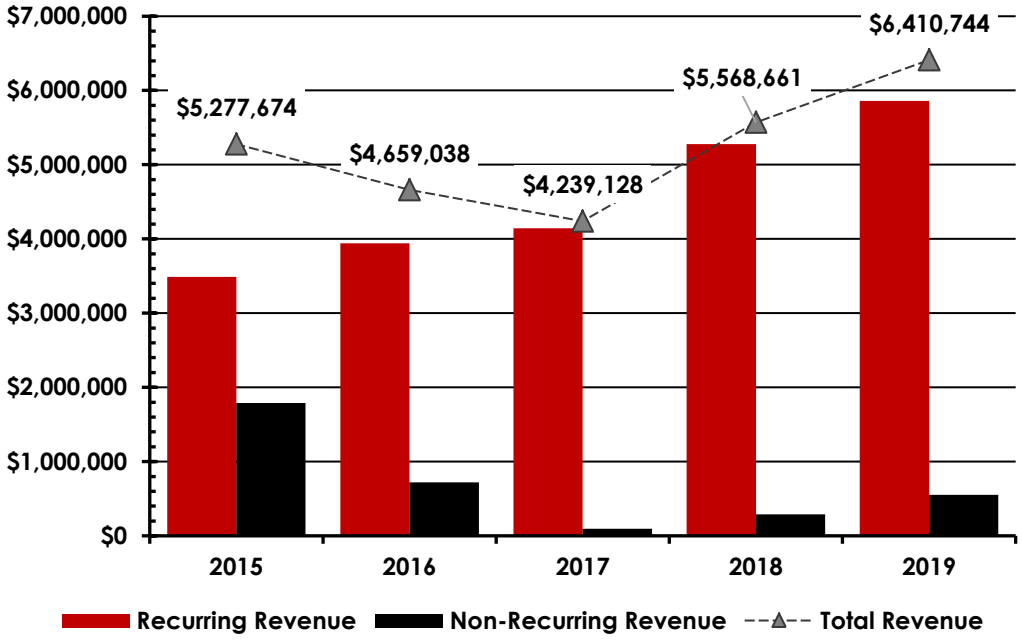
- **Sales and Use Tax**—As authorized by Chapter 775 of the Texas Health and Safety Code and set by voters at 0.5 percent on applicable sales and uses in 2017, provided the District with an additional $524,882 in revenue for FY 2018 and $782,247 in FY 2019.
- **Charges for Services**—As the District continues to grow, charges for services have steadily increased during the period from a low of $33,750 in 2016 to a high of $260,806 in 2018 due to collaborative funding for the fire alarm center with multiple ESDs and the City of Willow Park. Although fire services fees remained relatively flat, the majority of the increase can be attributed to fees for fire dispatch services.
- **Interest Earnings and Penalties**—Have increased over the period from $1,142 in 2015 to $8,259 in 2019, primarily due to the return on temporary investments.
- **Other Income**—Additional revenue sources categorized by auditors as Other Income represent a variable line of revenue that occurred within each year of the period.

Non-recurring revenue for the District, as expected, has varied considerably from a low of $93,470 in 2017 to a high of $1.79 million in 2015, due primarily to the exclusion of capital leases and notes payable from the fund financial statement as a liability that year. The largest component of non-recurring revenue is Operating Grants and Contributions. Non-recurring revenue sources are outlined as follows:

- **Operating Grants and Contributions**—Operating grants and contributions from fund balance represent a category of nonrecurring revenue that assists the District in balancing its annual budget.
- **Sale of Surplus Property**—In 2018, the net position earnings of the District were $134,072 through the sale of assets and $40,928 in 2019.

The following figure compares recurring to non-recurring and total revenue for the District General Fund and shows the impact of steadily increasing ad valorem and sales tax revenue on total revenue. As illustrated in the figure, the annual revenue composition and the ratio of recurring revenues versus non-recurring revenues have seen a pattern of greater reliance on recurring revenue, due primarily to increases to property values, and lesser dependence on non-recurring revenue.

Figure 16: Relationship of Recurring to Non-Recurring Revenues (2015–2018 Actual; 2019 Projected)



Expense

The following figure shows actual General Fund expenditures for the period 2015 through 2019, which are divided into recurring and non-recurring expenses. Recurring expenses are those such as employee wages and benefits, materials and services costs, and debt service (Payments and Interest) that are reasonably predictable and expected to continue from year-to-year.

In some cases, larger fire departments have such a large fleet that they can spend a predictable amount each year on apparatus and equipment replacement. Typically, they consider this a recurring cost and can budget such with an offsetting recurring revenue. Non-recurring expenses, on the other hand, are more sporadic in nature and may be difficult to predict, such as land acquisition, facility construction and major renovation, and large-scale equipment or apparatus purchases. In this analysis, all capital expenditures are shown as non-recurring.

Figure 17: Parker County ESD 1 Expenses (2015–2019)

Expenses	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Actual
Recurring Expense					
ESD Operating (excludes debt)	$217,569	$269,133	$296,085	$367,235	$654,042
Personnel Services	$1,693,864	$2,018,451	$2,520,290	$3,247,032	$3,774,550
Training Programs	$16,609	$29,053	$47,515	$60,107	$72,200
Depreciation	$655,927	$806,015	$828,800	$980,393	$987,077
Debt Service (net position except 2019)	$65,340	-	$51,758	$98,555	$41,193
Total	**$2,649,309**	**$3,122,652**	**$3,744,448**	**$4,753,322**	**$5,529,062**
Non-Recurring Expense					
Capital Purchases (net position)	-	$59,278	$38,216	$3,383	$145
Total Expense:	**-**	**$59,278**	**$38,216**	**$3,383**	**$145**

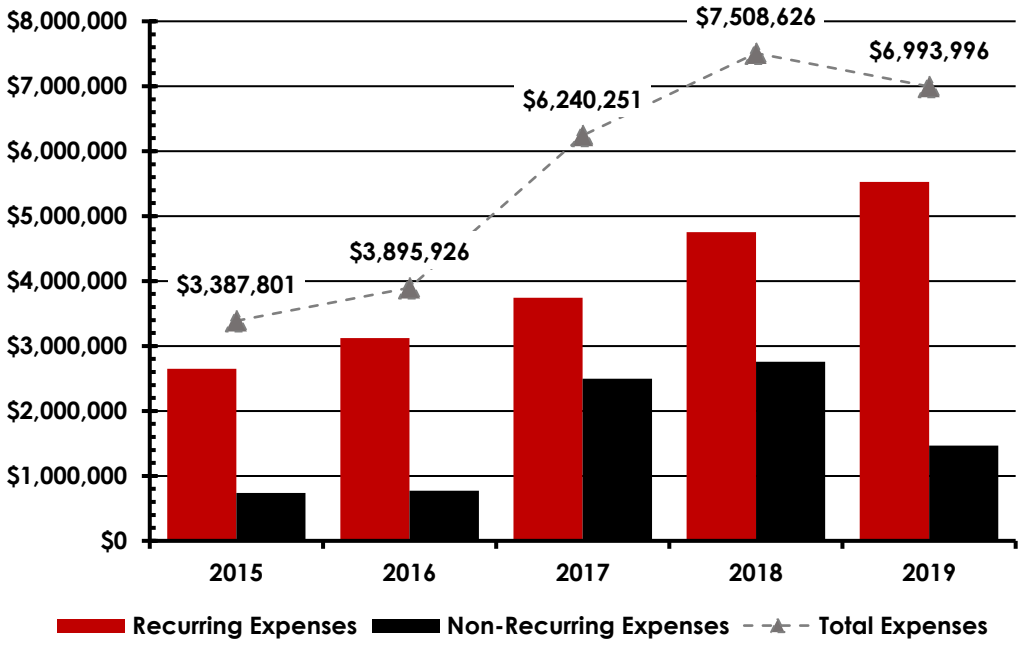
While Figure 17 displays the net positions of each category of expenses, large investments in land, buildings, and equipment have occurred each year. In Figure 18, the actual amounts dedicated to the infrastructure of the District are shown.

Figure 18: Capital Purchases and Debt Service (2015–2019 Actual)

Expenses	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Actual
Non-Recurring Expenses Prior to Reconciliation					
Capital Purchases	$338,777	$372,155	$2,217,598	$1,849,559	$1,130,898
Interest	$68,668	$53,788	$53,695	$75,842	$45,581
Principal	$331,047	$347,331	$224,510	$809,923	$288,455
Issuance	-	-	-	$19,980	-
Total Expense:	**$738,492**	**$773,274**	**$2,495,803**	**$2,755,304**	**$1,464,934**

Figure 19 compares recurring, non-recurring, and total General Fund expenses from 2015 through 2019. The non-recurring expenses for the District have varied from $738,000 in 2015 to $2.7 million in 2018 as the District built fire stations and acquired capital apparatus.

Figure 19: Relationship of Recurring to Non-Recurring Expenses (2015–2019)



Recurring expenses for the District have increased significantly over the period, rising at an average annual rate of 21.7 percent between 2015 and 2019. The major categories are described as follows:

- **ESD Operating Expenses**—In total have increased from $217,569 in 2015 to $654,042 in 2019 (exclusive of debt service accounted for separately in this analysis), for an increase of 200 percent over the period, which represents an average annual increase of 40.1 percent. This increase has been driven primarily by ESD Fleet Operations that increased from $167,141 in 2015 to $584,823 in 2019.
- **Personnel Services**—In total have increased from $1.7 million in 2015 to nearly $3.8 million in 2019 for an increase of 122.8 percent over the period, which represents an average annual increase of approximately 24.6 percent. Costs are projected to increase approaching $4.19 million in 2020 as the District has continued to add full-time staff.
- **Training Programs**—Costs have increased from $16,609 in 2015 to $72,200 in 2019 for an increase of 335 percent over the period or an average annual increase of 66.9 percent.

- **Depreciation**—As the District continues to acquire additional capital assets, the annual impact of depreciation increased from $655,927 in 2015 to $987,077 in 2019. This represents a 50.5 percent increase over the period and a 10.1 percent increase annually.
- **Debt Service**—The District has maintained a debt service that has fluctuated from a net position of $0 in 2016 to $98,555 in 2018. Actual payments for principal and interest fluctuate as well, with $278,205 spent in 2017 to $885,765 in 2018.

As mentioned previously, non-recurring expenses for the District have increased from 2015 through 2019, with various capital construction projects and the acquisition of capital apparatus in 2019.

Net Impact on Fund Balance

District fund balance falls into two major categories, non-spendable and spendable. Spendable fund balance can be further sub-divided depending upon various external and internal requirements. Un-spendable fund balance includes amounts that are either not in spendable form or which are legally or contractually required to be maintained intact. The non-spendable criterion includes items that are not expected to be converted to cash, for example: inventories, deposits, and prepaid items. The District has no un-spendable fund balance.

Spendable fund balance falls into several categories, which include; Restricted, Committed, Assigned, and Unassigned. Restricted reserves are utilized for a specific purpose and are generally constrained by external requirements. Committed reserves are those that can only be spent for specific purposes as formally adopted by Board action. The Board currently has no committed reserves. Assigned reserves are those for formal action that has not been taken but for which there is a purpose identified. Generally, jurisdictions adopt a policy regarding the use of reserves. The District does not have any committed reserves. The final category of spendable reserves is the residual positive fund balance, which is categorized as Unassigned. The District fund balance is all classed as Unassigned, and the District has not adopted a formal fund balance policy.

Unassigned fund balance serves as a reserve for cash carried forward each year. The District's unassigned fund balance is relatively constant, with fluctuations above and below $1.5 million. The following figure shows recurring expenses and the unassigned reserve amounts. It is a good financial practice to maintain a cash reserve equal to or above 2 to 2.5 months (17–21%) of recurring expenses. The Government Financial Officers Association (GFOA) provides guidance on how to account for fund balance and how much is recommended for various purposes.[10] Specifically, GFOA recommends that governments maintain at least two months or just under 17 percent of operating revenues or expenditures at a minimum. Currently, Parker County ESD1 maintains a separate reserve account funded at approximately 25 percent of the annual operating costs. Should Parker County ESD1 wish to adopt GFOA recommendations for best practices regarding reserve funds, additional dollars could be available for spending within the annual budget.

Figure 20: Recurring Expense vs. Unassigned Beginning Fund Balance (2015–2018 Actual)

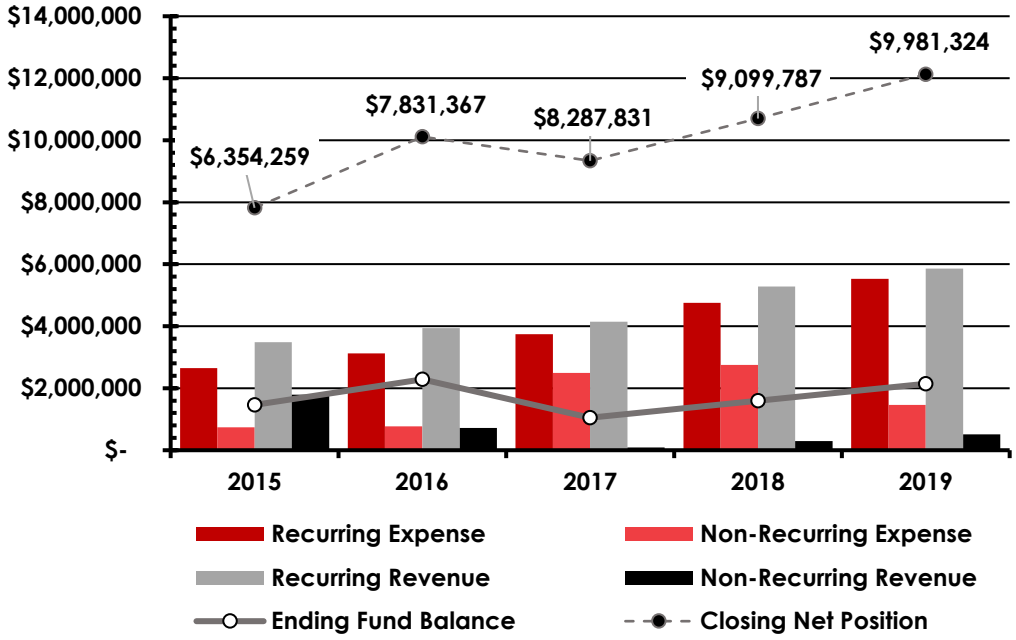
Budget Item	2015	2016	2017	2018	2019
Recurring Expenses	$2,649,309	$3,122,652	$3,744,448	$4,753,322	$5,529,062
Unassigned Fund Balance	$1,464,661	$2,285,913	$1,048,179	$1,600,331	$2,147,471
% of Recurring	55.3%	73.2%	28.0%	33.7%	38.8%

A formal District fund balance policy should be adopted and should explain the level of unrestricted fund balance to be maintained, how it should be used, and how and over what time period it should be restored if used. Risks of various types, whether natural or human-made, should be accounted for when developing the fund balance policy. If the Unassigned reserve amount can be considered as cash carried forward amount that could be used if necessary to cover a portion of recurring operating expense, then the District has maintained a very healthy reserve, which reached its lowest level of 28.0 percent in 2017 and a high of 73.2 percent in 2016. The following figure shows both recurring and non-recurring revenue (gray and black), recurring and non-recurring expense (red and light red), and ending fund balance (gray line) for 2015 through 2019 actual. If the total expenses exceed the total revenues in any given year, then the net loss is covered using reserve funds, and the ending fund balance decreases.

From 2015 through 2019, the District has invested in land, facilities, and equipment. In 2015 and 2016, revenues exceeded expenses; however, in 2017, 2018, and 2019 the opposite was true. During this period of growth and expansion, the District has maintained a healthy fund balance, and the closing net position has increased from $6.3 million in 2015 to nearly $10 million in 2019, a 57.1 percent overall increase.

[10] *http://www.gfoa.org/fund-balance-guidelines-general-fund.*

Figure 21: Relationship of Recurring/Non-Recurring Revenue/Expense & Ending Fund Balance (2015–2019)



Status Quo Projection

ESCI evaluated the historical information provided by the District and its external auditor, as well as portions of the adopted 2020 budget to prepare a status quo forecast for the District. The forecast relies on trends previously developed through the historical review period along with forecast information available from the District when available, to understand potential anomalies due to personnel changes, apparatus acquisitions, and other major events. Certain assumptions were made about revenues and expenses. These assumptions are described in each section.

Two forecasts are provided to gauge sensitivity to the continued addition of career staff and increased benefit amounts, while all other assumptions are held at the same rate of change. The first forecast continues the historical growth rate in total Personnel Services of approximately 10 percent per year. The second projection takes a more conservative approach to Personnel Services' growth at 5 percent annually. This still allows the District to grow but at a slower rate.

Revenue Assumptions

Figure 22 describes the revenue assumptions used in the Parker County ESD1 forecast.

Figure 22: Parker County ESD 1 Revenue Forecast Assumptions (2019–2024)

Revenue Source	Assumptions
Ad Valorem Tax	Has risen at an average annual rate of 8.4 percent from 2015 through 2019, driven by growth and rising property values throughout the District. The forecast assumes a conservative growth rate of 5.5 percent per year while maintaining a millage rate of 1.0 mills.
Sales Tax	Introduced in 2017, sales tax at a rate of 0.5 percent raised $524,882 for FY 2018 and $782,247 in FY 2019, a 33 percent increase. For this analysis, an annual increase of 15 percent was applied to simulate growth.
Charges for Services	This category has grown significantly since 2015, with a 48.7 percent increase annually over the period, due primarily to fees associated with fire alarm and dispatching services. Due to this phenomenal rate of growth, a conservative 10 percent annual increase was applied.
Investment Earnings/ Other Income	Together these form a relatively minor revenue stream and a 1 percent annual increase was used for the forecast.
Grants and Contributions	This source of non-recurring revenue varies greatly from year to year. For the purposes of the forecast, a set rate of $75,000 annually was applied.
Sale of Surplus	No surplus sales are projected for the forecast period.

The following figure is the revenue projection for Parker County ESD 1 for 2019 and projected through the 2024 forecast.

Figure 23: District Revenue Forecast (FY 2019 Projected–2024)

Revenue	2019 Actual	2020 Forecast	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast
Recurring Revenue						
Property Tax	$4,814,010	$5,078,781	$5,358,113	$5,652,810	$5,963,714	$6,291,719
Sales Tax	$782,247	$899,584	$1,034,522	$1,189,700	$1,368,155	$1,573,378
Charges for Services	$230,172	$253,189	$278,508	$306,359	$336,995	$370,694
Investment Earnings	$42,389	$42,813	$43,241	$43,673	$44,110	$44,551
Total	**$5,868,818**	**$6,274,367**	**$6,714,384**	**$7,192,542**	**$7,712,974**	**$8,280,342**
Non-Recurring Revenue						
Operating Grants & Contributions	$624,529	$75,000	$75,000	$75,000	$75,000	$75,000
TOTAL REVENUE:	**$6,493,347**	**$6,349,367**	**$6,789,384**	**$7,267,542**	**$7,787,974**	**$8,355,342**

Expense Assumptions

Figure 24 describes the expense assumptions used in the Parker County ESD 1 forecast.

Figure 24: District Expenditure Forecast Assumptions (FY 2019–2024 Forecast)

Expense Source	Assumptions
ESD Operating Expenses	During the period 2015–18, ESD operating expenses increased an average of 21.7 percent annually, with a large increase occurring in 2019. The forecast assumes a rate of 5 percent annual increase will continue for the period 2019 through 2024. The forecast uses the 2019 actual amount as the basis for the projection.
Personnel Services	Costs increased at an average annual rate of approximately 24.5 percent between 2015 and 2019 as the District continued to add full-time staff and increase benefits. The annual increase between 2018 and 2019 is approximately 16.2 percent. The forecast provides two assumptions to test sensitivity. In the first projection, the forecast assumes that the District continues its rate of staff addition and benefit growth at 20 percent for the entire forecast period. In the second projection, a more conservative growth rate of 10 percent is used throughout the forecast.
Training Programs	These costs have increased at an average annual rate of 66.9 percent between 2015 and 2019 as the department grew. The forecast assumes that the average annual rate of growth will be a conservative 5 percent and that the 2019 amount will be the basis for the projection.
Depreciation	Has risen at a rate from between 3 percent to 22 percent throughout the period. As the District is actively acquiring capital items, a rate of 1 percent is used for the projection.
Debt Service	Debt service is based upon the 2018 amount of $101,938 and is applied as a constant for the forecast.
Capital Purchases	The District should develop a long-range capital improvement plan to include land, facilities, improvements, and capital apparatus and equipment. This will allow the District to model financial performance more adequately. Capital improvements $1,130,898 occurred in 2019 and are projected for $1.86 million in 2020. These amounts are used as a basis for the projection within the respective year and $500,000 used in subsequent years, which is expected to increase at 4 percent annually throughout the forecast period based upon ESCI's historical observation of industry equipment costs.

The following figure is the expenditure forecast for Parker County ESD 1 for 2019 actual through the 2024 projected forecast using the more conservative 10 percent increase in personnel costs.

Figure 25: District Expenditure Forecast (2019 Actual–2024 Forecast)

Expenses	2019 Actual	2020 Forecast	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast
Recurring Expense						
ESD Operating (excludes debt)	$654,042	$655,000	$687,750	$722,138	$758,244	$796,157
Personnel Services	$3,774,550	$4,152,005	$4,567,206	$5,023,926	$5,526,319	$6,078,951
Training Programs	$72,200	$75,810	$79,601	$83,581	$87,760	$92,148
Depreciation	$987,077	$996,948	$1,006,917	$1,016,986	$1,027,156	$1,037,428
Debt Service	$41,338	$101,938	$101,938	$101,938	$101,938	$101,938
Total	**$5,529,207**	**$5,981,701**	**$6,443,411**	**$6,948,568**	**$7,501,417**	**$8,106,620**
Non-Recurring Expense						
Capital Purchases	$1,130,898	$1,866,096	$500,000	$520,000	$540,800	$562,432
Total Expense:	**$6,660,105**	**$7,847,797**	**$6,943,411**	**$7,468,568**	**$8,042,217**	**$8,669,052**

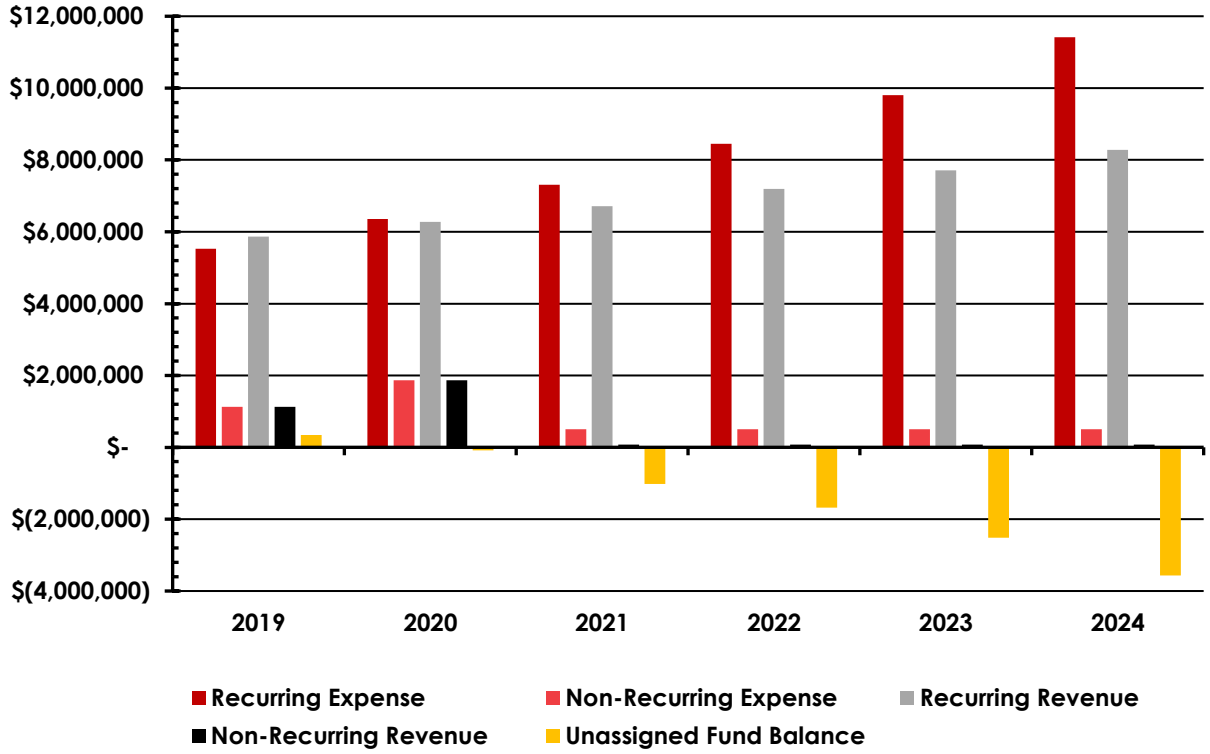
Excluding capital purchases, revenues slightly outpace recurring expenditures when a growth rate of 10 percent is applied to Personnel Services.

Status Quo Forecast

The next two figures provide a sensitivity comparison of the forecast recurring and non-recurring revenues and expenses under two status quo scenarios and their impact on the ending fund balance net position for Parker County ESD 1 for the period 2019 actual through 2024 forecast. In Figure 26, Personnel Services is increased at 20 percent annually as observed historically, while in Figure 27, Personnel Services are increased at a more conservative 10 percent. All other line items are kept the same between the forecasts.

There is a significant difference in the outcome between a 20 percent and 10 percent annual increase in Personnel Services costs. In the first case, by 2020, recurring revenues are first exceeded by recurring expenses, and the District must use the fund balance to meet its recurring obligations. The District's fund balance rapidly depletes if this rate of department growth continues. And, this excludes any significant capital expenses beyond approximately $500,000 annually.

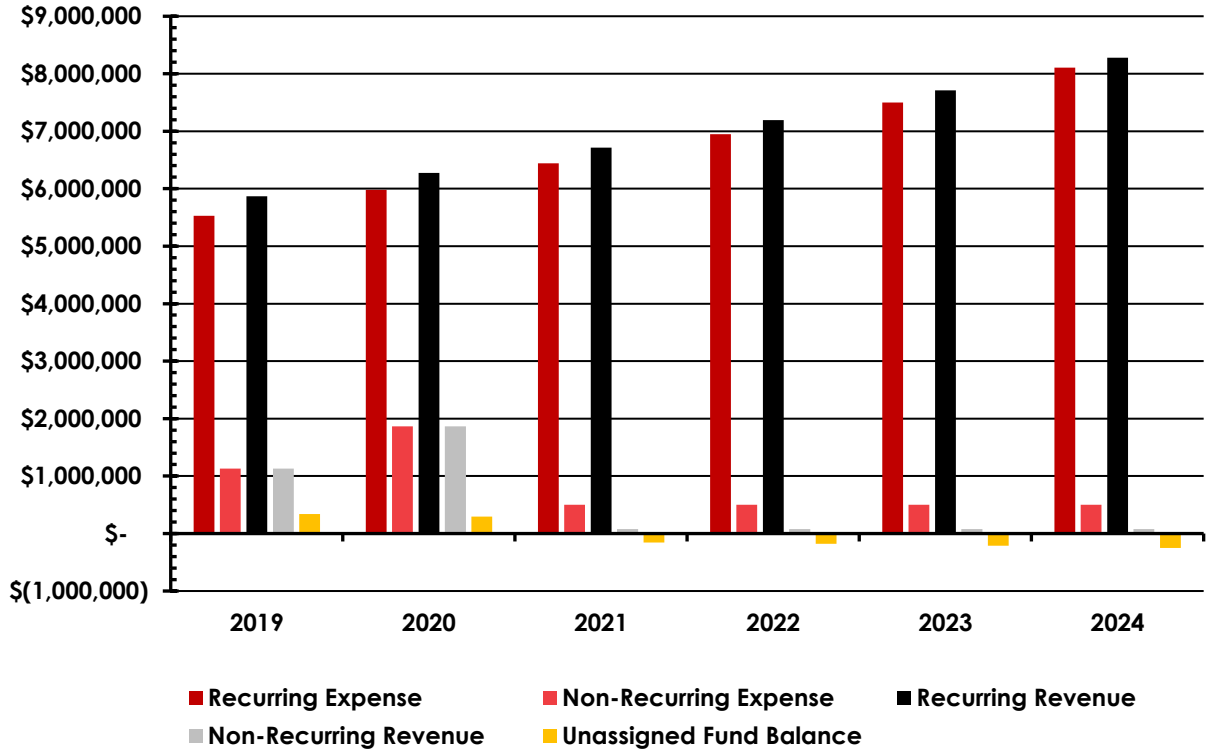
Figure 26: Relationship of Recurring/Non-Recurring Revenue/Expense and Ending Fund Balance (2019 Actual–2024 Forecast)



The above figure assumes a 20 percent annual rate of Increase for Personnel Services.

Conversely, if the District restricts its growth in Personnel Services to 10 percent or less per year through the forecast period, recurring revenue exceeds recurring expense and fund balance decreases slowly across the period from $292,666 in 2020 to ($251,278) in 2024. Although the relationship in recurring revenue and expense are stable throughout the forecast, the District still has plenty of time to adopt a plan to either scale back growth or increase revenue.

Figure 27: Relationship of Recurring/Non-Recurring Revenue/Expense and Ending Fund Balance (2019 Actual–2024 Forecast)



The above figure assumes a 10 percent Rate of Increase for Personnel Services. Based on these models, should Parker County ESD1 wish to expand fire rescue services at a rate in excess of 10 percent annually, additional revenue streams should be considered to ensure sufficient revenues are available. Although an additional one cent tax increase would require a referendum vote, an increase of this magnitude could as much as triple current sales tax revenues and ensure adequate funding would be available for future personnel and operating expenses.

CAPITAL ASSETS & CAPITAL REPLACEMENT PROGRAMS

For a fire department to carry out its primary mission, it must maintain three basic resources: trained personnel, firefighting equipment, and fire stations. No matter how competent or numerous the firefighters, if appropriate capital equipment is not available for use by responders, it would be impossible for the District to deliver services effectively. The most essential capital assets for use in emergency operations are facilities and apparatus (response vehicles). Of course, the District's financing ability will determine the level of capital equipment it can acquire for use by emergency personnel. This section of the report is an assessment of the respective capital facilities, vehicles, and apparatus of PCESD1.

Fire Stations & Other Facilities

Fire stations play an integral role in the delivery of emergency services for several reasons. To a large degree, a station's location will dictate response times to emergencies. A poorly located station can mean the difference between confining a fire to a single room and losing the structure. Fire stations also need to be designed to adequately house equipment and apparatus, as well as meet the needs of the organization and its career and volunteer personnel—as well as administrative support staff where applicable. It is important to research needs based on service-demand, response times, types of emergencies, and projected growth prior to making a station placement commitment.

Consideration should be given to a fire station's ability to support the fire department's mission as it exists today and into the future. The activities that take place within a fire station should be scrutinized to ensure the structure is adequate in both size and function. Examples of these functions include the following:

- The housing and cleaning of apparatus and equipment; including decontamination and disposal of biohazards.
- Residential living space and sleeping quarters for on-duty personnel (all genders).
- Kitchen facilities, appliances, and storage.
- Bathrooms and showers (all genders).
- Administrative and management offices; computer stations and office facilities for personnel.
- Training, classroom, and library areas.
- Firefighter fitness area.
- Public meeting space.

ESCI asked ESD1 staff to rate the condition of each of its fire stations using the criteria in the following figure.

Figure 28: Criteria Utilized to Determine Fire Station Condition

Excellent	Like new condition. No visible structural defects. The facility is clean and well maintained. The interior layout is conducive to function with no unnecessary impediments to the apparatus bays or offices. No significant defect history. Design and construction match the building's purposes. Age is typically less than 10 years.
Good	The exterior has a good appearance with minor or no defects. Clean lines, good workflow design, and only minor wear of the building interior. Roof and apparatus apron are in good working order, absent any significant full-thickness cracks or crumbling of apron surface or visible roof patches or leaks. Design and construction match the building's purposes. Age is typically less than 20 years.
Fair	The building appears structurally sound with a weathered appearance and minor to moderate non-structural defects. The interior condition shows normal wear and tear, but flows effectively to the apparatus bay or offices. Mechanical systems are in working order. Building design and construction may not match the building's purposes well. Showing increasing age-related maintenance, but with no critical defects. Age is typically 30 years or more.
Poor	The building appears to be cosmetically weathered and worn, potentially with structural defects, although not imminently dangerous or unsafe. Large, multiple full-thickness cracks and crumbling of concrete on the apron may exist. The roof has evidence of leaking and/or multiple repairs. The interior is poorly maintained or showing signs of advanced deterioration, with moderate to significant non-structural defects. Problematic age-related maintenance and/or major defects are evident. May not be well suited to its intended purpose. Age is typically greater than 40 years.

ESCI virtually toured most of the stations operated by PCESD1, except for two small crewless stations that are essentially apparatus storage buildings. These observations, combined with the information provided by the District for each station, produced the observations listed in the following figures.

Figure 29: Fire Station 34 (Aledo)

Address/Physical Location:	991 Bailey Ranch Rd.

General Description:
Staffed station, with an engine company, two Type 5 and one Type 4 brush trucks, a rescue/support unit, and water tender.

Structure						
Construction Type	Type 2 steel & masonry & wood frame/brick veneer					
Date of Construction	2017					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Excellent					
Number of Apparatus Bays	3	Drive-through bays			2	Back-in bays
Special Considerations	Yes					
Square Footage	8,900					
Facilities Available						
Separate Rooms/Dormitory/Other	5	Bedrooms	5	Beds	0	Dormitory Beds
Maximum Station Staffing	4 up to 7 with some reconfiguration					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Extractor & gear dryer					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Monitored alarm system					
Decon./Biohazard Disposal	Yes					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 30: Fire Station 37 (Annetta South)

Address/Physical Location:	701 Thunderhead Rd.

General Description:
Staffed station, with engine company, Type 5 brush truck, and water tender.

Structure						
Construction Type	Type 2 steel & masonry & wood frame/brick veneer					
Date of Construction	2017					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Excellent					
Number of Apparatus Bays	2	Drive-through bays			1	Back-in bays
Special Considerations	Yes					
Square Footage	6,200					
Facilities Available						
Separate Rooms/Dormitory/Other	5	Bedrooms	5	Beds	0	Dormitory Beds
Maximum Station Staffing	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Monitored alarm system					
Decon./Biohazard Disposal	Yes					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 31: Fire Station 46 (Peaster)

Address/Physical Location:	221 Judd St.

General Description:
Staffed station. An addition was made to the station in 2000, and renovation in 2011. Design does not flow well. Houses an engine, two Type 5 brush trucks, and a water tender.

Structure						
Construction Type	Metal building, wood-frame quarters					
Date of Construction	1970s					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	0	Drive-through bays			6	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	5,700					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	3	Dormitory Beds
Maximum Station Staffing	3					
Exercise/Workout Facilities	In apparatus bay					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decon./Biohazard Disposal	No					
Security	Cameras & access control					
Apparatus Exhaust System	No					

Figure 32: Fire Station 47 (Poolville)

Address/Physical Location:	16140 FM 920

General Description:
Uncrewed station. Houses an engine, a Type 4 brush truck, a Type 5 brush truck, a rescue/support unit, a rescue all-terrain vehicle, and a water tender. No living quarters. Training room and bathroom only.

Structure						
Construction Type	Metal Building					
Date of Construction	1995, addition in 2001					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays			6	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	4,700					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dormitory Beds
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	No					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	No					
Decon./Biohazard Disposal	No					
Security	No					
Apparatus Exhaust System	No					

Figure 33: Fire Station 48 (Springtown)

Address/Physical Location:	215 Goshen Rd.

General Description:
Staffed station, with an engine company, two Type 5 brush trucks, one Type 4 brush truck, a rescue/support unit, and a water tender.

Structure						
Construction Type	Metal building; masonry; wood-frame quarters					
Date of Construction	1998 (renovation 2019/2020)					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	4	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	11,000					
Facilities Available						
Separate Rooms/Dormitory/Other	6	Bedrooms	6	Beds	0	Dormitory Beds
Maximum Station Staffing	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Extractor w/gear dryer					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decon./Biohazard Disposal	No					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 34: Fire Station 51 (La Junta)

Address/Physical Location:	4480 East Hwy. 199

General Description:
Staffed fire station, with engine company, two Type 5 brush trucks, and a water tender.

Structure						
Construction Type	Metal building; masonry; wood-frame quarters					
Date of Construction	2000, addition and renovation 2018/2019					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	3	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	5,900					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Station Staffing	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decon./Biohazard Disposal	Yes					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 35: Fire Station 54 (Silver Creek)

Address/Physical Location:	6901 FM 730 South					
	**General Description:** Staffed station, with one engine company, a Type 4 brush truck, a Type 5 brush truck, and a water tender. Also houses the District SCBA maintenance station.					
Structure						
Construction Type	Metal Building, wood frame quarters					
Date of Construction	Not reported					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	0	Drive-through bays			5	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	6,200					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Station Staffing	3					
Exercise/Workout Facilities	Yes, in apparatus bay					
Kitchen Facilities	Yes					
Individual Lockers/Storage	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decon./Biohazard Disposal	No					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 36: Fire Station 234

Address/Physical Location:	6085 White Settlement Rd.

General Description:
Unmanned station. Houses an engine and a Type 6 brush truck.

Structure						
Construction Type	Metal Building					
Date of Construction	1998					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays			2	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	1,250					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dorm Beds
Maximum Station Staffing	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	No					
Training/Meeting Rooms	No					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	No					
Decon./Biohazard Disposal	No					
Security	No					
Apparatus Exhaust System	No					

Figure 37: Fire Station 248

Address/Physical Location:	3050 W. Hwy 199, Springtown

General Description:
Unmanned station. Houses an engine. No living quarters. Has an office and bathroom.

Structure						
Construction Type	Metal building					
Date of Construction	1999					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays			3	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	2,100					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dorm Beds
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	No					
Training/Meeting Rooms	No					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	No					
Decon./Biohazard Disposal	No					
Security	No					
Apparatus Exhaust System	No					

Figure 38: Parker County ESD 1 Administration Facility

Address/Physical Location:	315 Morrow Rd.

General Description:
Administration offices only. Also serves as central supply stores for all stations.

Structure						
Construction Type	Metal building, wood-frame interior					
Date of Construction	2010					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Excellent					
Number of Apparatus Bays	0	Drive-through bays			1	Back-in bays
Special Considerations (ADA, etc.)	Yes					
Square Footage	5,000					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Dormitory Beds
Maximum Station Staffing	6 offices					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage	No					
Shower Facilities	No					
Training/Meeting Rooms	Yes					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Security	Cameras and access control					
Apparatus Exhaust System	No					

Figure 39: Parker County ESD 1 Fleet Services Facility

Address/Physical Location:	315 Morrow Rd. #2

General Description:
Three back-in bay shop with truck lifts and hoists. Located adjacent to the Administration building.

Structure				
Construction Type	Metal building			
Date of Construction	2011			
Seismic Protection	No			
Auxiliary Power	No			
General Condition	Excellent			
Number of Apparatus Bays	0	Drive-through bays	3	Back-in bays
Special Considerations (ADA, etc.)	No			
Square Footage	3,600			
Facilities Available				
Kitchen Facilities	No (But has access to Administration kitchen)			
Individual Lockers/Storage	No			
Shower Facilities	Yes			
Training/Meeting Rooms	No			
Washer/Dryer	No			
Safety & Security				
Sprinklers	No			
Smoke Detection	Yes			
Security	Cameras & access control			
Apparatus Exhaust System	Exhaust fan only			

Capital Facilities Discussion

Each of the stations is well cared for and supports the assigned operations. ESCI noted that none of the stations have point-capture vehicle exhaust systems, and Stations 46 and 54 have their exercise equipment areas located in an apparatus bay.

ESCI identified two potentially significant issues related to commonly accepted life safety codes. Station 46's living quarters are located on the second floor, and a single wood framed stairwell from the apparatus floor is the only access/egress point. In addition, none of the bedrooms have exterior openable windows for egress during a fire. A similar issue was identified at Station 54, where years ago, two "extra" bedrooms were installed on the second floor, with a wooden stairway as the only access point from the apparatus floor. Neither station has a monitored fire alarm system or sprinkler system.

While there is no adopted Fire Code in Parker County, the District should identify the most appropriate approach in ensuring sleeping firefighters can quickly escape from the second floor unimpeded. Further, the District should follow commonly accepted Building and Fire Codes when performing alterations and renovations in the future.

The District has 11 separate buildings (not counting separate storage buildings) spread across the District. Each of these facilities has systems that need constant attention, including heating and ventilation equipment, electrical systems, generators, water and sewer treatment systems, and station alerting systems. Currently, maintenance and repair of these systems and the building envelopes are coordinated by the District's command staff. Consideration should be given to securing a Facilities Manager, with extensive experience in maintaining properties, or contract out for this service.

Capital Apparatus & Vehicles

Fire apparatus, rescue vehicles, certain command units, and support vehicles are unique and expensive pieces of equipment customized to operate for a specific community and defined mission. Other than its firefighters, officers, and support staff, the next most important resources in a fire department are likely the fire apparatus and special operations vehicles.

Apparatus must be sufficiently reliable to transport firefighters and equipment rapidly and safely to an incident scene. Such vehicles must be equipped properly and function appropriately to ensure that the delivery of emergency services is not compromised. For this reason, they are very expensive and offer little flexibility in use and reassignment to other missions.

Parker County ESD 1 Frontline Apparatus Inventory

PCESD1 is currently in the process of acquiring new apparatus that will include tankers (water tenders) and rescues. These are expected to be delivered in the latter half of 2020. The next two figures list the current inventory of Parker County ESD 1's frontline fleet of its engines, tankers, and wildland units (brush trucks).

Figure 40: Parker County ESD 1 Engine & Tanker Inventory (2020)

Unit	Type	Make	Year	Condition	Features
Engines					
E 34[A]	Engine	Pierce	2020	Excellent	1500 gpm/750 gal/CAFS
E 37	Engine	Pierce	2020	Excellent	1500 gpm/750 gal/CAFS
E 46[A]	Engine	Pierce	2018	Excellent	1500 gpm/1500 gal/CAFS
E 47[A,B]	Engine	Pierce	2004	Good	1250 gpm/1000 gal
E 48[A]	Engine	Pierce	2020	Good	1500 gpm/750 gal/CAFS
E 51	Engine	Pierce	2020	Excellent	1500 gpm/1500 gal/CAFS
E 54	Engine	Pierce	2018	Excellent	1500 gpm/1500 gal/CAFS
E 234[B]	Engine	Pierce	2007	Fair	1000 gpm/1000 gal
Tankers (Water Tenders)					
T 34	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 37[A]	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 46	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 47[B]	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 48[A]	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 51[A]	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal
T 54	Tanker	LaFrance	2003	Good	1000 gpm/3000 gal

[A]To be sold or traded or moved to reserve when new apparatus arrive. [B]Assigned to Volunteers.

As mentioned previously, two new tankers and two new rescues will be delivered in the first quarter of 2021. The new tankers will be assigned to Tanker 34 and Tanker 48. The existing Tanker 37 and Tanker 51 will be traded in. The current Tanker 34 will be assigned to Tanker 37, and the current Tanker 48 will be assigned to Tanker 51. The District also has two reserve engines, both 2013 Pierce 1500gpm/1000 gal/CAFS. The existing Support 34 and Support 48 will be sold, and replaced with the new rescue apparatus on order.

The next figure lists Parker County ESD 1's significant inventory of wildland apparatus, which consists of brush trucks.

Figure 41: Parker County ESD 1 Wildland Apparatus & Support Units Inventory (2020)

Unit	Type	Make	Year	Condition
Wildland Apparatus				
B 34	Brush Type 5	Skeeter	2019	Excellent
B 234	Brush Type 5	Ford (in-house)	2005	Good
B 334	Brush Type 4	Siddons-Martin	2005	Fair
B 37	Brush Type 5	Siddons-Martin	2008	Good
B 46	Brush Type 5	Skeeter	2020	Excellent
B 246	Brush Type 5	Ford (in-house)	2004	Good
B 47	Brush Type 4	Skeeter	2019	Excellent
B 247	Brush Type 5	Siddons-Martin	2008	Good
B 48	Brush Type 5	Ford (in-house)	2005	Fair
B 248	Brush Type 5	Dodge (in-house)	2015	Good
B 51	Brush Type 5	Dodge (in-house)	2015	Good
B 251	Brush Type 5	Ford (in-house)	2006	Good
B 54	Brush Type 5	Skeeter	2019	Excellent
B 254	Brush Type 4	Wildfire	2007	Good
HB 48	Brush Type 4	S & S (in-house)	2000	Good
Support & Specialty Units				
R 47	Rescue/Air	Ford (local vendor)	2015	Good
Support 34	Rescue/Air	Ford (local vendor)	2009	Fair
Support 48	Rescue/Air	Pierce	2008	Good
Ranger 47	ATV	Polaris	2003	*Not reported*

Of the 15 Type 4 and Type 5 brush trucks, four (27%) were rated by the District to be in "Excellent" condition, nine (60%) in "Good" condition, and two (13%) in "Fair" condition. Support Unit 34 (Unit 153) and Support Unit 48 (Unit 150) will be sold or traded and replaced with two new units. The new units will be designated as "Rescues" that will include light towers and Cascade systems (air).

Figure 42: Parker County ESD 1 Command & Staff Vehicles Inventory (2020)

Unit	Assigned To	Make	Year	Condition
Chief 100	Fire Chief	Chevrolet Silverado	2018	Excellent
Chief 101	Asst. Chief	Chevrolet Silverado	2016	Excellent
Battalion 101	Battalion Chief	Chevrolet Silverado	2016	Good
Maintenance 101	Fleet Services	Chevrolet Silverado	2016	Excellent
Maintenance 102	Fleet Services	Ford F250	2008	Fair
Squad 101	Station 48	Ford F250	2008	Fair
Squad 102	Station	Chevrolet Tahoe	2012	Fair
Squad 103	Station 46	Chevrolet Suburban	2003	Poor

The District also has a 2008 Chevrolet Silverado in "Fair" condition in reserve status.

Future Apparatus Serviceability

An important consideration for fire departments is the cost associated with the future replacement of major equipment. Apparatus service-lives can be readily predicted based on factors including vehicle type, call volume, age, and maintenance considerations. Parker County ESD 1 utilizes its own internal Fleet Services Division to maintain its apparatus and vehicles.

NFPA 1901: *Standard for Automotive Fire Apparatus* recommends that fire apparatus 15 years of age or older be placed into reserve status, and apparatus 25 years or older should be replaced.[11] This is a general guideline, and the standard recommends using the following objective criteria in evaluating fire apparatus lifespan:

- Vehicle road mileage.
- Engine operating hours.
- The quality of the preventative maintenance program.
- The quality of the driver-training program.
- Whether the fire apparatus was used within its design parameters.
- Whether the fire apparatus was manufactured on a custom or commercial chassis.
- The quality of workmanship by the original manufacturer.
- The quality of the components used in the manufacturing process.
- The availability of replacement parts.

[11] *NFPA 1901: Standard for Automotive Fire Apparatus; Section D.3.*

It is important to note that age is *not* the only factor for evaluating serviceability and replacement. Vehicle mileage and pump hours on engines must also be considered. A two-year-old engine with 250,000 miles may need replacement sooner than a 10-year-old one with 2,500 miles. The following figure represents a relatively simple example that the District can use for determining the condition of fire apparatus and vehicles.

Figure 43: Example Criteria & Method for Determining Apparatus Replacement

Evaluation Components	Points Assignment Criteria
Age:	One point for every year of chronological age, based on in-service date.
Miles/Hours:	One point for each 10,000 miles or 1,000 hours
Service:	1, 3, or 5 points are assigned based on service-type received (e.g., a pumper would be given a 5 since it is classified as severe duty service).
Condition:	This category takes into consideration body condition, rust interior condition, accident history, anticipated repairs, etc. The better the condition, the lower the assignment of points.
Reliability:	Points are assigned as 1, 3, or 5, depending on the frequency a vehicle is in for repair (e.g., a 5 would be assigned to a vehicle in the shop two or more times per month on average; while a 1 would be assigned to a vehicle in the shop an average of once every three months or less.

Point Ranges	Condition Rating	Condition Description
Under 18 points	Condition I	Excellent
18–22 points	Condition II	Good
23–27 points	Condition III	Consider Replacement
28 points or higher	Condition IV	Immediate Replacement

Fleet Maintenance Assets

All apparatus and vehicles are maintained by two in-house mechanics, who perform preventive maintenance (PM) inspections on all apparatus twice a year, along with all necessary repairs, except for motor and transmission rebuilds. They also maintain all station backup generators.

Both mechanics are Automotive Service Excellence (ASE) and Emergency Vehicle Technician (EVT) certified. The fleet shop is located next to the District administrative building and consists of a three-bay back-in shop, approximately 60' by 60' in size, which also includes a small office. The shop is equipped with heavy lift equipment hoists and vehicle hoists. The facility does not have a point capture vehicle exhaust system or other high-volume CFM air ventilation system. Vehicle and equipment maintenance records are maintained in the Emergency Reporting® RMS.

According to the lead mechanic, space is extremely limited when more than one piece of apparatus is undergoing repairs. Additionally, there is no on-site fire hydrant for pump testing after repairs. Apparatus must be taken off-site to a nearby fire hydrant for pump testing.

Other Capital Equipment

Among its other capital equipment inventory, ESD 1 maintains 77 Self-Contained Breathing Apparatus (SCBA) that were new in 2017, eight Rapid Intervention Team (RIT) packs, a variety of extrication tools, two 3M Scott® air compressors, UniMac® washer extractors and dryers, 44 Motorola® APX mobile radios, 21 Motorola® APX portable radios, and 11 Physio-Control Lifepak® 100 Automated External Defibrillators (AED)

Capital Improvement & Planning

Parker County ESD 1 does not have a formal Capital Improvement Plan (CIP) or capital equipment replacement plan. However, the District intends to develop a CIP based on the results of this study. Frontline apparatus are on a 10-year cycle, although some engines are being replaced early for the purpose of standardization. Most other capital equipment has been acquired in the previous five years in order to standardize equipment obtained from the various volunteer fire departments.

PERSONNEL & STAFFING

In today's fire service, progressive organizations consider their employees as their most valuable asset. Managing personnel to achieve maximum efficiency, professionalism, and personal satisfaction is an art as much as a science. Consistency, fairness, safety, and opportunities for personal and professional growth are key values in a healthy management culture. This is especially the case in organizations that are evolving, and/or reconstructing to meet today's emergency response challenges.

In this section of the staffing analysis, the ratio of administrative and support positions to total organizational staffing for PCESD1 is compared to industry best practices. Analyzing the ratio of administrative and operations supervisor and support positions can identify gaps and/or redundancies within the organization.

Several national organizations recommend standards to address staffing issues. The *Occupational Health & Safety Administration* (OSHA) Respiratory Protection Standard, and the *National Fire Protection Association* (NFPA) Standard 1720 are frequently cited as authoritative documents.[12,13] In addition, the *Center for Public Safety Excellence* (CPSE) publishes benchmarks for the number of personnel recommended on the emergency scene for various levels of risk.

Administrative & Support Staffing

The PCESD1 full-time uniformed senior leadership team consists of a full-time Fire Chief, one Assistant Chief, and one Battalion Chief. The following figure outlines PCESD1's administrative and support staff positions.

[12] *Respiratory Protection Standard 29 CFR 1910.134; Occupational Health & Safety Administration.*

[13] *NFPA 1710: Standard for the Organization & Deployment of Fire Suppression Operations, Emergency Medical Operations, to the Public by Career Fire Departments; National Fire Protection Association.*

Figure 44: PCESD1 Administrative & Support Staff

Administrative Staff Positions	No. of Staff
Fire Chief	1
Assistant Fire Chief	1
Battalion Chief	1
Administrative Manager	1
Administrative Assistant	1
Executive Assistant	1
EVT Mechanic	2
Total FTEs:	**8**
Administrative Personnel to Total Department Staff Ratio:	***5%***

The level of administration and support staffing reflects approximately 5 percent of the total workforce, including volunteer firefighters. This ratio of administrative to operations personnel should be viewed as low, yet is not unusual compared to other combination fire agencies studied by ESCI. Unlike municipal fire departments that can leverage other city services to fulfill their mission (e.g., information technology, legal, finance, fleet services, etc.), fire districts may have to either hire or contract for administrative services. PCESD1 has a variety of service contracts in place to provide specialized administrative support services, as previously noted.

Emergency Response Staffing

The ability to quickly, safely, and effectively mitigate highly dangerous and evolving emergency events requires an adequate number of properly trained personnel and equipment staffed at adequate levels and locations. This is especially important due to the mixture of urban, suburban, and rural response-areas in PCESD1's large service area. Insufficient staffing at an operational scene—especially for first-due apparatus—negatively impacts the District's ability to perform critical life and property-saving tasks, as well as ensuring firefighter safety. PCESD1 must ensure responding companies can perform all the described tasks in a prompt, efficient, and safe manner. The following figure lists the District's career emergency response staffing.

Figure 45: PCESD1 Career Emergency Response Staffing

Operations Staff Positions	No. of Staff
Battalion Chief	1
Captain	6
Lieutenant	6
Driver/Engineer	9
Firefighter/EMT	6
Total Career Operations Personnel:	**28**
Operational Officers to Firefighters Ratio:	**46%**

All FTE District firefighters are trained and certified to the Texas Emergency Medical Technician-Basic (EMT-B) level or above.

The following figure summarizes the volunteer and part-time firefighter positions assigned to the various PCESD1 stations.

Figure 46: PCESD1 Part-Time and Volunteer Response Staffing

Operations Staff Positions	No. of Staff
Deputy Chief	3
Captain	2
Lieutenant	6
Firefighter Paramedic	15
Firefighter EMT	59
Firefighter EMR	8
Firefighter	38
Single Role EMR	1
Total Volunteer Personnel	**132**
Operational Volunteer Officers to Firefighters Ratio:	**9%**

The ratio of career officers to career firefighters appears high compared to other similar jurisdictions studied by ESCI. However, these officers also oversee non-emergency support and training activities of the large number of part-time and volunteer firefighters. The ratio of career and volunteer officers to total emergency operations personnel is approximately 15 percent, which is consistent with the ratios found in other fire departments studied by ESCI.

PCESD1's *Standard Operating Guidelines* (SOGs) detail the rules and conditions around FTE shift-scheduling and leave use.

PCESD1 Operations Scheduling

Nine PCESD1 full-time operations personnel are assigned to each shift, and work a rotating schedule consisting of 24 hours-on, 48 hours-off. During the 14-day FLSA work period, this averages out to 2,920 hours worked annually. Operations employees annually receive a bank of Personal Time Off (PTO) hours that can be used for vacation and sick leave. Employees with up to five years seniority are given 168 hours of PTO, and employees over five years seniority receive 216 hours of PTO.

Up to three full-time employees can be off on PTO on any given shift. If an additional FTE is off, the position is backfilled with either an employee on overtime, or a qualified part-time or volunteer firefighter. Leave scheduling and overtime replacement scheduling is performed by the individual station officers.

Eighteen full-time, part-time, and volunteer personnel are scheduled on each shift. However, as previously noted, scheduled and unscheduled leaves can reduce daily staffing to a minimum of 15 personnel. Starting in March 2020, minimum staffing was increased to 18 (three per engine).

Volunteers and part-time employees are scheduled for shifts after the full-time employees are scheduled. A web-based program and mobile application called WhenToWork™ is used to facilitate scheduling. Some volunteers and part-time employees work a schedule that is set at the same time as full-time employees' schedules. The remaining open slots are filled by volunteers or part-time employees. If a slot is not filled within 24 hours of the open shift, the shift is offered as an overtime shift to full-time employees. If no one volunteers to fill the shift, the employee set to be relieved must remain on duty until relieved.

Operations Scheduling Discussion

ESCI noted that relying on station officers to schedule PTO has resulted in scheduling errors and a lack of consistency in staffing across the three shifts.

The 24-hour shift, followed by at least 24 hours off-duty, remains the predominant schedule for fire departments in the Western United States. However, some departments have recently transitioned to a 48 hours-on, 96 hours-off shift-schedule, citing research that suggests longer periods of off-duty time allows for full restoration of healthy sleep patterns. One comparative analysis of the 24-hour and 48-hour schedule suggested that the work/rest ratio was the same between the two schedules.[14] The author noted the positive benefits of increased relaxation and family engagement afforded by the 96 hours of off-duty time, and suggests that this results in a more rested and healthier employee. However, the author also cautioned that the employee may be at risk for excessive fatigue in the second half of the shift if their sleep was significantly disrupted during the first 24 hours. The author noted:

> *"Lastly, fire companies or truck units that have three or more calls per night, resulting in insufficient deep, restorative sleep for the brain to function effectively, will be too sleep-deprived to be safe and effective in their second 24-hour on-duty day. In this latter case, the safety and performance risks created by the 48/96 schedule outweigh the family, social, and morale benefits of this schedule design."*

The EMS community has also been concerned for some time about the negative physical and mental effects of lengthy EMS shifts and the implications on safety. An *Interim Safety Advisory Committee* of the *National EMS Advisory Council* addressed the issue of fatigue in EMS workers in a report published in 2012.[15] The review of the existing research literature and government work-hour regulations noted a profound lack of research specific to the EMS environment. It noted that much more research—specific to the EMS environment—is needed to quantify and validate the issue of fatigue among EMS providers, along with identifying strategies to address the issue within the EMS environment. However, they clearly expressed their expert opinion that poor sleep and fatigue is a threat to the safety of EMS workers and their patients.

---

[14] *Koen, S. "24/48 vs. 48/96 Work Schedules: A Comparative Analysis, Round the Clock Systems, 2005.*

[15] *Safety Committee Interim Advisory. (May 30, 2012). Fatigue in emergency medical services. The National EMS Advisory Council.*

Lastly, the federal government aggressively regulates and monitors commercial transportation workers, including commercial pilots, railroad workers, long-haul truck drivers, and ship workers. Regarding long-haul truck and passenger-carrying drivers, there are very restrictive rules in place to address potential driver fatigue. ESCI highlights these specific requirements because Firefighters, Firefighter/Paramedics, and EMS workers routinely drive emergency vehicles in all types of weather conditions—often for extended periods (long-distance interfacility transfers, for example). The following figure is a summary of the rules for truck drivers. This is presented to provide context on the level of the federal government's concern on driver fatigue.[16]

Figure 47: Commercial Driver Rules for Work Hours

Property Carrying Drivers	Passenger Carrying Drivers
11-Hour Driving Limit May drive a maximum of 11 hours after 10 consecutive hours off-duty.	**10-Hour Driving Limit** May drive a maximum of 10 hours after 8 consecutive hours off-duty.
14-Hour Limit May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off-duty. Off-duty time does not extend the 14-hour period.	**15-Hour Limit** May not drive after having been on duty for 15 hours, following 8 consecutive hours off-duty. Off-duty time is not included in the 15-hour period.
Rest Breaks May drive only if 8 hours or less have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes.	**60/70-Hour Limit** May not drive after 60/70 hours on duty in 7/8 consecutive days.

As noted in the preceding figure, the focus is not only on the length of the work periods but also *the length of the off-duty/rest periods.* Also, the safety and productivity implications of allowing shift trades that could extend well beyond a 24-hour shift must also be considered. ESCI noted that the District does not define a "cap" on the consecutive number of hours an employee can work, nor is it closely monitored by supervisors or the administration. Employees are expected to police themselves regarding the number of consecutive hours worked.

[16] *349 Code of Federal Register 395.1-5.*

Staff Relief Analysis

In evaluating the level and availability of Operations staff, ESCI analyzed and compared the minimum number of employees required to be on-shift, the total number of operations FTE employees in the organization, and the amount of leave used by these employees to determine how many the PCESD1 theoretically needs to meet the minimum number of total staff required. This is commonly referred to as a "Staffing Relief Factor (SRF)." In the following figure, ESCI used employee data provided by PCESD1 to identify the theoretical minimum number of employees required to staff PCESD1 operations 24-hours daily.

Figure 48: Elements Used to Calculate PCESD1 Staffing Relief Factor (2018)

Shift Schedule	Annual Hours	Average Workweek	Average PTO Leave[1]
24 hours	2,920 hours	53 hours	104 hours

[1] Includes Sick, Vacation, Funeral Leaves

Operations employees are paid for their holidays in lieu of scheduling time off. Therefore, holidays are not factored into the following *Staffing Relief Factor* (SRF) calculation. ESCI calculated the theoretical number of employees required to meet the various average PTO used by employees in 2019, and compared the results to the current number of Operations FTE employees assigned in 2019 (21) to the 24-hour shift schedule. This calculation compared the average available scheduled weekly work hours per employee, subtracted the average PTO—based on 2019 historical leave-use data—and calculated the SRF. ESCI then multiplied the number of personnel needed to cover a single position at 24-hours per day with the relief factor to determine the total number of employees required to meet daily minimum staffing.

Based on the 2019 PTO usage and work schedule, ESCI calculated an SRF of 1.05.

This factor was multiplied by the number of personnel needed to cover one position 24-hours daily. The following figure compares the theoretical number of positions needed to meet minimum daily FTE staffing (6 positions) with the current number of employees assigned to the operations work schedule.

Figure 49: Calculated Operational Staff Shortage/Overage

Shift Coverage Required	Calculated Total Personnel Required	Current No. Employees	Staff Shortage/Overage
PTO	25	27	**+2**

PCESD1 Staffing Discussion

The staffing analysis theoretically indicates an overage of two personnel needed to cover the PTO shifts used by employees in 2019. This includes the new positions recently hired. This means that, *theoretically,* two of the three shifts have an additional person available to fill an FTE PTO vacancy, and the third shift may require more frequent scheduling of part-time, volunteer, or overtime hire back to provide PTO coverage. However, administrative management of discretionary leave usage is commonly used to reduce overtime expenditures. Examples of this include moving "extra" employees to another shift to fill in during a long-term vacancy, or coverage for a shift that has a disproportionate number of scheduled PTO shifts to cover. It also does not take into consideration the recent implementation of the two-person peak-demand engine company.

Another important consideration concerns the additional cost of employee benefits, which can be up to 40 percent or more of employee salaries. This additional cost is not factored into overtime expenses, therefore making overtime expenditure a more cost-effective approach. However, if the total number of available employees is significantly diminished, requiring a substantially higher use of overtime or volunteer backfill to meet minimum daily staffing levels, it may result in employee or volunteer "burnout," and inability to meet minimum daily staffing requirements.

Staff Salaries & Benefits

ESCI evaluated the salaries, benefits, and compensation for the various employee classifications. The primary purpose of this analysis was to assist in forecasting future expenditure impacts related to recommended future administrative and operations staff changes. The following figures summarize the 2019 average salaries for each FTE position.

Figure 50: Administrative Uniformed & Civilian FTE Salaries

Administrative Staff Positions	Average Salary
Fire Chief	$110,300
Assistant Fire Chief	$84,872
Office Manager	$58,509
Administrative Assistant	$29,000
Executive Assistant	$40,000
EVT Mechanic	$58,363
Communications Center Manager	$41,600
Dispatcher/Call Taker	$37,363

The following figure summarizes the uniformed staff salaries.

Figure 51: Operations FTE Salaries

Operations Staff Positions	Average Salary
Battalion Chief	$71,500
Captain	$63,654
Lieutenant	$57,680
Driver/Engineer	$54,590
Firefighter/EMT	$46,350

The cost of benefits is estimated at approximately 26 percent across all uniformed positions, and approximately 27 percent across all civilian positions. Benefits paid include Social Security, Workers' Compensation, pension, and medical/vision/dental insurance.

The percentage of benefits is higher for the lower-salaried positions due to the fixed benefits costs paid per employee.

ESCI also noted the relationship between the various pay scales for each rank assigned to operations. Each rank has a seven-year pay scale that increases approximately 3 percent per year. The top step pays in Firefighter, Engineer, Lieutenant, and Captain positions are higher than the starting pays of the next highest rank. For example, a top-step Lieutenant annual pay—with FLSA scheduled overtime—is $66,867. The starting Captain pay—with FLSA scheduled overtime—is $62,486. To compensate, newly promoted Engineers and officers move into the new rank step category that results in at least a 3 percent increase in pay.

Staff Survey

Given the significant expansion and integration of various volunteer fire departments into the PCESD1 organization, ESCI wanted to solicit feedback on various topics related to department operations and culture, and ensure all district members had an opportunity to share their observations and opinions. A confidential online 13 question survey was created and sent to all department members, including civilian employees and dispatchers. The survey asked members how much they agreed or disagreed with various statements related to department operations, training, supervision, and response readiness. The full survey results, including individual comments, are listed in Appendix 1. The following is a summary of the most significant findings of the survey.

Seventy-five members took the survey, which represents approximately 47 percent of the total department membership. The majority of the respondents (66%) had five years or less experience with PCESD1, and 23 percent had five to ten years of experience. Twenty-three percent of respondents indicated they were volunteers, 41 percent were part-time, and 35 percent were career employees. Firefighter/EMTs were the largest respondent pool at 30 percent, followed closely by Apparatus Operators (22%).

The adequacy of fire suppression training was affirmed by 90 percent of the respondents, and 91 percent at least somewhat agreed that the District provides excellent fire suppression equipment. When asked about the District's adequate training resources and training facility, the results were much more tepid, with only 42 percent at least agreeing with the statement, and over 32 percent having no opinion or disagreeing with the statement.

In large part (87%), respondents agreed that the fire stations were adequate and well maintained, and 85 percent at least somewhat agreed that the District's officers and culture place a high priority on safety.

EMS training was rated fairly high as well, with approximately 75 percent of the respondents at least somewhat agreeing with the statement. The adequacy of EMS equipment was rated somewhat lower, with 65 percent at least somewhat agreeing with the statement, and 35 percent were either neutral or disagreed.

Familiarity with target hazards was ranked fairly high, with over 80 percent at least somewhat agreeing with the statement, and only 14 percent feeling they were not familiar.

Eighty-nine percent felt ICS was appropriately used on emergency scenes, and notably, over 82 percent at least somewhat agreed that their assigned station has a culture that supports the District's mission and operation.

Effective Response Force Analysis

In addition to reviewing the total number of operations staff available to the District, ESCI also reviewed its daily staffing levels and compared them to national consensus standards related to providing sufficient personnel and resources to quickly mitigate emergency incidents—specifically, structure fires and critical EMS situations. ESCI focused on the District's ability to mobilize an *Effective Response Force* (EFR) to mitigate structure fires or other complex and dynamic emergencies.

Structure fires and other complex and rapidly evolving incidents require quick and simultaneous performance of tasks to control the situation effectively. If there are insufficient resources to perform all required tasks, the incident commander must prioritize task assignments to maximize the effectiveness and safety of the limited resources.

Critical Task Analysis

Tasks that must be performed at a fire can be broken down into two key components: life-safety and fire-flow. Life-safety tasks are based on the number of building occupants and their location, status, and ability to take self-preservation action. Life-safety related tasks involve the search, rescue, and evacuation of victims. The fire-flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent actions, the incident commander must prioritize the tasks and complete some in chronological order. These tasks include command, scene safety, search and rescue, fire attack, water supply, pump operation, ventilation, and back-up/rapid intervention. An initial full-alarm assignment should provide for the following:

- Establishment of incident command outside of the hazard area for the coordination and direction of the initial full-alarm assignment. A minimum of one individual shall be dedicated to this task.
- Establishment of an uninterrupted water supply of a minimum 400 GPM for 30 minutes. Supply line(s) shall be maintained by an operator who shall ensure an uninterrupted water flow application.
- Establishment of an effective water-flow application rate of 300 GPM from two handlines, each of which shall have a minimum of 100 GPM. Each attack and backup line shall be operated by a minimum of two individuals to effectively and safely maintain the line.

- Provision of one support person for each attack and backup line, deployed to provide hydrant hookup and to assist in line lays, utility control, and forcible entry.
- A minimum of a single-victim search and rescue team shall be part of the initial full alarm assignment. Each search and rescue team shall consist of a minimum of two individuals.
- A minimum of one ventilation team shall be part of the initial full alarm assignment. Each ventilation team shall consist of a minimum of two individuals.
- If an aerial device is used in operations, one person shall function as an aerial operator who shall maintain primary control of the aerial device at all times.
- Establishment of an IRIC (Initial Rapid Intervention Company, Rapid Intervention Team) that shall consist of a minimum of two properly equipped and trained individuals.

The *Commission on Fire Accreditation International* provides a sample critical tasking analysis for the number of emergency workers required for various levels of risk. This is summarized as follows.

Figure 52: Sample Critical Task Staffing Need Based on Level of Risk

Critical Task	Maximum Risk	High Risk	Moderate Risk	Low Risk
Attack line	4	4	4	2
Search and rescue	4	2	2	
Ventilation	4	2	2	
Backup line/rapid intervention[2]	4	3	2	2
Pump operator	1	2	1	1
Water supply	1	1	1	
Utility support	1	1	1	
Command/safety[3]	2	2	2	1
Forcible entry[1]	0			
Salvage[1]	0			
Overhaul	1			
Communication	1			
Chief's aide	1	1		
Operations section chief	1	1		
Logistics	1			
Planning	1			
Staging[1]	1			
Rehabilitation	1	1		
Division/group supervisors[1]	2			
High-rise evacuation[1]	10			
Stairwell support[1]	10			
Total Required:	**51**	**20**	**15**	**4–6**

[1]At maximum and high-risk fires, additional personnel may be needed for these tasks.

[2]Backup line may not be required for certain incidents.

[3]Can often be handled by the first due officer.

Delivering enough personnel to the scene to accomplish the various tasks required to mitigate an emergency is essential, and many of these tasks must be completed quickly. However, it should be noted that not all of the tasks listed need to be completed simultaneously.

Typically, structure fires are the most labor-intensive incidents. As shown in the preceding figure, national standards recommend at least 15 personnel should arrive at the scene of a fire in a single-family residence, so as to ensure safe and effective operations. Even more personnel may be required as dictated by the size of the building, incident complexity, and/or special hazards that may be encountered.

The fire service assesses the relative risk of properties and occurrences based on a number of factors. Properties with high fire-risk often require greater numbers of personnel and apparatus to mitigate the fire emergency effectively. Staffing and deployment decisions should be made with consideration of the level of risk involved. The level-of-risk categories used by CFAI are as follows:

- **Low Risk**—Areas and properties used for agricultural purposes, open space, low-density residential, and other low intensity uses.
- **Moderate Risk**—Areas and properties used for medium density single-family residences, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- **High Risk**—Higher density businesses and structures, mixed-use areas, high-density multi-family residential, industrial, warehousing, and large mercantile structures.

A review of PCESD1's first-alarm assignments for responses to the incident categories above reveals that the District does not deploy enough on-duty personnel initially to respond to moderate or high-risk structure fire incidents in its service area to be consistent with national standards. The following figure summarizes its current first alarm assignments for the various incident types.

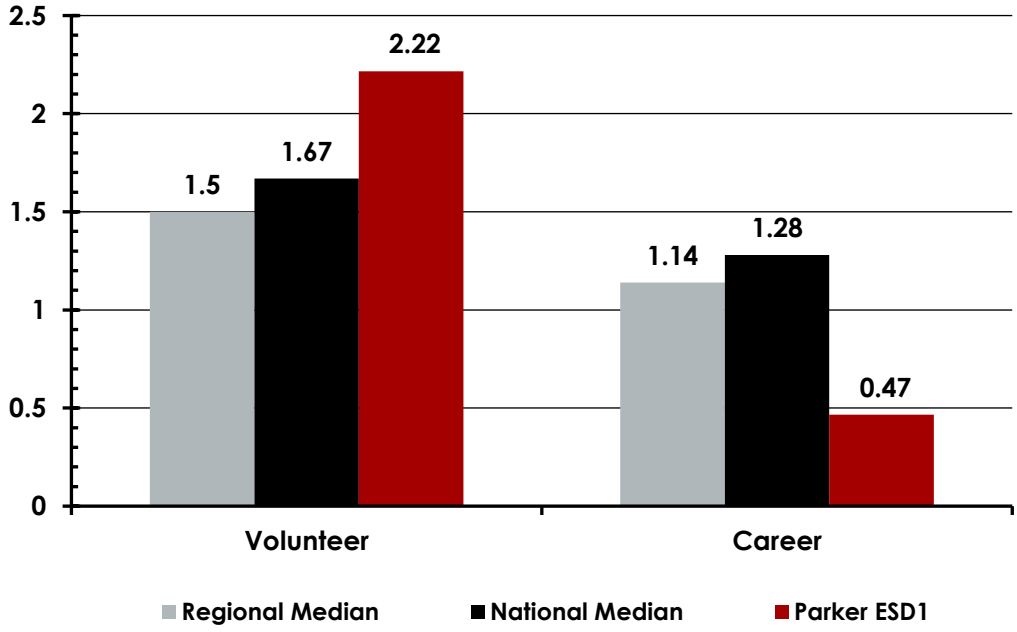
Figure 53: First Alarm Structure Fire Assignments

Unit Type	Number of Units	Number of Personnel
RESIDENTIAL STRUCTURE FIRE (With Water Supply)		
Engines	3	9
Ladder	0	0
Battalion Chief	1	1
Rescue/Air Truck	1	1
Tender	0	0
TOTAL	**5**	**11**
RESIDENTIAL STRUCTURE FIRE (No Water Supply)		
Engines	3	9
Ladder	0	0
Battalion Chief	1	1
Tender	2	2
TOTAL	**6**	**12**
MODERATE RISK COMMERCIAL STRUCTURE FIRE		
Engines	4	12
Ladder	0	0
Battalion Chief	1	1
Rescue/Air Truck	1	1
Tender	0	0
TOTAL	**6**	**14**
HIGH RISK COMMERCIAL STRUCTURE FIRE		
Engines	4	12
Ladder	0	0
Battalion Chief	1	1
Rescue/Air Truck	1	1
Tender	0	0
TOTAL	**6**	**14**

As illustrated in the above figure, PCESD1 currently deploys limited resources on first-alarm assignments. This is a result of limited on-duty staffing. ESCI noted that minimum staffing will be increased in 2020 to 18 personnel staffing six engine companies. It must also be noted that the deployment noted above assumes all units are in service, and not committed to other incidents at the time of the alarm. It also does not take into consideration any emergency call-back of off-duty or volunteer personnel, which can provide delayed additional resources at an incident.

The next figure shows PCESD1's firefighter staffing levels compared to mid-west and national fire departments with similar populations. The regional and national statistics used for comparison are from the NFPA's 2009 *U.S. Fire Department Profile*.

Figure 54: PCESD1 Firefighters versus National & Regional Medians
(per 1,000 population)



Benchmark data available through the National Fire Protection Association (NFPA) is based primarily on population and does not consider the geographical size or population density of a particular area.

The preceding figure represents a comparison of Southern communities with populations similar in size to PCESD1's service area. A population size of 60,000 was used in calculating this comparison, as provided by PCESD1. This figure does not consider any transient population increases due to recreational or business activities. Also, this analysis does not consider the number of hours worked per week by firefighters (which vary among jurisdictions), or if the fire departments provide emergency medical transport. Using this comparison, PCESD1 appears to be significantly above the regional and national medians for volunteer firefighter staffing, and significantly below the regional and national medians for career firefighter staffing.

ESCI noted that the minimum staffing level for first-due fire apparatus is three personnel (except for water tender staffing). However, the District currently allows first-due apparatus to be occasionally staffed with only two personnel at outlying stations.

While it is understood that PCESD1 is considered a combination fire department that falls under the NFPA 1720 standard, the NFPA 1710 standard recommends that career fire departments maintain minimum engine-company staffing of four personnel. This standard was developed from a consensus of experts, but is also supported by scientific research. In 2010, the *National Institute of Standards & Technology* (NIST) published a study that found four-person firefighting crews were able to accomplish essential firefighting and rescue tasks 25 percent faster than three-person crews were.[17] Another study analyzed the effectiveness of firefighting crews in high-rise operations.[18] The study found that firefighting crews of five or six members, instead of three or four, were significantly faster in completing search-and-rescue operations and extinguishing fires.[19] ESCI mentions this only as another example of evidence-based research supporting the use of sufficient personnel.

Considerable ongoing local, regional, and national discussion and debate draws strong focus and attention to the subject of firefighter staffing. Frequently, this discussion is set in the context of firefighter safety. While there are published national standards (NFPA Standards 1710 and 1720) regarding firefighter staffing, they generally speak in terms of the number of firefighters assigned to a particular response apparatus, and are often characterized as a "minimum of four personnel per each engine company." ESCI notes that the more critical issue is the *number* of firefighters that are assembled at the scene of an incident in conjunction with the scope and magnitude of the job tasks expected of them—regardless of the type or number of vehicles upon which they arrive. However, it should be noted that the City of Austin, Texas, passed a city ordinance in 2018 requiring four-person staffing on all fire apparatus.[20]

In 2018, the Camas-Washougal Fire Department was fined by the Washington State Department of Labor and Industries for initial actions taken at the scene of a residential structure fire. The first arriving fire apparatus was staffed with two firefighters, who discovered that a victim was trapped in the burning home. They immediately entered an immediately dangerous to life and health (IDLH) environment and rescued the victim. Subsequently, the State was notified of the incident, an investigation was conducted, and violations of state law related to lack of having the required rescue personnel standing by while the rescue was performed were determined.

---

[17] *Averill J, Moore-Merrell L, et al. "Report on Residential Fireground Field Experiments;" U.S. Department of Commerce, National Institute of Standards & Technology [NIST TN 1661], 2010.*

[18] *NFPA definition of a high-rise building; nearly equivalent to the Life Safety Code definition.*

[19] *Averill J, Moore-Merrell L, et al. "Report on High-Rise Fireground Field Experiment;" [NIST TN 1797], 2013.*

[20] *Four-person staffing on Austin Fire Engines now a law following City Council Vote, Community Impact Newspaper, December, 14, 2018.*

Although older, a 2001 study by the Houston Fire Department determined that fire apparatus staffing is a greater citizen safety issue than firefighter safety.[21] The report termed the understaffing situation a "crisis situation that demands immediate intervention." Decreasing the number of firefighters without eliminating any of the tasks fire departments are expected to accomplish causes the department to delay some of the required tasks or to try to perform all tasks unsafely with inadequate staff. The study also noted that "Firefighters working in understaffed environments are too often expected to perform beyond their capabilities." And, that inadequate staffing creates "a cumulative effect" caused by combined delays and lost functions of crews, resulting "in an even greater loss of overall effectiveness."

When looking at the minimum requirements for accomplishing the tasks necessary in containing and extinguishing a residential house fire, it should be noted that PCESD1's practice of allowing two-person staffing on first-due fire apparatus is inconsistent with national standards and safety practices.

[21] *Houston (TX) Fire Department, District Tactical Advisory Committee, "Staffing Report Averting a Crisis," October 2001.*

SERVICE DELIVERY & PERFORMANCE

In this section, ESCI conducted a review of the current service delivery and performance for the PCESD1. The operational components of service delivery and performance have been analyzed from multiple perspectives, including service demand, resource distribution, resource concentration, resource reliability, and response performance. To provide the highest level of service to the citizens and visitors of the District, the sum of all these components must be effective and efficient. This is achieved with timely notifications of incidents and rapid responses from strategically located facilities with appropriate apparatus staffed with an adequate number of properly trained personnel.

Service Demand

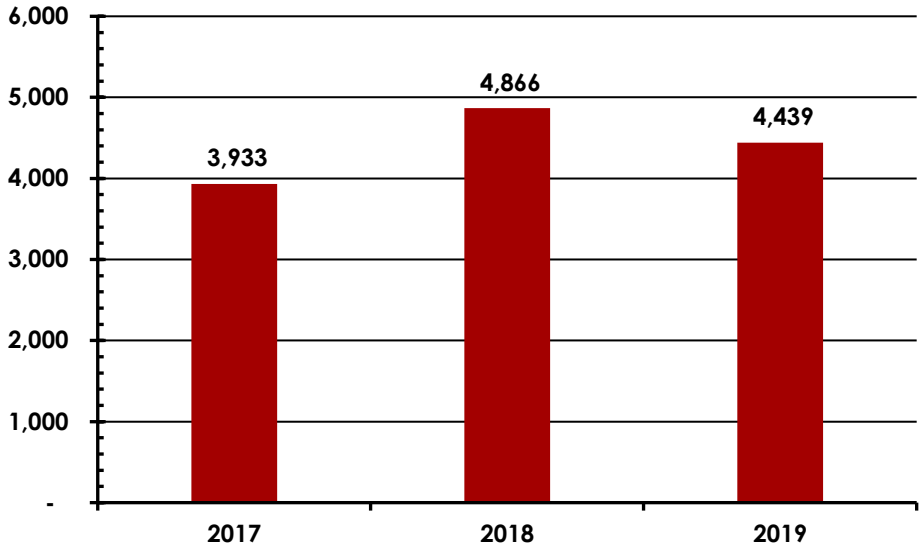
This service demand analysis reviews current and historical service demand by incident type and temporal variation. GIS software provides a geographic display of demand. Data for the service delivery and performance analysis was provided from the District's Record Management System (RMS) and the dispatch center's computer-aided dispatch (CAD) system.

RMS data was obtained from PCESD1 for the period January 1, 2017–December 31, 2019. ESCI noted that the call volume data was most accurate for 2019 with the upgrade to a new RMS. The 2017 and 2018 data was recorded under PCESD1's old RMS, which absorbed legacy reporting methods from the individual volunteer fire departments. In addition, ESCI noted that 2017 and 2018 had unusually high wildland fire response activity.

For the performance analysis, single incident records had to be extracted. This was completed by pulling the best performance in each time category and then removing duplicates. The dataset that was best suited for each analysis was utilized.

The next figure displays historical PCESD1 service demand for the previous three calendar years.

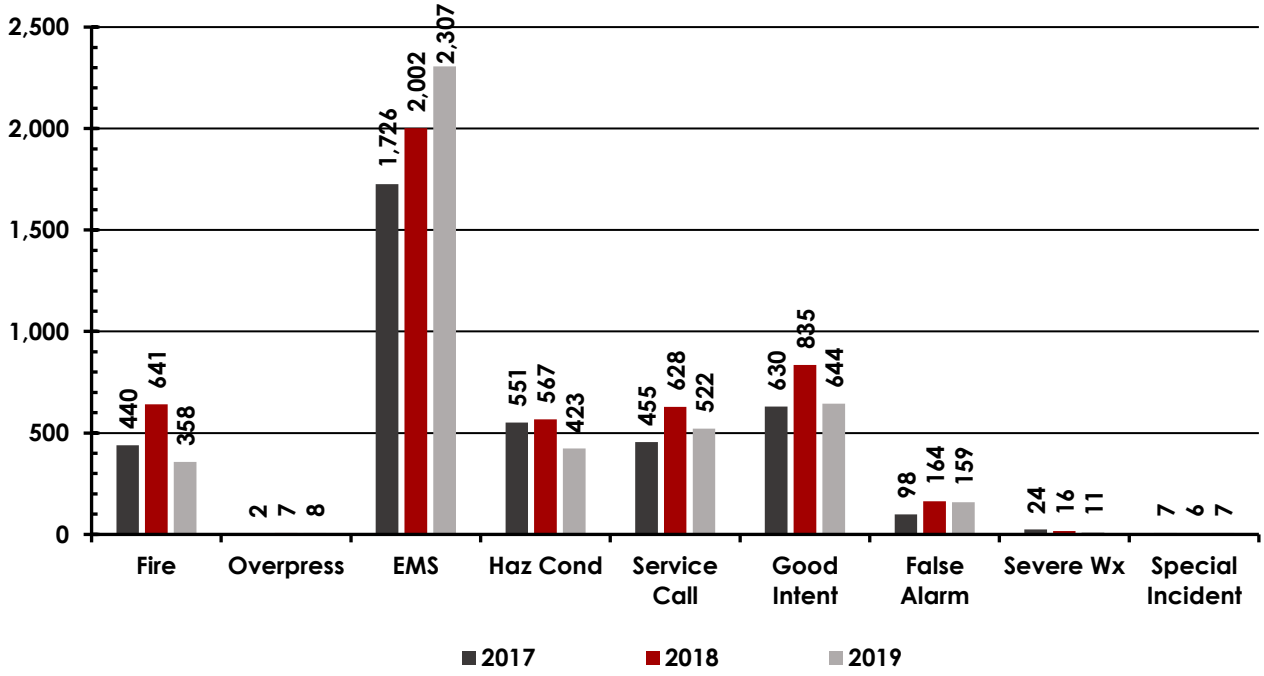
Figure 55: Parker County Service Demand (2017–2019)



Overall, service demand increased by 12.87 percent in the time period displayed in the preceding figure.

The next figure displays PCESD1's overall service demand for the previous three calendar years and a breakdown by NFIRS incident category, including the total number of annual calls.

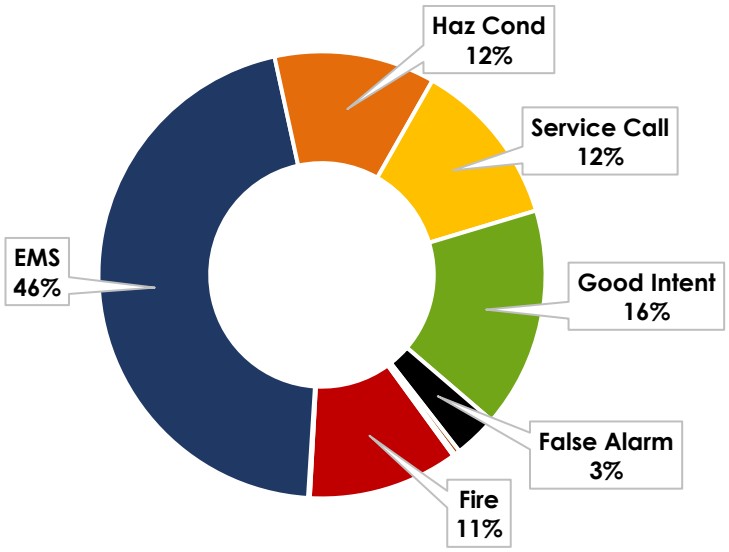
Figure 56: PCESD1 Service Demand NFIRS Incident Type (2017–2019)



In Figure 56, incidents typed as "Fires" include all types of fires such as structure, wildland, vehicle, etc. "False Alarms" include manual and automatic fire alarms in which no fire problem was identified. While most NFIRS incident categories showed modest fluctuations throughout the proceeding three-year period, the most notable increases were noted in the EMS and false alarm categories. EMS incidents within PCESD1 increase by 33.66 percent, while false alarm incidents experienced a 62.24 percent increase.

The next figure illustrates the variance of incident types as a percentage of the total service demand for PCESD1.

Figure 57: PCESD1 Service Demand by NFIRS Incident Type Percentages (2017–2019)



Over the course of the three-year period, the incident type percentages vary from a low of 3 percent for incidents typed as "False Alarm," to a high of 46 percent for EMS. Clearly, the NFIRS data indicates that EMS incidents comprise the highest percentage of service demand during the three-year period. ESCI noted that as a proportion of total incidents, the number of fires (11%) experienced in the District was higher than the overall proportion of fires reported in the most recent available annual report (2016) by the Texas State Fire Marshal's Office. This report noted that between the years 2011 to 2016, the overall percentage of fires compared to total incidents was 3.4 percent.[22]

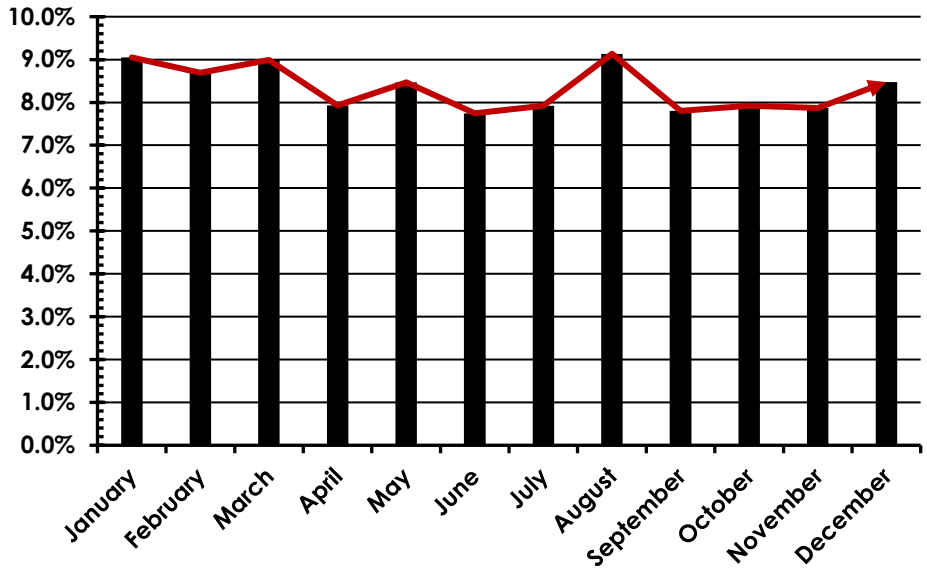
[22] *2016 Annual Report, Texas State Fire Marshal's Office, Texas Department of Insurance.*

Temporal Variation

Demand for services can often occur in cyclical patterns. A temporal variation analysis is helpful in order to determine if there are specific trends during various time measurements where staffing can be modified to better fit the demand. To determine if these patterns exist, the following figures are presented and discussed.

The next figure illustrates service demand by month during the preceding three-year period.

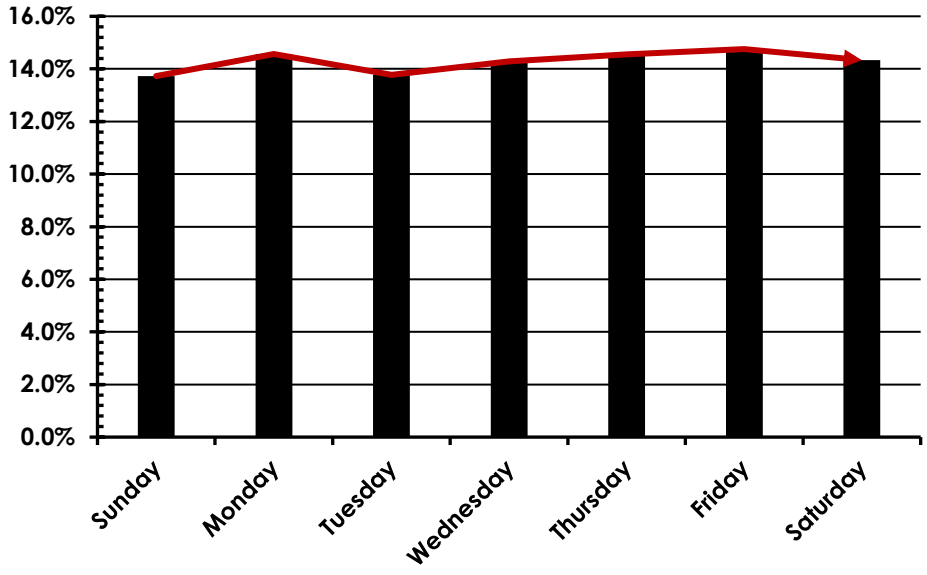
Figure 58: PCESD1 Service Demand by Month (2017–2019)



Service demand remained relatively consistent throughout the year, with the range between the busiest month and the slowest month at only 1.38 percent. August was the busiest month. Over the three-year period, August accounted for 9.13 percent of the service demand. June was the slowest month accounting for 7.75 percent of the total service demand.

The next figure continues the temporal analysis with an examination of service demand by day of the week.

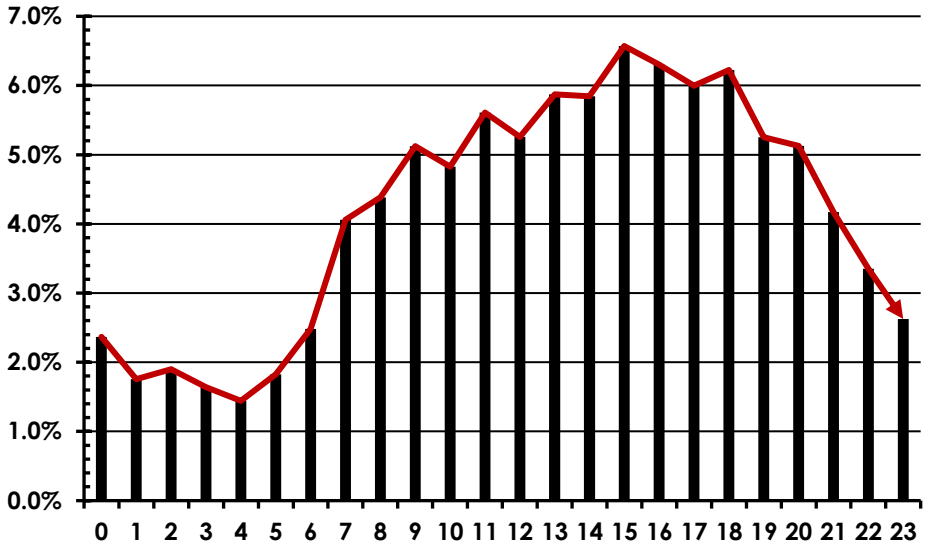
Figure 59: PCESD1 Service Demand by Day of the Week (2017–2019)



Typically, the most noticeable variation occurs during the weekends when service demand decreases. This is expected as more activity occurs during the workweek, such as an increase in the transient population tied to the retail/commercial labor force, depending on the area studied. In general, more activity occurs during the workweek. While weekends did exhibit the lowest percentage of service demand in PCESD1's service area, overall demand remained relatively consistent throughout the week. During the three-year period, the range between the busiest day and the slowest day was only 1.02 percent. Sundays accounted for 13.73 percent of service demand, making it the slowest day of the week. With 14.75 percent of service demand, Friday was the busiest day, but only slightly higher than Monday and Thursday (14.56 percent).

The next temporal analysis of service demand examines demand by the hour of the day.

Figure 60: PCESD1 Service Demand by Hour of the Day (2017–2019)



Analysis of service demand by time of the day revolves largely around the activities of the general population, with workload increasing during daytime hours and decreasing during nighttime hours, as illustrated in the preceding figure. Incident activity is at its highest between 8:00 a.m. and 7:00 p.m. During this 12-hour period, 67.25 percent of PCESD1's calls for service occurred, which would be expected. The highest incident activity is at 3:00 p.m., with 6.57 percent of the total activity per day. The slowest hour for activity is at 4:00 a.m., which accounted for 1.44 percent of the day's call activity during the three-year period.

Of note is that while demand is lower in the early morning hours, fatal residential fires occur most frequently late at night or in the early morning. According to the U.S. Fire Administration, from 2014 to 2016, fatal residential fires were highest between 0100 to 0200 and 0400 to 0500. The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 48 percent of fatal residential fires.[23]

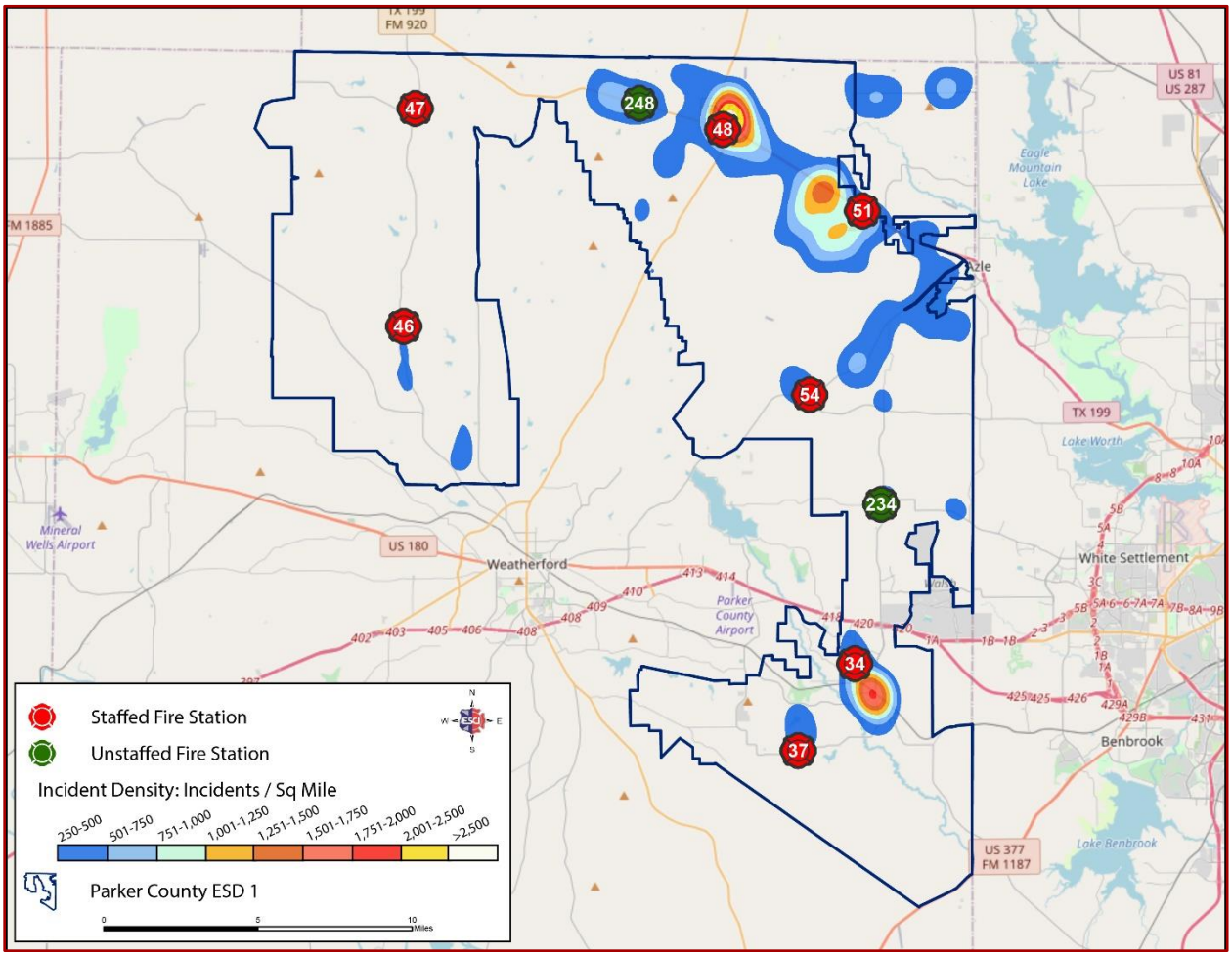
Geographical Service Demand Analysis

In addition to the temporal analysis of service demand, it is useful to examine the geographic distribution of service demand. Utilizing PCESD1's CAD data and GIS software, incident locations are plotted, showing the geographical service demands for both fire and EMS incidents during the period of January 2017 to December 2019 throughout the District's service area. In the following figures, an incident density analysis was completed to determine "Hot Spots" or areas experiencing the highest level of service demand.

[23] *Fatal Fires in Residential Buildings (2014–2016), Topical Fire report Series Volume 19, Issue 1/June 2018, U.S. Department of Homeland Security, U.S. Fire Administration, National Fire Data Center.*

The next figure demonstrates the mathematical density of all incidents, summarized as incidents per square mile.

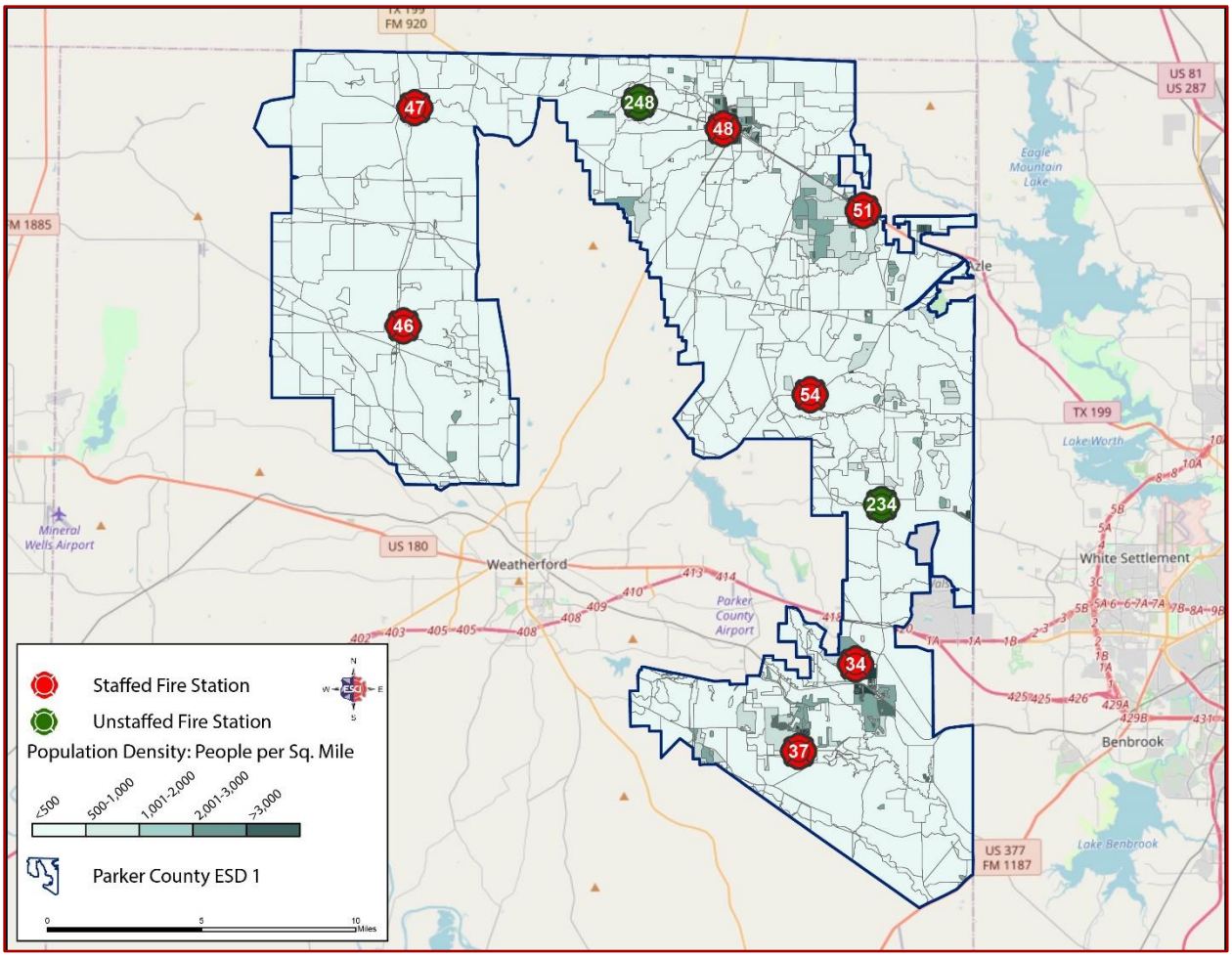
Figure 61: Incident Density (Hot Spot Analysis), 2017–2019



Service demand is distributed sparsely throughout the PCESD1 service area with a notable higher incident density location near Stations 48 and 51. The northeastern region of the District experiences the highest incident demand, especially the area on either side of Texas State Highway 199 near Springtown, La Junta, and Sanctuary. An additional higher incident density location is noted in the southeastern region of the district in the Aledo area south of Interstate 20.

As can be expected, areas of high incident density are typically linked to areas of higher population counts. The next figure illustrates the population density of the PCESD1 service area.

Figure 62: Parker County Population Density



As shown in the preceding figure, the vast majority of the District is sparsely populated. The densest population areas are immediately adjacent to Stations 48, 51, 34, and 37.

ESCI noted that the provided data for the preceding map did not include the recent addition of the Morningstar residential development that is planned to have a 3,000 person per square mile density upon full buildout. This development is located between Stations 34 and 234.

Resource Distribution

This section of the report summarizes ESCI's analysis of PCESD1's distribution of response resources. GIS data was utilized to examine the distribution of resources in the PCESD1 service area. Two national performance standards were utilized to provide a benchmark for performance—ISO criteria and the National Fire Protection Association (NFPA) standards. These are important standards for comparison purposes because, while ISO focuses on fire suppression capabilities for insurance purposes, NFPA standards establish a foundation for overall system benchmarking for fire suppression, rescue, and other activities fire departments could be required to perform.

The distribution of resources was examined by geographical location and by travel time over the existing road network. In addition, the District's water system (hydrant) distribution and coverage were evaluated.

ISO Distribution

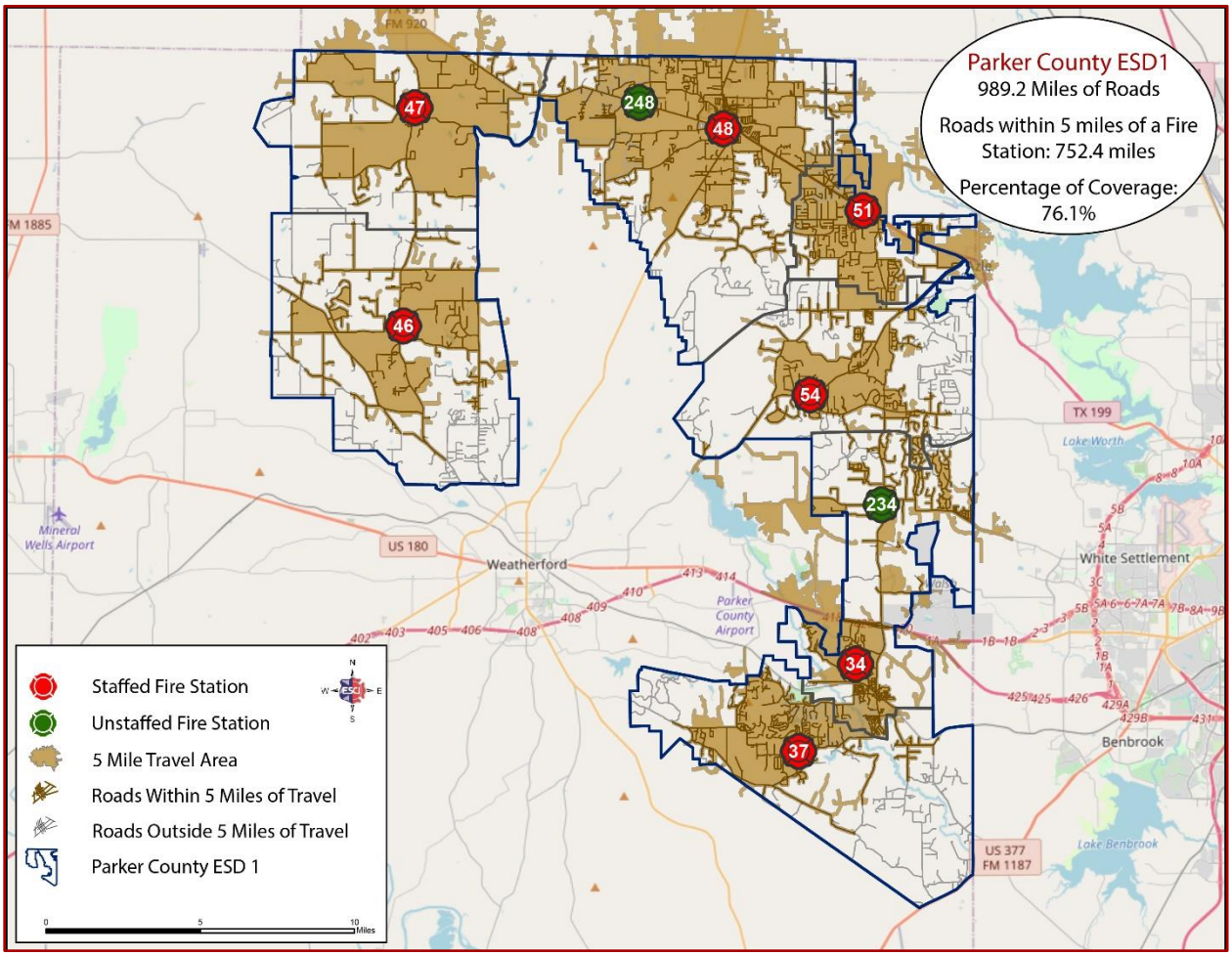
The Insurance Services Office (ISO) is a national insurance industry organization that evaluates fire protection for communities across the country. ISO assesses all areas of fire protection as broken down into four major categories, including emergency communications, fire department, water supply, and community risk reduction. Following an on-site evaluation, an ISO rating, or specifically, a Public Protection Classification (PPC®) number is assigned to the community ranging from 1 (best protection) to 10 (no protection). The PPC® score is developed using the Fire Suppression Rating Schedule (FSRS), which outlines sub-categories of each of the major four categories, detailing the specific requirements for each area of evaluation.

A community's ISO rating is an important factor when considering fire station and apparatus distribution and deployment due to its effect on the cost of fire insurance for residents and business owners. The ability of a fire department to arrive on the scene of an incident equipped with personnel, equipment, and water sufficient to mitigate a fire effectively is a critical factor evaluated during an ISO evaluation.

To determine whether a structure is eligible to receive a PPC rating better than 10, a five road miles threshold from a fire station measure is generally used. Typically, areas outside of five road miles may be subject to a split ISO rating if the fire department can demonstrate sufficient fire flow is available. In addition, to receive maximum credit for station and apparatus distribution, ISO evaluates the percentage of the community (contiguously built upon area) that is within specific distances of both engine/pumper companies (1.5 miles) and aerial/ladder apparatus (2.5 miles). PCESD1 does not deploy aerial/ladder apparatus, so no mapping was included for this ISO benchmark.

The next figure illustrates fire station distribution for the PCESD1 service area and the roadways within the ISO required 5 miles of travel distance.

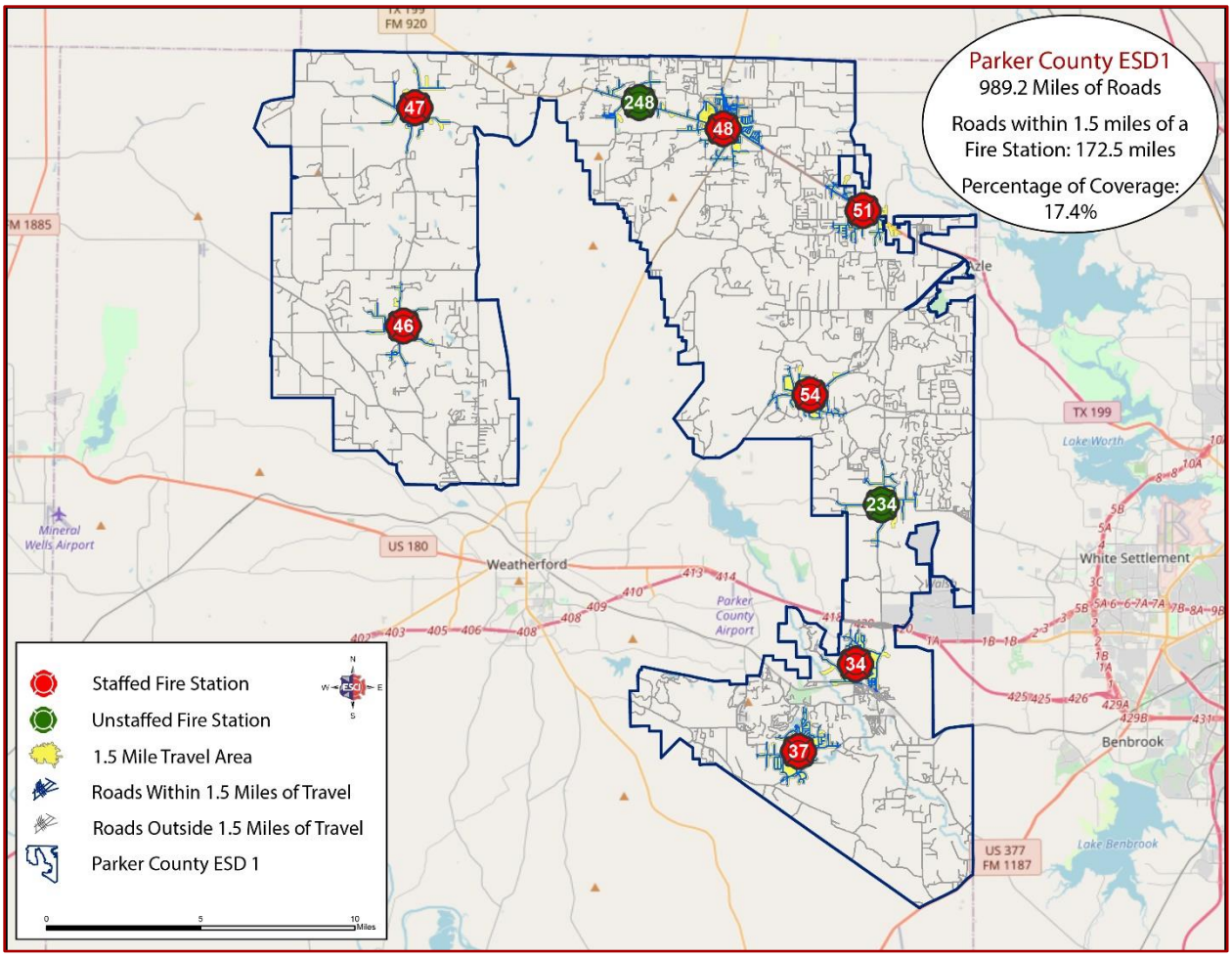
Figure 63: PCESD1 Station Distribution, ISO 5 Mile Travel Distance Criteria



As would be expected, the areas centrally located around the nine staffed and unstaffed PCESD1 fire stations meet the 5-mile ISO coverage requirement. In total, 752.4 miles of the 989.2 miles of roadways with the service area fall within the 5-mile coverage requirement equaling 76.1 percent of total coverage.

The next figure illustrates engine company distribution for the PCESD1 service area and the roadways within the ISO required 1.5 miles of travel distance.

Figure 64: PCESD1 Station Distribution, ISO 1.5-Mile Engine Company Criteria

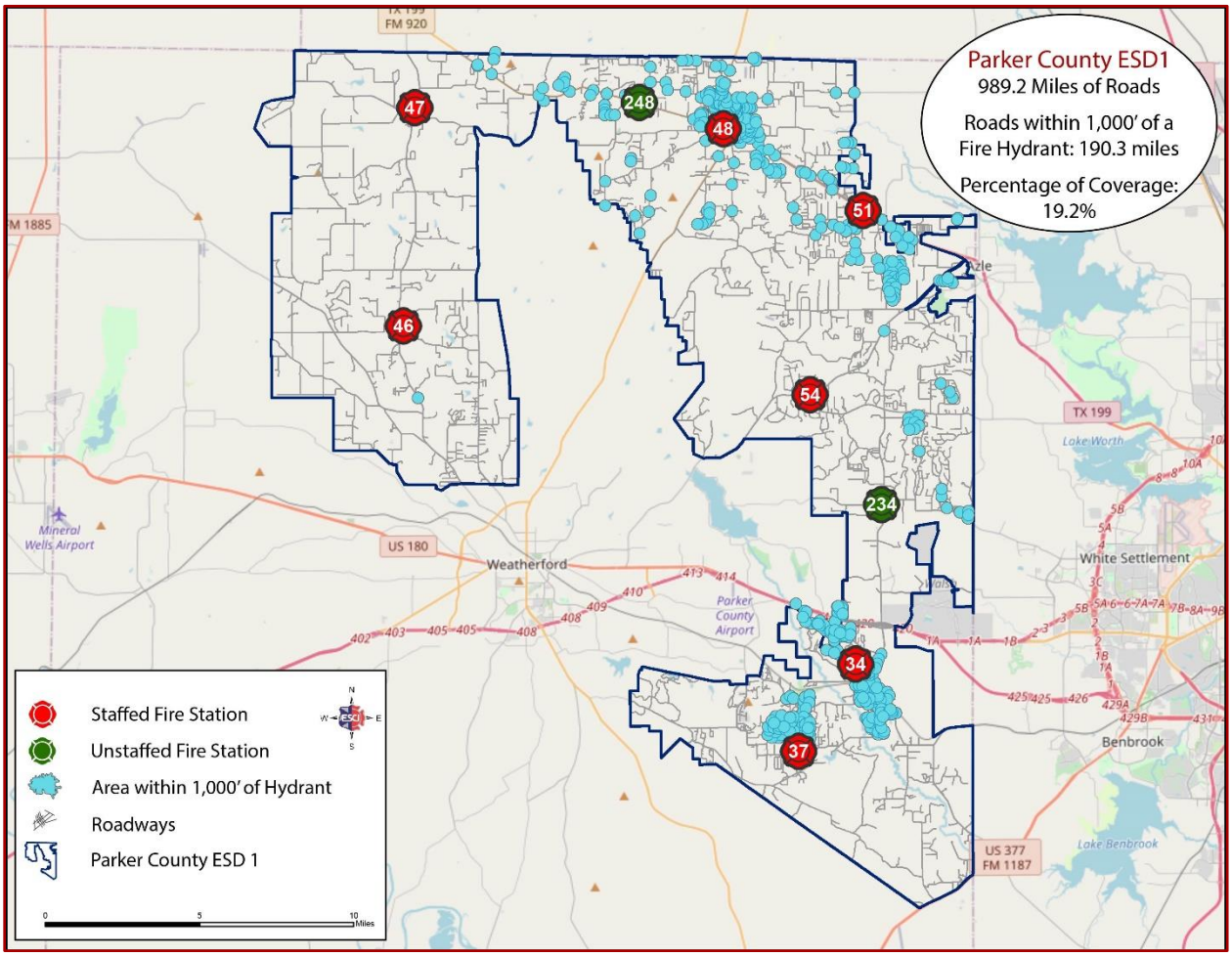


PCESD1 operates engines or engine capable units for all nine staffed and unstaffed fire stations. As measured from the facility in which they are housed, PCESD1 engine companies are deployed such that 17.4 percent of the road network in the service area is within the ISO 1.5 miles of travel distance (172.5 miles). This leaves 82.6 percent of the road network outside of the ISO required 1.5 miles of travel distance (816.7 miles).

ISO also evaluates a community's availability of a sufficient water supply, critical for the extinguishment of fires. One of the areas evaluated is the geographical locations and distribution of fire hydrants. Based on ISO scoring, structures that sit outside of a 1,000-foot radius of a fire hydrant could be subject to a Class 10 rating, signifying that no fire protection capabilities exist. Exceptions are made when a fire department can show an adequate alternative water source is available to provide the needed volume of water for fire suppression activities for a sustained period of time. This could be provided through the use of a dry hydrant storage tank of 30,000 gallons or more, or a multiple water tender operation.

The next figure illustrates fire hydrant distribution within the PCESD1 service area and the roadways within the ISO criteria 1,000-foot radius.

Figure 65: Parker County Hydrant Distribution, ISO Criteria

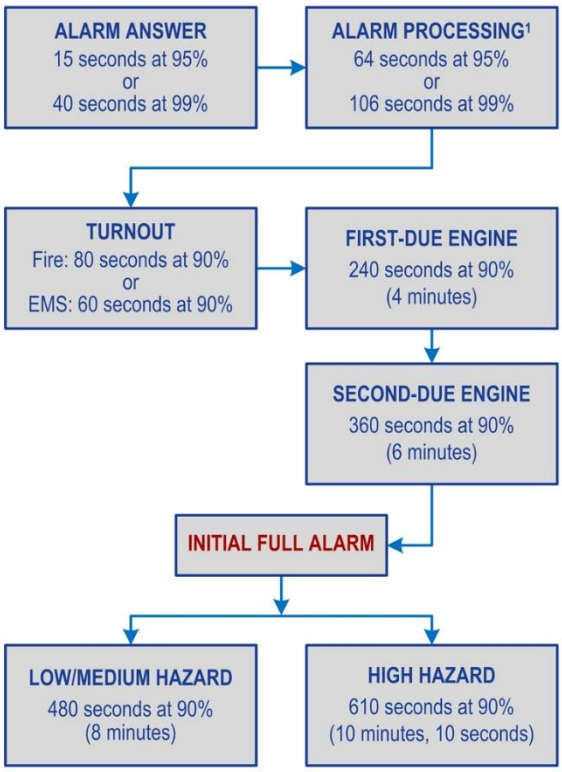


As shown in the preceding figure, fire hydrant coverage is absent in approximately 80 percent of the District. PCESD1 mitigates this using water tenders that are strategically located throughout the District. Additional water tenders can be summoned through automatic aid or mutual aid requests from adjacent fire departments.

NFPA 1710

NFPA 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments,* provides travel time goals for fire, EMS, and special operations emergency responses.[24] While this standard is more commonly utilized for career fire departments and not combination departments such as PCESD1, this section has been included for comparison purposes and information for the organization. The next figure illustrates this standard while also including alarm processing (call processing) and turnout time.

Figure 66: NFPA 1710 Response Time Standards

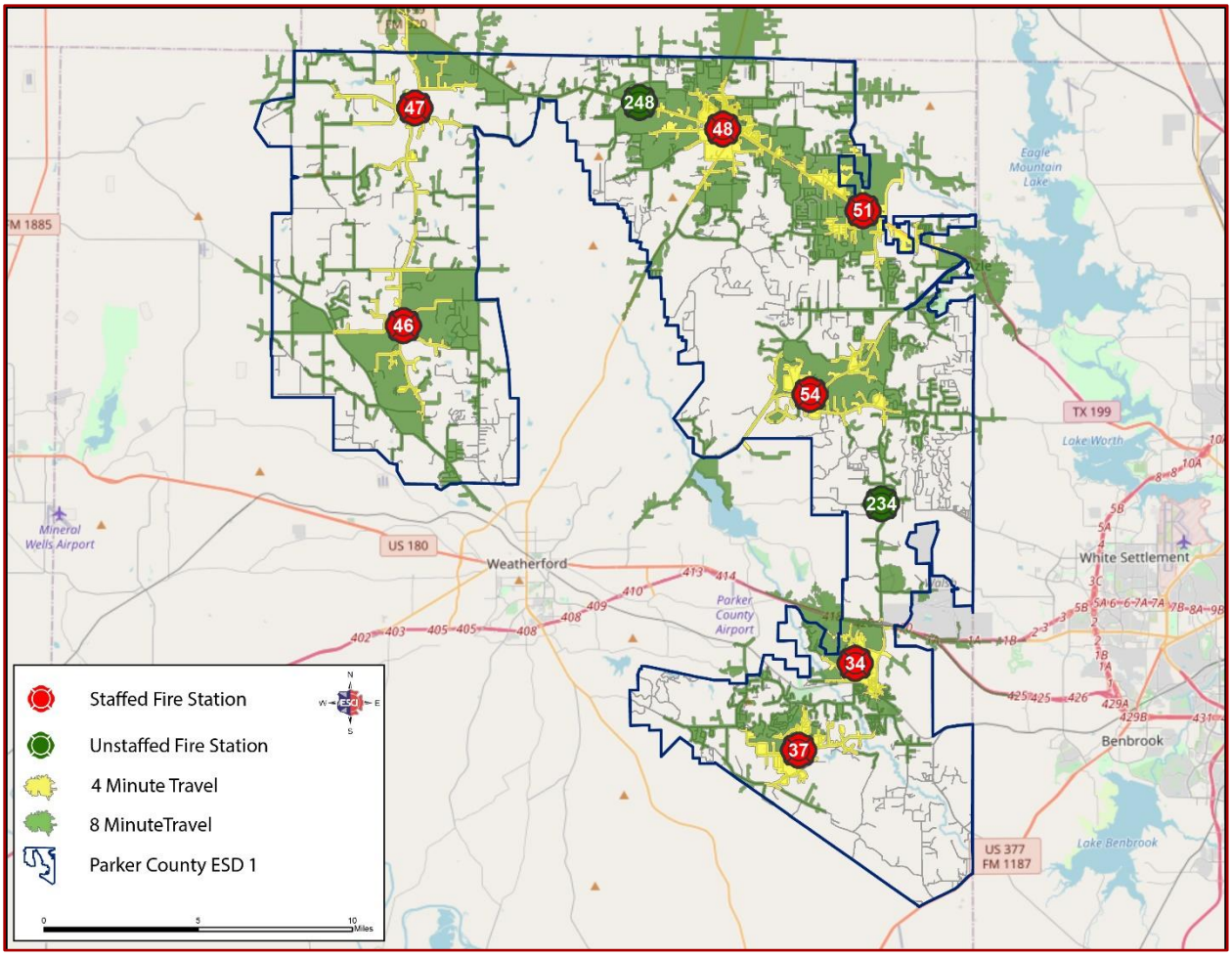


[1]From NFPA 1710, which references NFPA 1221 (2019), which states high-priority incidents should be at 60 seconds or less at 90%.

[24] *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (National Fire Protection Association 2010).*

As illustrated in the proceeding figure, NFPA 1710 specifies that career staffed fire departments deploy resources such that in 90 percent of emergency incidents, the first arriving unit arrives on the scene within four minutes from the time they began to respond (wheels rolling). Additionally, the standard identifies that the full first alarm assignment should arrive in eight minutes' travel or less at a low to medium hazard fire suppression incident (measured at the 90th percentile). This means that all units dispatched on the first alarm assignment must arrive on the scene within that period of travel time. The next figure illustrates this standard from the currently staffed PCESD1 fire stations 34, 37, 48, 51, and 54. The actual alarm processing (call processing), turnout, first-due engine (travel time), response time, and total response time performance of the PCESD1 will be discussed in the response performance section of this report.

Figure 67: 4 and 8-Minute Travel Time, NFPA 1710 Criteria



The quality and connectivity of the street network, traffic, geography, weather, and barriers all potentially affect travel time performance. While the four- and eight-minute travel time criteria are only accomplished in limited geographic locations within the District, ESCI noted that these locations correlate with the areas of increased incident density, as shown in previous figures.

It should be noted that the NFPA 1710 standard is not mandated or codified. However, it is an industry best practice and should be viewed as a desirable goal. Also note that the travel time model does not measure actual travel time performance. The model demonstrates potential travel time, assuming all apparatus are in quarters and available.

Resource Reliability

The workload of emergency response units is a factor that influences response time performance. If a response unit is unavailable for any reason, another unit from a more distant station (or mutual/automatic aid department) must respond. This can obviously increase the overall response time. Although fire stations and units may be distributed in a manner to provide quick response, as illustrated in previous map figures, that analysis assumes the response units are in their assigned stations and available for response.

Call Concurrency

Concurrent incidents and the amount of time individual units are committed to an incident affect a jurisdiction's ability to muster enough resources to respond to additional emergencies. The higher the number of incidents that occur at the same time can drastically reduce a department's capability to respond to additional incidents, resulting in longer response times from units responding from distant locations.

The next figure displays the frequency in which concurrent incidents occurred in the PCESD1 service area during the study period.

Figure 68: Call Concurrency (2017–2019)

Number of Incidents	Percentage
1	69.8%
2	21.3%
3	5.8%
4	1.7%
5	1.4%

During the preceding three-year period, single incidents accounted for 69.8 percent of the overall service demand for PCESD1, and two incidents occurred at the same time 21.3 percent of the time. Figure 68 shows that approximately 70 percent of the emergency workload involved only one incident at a time, with simultaneous incidents occurring 30 percent of the time. In ESCI's experience and the number of overall available District resources, these percentages do not indicate stress on PCESD1's available response resources.

Unit Hour Utilization

Unit Hour Utilization (UHU) is another response measurement methodology that is useful in quantifying a response unit's emergency response workload. The UHU measurement, expressed as a percentage, quantifies the amount of time that a unit is engaged in an emergency response, and is therefore not available to respond to a concurrent incident, or other non-emergent support activities, such as training, inspections, public education sessions, station/apparatus maintenance, etc. UHU rates are expressed as a percentage of the total hours in a year.

The following figure summarizes a 2016 Henrico County (VA) Division of Fire published study, which analyzed the department's EMS workload, and subsequent UHU commitment criteria and likely impacts on overall unit availability.

Figure 69: Commitment Factors as Developed by Henrico County (VA) Division of Fire, 2016

Factor	Indication	Description
0.16–0.24	Ideal Commitment Range	Personnel can maintain training requirements and physical fitness and can consistently achieve response time benchmarks. Units are available to the community more than 75% of the day.
0.25	System Stress	Community availability and unit sustainability are not questioned. First-due units are responding to their assigned community 75% of the time, and response benchmarks are rarely missed.
0.26–0.29	Evaluation Range	The community served will experience delayed incident responses. Just under 30% of the day, first-due ambulances are unavailable; thus, neighboring responders will likely exceed goals.
0.30	"Line in the Sand"	Not Sustainable: Commitment Threshold—the community has less than a 70% chance of timely emergency service and immediate relief is vital. Personnel assigned to units at or exceeding 0.3 may show signs of fatigue and burnout and may be at increased risk of errors. Required training and physical fitness sessions are not consistently completed.

The commitment factors described relate to 24 hours a day staffed units and are included for comparison purposes and information for the organization. Due to PCESD1 data limitations, incident data used to calculate UHU was only available for the partial 2019–2020 year. The following figure summarizes the calculated UHU for specific PCESD1 units, and is shown as a percentage of the total non-available time.

Figure 70: UHU Calculation (2019–2020, partial years)

Unit	UHU Commitment Time (Hrs/Min/Sec)	UHU Commitment Ratio (%)
Engine 34	600:52:00	3.74
Engine 37	265:43:18	1.65
Engine 46	307:36:31	1.92
Engine 47	38:52:00	0.24
Engine 48	803:41:10	5.01
Engine 51	875:44:46	5.45
Engine 54	553:33:08	3.45

Clearly, the number of incidents and on-scene commitment times do not approach saturation levels for any of the response units, indicating that the number of units deployed and the response territory covered by each unit is sufficient to handle the incident demand.

Response Performance

Using District provided CAD response time data, ESCI also analyzed PCESD1's emergency incident response time performance from January 2017 through December 2019. Mutual aid incidents outside the study area, data outliers, and invalid data are removed from the data set whenever possible.

Fire service best practice documents such as the Center for Public Safety Excellence (CPSE) *Community Risk Assessment: Standards of Cover, 6th Edition* and the *NFPA 1710: Standard for Career Fire Departments, and Special Operations to the Public by Career Fire Departments* recommend measuring emergency response time performance at the 90th percentile; meaning 90 percent of emergency responses occur in the stated value or less.[25,26] In basic terms, the 90th percentile means that ten percent of the values are greater than the value stated, and all other data is at or below this level. This can then be compared to the desired performance objective to determine the degree of success in achieving the goal.

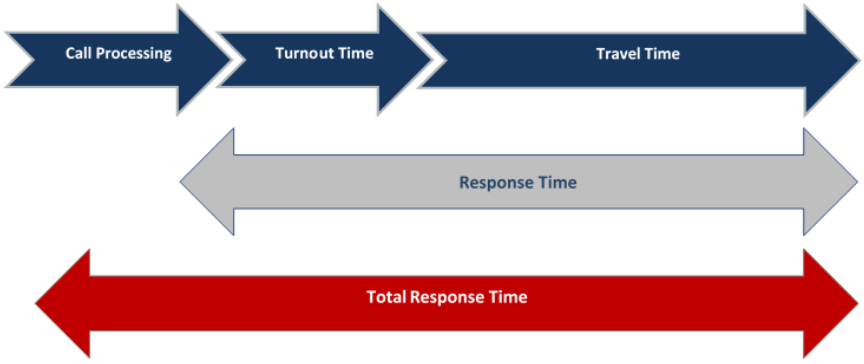
[25] *Center for Public Safety Excellence (CPSE) Community Risk Assessment: Standards of Cover, 6th Edition.*

[26] *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (National Fire Protection Association 2016).*

ESCI does not calculate an average for measuring response time components, as a calculated average may be significantly skewed by data outliers, and one or more particularly good or bad values could skew the average for the entire data set. Percentile measurements are a better measure of performance since they show that most of the data set has achieved a defined level of performance. Industry best practices recommend measuring response performance from the time the emergency call is received at the dispatch center to the arrival of the first fire department apparatus.

Tracking the individual components of the total response time allows for identifying specific issues and areas for improvement. The following figure illustrates the various response time components evaluated by ESCI.

Figure 71: NFPA 1710 Response Time Measurements



The definitions for each response time component are listed below:

- **Alarm (Call) Processing Time:** The amount of time between when a dispatcher answers the 911 call and resources are dispatched.
- **Turnout Time:** The time interval between when units are notified of the incident and when the apparatus are responding.
- **Travel Time:** The time interval between when units begin traveling to an incident and when they arrive on the scene.
- **Response Time:** The sum of the turnout time and travel time. This is the most utilized measure of fire department response performance.
- **Total Response Time:** The time interval from the receipt of the alarm at the dispatch center to when a unit arrives on the scene.

The NFPA standard for alarm processing time is defined in NFPA 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*. Similarly, NFPA 1710 provides response time measurements for career fire departments and is considered an industry best practice. These standards are illustrated in the next figure.

Figure 72: NFPA 1710 Standard for Fire/EMS Response

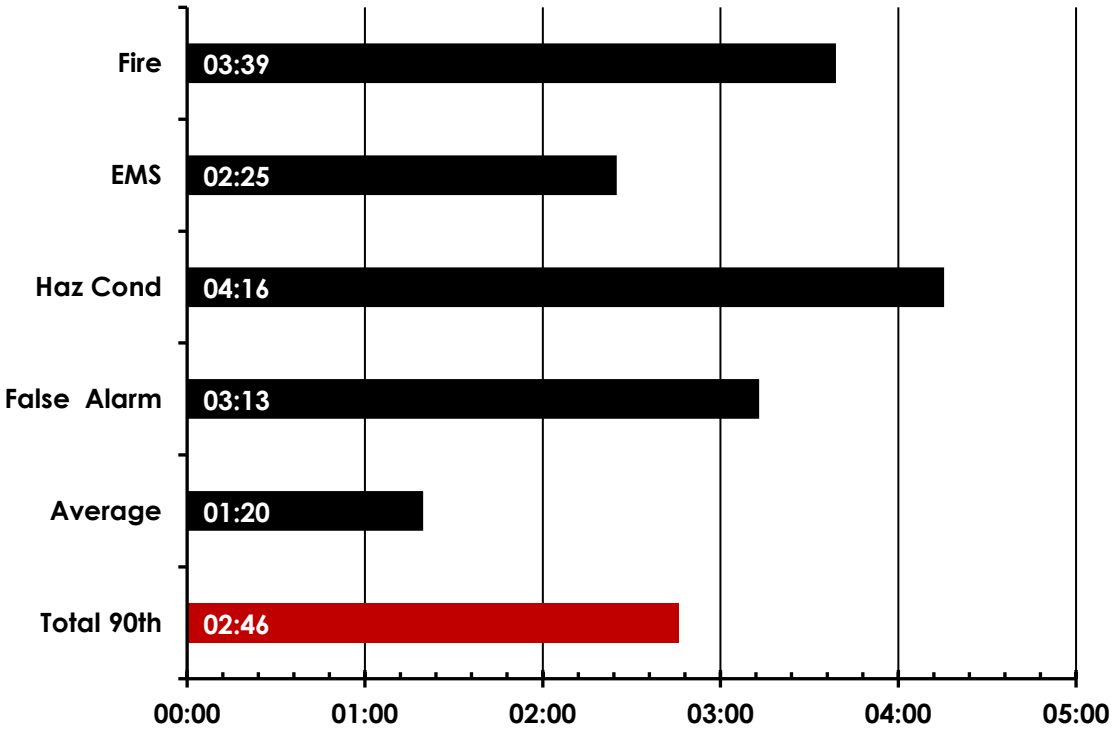
Response Interval	NFPA Standard
Alarm Processing (NFPA 1221)	60 seconds or less at 90% for High Acuity Calls
Turnout Time	60 seconds or less at 90% for EMS 80 seconds or less at 90% for Fire and Special Operations
Travel Time	240 seconds or less at 90% for the first arriving unit

PCESD1 has established a performance goal for turnout times of 60 seconds for all emergency incidents. While ISO does not specify these specific numbers under their "Fire Department" section of FSRS PPC® review, they do describe the expectation under "deployment analysis." Specifically, ISO states that "the timing is in accordance with the general criteria in NFPA 1710."

Call Processing Time

PCESD1 manages the Parker County Fire Alarm Center (PCFA). The next figure illustrates call processing performance for the PCESD1's response area at the 90th percentile. Call processing figures were based on the provided data and not analyzed by ESCI.

Figure 73: Call Processing (2017–2019)

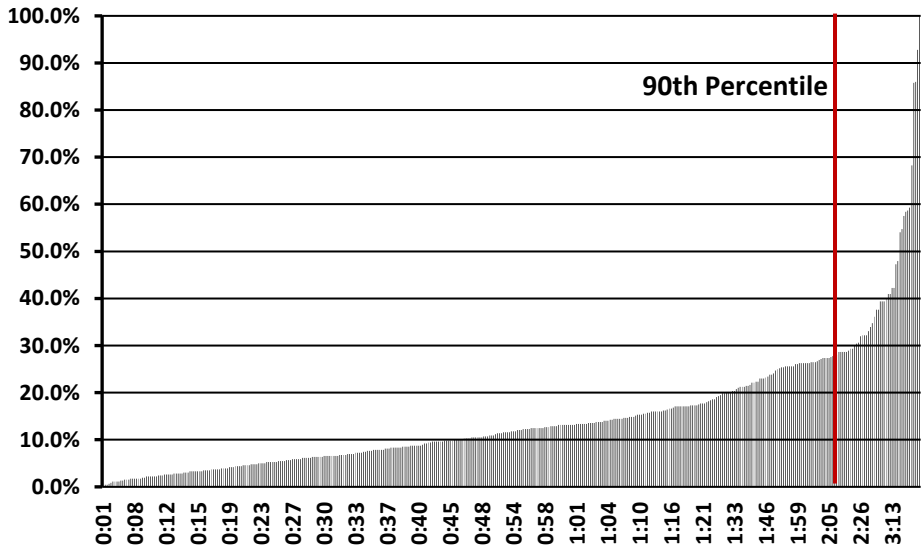


At the 90th percentile for all noted categories, PCFA's call processing performance of 2:46 exceeded the NFPA 1221 recommendation of 60 seconds or less for high acuity incidents. ESCI noted a significant factor that impeded the ability to analyze call processing times thoroughly. Previously, the dispatcher would only log the incident as dispatched only after they had completed entering notes for the incident, not when the incident was actually dispatched (notification made to response resources.) For instance, a dispatcher may get the location and type of incident, dispatch the recommended resources, then remain on the 911 call to obtain additional notes and information before marking the call as complete in the CAD. Measures are being taken to implement tracking of this data based on the time between the call being received and the resources being dispatched.

Turnout Time

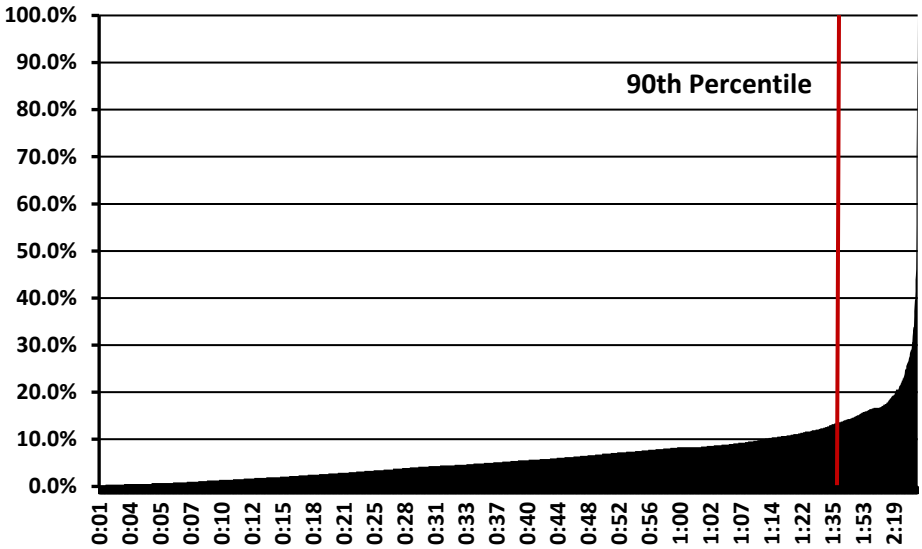
Measuring turnout time is an important piece of total response performance, as it can be positively or negatively influenced by factors such as station design, apparatus staffing, and the performance of the assigned personnel. PCESD1 has an established overall turnout time response goal of 60 seconds for all emergency incident types. Due to limitations of the data provided by the District, only partial year 2019–2020 data was available for turnout time analysis. The next figure illustrates the PCESD1's 90th percentile turnout time performance for the first apparatus on the scene at a fire incident.

Figure 74: Fire Incident Turnout Time Performance (Partial Year 2019–2020)



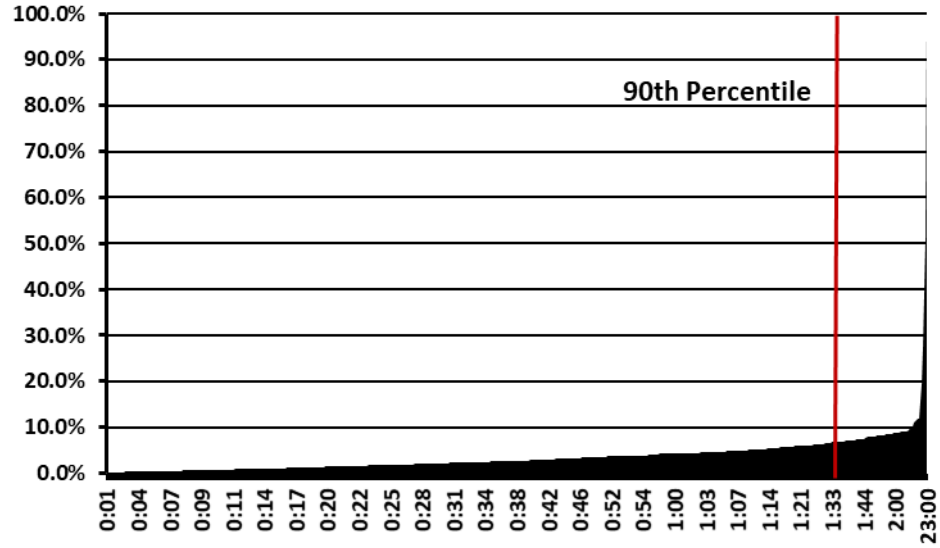
At the 90th percentile, PCESD1's fire incident turnout time performance of 02:08 exceeded by 40 seconds the NFPA 1710 recommendation of 80 seconds for fire incidents. The following figure illustrates PCESD1's EMS incident turnout time performance during the same timeframe.

Figure 75: EMS Incident Turnout Time Performance (Partial Year 2019–2020)



The preceding figure illustrates that while EMS incident response time performance was much faster than fire incident turnout time performance, it was still longer by 37 seconds than the NFPA 1710 standard of 60 seconds. Next, ESCI evaluated turnout time performance to incidents involving a wide range of hazardous conditions.

Figure 76: Hazardous Condition Incident Turnout Time Performance (Partial Year 2019–2020)



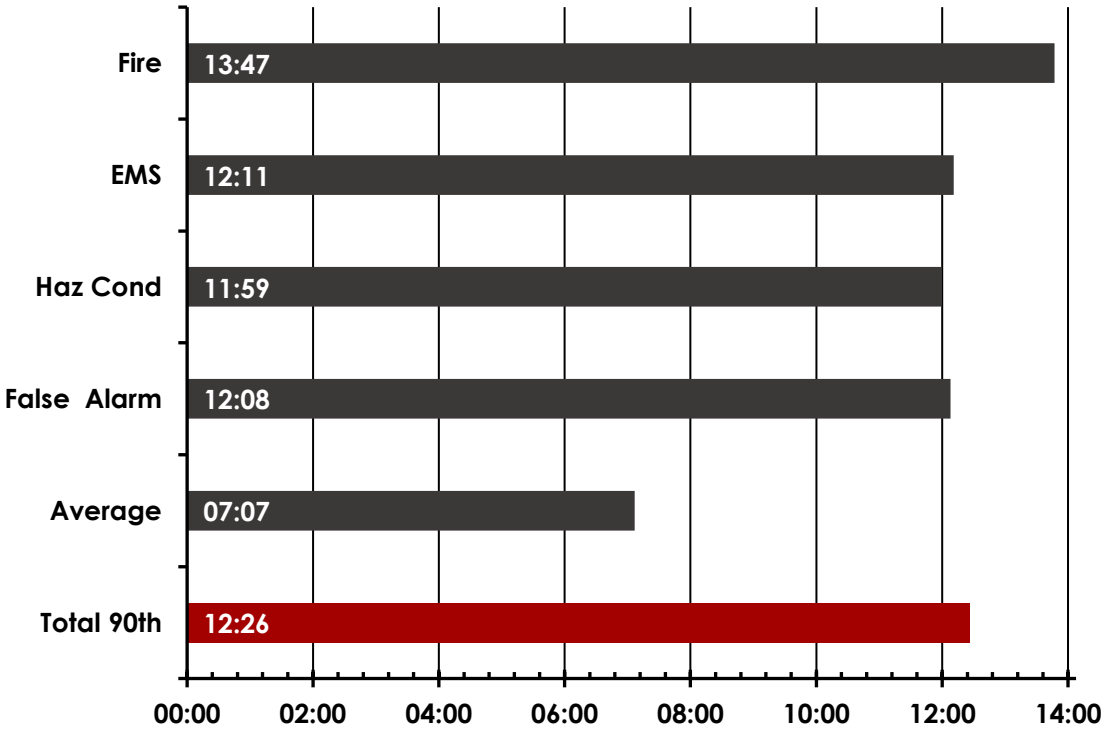
The preceding figure illustrates that units responding to incidents with the NFIRS type code of Hazardous Conditions had a 90th percentile turnout time of 97 seconds, which was 37 seconds longer than the NFPA turnout time standard of 60 seconds.

Travel Time

Travel time is one component of total response time that is mostly influenced by factors outside of the control of the fire department. These factors include the characteristics of the existing road network, traffic congestion, weather, geographic barriers, and the size of the service area.

The next figure illustrates travel time performance throughout the PCESD1's service area at the 90th percentile.

Figure 77: Travel Time (2017–2019)



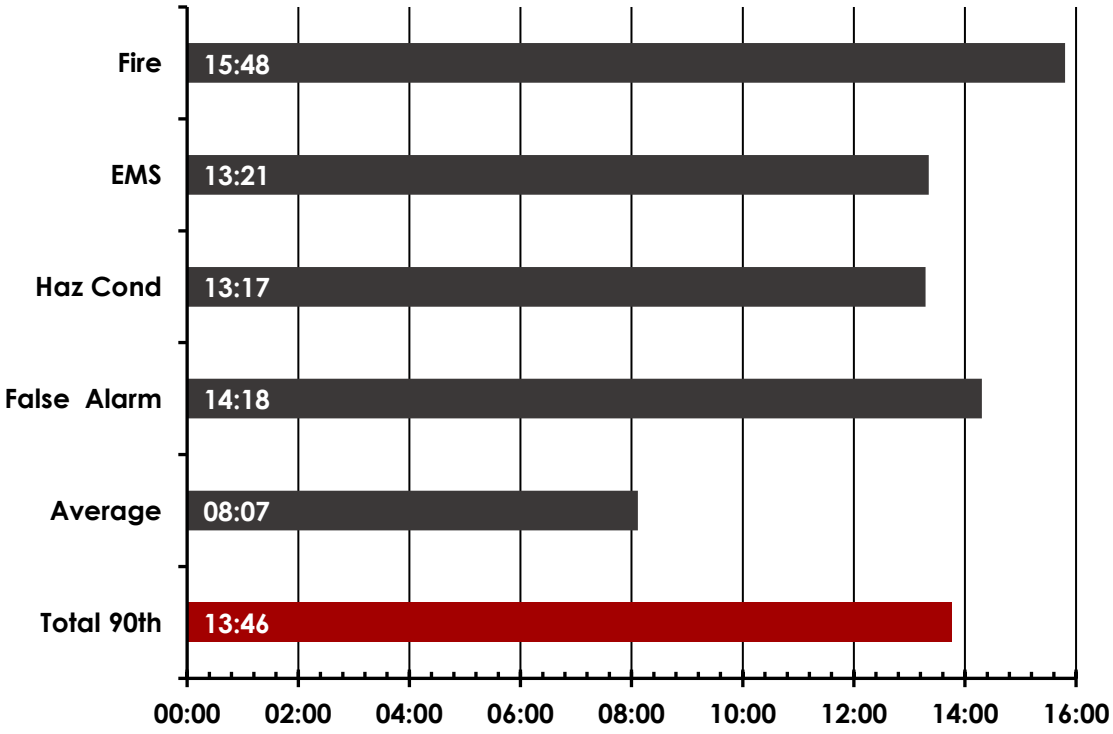
At the 90th percentile for all noted categories, PCESD1's travel time performance of 12:26 exceeded the NFPA 1710 recommendations of 240 seconds for the first arriving unit.

Response Time

As previously discussed, the most commonly utilized measure of fire department response is a combination of turnout time and travel time, referred to as response time or response performance.

The next figure illustrates emergency response time performance for the PCESD1's service area at the 90th percentile.

Figure 78: Response Time (2017–2019)



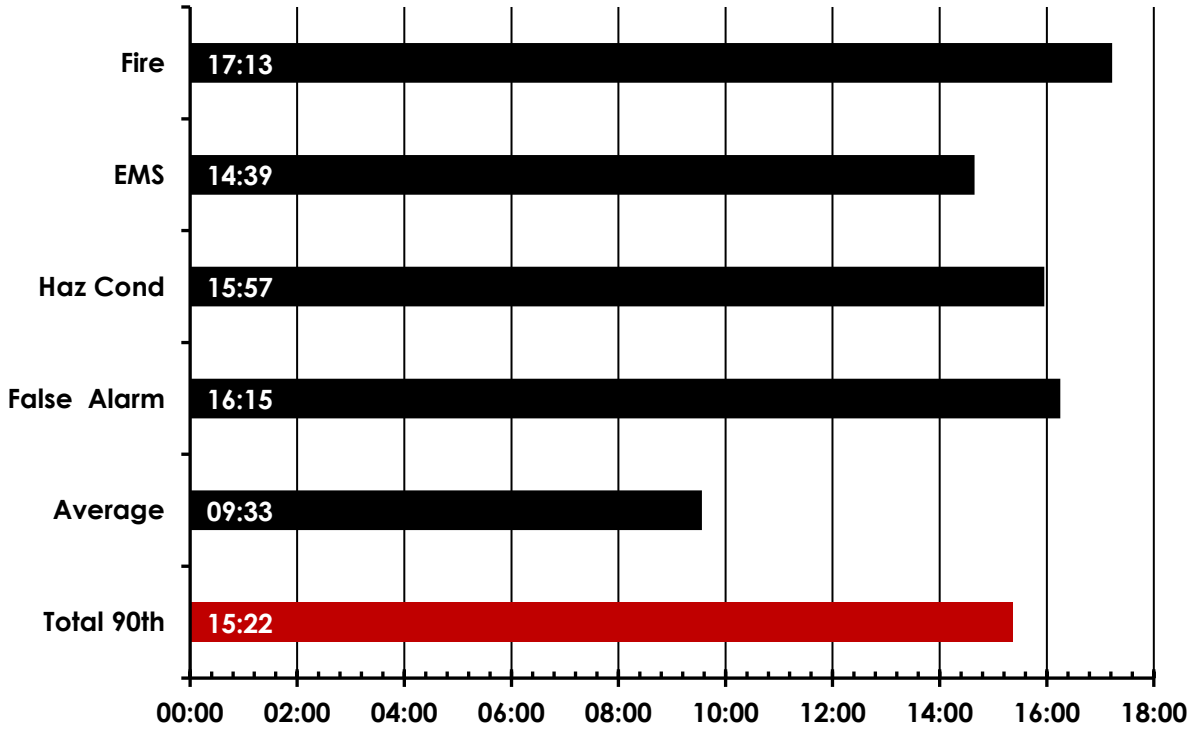
At the 90th percentile for all noted categories, PCESD1's response time performance of 13:46 exceeded the NFPA 1710 recommendations of 5:00 for EMS calls and 5:30 for fire and special operations calls.

Total Response Time

As previously discussed, total response time is the amount of time a resident or business waits for resources to arrive at the scene of an emergency, beginning when they first call 911.

The next figure illustrates total response time performance throughout the PCESD1's service area at the 90th percentile.

Figure 79: Total Response Time (2017–2019)



As would be expected due to the call processing, turnout time, and travel time performance, PCESD1 exceeds the NFPA 1221 and 1710 recommendations in all noted categories at the 90th percentile with a total response time performance of 15:22.

NFPA 1720

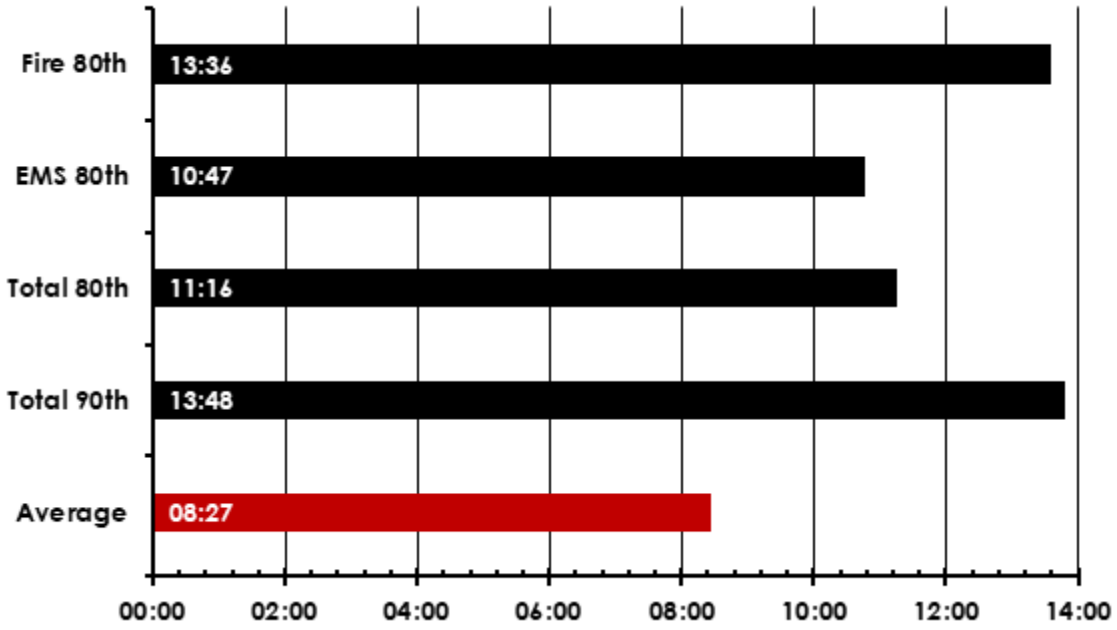
It should be noted that NFPA 1720: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* uses a different response time benchmark matrix for volunteer and combination fire departments. The next figure summarizes this matrix.

Figure 80: NFPA 1720 Deployment Matrix

Demand Zone	Demographics	Response Time	Objective Percentage
Urban Area	> 1,000 population/mi	9 minutes	90%
Suburban Area	500–1,000 population/mi	10 minutes	80%
Rural Area	< 500 population/mi	14 minutes	80%

The next figure illustrates emergency response time performance for PCESD1 based on NFPA 1720 recommendations for suburban demand zones.

Figure 81: Response Time, Suburban (2017–2019)



As previously illustrated, NFPA 1720 requires a 10-minute response time performance at the 80th percentile for suburban demand zones. PCESD1 exceeds this standard by 1:16. While the utilization of averages is not recognized by NFPA 1720 due to the previously noted issues, PCESD1 does have an average response time of 8:27.

Mutual and Automatic Aid Systems

Very few, if any, organizations possess enough resources needed to mitigate all possible incident types and sizes. Additionally, when mutually beneficial agreements are possible, good governance suggests that these opportunities should be seized to provide higher service levels, particularly when they occur at little or no cost.

Two types of agreements are currently in place within PCESD1; Mutual and Automatic aid. In mutual aid agreements, two or more organizations agree that, when requested, they will supply the other agency with their available resources. Automatic aid occurs as the name implies, automatically. When the dispatch center receives an emergency call, all available resources are examined based on the appropriate unit-type and their proximity to the call. The closest unit is then dispatched, regardless of jurisdiction.

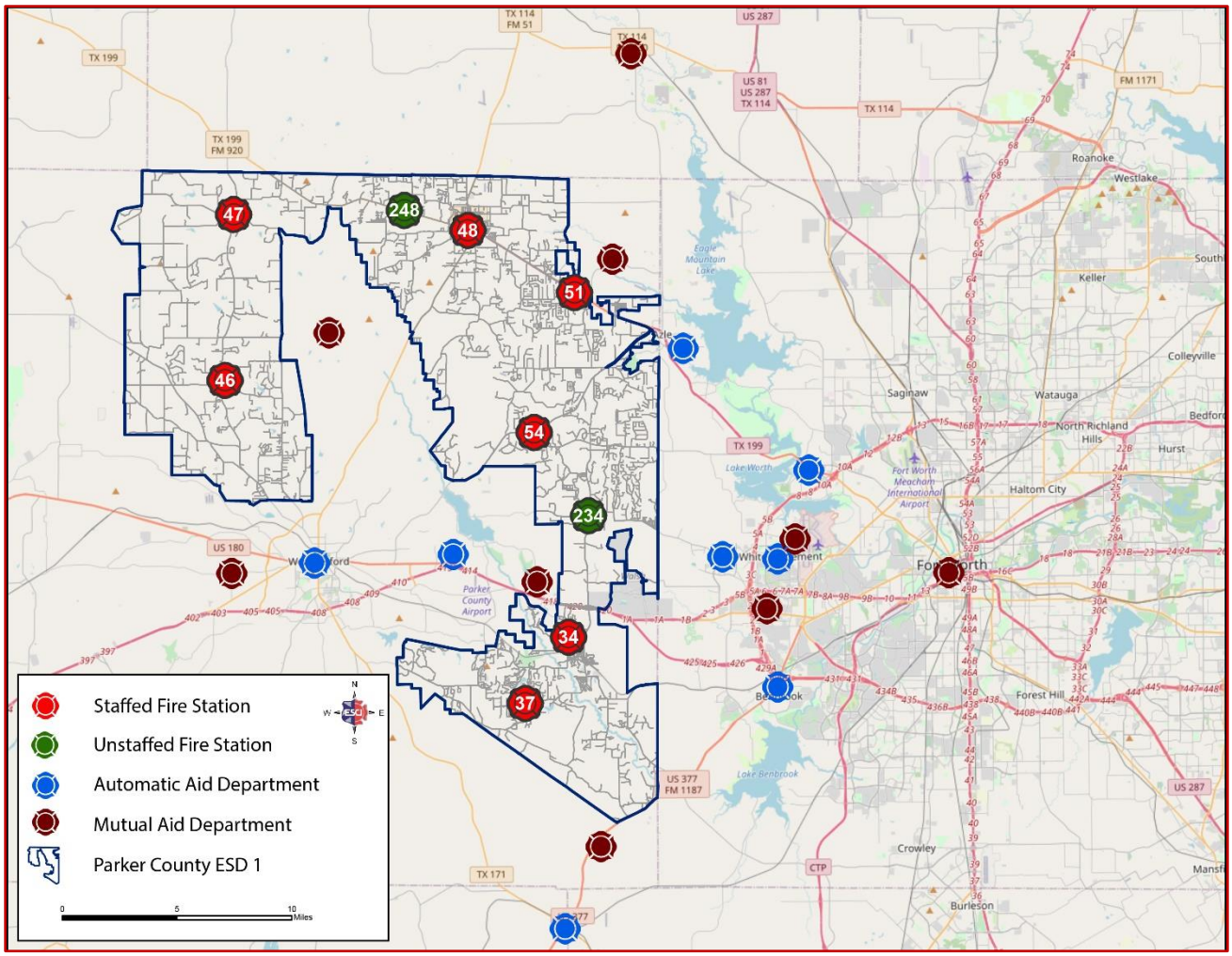
PCESD1 currently has mutual and automatic aid agreements with several surrounding departments. It should be noted that mutual aid and automatic aid agreements are for specific resources and not necessarily the total resources available within each department listed. The next figure indicates all mutual and automatic aid departments for PCESD1.

Figure 82: PCESD1 Mutual and Automatic Aid Departments

Department	Mutual Aid	Automatic Aid
Parker County ESD 6	X	
Parker County ESD 9	X	
Wise County ESD 1	X	
Lockheed Martin Fire Department	X	
Parker County ESD 3	X	X
Parker County ESD 7	X	X
Parker County ESD 8	X	X
Briar-Reno VFD	X	X
Azle Fire Department	X	X
Benbrook Fire Department	X	X
Willow Park Fire Department	X	X
Weatherford Fire Department	X	X
White Settlement Fire Department	X	X
Lake Worth Fire Department	X	X
Cresson Fire Department	X	X
Fort Worth Fire Department	X	X

The next figure illustrates the location of PCESD1's mutual and automatic aid partners.

Figure 83: PCESD1 Location of Mutual and Automatic Aid Departments



The next figure displays PCESD1 mutual and automatic aid responses summarized by year for 2017 through 2019.

Figure 84: PCESD1 Mutual/Automatic Aid Summary (2017–2019)

Type	2017	2018	2019
Mutual Aid Given	145	166	306
Mutual Aid Received	162	176	160
Automatic Aid Given	–	–	124
Automatic Aid Received	–	–	67
Net (Aid Given - Received)	17	10	(-203)

ESCI noted a large increase in mutual aid responses outside of the PCESD1 service area. This is most likely the result of an automatic aid agreement that was signed between the District and the Fort Worth Fire Department for a section of the city that has a faster response from District units. In the time interval illustrated in the preceding figure, PCESD1 provided aid to neighboring jurisdictions 741 times, while receiving aid 565 times. This shows a net benefit of (-176) for both mutual and automatic aid agreements.

Service Delivery Discussion

As previously noted, PCESD1's 80th percentile total response time performance compared to the NFPA 1720 standard was deficient by 1 minute, 16 seconds. The NFPA suburban category was used for comparison purposes as almost all of the District's population density falls into that category.

SUPPORT PROGRAMS

Using information provided by the District, ESCI reviewed critical support areas and provided overall observations in the following areas:

- Training
- EMS
- Communications
- Life-Safety (Fire Prevention)
- HazMat
- Technical Rescue

Training Program

General Training Competency

The District has a strong and robust training program. As a fire district regulated by the Texas Commission on Fire Protection (TCFP), the District is required to meet specific training requirements for all paid personnel, most notably Basic Structural Firefighter (NFPA Firefighter II), within one year of appointment. As a rule, the District requires certification through an external process, i.e., third-party TCFP-approved sources, before assigning personnel to operational firefighter duties. For volunteer personnel, the District provides internal training for State accreditation as Basic (NFPA Firefighter I) and Advanced (NFPA Firefighter II) Firefighter certification through the Texas State Firefighters' and Fire Marshals' Association (SFFMA).

Continuing education (CE) provided by the District is available for all personnel. Personnel also receive CE training from independent third parties, such as other employers, local departments, and regional or state-sponsored training offered by the SFFMA and/or the Texas A&M Engineering Extension Service (TEEX).

The District has systems in place to track training and link training to job duties, as shown in the following figure.

Figure 85: Training Competencies

Training Competency	Findings
Incident Command System (ICS) Certification	Formalized incident command structure is defined, job descriptions on all positions, including certification requirements, have been implemented. There is no formal record of NIMS-specific training.
Personnel Accountability Training	Periodic training using in-house training. PAR tags are issued to all personnel.
Formal Training SOGs	Training SOGs are in place for live fire training and company level training.
Training Safety Procedures	None reported.
Technical Rescue	External training available is to personnel.
Hazardous Materials Certification	All personnel trained to Hazmat Awareness and Operations level. External training is available to all personnel. 15 personnel trained to TCFP hazmat technician certification. No documentation of annual refresher training reported.
Wildland Firefighter Certification	All personnel are required to complete Basic Wildland Firefighter (S130/190) course. All full-time personnel members are required to obtain TCFP Wildland basic certification.
Vehicle Extrication	All TCFP and SFFM certified personnel have basic knowledge of extrication skills. Department hosts annual extrication training internally in cooperation with TEEX.
Defensive Driving	VFIS-sourced driver training includes annual EVOC course. Also have internal driver operator program. Driver-Operator certification encouraged but not required.
Use, Safety, & Care of Small Tools	Routine training with all tools and equipment. Special training for all new tools and applications.
Use, Safety, & Care of Power Equipment	Routine internal training, including safety, with all power tools and equipment, supplemented with vendor-provided training for all new tools and applications. Maintenance personnel attend classes on proper care and maintenance.
Radio Communications & Dispatch Protocols	Radio etiquette SOGs and communications procedures, with Parker Co Fire Alarm (primary dispatch agency)
Other Topics	Periodic CE on others topic conducted via online platform, medical director, or other qualified provider.

Personnel Trained

The District provides ongoing, periodic training for all personnel and encourages that personnel take advantage of external training opportunities as part of an ongoing professional development program. According to 2019 District records, the District documented training for:

- **121 people**. This number includes volunteers, full-time paid personnel, and part-time paid personnel.
- **20,349 total training hours delivered**. This includes all combined training hours—online service delivery, instructor-led classes; certification and continuing education classes; and regional or state fire schools. This number includes:
  - **13,036 fire-related training hours**
  - **6,833 EMS-related training hours**
  - **480 vehicle extrication training hours**

The above statistics do not take into account part-time employee training hours documented through other employers.

Training Methodology

The District uses a variety of training methods to ensure personnel have the required knowledge and skills to perform assigned tasks. Station and individual company drills and training are routinely conducted. Multi-company drills and training are conducted monthly, and multi-agency drills are conducted periodically. Training delivery may be instructor-led, delivered online, or through self-study.

Training Administration and Budget

The District has a healthy training program that appears to meet the immediate needs of continuing education for all personnel and fire/EMS certification for volunteers. The District's training program is primarily focused on fire training, with limited emphasis on EMS training or leadership development. EMS and leadership training opportunities are available to all personnel; however, this training is usually provided by others at the regional or State level. ESCI found there is a need for long-term planning, additional funding, and improved documentation of training efforts.

Training Facilities & Resources

The District has a 40-person classroom and various fire operations props (roof ventilation, forcible entry, ceiling pull, SCBA survivor course, etc.). Some dedicated EMS training equipment, including CPR mannequins, spinal immobilization equipment, and expired airway management devices, are available. A central training library with digital and printed materials is maintained.

The District recently purchased approximately 12 acres of land for construction of a multi-use training facility, which is slated for completion within the next 18–24 months. Discussions are underway with the Texas Department of Transportation to co-locate a highway cable barrier training prop along with a 150-foot long roadway on the site as well. Until then, the District will continue to use parking lots, acquired structures, and training facilities in other jurisdictions.

Recordkeeping

The Assistant Chief and station Captains are primarily responsible for recording training. Completed Target Solution® courses are automatically recorded in its database.

Overall, the District's training records appear to meet minimum requirements. However, there is a need to reduce the administrative workload of chief officers and establish a single point of data entry for all training records that are generated both internally and externally to ensure consistency and maintain database integrity. The following table provides a summary of current training documentation and archiving procedures.

ESCI reviewed certification records maintained by the Texas Commission on Fire Protection (TCFP) to verify licenses, certifications, and required training. Of the 81 personnel:

- 86 percent are career (full-time or part-time), and 14 percent are volunteers.
- 100 percent are certified as structural firefighters.
- 73 percent are certified as Driver-Operators (pumper, aerial, or both).
- 33 percent are certified as Wildland Firefighters.
- 23 percent have not completed the Traffic Incident Management course
- 10 percent have not completed the Courage to Be Safe course

Training Program Discussion

While PCESD1 has made significant strides in better integrating training activities among the various absorbed fire departments, there are significant areas of concern that need to be addressed. Based on current goals and other information provided by the District, ESCI has identified the following items as critical issues that are related to the training support function. These critical issues need to be prioritized and addressed by the District as soon as practical and based on available funding.

- Develop a centralized, multi-year training program that upgrades the professional competency of volunteer members, especially those in command or other leadership roles.
- Design and construction of a training facility, with the possibility to co-locate with administration and fleet maintenance.
- Develop a plan to transition EMS first response from BLS only to ALS capability (see EMS Program section that follows).
- Identify ways, including the establishment of additional support positions, to reduce operational chief officer workload and ensure continued firefighter safety and compliance with State regulations.
- Secure and allocate the funding necessary in order to meet expanding training needs in light of community growth and urban development.

EMS Program

Emergency Medical Services (EMS) has become the largest component of emergency response in fire service organizations that respond to EMS incidents. In Texas, over 65 percent of all incidents are estimated to be medical related.[27]

The District is licensed as a First Responder Organization (non-transport) and provides basic life support (BLS) care only. Advanced Life Support (ALS) and Basic Life Support (BLS) ground ambulance transport service is provided by LifeCare EMS®, a public, hospital-based service provider.

EMS Administration & Oversight

The District does not have a stand-alone EMS Division. An Assistant Chief is assigned to oversee EMS activities, along with other department responsibilities. EMS specific responsibilities of the position include overseeing EMS training and certifications, agency licensing, patient documentation, equipment maintenance, supply maintenance, and patient care quality assurance. The District recently entered into a contract with Dr. Justin Northeim for EMS Medical Director services. These services include training and operational oversight, patient care report run reviews, and liaison with the hospital(s). However, implementation in most of these areas has not started.

EMS Staffing & Personnel

ESCI reviewed certification records maintained by the Texas Department of State Health Services (DSHS) to verify licenses, certifications, and required training associated with District personnel.[28] As found:

- 45 personnel are documented by DSHS as licensed EMS personnel
- 31 percent are paramedics
- 2 percent are EMT-A
- 53 percent are EMT-B
- 13 percent are ECA

Note: There is a discrepancy between District records (122) and DSHS records (45) about the number of licensed individuals that are affiliated with PCESD1. The District should investigate to determine if an individual's missing documentation resides with another provider agency or training agency, and ensure certification documentation is entered into the District's records system.

---

[27] *Incident Types in Texas, U.S. Fire Administration, from NFIRS source data, 2017.*

[28] *Licensing records, Texas Department of State Health Services.*

EMS Equipment & Supplies

The District has an adequate supply of equipment and supplies for BLS operations. There is an inventory control system in place, and a re-supply agreement exists with the primary transport service. There are no controlled drugs or medications in inventory or use. Equipment and supplies checks occur daily, and there is a tag/seal system in use. The District has no ALS cardiac monitor/defibrillators; however, AEDs are readily available.

Clinical Skills & Continuing Education

Based on the information provided, the District provides significant support in practicing and ensuring adequate clinical skills and continuing education. There appears to be room for improvement in two primary areas: Formal EMS field training and evaluation (FTE) program, and the training/selection of designated Field Training Officers (FTO) acting under the direction of the Medical Director.

Record Management & Data Collection

Records management and data collection have a direct impact on four areas of EMS service: Education, Outcomes, Research, and Reimbursement.[29] Each of these plays an integral part in shaping effective and cost-efficient EMS programs and service delivery. Patient care reports (PCRs) are electronically entered in the Emergency Reporting® RMS, or handwritten reports. Written reports are securely stored, consistent with federal privacy laws.

ESCI noted that the District has identified gaps in records management and data collection. In partnership with the new Medical Director, the District is reviewing, updating, and developing new policies and procedures to improve the quality of record management and data collection.

[29] *Beyond EMS data collection: Envisioning an information-driven future for Emergency Medical Services (Report No. DOT HS 812 361). Becknell, J. and Simon, L. National Highway Traffic Safety Administration, Washington, D.C., 2016*

Communications Program

The Parker County Fire Alarm Center (PCFA) receives calls for fire and EMS responses from three public safety answering points (PSAPs) and Life Care EMS® Dispatch Center in Parker County. It is a regional fire dispatch center staffed 24/7 with a minimum of one telecommunicator who provides fire dispatch services to 7 fire departments with 16 stations encompassed in six emergency service districts (ESDs), one municipality, and the Parker County Fire Marshal's Office. PCFA is operated by PCESD1 with cooperative agreements with the other ESDs and cities throughout the County.[30] The 2018–2019 PCFA budget was $250,464 and is funded through apportioned costs assigned to the user agencies based on the percentage of an agency's incidents dispatched the previous year, plus a $2,000 base payment. The District is currently working on the following activities:

- Pursuing Association of Public Communication (APCO) dispatcher and dispatch center certifications.
- Training dispatchers to the Texas Commission on Law Enforcement Telecommunicator standard.
- Increasing the use of routine data reporting: call processing and response times.
- Exploring opportunities to link/consolidate multiple PSAPs/dispatch centers.

Communications & Dispatch Operations

The PCFA strives for professional excellence in call-taking, radio communication, incident mitigation, and EOC integration. As examples, for all calls, the PCFA:

- Has the ability to collect specific response performance measures and calculate key performance indicators for the purposes of analytical review of service delivery, comparison with identified standards and benchmarks, and areas for possible improvement.
- Routinely and periodically evaluates dispatch activities by time and location, by incident type, and by random selection.
- Has SOPs and SOGs and a formal, nationally recognized (Aqua®) quality management/quality assurance (QM/QA) system and process in place.
- Uses external training and certification programs.
- Has options for non-emergent calls, such as lift assist and public assist calls.

[30] *Our Story, Parker County Alarm Center, Facebook, 2019.*

The Center's computer-aided dispatch (CAD) system logs all components of incident response, including address, caller ID, latitude/longitude coordinates, dispatch time, en route time, on-scene time, and incident cleared time. However, call received and call processing times from calls transferred from other PSAPs are not logged in the PCFA CAD system, nor are non-emergency calls logged.

None of the PSAPs are directly linked, and cannot currently serve as secondary PSAPs. Efforts are underway to create secondary PSAP capabilities in 2021. The PCFA radio system is internet protocol (IP) linked to six radio towers via commercial telecommunications carrier T-1 cable, which has failed intermittently in the past, resulting in limited ability to transmit and receive from various tower sites. There have been discussions about replacing these lines with microwave "back haul" transmission equipment to provide more reliable communications with the PCFA, and ESCI understands the current FY 2020/21 County budget includes funding to improve this equipment.

Staffing & Workload Activity

PCFA provides all non-EMS related processing and dispatch services for 22 fire agencies throughout Parker County. EMS related calls are processed through the LifeCare Ambulance Dispatch Center. LifeCare dispatchers use the *Medical Priority Dispatch*® ProQA computer program to interrogate callers and provide pre-arrival instructions. They then send the incident information over to the PCFA for dispatching of the appropriate fire agency. The Center has a full-time Director, a part-time Assistant Manager, two full-time dispatchers, and ten part-time dispatchers. Two call-taker/dispatchers are scheduled during peak times; one dispatcher works off-peak times, and additional dispatchers are called in for severe weather, high fire danger, and other disaster situations.

Once a call is transferred from a PSAP, PCFA interrogates the caller to determine the nature of the emergency and dispatches the appropriate agency and apparatus.

Changes in weather patterns and increases in population have resulted in a steady increase in dispatcher workload over the past few years. In 2019, the Center dispatched over 4,000 EMS-related incidents, and over 3,200 fire and non-EMS-related incidents.

Communications Facility and Equipment

The following figure describes the current Dispatch Center facilities and equipment.

Figure 86: Communications Facility and Equipment

Component	Findings
Facility Security	Camera, double access control, fenced/gated parking.
Emergency Power	Yes, onsite generator with auto-switching. No system reboot required.
CAD System, Year Implemented	SunGard OSSI – November 2014
Geo Database	Yes
Telephone System/Equipment	Housed in County OEM/EOC building. Use their VOIP, with two 911-transfer hardlines off the VOIP. Scheduled to receive secondary PSAP equipment in 2021.
Radio System	5-site P25 digital trunked system, VHF and 700/800, Not encrypted.
Radio Control, Workstations	Motorola MCC-7500 IP consoles 2 full radio console/call-taker stations with CAD, plus 2 call-taker stations with CAD only
Recording Equipment	Voice recording only – No time stamping
Fire/EMS Notification System	Active 911 alerts personal devices and apparatus iPad Staffed station alerting system activated by P25 signaling Plan for 2-tone analog signaling as a redundant backup
Alarm Monitoring/Fire Systems	No direct monitoring
Backup Plan/Center Operations	LifeCare EMS® dispatch and the Parker Co. Sheriff's Office: same radio consoles and CAD capability
Emergency Notifications	Working fire sent to all Chiefs, Fire Marshal list, and OEM

ESCI understands the PCFA CAD will be transitioning late in 2020 to a new regional CAD system that will facilitate seamless, interoperable communications between various dispatch centers through a centralized computer "hub." This new system should help facilitate the implementation of secondary PSAP capabilities among the participating PSAPs.

District apparatus have P25-compliant 700 and 800 MHz mobile and portable radios, supplemented by mobile data computers (MDCs) with automatic vehicle location (AVL) capability in all first-out staffed apparatus, and some volunteer-staffed apparatus.

Communications Discussion

Regardless of the time of day, the practice of minimally staffing the PCFA with one dispatcher should be evaluated from a worker health and firefighter safety standpoint. While overall incident workload drops off significantly during late evening hours, relying on a single dispatcher to be available to handle simultaneous calls and incidents that come into the center can result in a delay in the dispatching of units and communicating critical incident information in a timely manner. For example, a dispatcher who has to leave the console to go to the bathroom has to take a portable phone and radio to ensure they can answer 911 calls and communicate with field units while they are out of the room.

Lack of call logging/recording and time-stamping are additional deficiencies that should be resolved. Currently, simple voice recording devices, similar to answering machines, record incoming 911 calls. However, these calls are not time-stamped in a synchronized way with the CAD system, and there is no way to track or analyze how quickly dispatchers answer 911 calls.

NFPA 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems* identifies two key standards that address the concerns noted above:

Chapter 7: Operations

- 7.3.1 *There shall be a minimum of two telecommunicators on duty and present in the communications center at all times.*
- 7.4.1 Ninety-five percent of alarms received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds.

It appears PCFA does not adequately meet either standard listed above, as they routinely operate with only one dispatcher, and do not track how long it takes to answer and process a 911 call.

Lastly, the PCFA relies on the ambulance provider dispatch center to perform EMD caller interrogation and pre-arrival instructions. Any future changes in ambulance service delivery within the District may impact how this service is provided, and may require incorporation of EMD training, protocols, and quality assurance program into the Center's operation.

ESCI understands discussions are ongoing between the various County emergency response organizations to explore opportunities and options to combine the various law enforcement and fire dispatch services in a centralized location. However, no agreement or plan is in place at the time of this study.

Life-Safety (Fire Prevention) Program

An aggressive risk management program that includes fire prevention and risk reduction support services is a fire department's best opportunity to minimize the losses and human trauma associated with fires and other community risks.

The National Fire Protection Association recommends a multifaceted, coordinated risk reduction process at the community level to address local risks. This requires engaging all segments of the community, identifying the highest priority risks, and then developing and implementing strategies designed to mitigate the risks.[31]

A key role of the fire department is to understand the importance of fire prevention and public education in the planning process. This is especially important in a community with a diversified mix of urban, suburban, and rural areas such as PCESD1.

The fundamental components of an effective fire prevention program are listed in the following figure, accompanied by the elements needed to address each component.

Figure 87: Fire Prevention Program Components

Program Components	Elements Needed
Fire Code Enforcement	Proposed construction and plans review New construction inspections Existing structure/occupancy inspections Internal protection systems design review Storage and handling of hazardous materials
Public Fire and Life Safety Education	Public education Specialized education Juvenile fire setter intervention Prevention information dissemination
Fire Cause Investigation	Fire cause and origin determination Fire death investigation Arson investigation and prosecution

From the information provided, it appears the District provides fundamental fire and life safety activities and has identified the need for additional fire prevention efforts within its service area. However, based on the legally defined roles of a County Fire Marshal and an Emergency Services District, there are some challenges that will need to be discussed and addressed.

[31] *Kirtley, Edward. Fire Protection Handbook, 20th Edition, 2008, NFPA, Quincy, MA.*

Fire & Life Safety Code Enforcement

A strong fire prevention program, based on locally identified risks and relevant codes and ordinances, reduces the loss of property, life, and the personal and community-wide disruption that accompanies a catastrophic fire. ESCI noted there is no adopted and enforced fire code or other fire safety regulations in the County or PCESD1. ESCI further noted that some municipalities within the PCESD1 service area have adopted fire codes, as shown in the following figure.

Figure 88: Fire Marshals within the PCESD1 Service Area

Jurisdiction	FM	Fire Code	Findings
Parker County	Yes	No	Limited staffing, mostly volunteer
Town of Aledo	No	Yes	IFC 2015, administered by the Fire Marshal
Town of Annetta[32]	No	No	Repealed by Ordinance 109
Town of Peaster	No	No	
City of Springtown	Yes	Yes	IFC 2018, administered by a Code Enforcement Official

The municipal Fire Marshals only enforce building and fire codes within their respective city limits. The Parker County Fire Marshal's Office (PCFMO) provides both fire prevention and fire investigation activities on a limited basis. According to TCFP records, PCFMO has eight personnel—one full-time, one part-time, and six volunteers. Two volunteers are certified as fire inspectors and plans reviewers, and four volunteers are certified as fire investigators (one is an arson investigator). The full-time employee serves as the County Fire Marshal and is certified as an Arson Investigator.

[32] *The City of Annetta South has adopted the International Building Code, 2006 Edition with local amendments. By reference, this adoption included the specific sections of the International Fire Code-2006 as listed in Chapter 35 of the IBC-2006. Annetta South Ordinance no. 65, effective.*

New Construction Plan Review and Inspection

A key component of effective code enforcement is the plan review, permitting, and inspection process associated with new construction. Most model codes define the scope and applicability of the code to include:

- New construction—Structures, facilities, and conditions arising after code adoption.
- Existing conditions and operations—where required by the code, or where in the opinion of the fire code official, there is a distinct hazard to life or property.
- Change of use or occupancy.[33]

Currently, the District is only consulted on new construction or occupancy changes in the Cities of Springtown and Aledo. The District has had to resort to monitoring Parker County Assessor reports to identify new construction in their service area.

Existing Occupancy Inspection Program

Periodic inspections of existing occupancies with the intent to identify and correct potential fire-life safety hazards are an essential part of an effective fire prevention program. These efforts are most effective when completed by individuals that have the proper training and experience, and when completed with the appropriate frequency. Likewise, self-inspection programs for low-risk occupancies provide the benefits of community involvement, a more collaborative relationship, and a safer community for firefighters, employees, and the public. Currently, the District only inspects existing occupancies for pre-fire plan purposes.

Code Enforcement Discussion

The District conducts inspections of existing occupancies only for the purposes of pre-fire planning, and findings are documented in the District's RMS. There is no periodic inspection of public assemblies, schools, or other target hazards. There is no self-inspection program for low-risk occupancies. The District does not issue citations or take any other legal action for fire-life safety hazards.

This reality appears to be a result of the lack of proactive fire code review and enforcement activities throughout Parker County, with the exception of a few municipalities. The District is very aware of the need for a more robust fire code enforcement and monitoring program within its service area. However, it currently does not have the foundational codes or authority to perform these important life safety duties.

[33] *Sections 102.1, 102,2, and 102.3 of the International Fire Code, 2018 edition. © 2017 by the International Code Council, Inc., Country Club Hills, IL 60478.*

Fire & Life Safety Public Education Programs

Providing fire and life safety education to the public to minimize the number of emergencies while training the community to take appropriate actions when an emergency occurs is essential to an effective fire and life safety program. Life and fire safety education provides the best chance for minimizing the effects of fire, injury, and illness to the community.

The District provides some of the traditional fire department public education programs, including:

- Call 9-1-1
- Exit Drills In The Home (EDITH)
- Smoke alarm installations
- Kindergarten through fourth grade school fire safety
- CPR training/Blood pressure screening
- Wildfire interface education

Public Education Discussion

Public education and outreach appear to be narrowly focused on elementary-age school life safety education. The District supports a robust program known as the "Eastside Fire Clownz," consisting of a group of volunteers who deliver engaging and contemporary safety messages using clowns, puppets, videos, and music. The program is modified and tailored to the specific ages of the audience. The group delivers approximately 35 presentations per year in various schools throughout Parker County. The Aledo Volunteer Deputy Chief administers this program.

The District also conducts some public education/safety programs, including wildland-urban interface education and mitigation. More focused efforts and dedicated resources towards public education could improve the safety of vulnerable population groups, including the elderly and special needs communities. Examples of successful programs include elder home safety, fall prevention, and car seat inspections, just to name a few.

Fire Cause & Origin Investigation

Accurately determining the cause of a fire is another essential element of an effective fire prevention program. The results of fire investigations can help identify public education focus areas, the need for code modifications, and identification and prosecution of arsonists. The District has no fire investigation resources to conduct cause and origin investigations. Initially, fire investigations for the determination of origin and cause (O&C) start with the ranking Fire Officer on the scene of a fire, but only in small loss fires with an obvious accidental cause. All other fires are referred to the Parker County Fire Marshal's Office (PCFMO) for investigation and additional action.

A small number of District personnel have received appropriate training and certification in accordance with NFPA 1033 and NFPA 921. However, there is no ongoing, formal continuing education (CE) program, nor is there any peer review to ensure investigations are properly conducted.

Fire Code Enforcement Challenges

Texas law authorizes an Emergency Services District (ESD) to create the Office of District Fire Marshal.[34] However, State law prohibits a District Fire Marshal from investigating fires or performing arson investigations if a county already has a Fire Marshal. The law allows fire districts to adopt and enforce a fire code in non-incorporated district areas.

ESCI understands the District has entered into discussions with each municipality and the County about the feasibility of inter-local agreements to provide fire prevention and code enforcement services within their respective jurisdictions, along with the possibility of adopting a county fire code. These efforts should be continued.

Hazardous Materials Program

The District provides basic awareness and operations level response to incidents involving hazardous materials. Product-specific operations are limited to small hydrocarbon spills, *e.g.,* fuel spills from saddle tanks or other washdowns, and small pressurized gas releases, *e.g.,* residential gas lines and tanks. All other incidents require mutual aid assistance from the Fort Worth Fire Department or others. All paid personnel are trained to Awareness and Operations (HazWoper) level, but not all volunteer training has been documented. There is limited documentation of required annual hazmat refresher training.

[34] *Section 775.101 of the Texas Health and Safety Code, effective Sept. 1, 2001.*

Seventy-eight personnel are trained to the Hazardous Materials Operations level, 16 are trained to the Technician level, and three are trained Hazardous Materials Incident Commanders.

On-board reference materials are limited to the DOT Emergency Response Guidebook, 2016 edition, carried on each apparatus. PPE is limited to respiratory protection and structural firefighter thermal protection. Decontamination equipment is limited to gross applications of water using fire hoses and/or aerials streams. There are plans to carry Level B PPE and decontamination equipment in the future.

Hazardous Materials Discussion

The District provides very limited Hazardous Materials response capability, and is primarily focused on product identification, scene isolation, Command and Control, and support operations of outside agency response. The Fort Worth Fire Department is the primary mutual aid agency responsible for containing, controlling, and clean-up of hazardous materials releases of significant size or hazard.

Initial and ongoing verifiable HazWoper training is critical to ensuring responder and citizen safety during dangerous releases. The lack of hazmat training documentation for some volunteers should be immediately addressed.

Technical Rescue Program

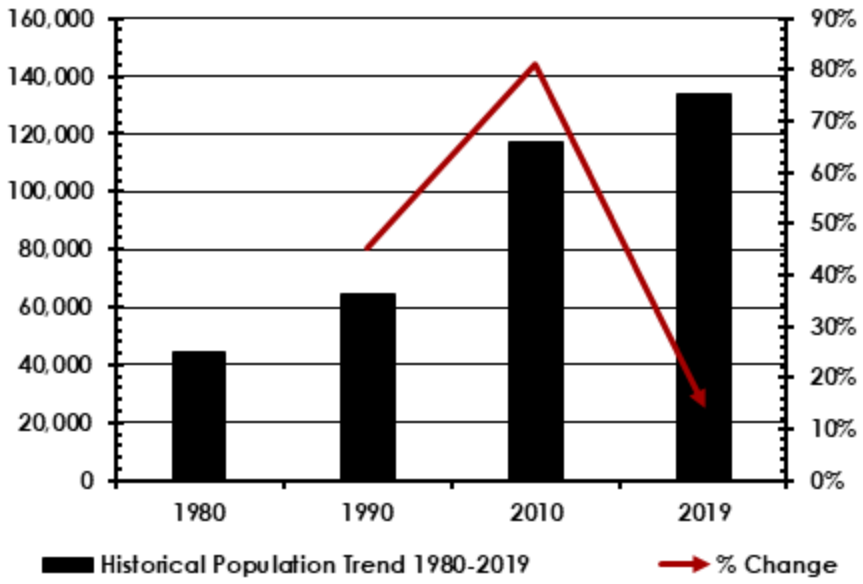
The District provides limited technical rescue response—vehicle/machinery extrication, rising water/swift water rescue, and limited rope rescue. All water rescue activities are as a participant in the County-wide water rescue task force. All other technical rescue incidents require mutual aid assistance from the Fort Worth Fire Department. There are no specific District Technical Rescue training hours/skills requirements/standard operating guidelines.

SYSTEM DEMAND & POPULATION PROJECTIONS

Population Growth & Demographic Projections

Future emergency service demand is largely tied to changes to the service area population, economic activity, and demographics. Analyzing historical population data can assist in forecasting future service demand. ESCI used data from the U.S. Census Bureau, the Texas Demographic Center (TDC), and Economic Modeling LLC (EMSI) to assist in projecting future growth. The following figure shows the historical population growth in Parker County.

Figure 89: Historical Population Trends



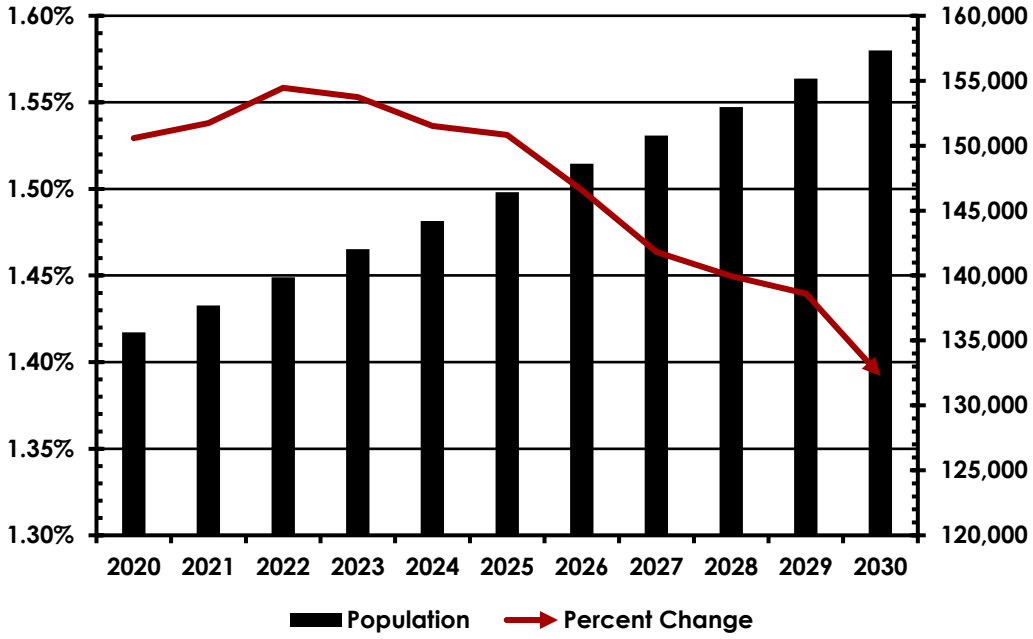
As you can see, the County experienced a tremendous increase in population between 1990 and 2010, which slowed significantly over the past decade. However, strong growth continued during that timeframe. EMSI noted the County's population grew almost 16 percent since 2014, adding just over 19,000 new residents, and projects that another 14,000 will reside in the County by 2024.[35]

The overall annual average growth rate was 13 percent over this time span. However, this average includes an 81 percent "spike" in population growth over two decades. Since 2010, the County's population growth trend has slowed substantially (2.1% annual average growth).

[35] *EMSI Economy Overview, Quarter 1, 2020, Data Set.*

The TDC developed long-range population projections for all counties and cities in Texas. The following figure summarizes the population projection for Parker County for the next decade.

Figure 90: Future Population Growth Projections, 2020–2030



As you can see in the preceding figure, the TDC projects that the County's population will continue to incrementally increase over the next decade at approximately 1.5 percent per year.

Poverty is another population demographic that must be considered when projecting future service demand, as those in poverty typically use EMS services more, and are at higher risk for fires. Since 2012, the County's poverty rate has been varied slightly from a high of 11.1 percent in 2012 to a low of 8.3 percent in 2018.[1]

Community Development

The preceding population projections and demographics summaries are for the entire county and not specific to growth and demographics in the PCESD1 service area alone. ESCI understands significant development has and will continue to occur within the service area, resulting in dense housing development and related pocket population densities that will have to be taken into consideration when assessing future demand on emergency services. According to District officials, over 40 new residential developments are under construction in the service area, particularly in the Springtown and Aledo areas.

According to the Parker County Appraisal District, since 2017, over 1,800 new homes have been built in the PCESD1 service area, and even more are currently under construction. Additional insight on specific PCESD1 population growth can be found in a demographics report commissioned by the Aledo Independent School District. Approximately 75 percent of the District lies within the PCESD1 service area. The School District projects an increase of 2,600 new students in the next five years, and ten-year enrollment growth of 6,250 new students by 2030. The majority of this increase will be tied to migration to new housing developments in the PCESD1 service area.

Lastly, building permit information from the cities of Aledo and Springtown reveals additional planned developments, with over 750 new lots platted and 391 single-family residential building permits issued since 2017. Significant additional development is also occurring in other unincorporated areas of the District as well. However, the District has no way of identifying or tracking these developments.

ESCI believes population growth in the PCESD1 service area will be greater than the overall Parker County growth rate projected by the Texas Demographic Center. Current U.S. Census data estimates that each household has 2.90 residents. Extrapolating this to the known number of new homes built and appraised over the last three years results in an estimated 5,200 new residents in the service area. This aggressive growth is expected to continue over the next several years.

SERVICE DEMAND PROJECTIONS

A potential change in the emergency workload is one of the most critical components to consider when developing a master plan for fire and EMS organizations. In many cases, the emergency workload is tied to the population of a given area. Thus, as populations increase, so does the emergency workload necessitates effective planning. These increases in service demand may require changes and adjustments in the deployment of staffing and capital assets in order to maintain an acceptable level of performance.

Population growth projections, along with historical and forecasted incident rates, were utilized to develop projections for future service demand. To determine historical demand, three years of service demand was analyzed from data provided by PCESD1. Between the years of 2017 to 2019, PCESD1 experienced a service demand increase of 12.87 percent. This represents an average annual increase of 4.29 percent. During this same time, the population increased by 6.86 percent, representing a 2.29 percent annual increase.

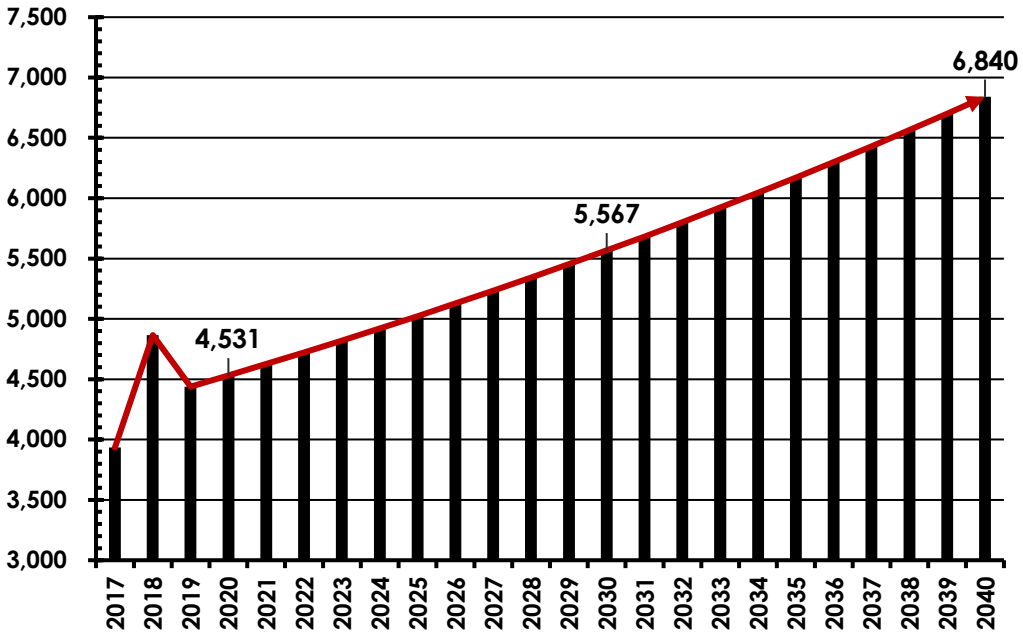
As previously noted in the Service Delivery and Performance section of this report, PCESD1 believes that the reporting data provided for 2019 under a new RMS represents the most accurate service demand figures. This was due to the fact that 2017–2018 data was reported under PCESD1's old RMS, which absorbed reporting methods from when each individual volunteer fire department was reporting.

These factors with historical demand might have an overall effect on the accuracy of future service demand if only the percentage increase was utilized for projections. To minimize these factors, a per capita estimate for service demand projections was utilized by first determining future population growths based on U.S. Census historical figures. The next figure illustrates the historical population figures for Parker County and projected growth through 2040.

As previously noted, Parker County experienced significant population growth between the years of 2010 and 2018 based on U.S. Census historical figures, which represent an average annual increase of 2.08 percent. As previously discussed, the TDC projected that Parker County's population would increase by approximately 1.5 percent per year, which is slightly lower than the projection based on U.S. Census figures. It would be likely that the answer would lie somewhere between these two figures.

With the utilization of the per capita estimate methodology and the average annual increase based on U.S. Census estimates, the next figure illustrates projected service demand through 2040.

Figure 91: Projected Service Demand



The projected service demand by 2040 is 6,840 incidents. Several factors have already been mentioned that must be evaluated when discussing this figure. The population figures utilized were based on the entire Parker County area and not specific to PCESD1's response area. In addition, widespread community development can greatly increase the emergency workload in a specific area. Based on these factors, it is likely that future service demand figures will continue to increase.

GENERAL OVERVIEW OF COMMUNITY RISKS

This section provides an "all-risks; all-hazards" perspective of PCESD1's service area. It is intended to assist in: (1) Identifying hazards and risks within the community; (2) prioritizing risks in order to develop effective risk reduction strategies; and (3) determining the appropriate resources necessary to reduce risk and attain desired outcomes. This assessment relies on the use of both quantitative and qualitative data to describe the fire/EMS protection needs of the community. Where available, physical, economic, and demographic data were utilized to assess the fire/EMS-related hazards and risks.

Characterizing Risk

Simply stated, community risk assessment (CRA) is "the identification of potential and likely risks within a particular community, and the process of prioritizing those risks." This concept is consistent with the FEMA concept of "whole community" and a shared responsibility for emergency preparedness.[36] Thus, CRA is a critical component of the core capabilities, or phases, of emergency management—prevent, prepare, respond, recover, and mitigate, as shown here.

Figure 92: CRA and the Core Capabilities of Emergency Management

- **Prevention** focuses on preventing human hazards, primarily from potential natural disasters or terrorist (both physical and biological) attacks.
- **Preparation** is a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action.
- **Response** is the coordination and management of resources in an all-hazards approach with measures taken for life/property/environmental safety.
- **Recovery** is the group of activities to restore critical community functions and begin to manage stabilization efforts.
- **Mitigation** is the effort to reduce the loss of life and property by lessening the impact of disasters and emergencies.

[36] *National Planning Frameworks, U.S. Department of Homeland Security, FEMA, 2018.*

Unique Risk Factors within the District

The geography of the District is mainly grassy flatlands with few trees and hills. The Barnett Shale, a major formation for the production of natural gas, lies underneath the southeast area of the District, and there are many oil and gas wells and gathering facilities in the service area. Various water systems and sources are used to provide potable water throughout the PCESD1 service area. The City of Aledo's water supply is provided by the City of Fort Worth water system. Springtown's water is supplied by Lake Bridgeport and the Walnut Creek Utility District water system. Annetta's water system consists of a series of Town-owned large-capacity wells. Other smaller wells provide local water supply to the remaining areas of the PCESD1 service area.

Parker County has expanded the basic risk analysis process to match the "all hazards—all risks" methodologies common to emergency management. In addition to the traditional characteristics of likelihood and community impact, this approach provides qualitative data about the probability and consequences of an incident for both natural hazards and technological/human-caused hazards. A detailed explanation of each of these hazards may be found in the Parker County Hazard Mitigation Plan. To limit repetition and ensure consistency with that Plan, only a summary of each risk is provided in this report.[37]

[37] *As part of the region's efforts to develop multi-juridictional Hazard Mitigation Action Plans (HazMAPs), the Parker County Hazard Mitigation Plan is under revision and was not available. Material in this section is taken from various sources, but is subject to change based on final changes to the Parker County HazMAP.*

History of Hazards & Vulnerabilities

Since 1953, the number of federally-declared disasters in Parker County (23) is 35 percent higher than the Texas County average (17) and 49 percent higher than the U.S. County average (15).[38] The cause for each of these declarations is shown in the next figure. Although some of these declarations did not affect the District directly, they are an indication of the hazards present throughout the County.

Figure 93: Federally-Declared Disasters, 1953–2020

Type	Number	Percent
Flood	6	26.1%
Fire	5	21.7%
Severe Storm	5	21.7%
Hurricane/Tropical Storm	4	17.4%
Other	3	13.1%
Total	**23**	**100.0%**

[38] *FEMA Disaster Declarations Summary - Open Government Dataset, U.S. Department of Homeland Security, last updated March 25, 2020.*

Hazard Classification

The District is susceptible to a variety of hazards, which can be grouped into one of two categories:

- **Natural hazards**: Result from acts of nature.
- **Technological/Human-caused hazards**: Result from accidents or failures of systems and structures; or from the actions of people, both accidental and intentional.

The demographics of the population can affect the amount of service demand and the nature of risks within a community. A detailed discussion of the District's demographics is included in the "Organization Overview" section of this report.

Natural Hazards

Natural hazards include the following.[39]

Figure 94: Examples of Natural Hazards

- Avalanche
- Animal Disease
- Dam/Levee Failure
- Drought
- Earthquake
- Extreme Temperature
- Flood
- Hurricane/Tropical Storm
- Landslide/Sinkhole
- Thunderstorm/Hail/Lightning
- Tornado
- Tsunami
- Volcanic Eruption
- Wildfire
- Winter Storm

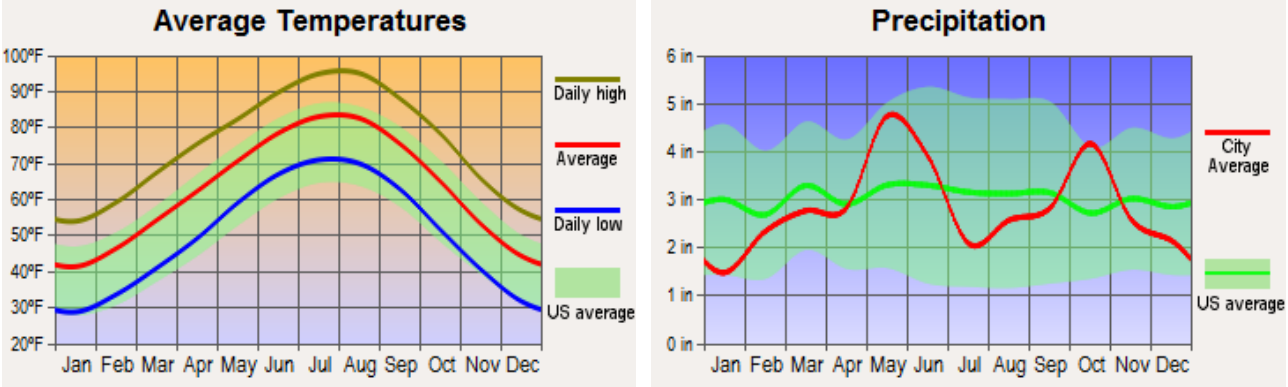
Climate

The weather classification for the District service area is classified as humid subtropical with hot summers; however, it is also continental, characterized by a wide annual temperature range. As shown below, the year-round average temperature is 63 degrees F, with a monthly average low of 51 degrees F and a monthly average high of 75 degrees F. July and August are the hottest months, and December and January are the coldest. The relative humidity is about 65 percent year-round but can range from 40 to 80 percent.

The District receives about 40 inches of rainfall annually, which is an inch above the national average of 39 inches. May is the wettest month (5 inches), followed by October (4 inches). The driest months are July (2 inches) and January (1.5 inches).

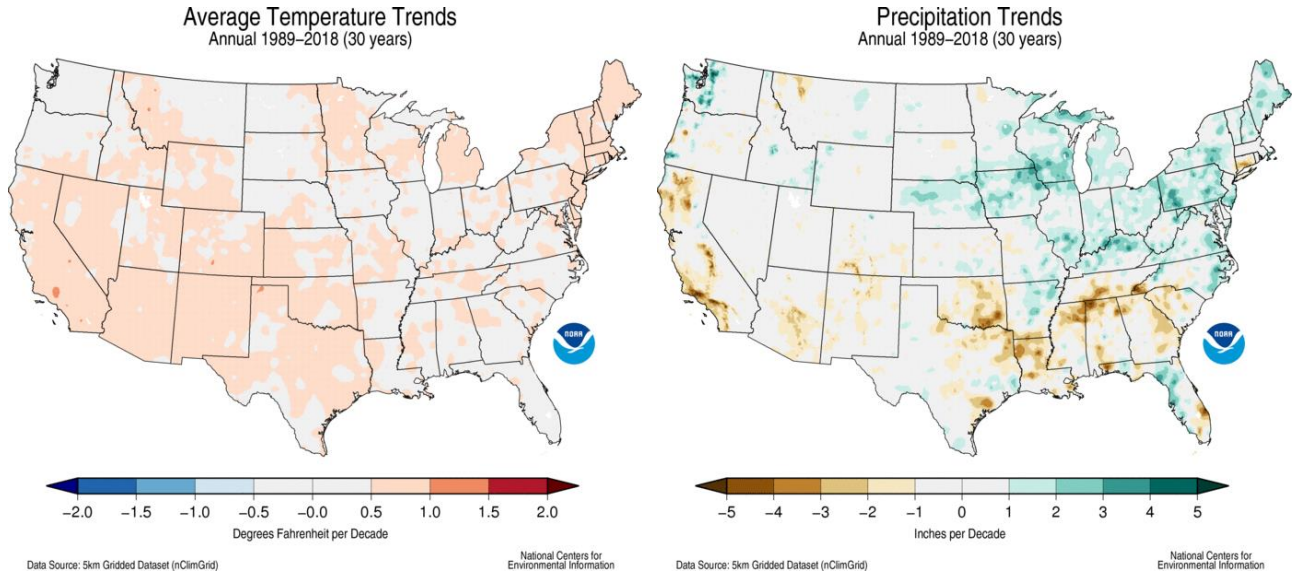
[39] *SCPG 201: Threat and Hazard Identification and Risk Assessment Guide—2nd Edition, U.S. Office of Homeland Security, FEMA, August 2013.*

Figure 95: Temperature and Rainfall Totals[40]



As shown below, the annual temperature for the region is slightly higher than the historical average from 1989–2018. Precipitation for the region for the same period is slightly drier than the average.

Figure 96: Temperature and Rainfall Trends[41]



In addition to the federally-declared disasters mentioned previously, there have been about 5,600 other extreme weather events within 50 miles of the District from 1950 to 2010. Over 93 percent of these events were categorized primarily as Hail (49%), Thunderstorm Winds (35%), and Floods (12%). Over 100 tornadoes of magnitude EF-2 or greater have occurred within 50 miles of the District, including those in other counties.[42]

---

[40] *City-Data for Parker County.*

[41] *National Oceanic and Atmospheric Administration, March 2020.*

[42] *Natural Disasters and Extremes for Parker County, USA.com.*

Drought

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought occurs in virtually all climatic regions, including areas with high and low average rainfall.

Earthquake

Earthquakes are sudden rolling or shaking events usually caused by the movement of fault lines in the earth's crust. They can be minor enough that they cannot be felt, and can be strong enough that a person cannot stand, and cause catastrophic damage. Historically, earthquakes rarely occurred in the region. However, over the last decade, several small earthquakes have been noted in the north Texas region, which may be attributed to gas field fluid injection and removal.[43]

Extreme Heat

Extreme heat is characterized by a combination of exceptionally high temperatures, often combined with high humidity, presenting a significant health threat and strain on public utilities.

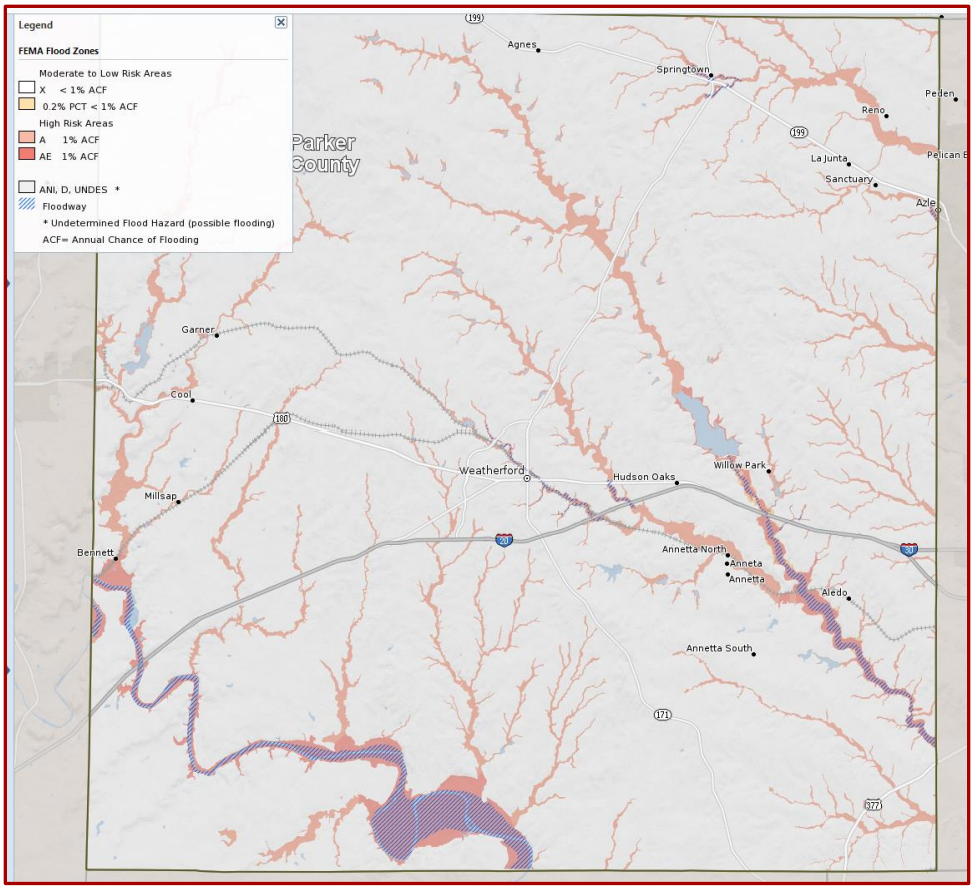
Flood

Flooding is the most prevalent hazard in the United States. Three types of flooding occur in the District: river flooding, inland (sheet) flooding, and flash flooding.

FEMA has identified geographic areas in Parker County that are prone to flooding. Each zone reflects the severity of impact or type of flooding in the area. The following figure shows the County's flood zones.

[43] *Causal Factors For Seismicity Near Azle, Texas, Nature Communications, April 21, 2015.*

Figure 97: FEMA 100- and 500-Year Floodplain within the District



Hurricane/Tropical Storm

Hurricanes and tropical storms are defined as any closed circulation developing around a low-pressure center in which the winds rotate and whose diameter averages 10 to 30 miles across. The official season for Atlantic storms is from June 1 through November 20. Tropical storms are storms where the maximum sustained winds reach or exceed 39 miles per hour; hurricanes have maximum sustained winds over 74 miles per hour.

Parker County is located far enough inland that the energy and force of these storms would likely be significantly diminished. However, storm remnants could still be strong enough to impact Parker County with sustained high-velocity winds, heavy precipitation with associated flooding, and tornadoes.

Severe Winter Weather

Severe winter weather can be a variety of precipitation that forms at low temperatures such as heavy snowfall, sleet, or ice. Maintaining the electrical power grid and road transportation systems are primary concerns during these weather events.

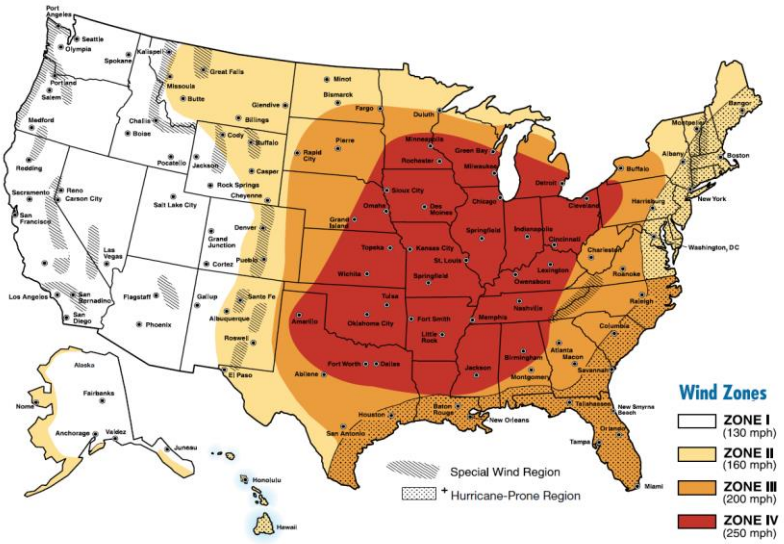
Thunderstorms

The National Weather Service defines a severe thunderstorm as "a storm that has winds of at least 58 mph (50 knots), and/or hail at least 1" in diameter." Severe thunderstorms also produce tornadoes and damaging straight-line winds and hail.

Tornado/Severe Straight-Line Winds

Spawned from powerful thunderstorms, tornadoes can cause devastating damage, injuries, and deaths. The District has a high vulnerability to tornadoes, as shown in the following figure.

Figure 98: Tornado Wind Speeds in the United States[44]



Wildfire

Wildfire is defined as an uncontrolled fire spreading through wildland vegetative fuels, urban interface areas, or both, where fuels may include structures. These fires are typically caused by lightning or human carelessness. The proximity of development near wildland areas, along with landscaping with indigenous plants in the area, creates what is commonly known as the wildland-urban interface, which places these structures at significant risk from an approaching wildfire. Also, the secondary effects of smoke and ash can pose significant threats to air quality and health.

Other Natural Hazards

Other natural hazards—avalanche, animal disease, earthquake, landslide, tsunami, and volcanic eruption pose little to no hazard within the PCESD1 service area.

[44] *Tornado Risks and Hazards in the Midwest United States, FEMA, May 2007.*

Technological/Human-Caused Hazards

Technological or human-caused hazards are hazards which result from failures of systems and structures, or intentional or accidental acts and omissions.

Dam/Levee Failure

Dam failures typically occur when spillway capacity is inadequate, and excess flow overtops the dam, or a failure of the structure itself. Levee failures typically occur during periods of heavy precipitation, resulting in overtopping or saturation failure of levy walls. An unexpected dam or levee failure can be catastrophic, with significant flooding that causes loss of life, emergency evacuations, and insufficient time to reduce damages to property.

Fire or Explosion

Fires are most likely to occur in residential structures due to careless acts involving cooking or smoking. The frequency of fires or explosions in large or high-risk structures is low due to fire-resistive construction and the presence of fire protection systems. However, the potential impact may be serious. The risk of an urban conflagration in the District is possible but highly unlikely.

Hazardous Materials Release

The uncontrolled release of hazardous materials has occurred in the service area and is anticipated to occur in the future. The hazard of these releases is related to the size of the release and toxicity of the chemical being released. A release of hazardous materials can occur throughout the District, either during transport or while in production, use, packaging, or storage in a fixed facility.

Critical Infrastructure

Examples of critical infrastructure include road, rail, and airport transportation infrastructure, public utilities, schools, key government buildings; telecommunications systems, and data transmission systems—electric, water, and gas; schools; and telecommunications equipment—television, radio, and information technology. Damage or failure of these systems can cause widespread disruption and cascading secondary community effects and damage.

Medical Emergency

A medical emergency usually involves an emergency medical services (EMS) response, *i.e.*, pre-hospital medical care, usually delivered on-site by trained specialists with transport by ground ambulance. Common responses include sick calls, vehicular incidents, difficulty breathing, injuries due to trauma, and heart attacks. The number of patients is usually small, and symptoms are within the capabilities of first arriving units. Some calls require only first aid; others require basic life support (BLS), advanced life support (ALS), or mobile intensive care (MIC).

Mass casualty incidents (MCIs) generate multiple patients and require numerous EMS resources. MCIs are infrequent events, most often associated with commercial transportation accidents and hazardous materials releases.

Power Outage

A power outage is any interruption or loss of electrical service caused by disruption of power transmission, which may be the result of an accident, sabotage, natural hazard, excess energy demands, or equipment failure. A significant power failure of a long duration may require a significant deployment of community resources to assist with maintaining basic human needs.

Technical Rescue

Technical rescue includes the specialized rescue of victims from vehicles, elevators, rising water, confined spaces, structural/trench collapse, elevated spaces (high-angle), or other unique environments. Vehicle extrication is the most commonly performed technical rescue.

Terrorism/Workplace Violence

According to the Homeland Security Act of 2002, terrorism is defined as "activity that is dangerous to human life or potentially destructive of critical infrastructure or key resources." There are different types of terrorism defined by the motivation behind attacks. There are also different methods and tactics that terrorists use in their attacks, such as assassination, explosives, radiological threats, radicalization, chemical threats, biological threats, active shooters, infrastructure threats, arson, kidnapping, and cyber threats.

Risk by Geographical Planning Zone

The District has established first-due response zones. However, these zones are based primarily on incident history rather than on a risk-based analysis of trends, needs, expectations, and specific risks, including significant socio-economic and demographic characteristics. The development of risk-based geographic planning zones can help the District identify and use outcome-based performance measures to determine the effectiveness and efficiency of service delivery and program improvements.

Risks by Land Use Designation

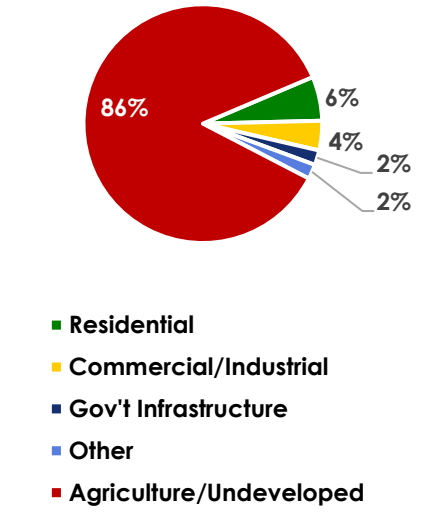
Risks may also be defined in terms of current and planned land use—the density of development and the types of structures present in geographic areas within the community affect relative risk throughout the community as follows:

- **Low Risk.** Areas zoned for agricultural purposes, open space, and other low intensity uses.
- **Moderate Risk.** Areas zoned for low-density and medium-density, single-family residential properties; small commercial and office uses; low-intensity retail sales; and equivalently-sized business activities.
- **High Risk.** Higher-intensity business districts; mixed-use areas; high-density residential; and industrial, warehousing, and large mercantile centers.
- **Interface Area.** An area where urban development meets other land uses. Usually, the term refers to the wildland-urban interface, where urban development meets nature. Other interface areas include marine-urban, industrial-urban, and commercial-urban.

Current Land Use

Land use within the District is predominantly agricultural, with a few census-designated cities, towns, and unincorporated communities. Approximately six percent of the District's land area is residential, with over 21,000 improved home sites. There are a few multi-family residences, and a significant number of mobile homes and manufactured housing. Figure 99 shows the mix of existing land use.[45]

Figure 99: Current Estimated Land Use



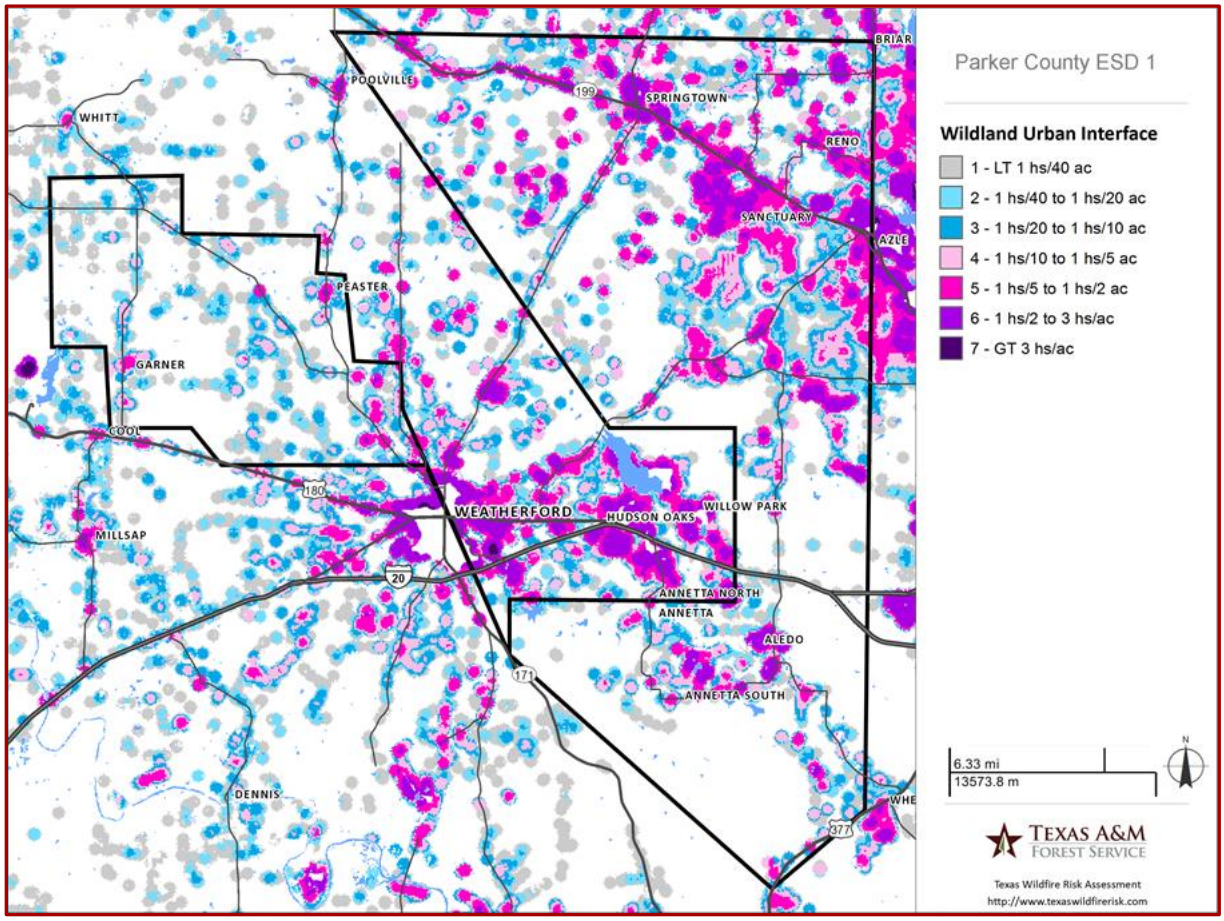
[45] *U.S. Census Quick Facts.*

Wildland-Urban Interface Areas

The District has a significant number of wildland-urban interface areas. The potential vulnerability is greatest in the areas with the highest number of houses or other development per acre. For the PCESD1 service area, it is estimated that over 49,000 people, or 76 percent of the population, live within the WUI. As a result, significant wildfires occur annually throughout the District, especially during the summer months and when high winds are experienced.

As shown in the following figure, most of the WUI areas in the District are in the northeast part of the District along the State Highway 199 corridor around Azle, Sanctuary, and Springtown, and northwest toward the Parker-Wise county line. Other WUI areas are concentrated in the southern part of the District around Aledo and Annetta South.

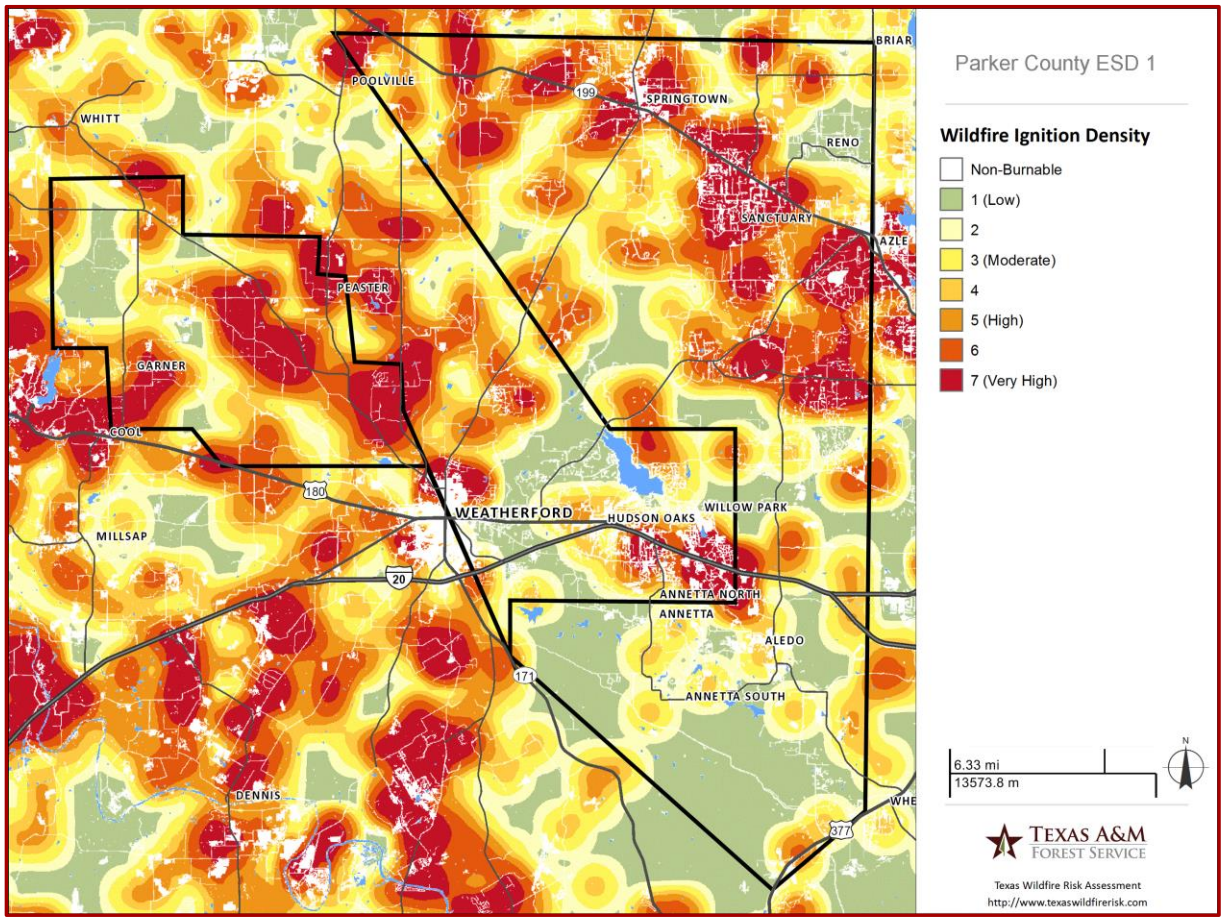
Figure 100: Wildland Urban Interface Areas[46]



[46] *Wildland Urban Interface, pages 9-13, Texas Wildfire Risk Assessment Summary Report, PCESD1. Texas A&M Forest Service, 2020.*

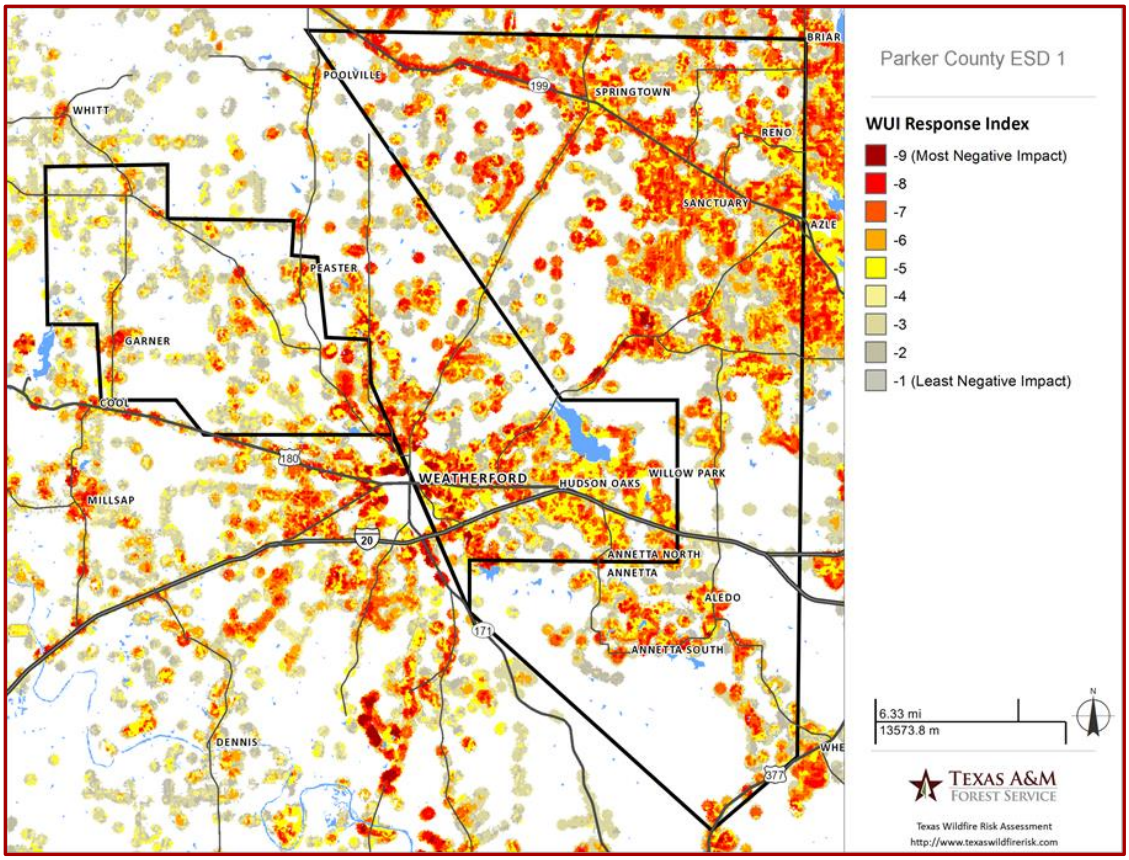
ESCI noted areas of wildland interface inside the boundaries of cities and towns in the District, as can be seen in the following two figures.

Figure 101: Wildland-Urban Interface Area Risk, Probability[47]



[47] *Wildfire Threat (Likelihood), pages 27–30, Texas Wildfire Risk Assessment Summary Report, PCESD1. Texas A&M Forest Service, 2020.*

Figure 102: Wildland-Urban Interface Area Risk, Impact[48]



Wildland-Urban Interface Discussion

In discussions with the District, ESCI noted that the District has experienced significant wildland fires that have threatened structures. This problem is increasing with the continued build-out of residential developments that encroach into the WUI. While the District has specialized apparatus, equipment, and personnel trained to respond to these fires, they frequently have to rely on mutual/automatic aid resources to protect exposures and extinguish these fires effectively. However, according to the District, these resources must be requested individually during an incident, and there is no coordinated pre-staging of equipment and personnel during high-risk wildfire weather ("Red Flag") conditions.

Consideration should be given to establishing a regional mutual/automatic aid program for wildfires that identifies "pre-packaged" resources organized into NIMS compliant task forces and strike teams that can be quickly and efficiently deployed to rapidly evolving wildfire incidents.

[48] *WUI Response Index, pages 17–19, Texas Wildfire Risk Assessment Summary Report, PCESD1. Texas A&M Forest Service, 2020.*

Risk by Target Hazard Location

A **target hazard** is an identified location deemed to have a significant likelihood of significant loss of life or property, and would likely require a large number of emergency response resources in the event of an incident. These locations may require greater numbers of emergency response resources during an emergency. ESCI identified several buildings to list as target hazards, e.g., places of public assembly, schools and childcare centers, medical and congregate care facilities, residential care facilities, multi-family dwellings, and high-rise office buildings, and those that, if damaged or destroyed, would have a significant impact on the community.

Examples of identified target hazards, along with vulnerability assessment observations by the ESCI assessment team, appear in the following figures. The following information and figures are not intended to list all buildings of a given type or occupancy. Rather, the locations included here have been identified by the District for a potentially significant impact on the community in case of fire. This information is subject to change given specific characteristics as determined by the District.

Critical Infrastructure and Key Resources

The term "critical infrastructure and key resources" (CIKR) describes resources that are essential for the functioning of a society and/or economy. Critical infrastructure is defined as a sector "whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof." There are 16 defined Critical Infrastructure Sectors (CIS):[49]

- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy Sector
- Financial Services
- Food and Agriculture
- Government Facilities
- Healthcare and Public Health
- Information Technology
- Nuclear Reactors, Materials, and Waste
- Transportation Systems
- Water and Wastewater Systems

[49] *Infrastructure Security, Department of Homeland Security, 2019.*

Examples of CIKR locations could include hospitals, assisted living centers, community shelters, schools, airports, government offices, emergency operations centers and communications systems, hazardous materials sites, and water/sewage treatment facilities. It is recommended that discussions of CIKR should be limited and in general terms in order to maintain CIKR security.

The District has documented or pre-planned only a small number of target hazard locations. It is important that the District have current pre-plans, including the resource allocation necessary to deliver an effective response force (ERF) for both high-frequency/low impact incidents, *e.g.*, medical emergency or small fire, and low frequency/high impact incidents, *e.g.,* tornado, mass casualty, or large structure fire at any of these locations.

Commercial Facilities, Public Assembly, & Shopping Centers

There are numerous buildings within the District where large numbers of people gather for entertainment or worship. A variety of nightclubs, theaters, and other entertainment venues exist, along with recreational, religious, and cultural sites, and sporting and other event venues. These occupancies present additional risk due to the large number of people and the economic and social impacts on the community from a loss due to fire or some other event. These sites may also pose greater risks to first responders due to size and/or configuration. Fire, criminal mischief, and potentially terrorism could cause a major medical emergency requiring significant emergency service resources.[50] The following public assembly occupancies were identified as target hazards by the District.

Figure 103: Public Assembly Occupancies

Occupancy Type	Number
Church	23
Event Center	6
Stadium	3

Based on previous research, it appears that buildings intended for food or drink consumption (restaurants and community centers) and worship (churches) would represent the majority of the assembly occupancies. It is expected that these would concentrate primarily in the central business core of each town or community, usually along main thoroughfares such as IH-20, U.S. 180, SH-199, and FM-1187.

[50] *There are many other businesses with the characteristics as an assembly occupancy but have an approved occupancy load of less than 50 people. These are not included in this category unless there is some other and compelling reason, such as historical or cultural significance.*

Communications

Emergency communication centers and the associated transmitting and receiving equipment are essential facilities for emergency response. The District provides call receipt and dispatch service for fire and EMS in out-of-district facilities collocated with the Parker County Office of Emergency Management in Weatherford.

There are other communication facilities and equipment that also are important to the community and government operations. These are the telephone company central offices and the transmission lines of local telephone service providers. Internet service providers, along with wireless cellular communication providers, provide essential communication capabilities for the community as well as emergency personnel through their facilities and equipment. Two radio tower locations were identified as target hazards; the Chattanooga Hill radio tower and a radio tower located on Judd Street.

Dams, Levees, & Bridges

Dams and levees include the systems, networks, and functions constructed to contain, control, or divert the flow of water so as to provide protection from temporary flooding, or to provide navigation. They may be constructed as earthen embankments, or concrete or steel, and may have closures, draining devices, and pumps. Although the likelihood of dam or levee failure is remote in the District service area, there is flood risk downstream from the outflow side of Weatherford Lake. Likewise, bridge locations may be the site of flood-related incidents due to high water—road closures, washouts, or risk of people being swept into rising water or swift water.

Educational, Schools, & Daycare Centers

Educational occupancies are defined as buildings that are used for schools or daycare centers. These facilities house concentrated populations of school-aged and younger children. Though primarily operational during the daytime hours, evening classes or athletic events create an environment in which many persons can occupy the property at varying hours of the day and early evening. School-age children (especially daycare children) represent a higher risk population in a fire emergency. The following figure summarizes the educational facilities identified as target hazards.

Figure 104: Educational Facilities

Occupancy Type	Number
Elementary School	8
Middle School	4
High School	4
Other School	3

Energy

Previously discussed community services, from communications to traffic signals to normal operations, require the use of energy. Whether it is electricity generation and transmission systems, fuel distribution and storage tanks, or natural gas pipelines and regulator stations, the community is dependent upon energy sources and systems. These sites pose potential risks due to interruption of business, government services, public health, and general commerce. The District reported several energy/chemical target hazards:

- **Chadwell & Sons Gas.** 608 East Highway 199
- **Heritage Crystal Clean.** 320 Scroggins Road
- **Texas Pride Fuels.** 1300 East State Highway 199
- **Joe Rider Propane Storage.** 6508 E. State Highway 199
- **Enbridge Springtown LP/NLG Processing Plant**. Multiple partners. Near the intersection of FM-51 and Scroggins Road
- **Enlink Poolville LP/NLG Gathering Station**. Near the intersection of FM-920 and Poolville Cut-Off Road
- **Barnett Shale natural gas field**. Underlies all of Parker County. Numerous wells, gathering lines, compressor stations, and field production units throughout the service area.
- **Kelly Road Compressor 1.** 4000 block Kelly Road
- **Bear Creek Compressor 1.** 1000 Bear Creek Road
- **White Settlement Compressor Station.** 1400 block Farmer Road
- **Haigood & Campbell Fuel Distributor.** 9900 block Bankhead Highway
- **Magellan Midstream Fuel Terminal.** 6900 East 1-20
- **EnLink Midstream/Azle Cryo Plant.** 3325 and Younger Ranch Road

Financial

There are no Federal Reserve Banks or other large financial institutions located in the service area.

Food & Agriculture

Although a significant portion of undeveloped land in the District is used for agricultural purposes, primarily for livestock grazing or cropland, there are no significant target hazards other than grain elevators.

Government Facilities

Governmental services include properties and structures, many open to the public, for business activities, commercial transactions, public works, or recreational activities. Other facilities, not generally accessible to the public, may be the site of correctional facilities, military installations, embassies, courthouses, laboratories, and cyber-technology centers and systems. There is a greater potential risk at these locations due to the interruption of essential services and social impact. The District did not report any locations of government facility target hazards.

Hazardous Materials & Tier II Facilities

High-hazard occupancies include facilities that involve the manufacturing, processing, generation, or storage of hazardous materials, of sufficient quantity or type as to create an elevated risk to the public or first responders. Examples include Tier II and other Class H occupancies.

In addition to the energy sites previously listed, the District identified the following hazardous materials target hazards.

- **EnLink Midstream/Azle Cryo Plant**. 3000 block of Farmer Road
- **Magellan-Midstream Fuel Terminal.** 6000 IH-20 East

A release could also occur along any transportation route as primary transportation routes into and out of the area, trucks, railcars, and pipelines move a significant amount of hazardous substances through the service area.

Within the District, the greatest potential for a release during over-the-road transportation would be along IH-20, SH-199, and to a lesser extent, all rural roads. The greatest potential for a release during rail transportation would be along the routes of the Union Pacific rail line that roughly follows the IH-20 highway corridor.[51] Other areas of concern would be the rail spur line that services the industrial parks in the western areas of Parker County. A release of hazardous material could also occur along the route of any of the gas transmission, distribution, or service lines that lie underground throughout the District. These routes are discussed in more detail under Transportation.

Healthcare & Public Health

Healthcare facilities (hospitals, clinics, skilled nursing, and assisted living facilities) are generally built of highly fire-resistive construction with built-in fire suppression, and typically receive more inspection scrutiny; however, occupants may need assistance to evacuate quickly. The District did not report any locations of traditional health care facilities. However, there are three substance abuse rehabilitation centers in the service area.

Manufacturing, Industrial, & Storage

Facilities used for manufacturing, storage, or other industrial uses may be the site of physical hazards, or potentially hazardous operations, processes, or combustible fire load. Target hazards of this type include high-pile storage, and manufacturing processes that involve extremely heavy materials, expose workers to extremes of heat or cold, automated or rotating machinery and equipment, or contain large amounts of plastics or other combustible fire loads. The District did not report any locations of manufacturing target hazards.

Nuclear/Radiological Facilities

There are no nuclear power or waste facilities in Parker County; however, "A portion of Parker County is within the emergency planning zone (ingestion pathways) of the Comanche Peak Nuclear Power Plant. Federal and state officials will provide adequate support in incidents involving Comanche Peak when requested."[52]

[51] *State Railroad Map, Texas Department of Transportation, 2016.*

[52] *Report on Emergency Evacuation Planning for Comanche Peak Nuclear Power Plant, Glen Rose, Texas. Disaster Accountability Project, 2016.*

In addition, other facilities use small amounts of radioactive materials for specific work or scientific processes. The most common of these in the service area would be nuclear medicine (both diagnostic and therapeutic), non-destructive testing, food irradiation, and scanning of baggage and shipping containers. The District did not report any locations of other nuclear/radiological facilities.

Public Safety Services

There are four separate and wide-ranging functions and roles commonly associated with emergency services—Law Enforcement, Fire/Rescue Services, Emergency Medical Services, and Emergency Management. Target hazard locations for public safety would include police, fire and EMS stations, the Emergency Operations Center (EOC), and related structures and properties. The District did not report any locations of any public safety target hazard locations, with the exception of fire stations.

Residential

Some structures used for residential purposes pose higher risks to civilians and firefighters than single-and-two-family residences. These include multi-family dwellings (primarily apartments and condominiums), hotels and motels, dormitories, fraternity and sorority residences, group homes, live/work units, and boarding homes.

The first risk is the potential for a large loss of life and property. The second risk is the size and construction of the building. Often, older structures have limited fire District access, do not meet modern codes for means of egress, fire protection systems like automatic sprinkler systems, or fire separation and compartmentation. Attics and crawl spaces may be open, or have penetrations in firestops caused by maintenance, installation of communications cabling, and damage. The District did not report any locations of residential target hazards.

Transportation

Transportation corridors provide necessary access and egress for the public, commercial enterprise, and emergency service providers. For this study, ESCI used geographic information systems (GIS) data supplied by District and others to understand the transportation network throughout the study area.

The configuration of transportation systems can also affect the response capability of emergency services. Limited access freeways and rail lines can interrupt street connectivity, forcing apparatus to negotiate a circuitous route to reach an emergency scene. Pipeline and air routes are usually taken for granted by the public; however, a major incident could occur along any of these routes, often with the potential for hazardous material release, spill, or fire.

Air

There is one general aviation airport, Parker County Airport (WEA), in the District's service area. WEA is located on the east side of the City of Weatherford, close to residential areas.

Marine

There are no marine terminals or waterways in the service area.

Over-the-Road

The District is served by several roadways, including limited-access interstate freeways, state highways, and rural roads. The primary over-the-road routes in Parker County are:

- IH-20, which runs east-west between Florence (SC) and Kent (TX). IH-20 splits into IH-20 and IH-30 about 1.5 miles inside the Parker-Tarrant county line.
- IH-30 (US-80), which runs east-west between North Little Rock (AR) and a point east of Hudson Oaks (TX), where it joins IH-20.
- US-377, which runs northeast-southwest between Stroud (OK) and Del Rio (TX) along the southeast boundary of the District.
- SH-199, which runs southeast-northwest between Fort Worth and Jacksboro in the northeast corner of the District.
- SH-177, which runs southeast-northwest between Cleburne and Weatherford in the southeast corner of the District.

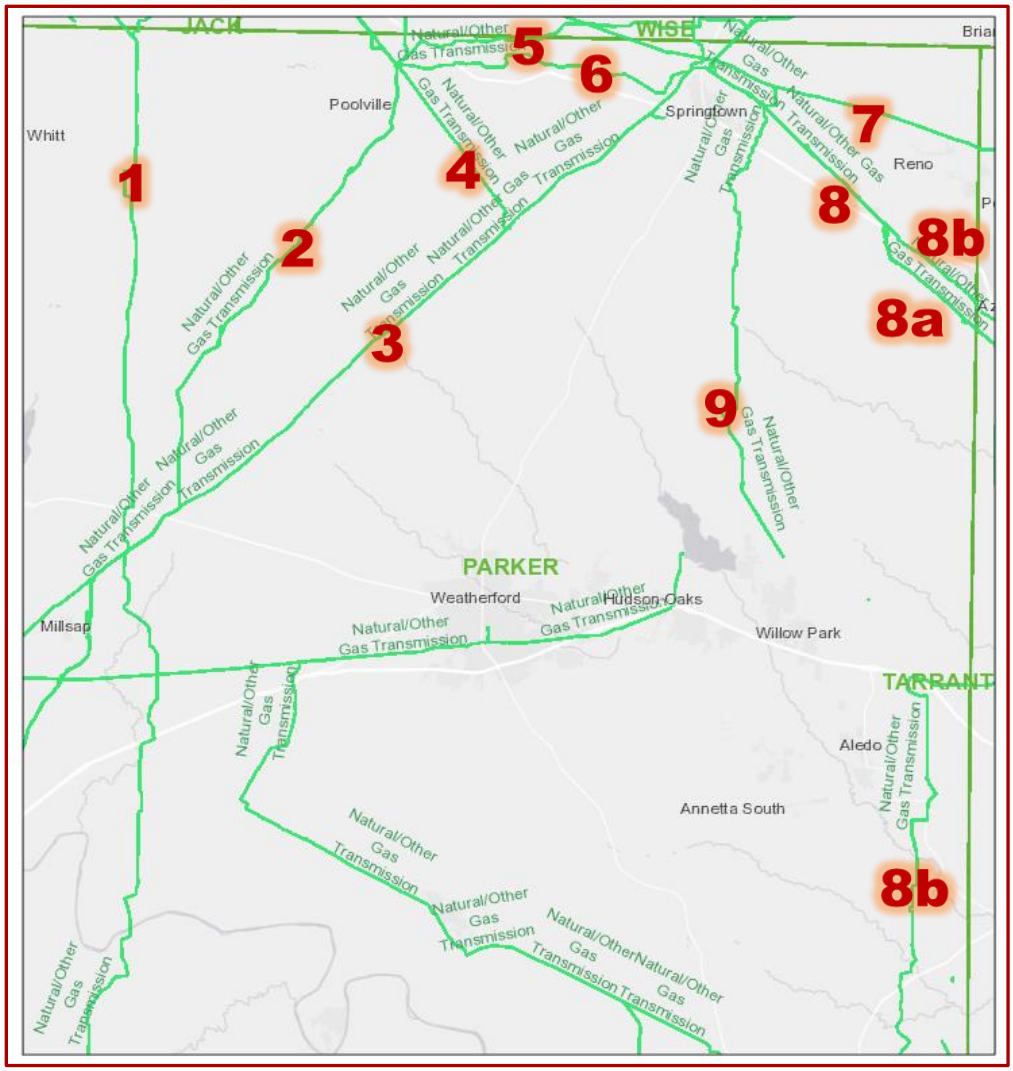
Pipeline

There are four gas transmission lines, two operated by Atmos Energy and two operated by Enterprise Products in the District.[53] There are residential gas mains, branch lines, and many well-gathering lines buried sub-surface throughout the District. The major transmission lines in Parker County are listed here, from west to east, and shown in the following figure.

1. Gas transmission line (Worsham-Steed Gas Storage, LLC) generally running north-south, east of FM 113.
2. Gas transmission line (Enterprise Products Operating, LLC and EnLink Midstream Services, LLC) generally running northeast-southwest from a point northwest of Weatherford to Poolville and points north into Wise County.
3. Gas transmission line (Atmos Energy) generally running northeast-southwest from a crossing with the Enterprise-EnLink line to Springtown and points northeast.
4. Gas transmission line (EnLink Midstream Services, LLC) generally running southeast-northwest from an intersection with the Atmos line to Poolville.
5. Gas transmission line (EnLink Midstream Services, LLC) generally running east-west from Poolville to points east in Wise County.
6. Gas transmission line (EnLink Midstream Services, LLC) generally running east-west from Poolville to Springtown.
7. Gas transmission line (Energy Transfer Company) generally running east-west from Springtown to points east in Tarrant County.
8. Gas transmission line (Atmos Energy) generally running northwest-southeast from Springtown to points east in Tarrant County. Splits into two lines south of Sanctuary. The southern-most branch line (**8a**) continues east into Fort Worth. The northern-most branch line (**8b**) turns north-south and follows a pipeline right-of-way in Tarrant County until it reaches IH-30 (US-80). From there, the line runs east-west along IH-30 (US-80) and then runs generally north-south along a pipeline right-of-way about one mile from the Parker-Tarrant County line and travels to points south into Johnson County.
9. Gas transmission line (Energy Transfer Company) generally running north-south from a gathering location east of Lake Weatherford to Springtown.

[53] *GIS Public Viewer, pipelines. Texas Railroad Commission, 2020.*

Figure 105: Pipeline Routes in Parker County



10. While not shown on the preceding map, an additional pipeline right of way bisects the District from east to west, and contains two liquid petroleum pipelines that feed Dyess Air Force Base, the Naval Air Station Joint Reserve Base/Fort Worth, and the Magellan Fuel Terminal in Aledo. An additional high-pressure natural gas pipeline is also in the right of way.

Rail

The Union Pacific Railroad (UP) operates a primary freight rail line that generally runs east-west through the heart of the City of Weatherford and the District. Most trains are pass-through, with spur service to customers along the right-of-way. Primary commodities are intermodal-wholesale, agricultural products, plastics, stone and gravel, industrial chemicals, auto parts, sand, and coal.

Water & Wastewater

Water sources within the District include wells, streams, and lakes in the area. The most obvious concern to the District is the water reservoir, water main, and fire hydrant system. Providing enough storage, distribution, and access to this valuable firefighting resource through well-distributed fire hydrants is very important. Hydrants are located in several areas in the PCESD1 service area. However, there are large populated rural areas that do not have hydrants. The District identified the following water system target hazards.

Figure 106: Water/Sewer Facilities

Water System Component	Number
Water Tower	3
Pump Station	7
Treatment Facility	10

HAZARD VULNERABILITY ANALYSIS

Methodology for Hazard Vulnerability Analysis

It is important to understand and agree upon the methodology of defining risk in order to assess risk. For this assessment, ESCI used its *Composite Hazard Analysis Tool* (C-HAT), a qualitative risk scoring tool, to simplify understanding, ensure consistency, and provide a baseline for comparison with other methodologies. A key advantage of C-HAT is the inclusion of mitigation efforts as part of a risk reduction strategy.[54] Simply stated, risk is the probability (likelihood) of an emergency to occur and the severity of impact (consequence). As defined, it can be quantified as:

$$\boldsymbol{R = [P \times (I_c - C_M)}$$

Where:

R = Risk, expressed as a percent
P = Probability of the event
I_C = Impact on the community
C_M = Mitigation capacity

Probability is the chance, or likelihood that an event will occur. Factors to consider when describing probability include known probability, historical or empirical data, and other statistical information. Probability can range from less than 1 percent to a 100 percent annual chance of occurrence.

Community impact is the potential for damage or negative effect. Impact is summarized in three types: human, property, and business or economic. Factors to consider when describing:

- **Human impact** includes the potential for civilian injuries or deaths, first responder injuries or deaths, and the social/psychological impact on an event.
- **Property impact** includes the potential cost and time required to establish temporary replacement, to repair or replace, and the environmental impact of an event.
- **Business impact** includes the potential for business interruption; *e.g.,* interruption of critical supplies and support, or product distribution; the inability of customers to reach locations; loss of reputation and public image; imposition of fines, penalties, or other legal costs; and the overall financial impact or burden of an event.
- ***Mitigation capacity*** is the positive effect of the community's efforts to minimize the impact of an event and is summarized in three types: preparedness, internal resources, and external resources.

[54] *Adapted from the original Hazard and Vulnerability Assessment Tool developed by Kaiser Permanente (2002) as modified by the Los Angeles County Department of Public Health, Emergency Preparedness and Response (2008).*

Factors to consider when describing:

- **Preparedness** includes the status of current plans, frequency of drills, training status, and the availability of alternate sources for critical supplies/services.
- **Internal resources** include the availability and operational readiness of the initial response, the time required to muster an Effective Response Force, and resource survivability, or the ability to withstand and recover from disasters.
- **External resources** include agreements with neighboring communities, coordination with regional and state resources, public/private resources, and federal resources.

Calculating the C-HAT Risk Index

To calculate the C-HAT risk index, values for each element of risk—probability, impact, and mitigation—are entered into an electronic spreadsheet using a Risk Index Value (RIV) that is assigned as shown in Figure 107. For specific occurrences of each hazard type, risk is calculated in terms of relative threat, from less than 1 percent (no risk) to greater than 100 percent (certain risk), with the factors of probability, or likelihood, and severity (impact less mitigation).

Figure 107: Hazard Assessment Tool Risk Definitions

Annual Probability	Severity = (Magnitude – Mitigation)						Risk Index Value
	Impact			Mitigation			
	Human	Property	Business	Preplan	Internal	External	
< 1%	Very Low	Very Low	Very Low	Very High	Very High	Very High	0
> 1%	Low	Low	Low	High	High	High	1
> 25%	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	2
> 50%	High	High	High	Low	Low	Low	3
> 75%	Catastrophic	Catastrophic	Catastrophic	None	None	None	4

Once all data has been entered, and the calculation of the relative risk threat completed, the results are displayed in three graphs, one each for the relative probability and severity of each generic hazard type, the risk of each generic hazard type, and a summary of overall community risk in terms of probability and severity, as shown in the following fgures.

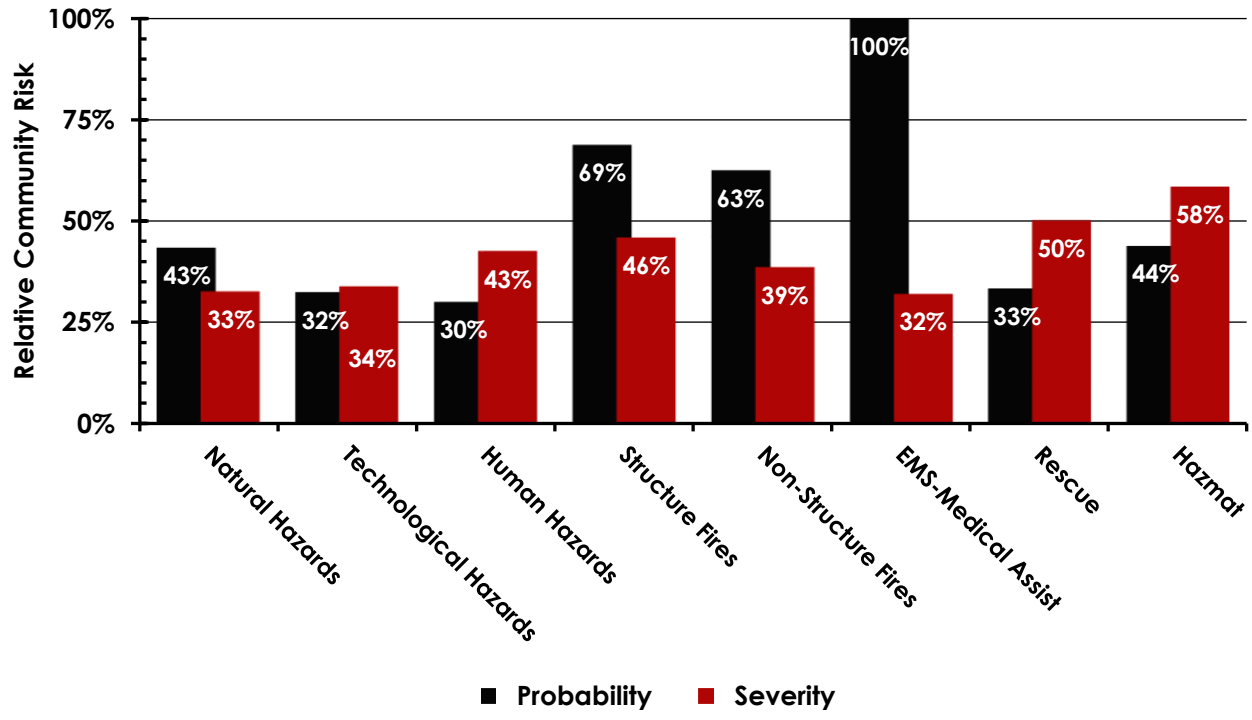
Risk Analysis Summary

Based on the information provided by the District, ESCI analyzed the relative risk for common hazards within the District service area, grouped as follows.

- Natural Hazards
- Technological Hazards
- Human Hazards
- Structure Fires
- Non-structure Fires
- EMS-Medical Assist
- Rescue
- Hazardous Materials

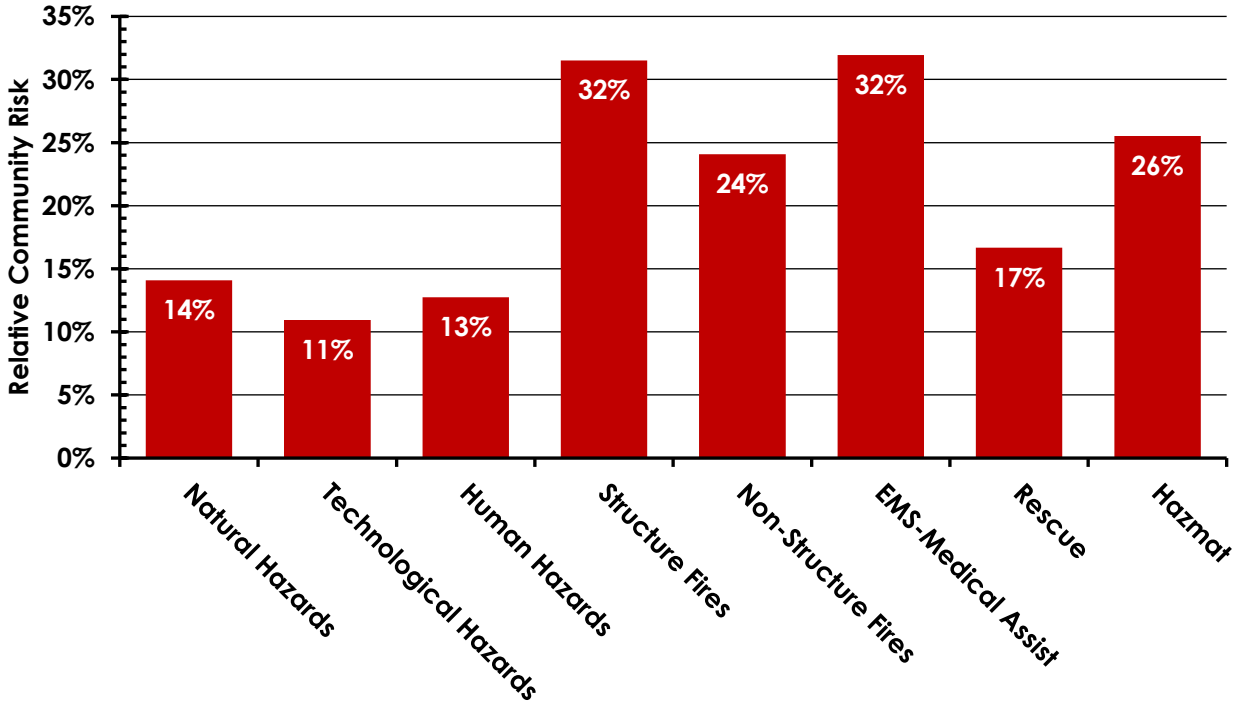
More specific hazards were identified, and scores were assigned within each category. Based on the completed hazard vulnerability analysis, the following representations of relative community risk were developed. Complete documentation is at the end of this section.

Figure 108: Hazard-Specific Relative Probability and Severity



As shown, the likelihood of EMS medical assists is the highest hazard, followed by structure fires, non-structure fires, and natural hazards. The potential impact of hazmat emergencies is highest, followed by rescue and structure fires. As experienced in the current COVID-19 pandemic, pandemics can have a catastrophic impact, but extremely low probability.

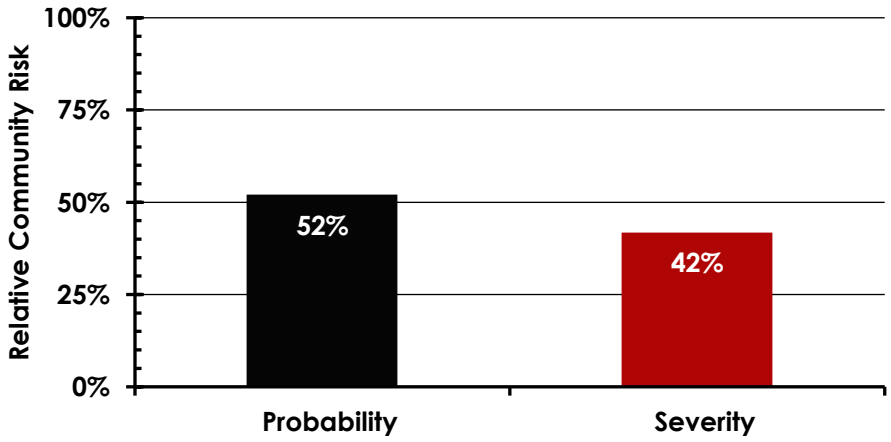
Figure 109: Hazard-Specific Relative Risk



As shown, structure fires and EMS-medical assists, pose the greatest relative risk potential within the District service area, followed by hazmat emergencies and non-structure fires.

The following figure illustrates the overall probability and severity of the various community risks.

Figure 110: Relative Community Risk



As can be seen from the preceding figure, both the overall likelihood, or probability, of all incidents combined is slightly more than 50 percent. The overall severity, or impact, of all incidents combined is slightly lower at 42 percent.

Summary & Cautionary Note

The District is obviously susceptible to various natural and technological/human-caused hazards. It is impossible to include or predict all aspects and indicators of hazards and risks. There are simply too many variables of weather, human behavior, and systems malfunction.

Likewise, the potential impact on specific services may not be the same for all service providers or other local officials. Thus, it would not be unusual for the District to rank some hazards higher and others lower than the rankings provided by other service providers and the County. This is reflected in the overall risk assessment found in Annex F, or ESF-4, of the County's Hazard Mitigation Plan.

In general, the District appears to have a core of properly trained and prepared personnel, plus well-maintained facilities and equipment, along with appropriate policies and plans to guide the organization in mitigating identified risks. It is currently able to provide appropriate levels of low to moderate-risk response for the residential, industrial, and large commercial warehouse areas of the service area, and have taken into account its proximity to the larger Dallas/Fort Worth metro area to secure additional, external resources through automatic and mutual aid for responses to low-frequency, high-impact incidents. As with most first responder agencies, there are opportunities for enhancements and improvements.

ESCI recommends that the District continue active participation in the process of reviewing and updating the Parker County Hazard Mitigation Plan. In this way, the District can ensure that plans contain the most accurate and up-to-date information available about community hazards, vulnerabilities, risks, and needs.

Critical Issues

Based on current goals and other information provided by the District, ESCI has identified the following items as critical issues that are related to community risk reduction. These critical issues need to be prioritized and addressed by the District as soon as practical and based on the availability of funding.

- Limited fire prevention activities.
- Limited pre-planning of target hazards.
- Limited staff time and funding for community risk reduction activities.

A detailed review of community risk reduction programs is outside the scope of this study. Long-term, it is in the best interest of the District and the communities it serves to continue to work closely with the Parker County Office of Emergency Management, the Fire Marshal's Office, and Hospital District, and with local industry—especially the energy, transportation, and agricultural sectors—to develop and implement effective community risk reduction activities. This would be a significant undertaking and logical expansion of the District's role in risk reduction fire protection within the service area. These discussions should be part of the District's Strategic Planning process as they will have an impact on future staffing needs and cost recovery.

STRATEGIES & RECOMMENDATIONS FOR THE FUTURE

This Master Plan culminates in a series of recommendations based on the observations and analysis previously discussed. Addressing these recommendations should be approached pragmatically. As such, ESCI grouped them into recommended time frames to address.

Facilitating the adoption and implementation of many of these recommendations will take significant commitment, time, and resources (including finances). The suggested timeframes are intended to introduce a realistic "blueprint" for implementation. However, environmental conditions and circumstances may provide challenges or opportunities to address a recommendation(s) outside of the timeframes identified here.

ESCI has grouped the recommendations into three implementation timeline categories: Short-Term (6 months–1 year), Mid-Term (1–3 years), and Long-Term (3–5 years).

Lastly, these recommendations are just that—recommendations. They are ESCI's best effort in providing guidance in addressing issues and deficiencies identified during the study period. District leaders and citizens hold the ultimate authority in embracing, revising, or discounting the following guidance.

Short-Term Strategies

Recommendation 1-A: Create a Strategic Plan for PCESD1, spanning a three-to-five-year period as a follow-up to this Master Plan.

This Master Plan should be considered an initial step in charting a future course for the District in addressing future challenges. However, many of the issues and recommendations in this study will take a "team effort" to address. Identifying the mission, vision, values, goals, and objectives of the District will be critical to ensuring everyone is pulling in the same direction in accomplishing future goals.

Estimated Cost: $18,000 based on the typical cost for ESCI's Strategic Plan development and facilitation. The cost could be less if internal District or local resources are used.

Recommendation 1-B: Appoint a Training Battalion Chief.

Establish a Training Officer position who reports to the Assistant Chief to coordinate and deliver fire and EMS training. This position will become even more critical when a new District training facility becomes operational.

Recommendation 1-C: Expand the use of the Emergency Reporting® RMS.
Reduce paper recording of basic District activities, and leverage the RMS to better document:

- Patient care reports
- Fire inspections and pre-fire plans
- Company, shift, and District-wide training activities
- Administrative, maintenance, and daily District support activities

Emergency Reporting (ER) has built-in tools that can assist in assessing and quantifying hazard vulnerabilities of various structures in the District's service area, including the Occupancy Module, Vision Risk Assessment Tool, and an Occupancy Vulnerability Assessment Profile tool.

Recommendation 1-D: Establish a consecutive-hours worked policy.
The District should identify a maximum consecutive-hours worked policy to prevent excessive fatigue. Consideration should be given to requiring at least a 12-hour rest period after 48 consecutive hours worked, unless approved by a chief officer.

Recommendation 1-E: Add an additional engine company to the first alarm assignment on all reported fires in low/moderate risk structures.
Adding an additional engine company should result in a minimum of 14 personnel responding to a reported structure fire incident, which should be considered as a minimum number deployed to structure fires.

Recommendation 1-F: Review training records of all full-time personnel to ensure compliance with state requirements for basic Wildland Firefighter, Traffic Incident Management, and Courage to Be Safe® programs.
Ensuring that delivered wildland firefighting training, Traffic Incident Management, and Courage To Be Safe® and subsequent certifications are in alignment and in possession of the District should be performed as soon as possible to reduce potential future liability at emergency incidents, and ensure deployed personnel have completed the required training and are competent to perform at incident scenes safely.

Recommendation 1-G: Consolidate State Firefighter and Fire Marshal Association Memberships.
The individual fire department memberships should be consolidated under one District-wide membership to reflect the revamped organization better, reduce needless redundancy and administrative work, and reduce annual membership cost.

Recommendation 1-H: Reconfigure the CAD to capture individual response time components.

The individual response time components—call processing time, turnout time, and response time—should be segmented and tracked automatically through the Communications Center's CAD *for each responding unit* to allow for more accurate logging of incident responses and subsequent response time performance analysis.

Recommendation 1-I: Adopt Response Time Performance Goals and track performance.

While PCESD1 has developed and adopted a turnout time standard, other critical response performance goals specific for its organization have not been developed. The historical response time performance data contained in this report can assist in setting initial goals that can be subsequently measured against and adjusted as necessary.

Mid-Term Strategies

Recommendation 2-A: Formally establish a Public Educator/Public Information position.

Creating a standalone position, or an existing position with additional duties to oversee the District's life safety public education programs and dissemination of important District information should be undertaken. While the District has a robust fire safety program for elementary-aged school children, much more can be done to reach and teach vulnerable populations.

Recommendation 2-B: Add a civilian Facilities Manager position.

Given the number of District-owned buildings and the systems within, the District should hire a Facilities Manager to oversee the maintenance and repair of these valuable assets. Alternatively, the District may be able to contract with a property management company to oversee facility maintenance and repairs.

Recommendation 2-C: Add a 24/7 Operations Battalion Chief position.

Given the size of the service area, the number of staffed stations, and incident workload, the coordination and supervision of on-duty crews in emergency and non-emergency situations should be conducted by a chief level officer 24 hours a day, seven days per week. In addition, this position should be responsible for daily shift scheduling and leave usage authorization.

Recommendation 2-D: Install a Point Capture exhaust system in each station and fleet maintenance shop.

Diesel exhaust point capture systems should be installed, either on individual apparatus or in each station. The District should be concerned about particulate contamination to turnout gear openly stored in apparatus bays, and the exercise areas located in the apparatus bays in two of the stations.

Recommendation 2-E: Eliminate the use of the two upstairs bedrooms at Station 54.

Due to fire code issues (lack of clear exiting), the additional upstairs beds at this station should be removed, and the space converted to storage or other non-occupied use.

Recommendation 2-F: Improve fire egress in the second-floor living/sleeping area at Station 46.

Fire egress bedroom windows should be installed in each bedroom to provide two paths out of the room. The interior bedrooms that are not located near exterior walls should be decommissioned as bedrooms. In addition, an exterior stairwell should be installed to provide direct exterior egress from the second floor.

Recommendation 2-G: Develop and implement a Multi-Year Training Plan.

The District should develop a 3-5-year Training Plan that ensures annual state, federal, and local training requirements are met. FEMA's Homeland Security Exercise and Evaluation Program (HSEEP) template is an excellent model to consider using to develop the Plan.

Recommendation 2-H: Increase the Annual Training Budget.

The District's annual training budget should be increased to 3 percent of the operating budget, with a future target goal of 5 percent to sustain the operation of the planned District fire training facility.

Recommendation 2-I: Adopt a Formal District Unrestricted Fund Balance Policy.

Establish a policy that identifies a minimum unrestricted fund level, use, and restoration of the balance. Evaluation of financial risk exposure should be conducted as part of the policy adoption process.

Recommendation 2-J: Hire additional dispatchers to ensure the minimum staffing of two dispatchers at all times in the Communications Center.

As noted in the study, the emergent nature of the duties performed by dispatchers requires that they be available at the communications console at all times to answer 911 calls, quickly dispatch units, and monitor response units on emergency scenes reliably. The Department should work towards adding personnel to the Communications Center to ensure at least one dispatcher is in the Communications Center dispatch room at all times.

Recommendation 2-K: Improve Wildland-Urban Interface fire response resources coordination.

The District should evaluate internal policies and procedures related to pre-deployment of wildland fire resources during Red Flag weather conditions and communicating with the public about wildfire prevention during these conditions. In addition, the District should work with other regional partners to establish model response procedures, equipment typing, and rapid deployment strategies consistent with the National Incident Management System (NIMS).

Long-Term Strategies

Recommendation 3-A: Establish and enforce a District Fire Code.

Continue efforts to adopt a Countywide Fire Code. If efforts fail, the District should enact a Fire Code, such as the 2018 edition of the *International Fire Code* for all occupancies, businesses, and developments within its service area, and consider interlocal agreements with all incorporated areas to adopt the District's Fire Code as their own. In addition, the District should consider the adoption of applicable sections of the Wildland Urban Interface Code as amendments to the District Fire Code, given the considerable wildland risk and exposure.

Recommendation 3-B: Develop and implement a formal Community Risk Reduction (CRR) Plan.

The District should develop an all-hazards CRR, with special emphasis on developing a Wildfire Community Risk Reduction Plan in partnership with the Texas A&M Forest Service and local communities at high risk of wildfire.

Recommendation 3-C: Develop and adopt a safety manual and SOGs for all training evolutions and environments—classroom and field.

Consistent with previously listed recommendations related to bolstering the District's training program, ESCI recommends developing a detailed training safety manual and standard operating guidelines for the execution of training evolutions and environments, including live fire training. The ESTI Student Safety Manual created by the TEEX Emergency Services Training Institute is an excellent example for reference.

Recommendation 3-D: Initiate Consolidation Feasibility Planning with Neighboring Fire Districts.

The District is surrounded by smaller ESDs and volunteer fire departments, including PCESD8, which effectively almost splits PCESD1 in half. Significant growth is planned or is currently being experienced within these districts, close to the PCESD1 jurisdictional boundaries. In particular, growth within PCESD8 is anticipated in the north area of the District, close to the PCESD1 boundary. Initially, the two districts should consider entering into a consolidation planning effort to ensure cost-effective emergency services can be coordinated and delivered to meet this anticipated growth.

CONCLUSION

ESCI began this study in early 2020 by reviewing significant amounts of information submitted by the District, including previous years of incident data, demographic data, local hazard mitigation studies, department capital assets and maintenance programs, finance data, and population and economic growth projections. Equally as important, local citizens provided ESCI with excellent feedback about the expectations and priorities of their fire district. These expectations were taken into consideration in the crafting of the report and the recommendations.

Part way through our analysis, the COVID-19 Pandemic struck the nation, essentially bringing the nation's economic, educational, and societal infrastructure to a grinding halt. While the long-term economic and societal impacts have yet to be fully identified and understood, they will most certainly affect fire department operations across the country, and PCESD1 will undoubtedly experience these impacts as well. ESCI hopes our analysis and recommendations will assist the District in addressing these unknown impacts, and result in a stronger and healthier organization in the long-term, and we stand ready to assist the District in the future.

APPENDIX A: STAFF SURVEY RESULTS

The following is a summary of the survey that was sent to all PCESD1 staff. Seventy-five department members completed the survey. The percentages have been rounded.

Survey Instructions: Emergency Services Consulting International (ESCI) is conducting a Master Plan study for Parker County ESD1. As part of this study, we want to provide an opportunity for you to *confidentially* share your thoughts and observations about the department and programs. The survey should take less than 10 minutes to complete. You may also contact the ESCI Project Manager, Bill Boyd, at 360-305-1102 if you have any questions or wish to share additional information beyond any comments you provide in the survey answers. Thank you for your participation!

Question 1: I feel adequately trained for fire suppression operations.

Level of Agreement	Percentage of Respondents
Strongly Agree	33%
Agree	**47%**
Somewhat Agree	11%
Neither Agree or Disagree	7%
Somewhat Disagree	1%
Disagree	0%
Strongly Disagree	1%

Question 2: I feel adequately prepared for fire suppression operations.

Level of Agreement	Percentage of Respondents
Strongly Agree	**53%**
Agree	33%
Somewhat Agree	5%
Neither Agree or Disagree	5%
Somewhat Disagree	0%
Disagree	1%
Strongly Disagree	1%

Question 3: I feel our training resources and facility are adequate for safe and effective training.

Level of Agreement	Percentage of Respondents
Strongly Agree	11%
Agree	**31%**
Somewhat Agree	27%
Neither Agree or Disagree	19%
Somewhat Disagree	7%
Disagree	4%
Strongly Disagree	3%

Question 4: Our fire stations are adequate for supporting our current mission, and are well maintained.

Level of Agreement	Percentage of Respondents
Strongly Agree	23%
Agree	**44%**
Somewhat Agree	21%
Neither Agree or Disagree	5%
Somewhat Disagree	3%
Disagree	3%
Strongly Disagree	1%

Question 5: Our officers and department culture pace my personnel safety above all else.

Level of Agreement	Percentage of Respondents
Strongly Agree	24%
Agree	**41%**
Somewhat Agree	20%
Neither Agree or Disagree	7%
Somewhat Disagree	4%
Disagree	3%
Strongly Disagree	1%

Question 6: I feel adequately trained and prepared to evaluate and treat EMS patients.

Level of Agreement	Percentage of Respondents
Strongly Agree	17%
Agree	**45%**
Somewhat Agree	12%
Neither Agree or Disagree	15%
Somewhat Disagree	5%
Disagree	1%
Strongly Disagree	4%

Question 7: I feel we have excellent equipment to evaluate and treat EMS patients.

Level of Agreement	Percentage of Respondents
Strongly Agree	9%
Agree	**39%**
Somewhat Agree	16%
Neither Agree or Disagree	16%
Somewhat Disagree	5%
Disagree	11%
Strongly Disagree	4%

Question 8: I am familiar with the building layouts, special features, and special hazards of the target hazards in my community.

Level of Agreement	Percentage of Respondents
Strongly Agree	11%
Agree	33%
Somewhat Agree	**36%**
Neither Agree or Disagree	7%
Somewhat Disagree	7%
Disagree	5%
Strongly Disagree	1%

Question 9: We always operate appropriately under the Incident Command System (ICS) on all significant emergency incidents.

Level of Agreement	Percentage of Respondents
Strongly Agree	16%
Agree	**53%**
Somewhat Agree	19%
Neither Agree or Disagree	7%
Somewhat Disagree	3%
Disagree	3%
Strongly Disagree	0%

Question 10: The culture in each station supports PCESD1's overall mission and operation.

Level of Agreement	Percentage of Respondents
Strongly Agree	34%
Agree	**35%**
Somewhat Agree	15%
Neither Agree or Disagree	11%
Somewhat Disagree	3%
Disagree	1%
Strongly Disagree	1%

Question 11: How long have you been with PCESD1?

Years of Service	Percentage of Respondents
Less than 1 year	16%
1–5 years	**50%**
5–10 years	23%
10–20 years	7%
20+ years	4%

Question 12: What is your employment status in PCESD1?

Status	Percentage of Respondents
Volunteer	23%
Part-paid	**41%**
Career	35%

Question 13: What is your position?

Position	Percentage of Respondents
Firefighter	8%
Firefighter EMR	8%
Firefighter EMT	**30%**
Firefighter Paramedic	8%
Apparatus Operator/Engineer	22%
Lieutenant	5%
Captain	7%
Chief Officer	5%
Dispatcher	3%
Administrative Position	3%

Additional Comments Submitted:
Note: Where possible, the comments were taken verbatim from the survey, including errors in syntax and grammar.

Question 1:

- Just need more company training, both fire and EMS.
- Question does not pertain to the scope of everyday job assignment.
- I've only been here 2 weeks.
- Much of the training is from others that take initiative at the station level.
- We could definitely do more live fire training with multi-companies.
- Which is largely due to the crews that I choose to work with on a regular basis, and is not necessarily due to ESD provided training or the culture of ESD as a whole.
- Would be nice to partake in live fire training more often at TCC, or anywhere else as a shift or crew.
- My position is not suppression.
- My shift trains regularly, but there's not much joint station training or training between each station and the surrounding mutual aid departments.
- It is normal to feel inadequate in a job that can kill you.
- This is mainly self-paced, and dependent on the leadership you have on your shift and now consistent that is.
- Only because I came in with 17 years' experience. Training could be improved at certain stations.
- This is probably due to my years currently in grade and lots of teaching.
- Training only gets done if the shift officer does it. We need to have scheduled training from the department that needs to be turned in bi-weekly or every month.

Question 2:

- Fire trucks designed for aggressive firefighting tactics.
- Question does not pertain to the scope of everyday job assignment.
- I've only been here two weeks, but have 21 years in the fire service.
- Uniformity would be beneficial. That way, one could go from station to station without having to be re-oriented to the equipment.

- The Department is upgrading all the time. But there are trucks without equipment that should be standard.
- The equipment provided is top-notch, but could be better utilized by better-trained firemen who are eager to learn how to use their equipment more effectively.
- We have outstanding equipment. I do wish that we had a little bit more hose on the rack at the station for reload, as well as training. Also, would like to explore the use of smooth bore nozzles, depending on the application, and it may benefit our operations.
- We will soon have one new truck placed into service.
- Absolutely.
- One of the problems we face on most structure fires is water supply. The current tankers are incapable of keeping up with the pumpers when multiple lines are on the ground.
- No question about it.
- Lack of hydrants in the district.

Question 3:

- We are a very proactive training department, and the guys love to train. From an administrative standpoint, we rely too heavily on internet-based CE instead of having regularly scheduled training to accomplish this goal. This leads to very different ideas on how ESD1 operates on the fireground throughout the district. If the administration directed the regular CE training, they would get the opportunity to define the way they wanted stuff done and drill on it.
- Could work on each station having vent props or window VES props.
- Question does not pertain to the scope of everyday job assignment.
- Manpower and some stations do not have many training props.
- It's hard to get access to our training trailer, because it is kept in one location and must be brought back the same day it is used. All equipment has to be pulled out to access certain props, and with 3 firefighters it can be a hassle logistically to secure.
- We can get some work done at our stations, but only so much.
- I know a training facility is planned.
- I have never seen the inside of the training trailer.

- While the resources available are adequate for maintaining a minimum competency at basic firefighting skills, many crews in many stations don't prioritize (or even go so far as to totally disregard a need for training) training which has led to a growing culture of accepting status quo, instead of a culture of learning and growth.
- Upon completion of the training center I am sure this will become "strongly agree."
- I believe this will be addressed with the new training facility, and hope that it will contain plenty of concrete for driving training, as well as water supply/hydrants for numerous training scenarios.
- I feel we could have more frequent training outside of just daily station training.
- We strongly need an active training command to standardize training throughout the ESD.
- I think the training facility will add a great deal of training experience to all, so we can actually hold Class A burns to test of the knowledge of all ESD personnel.
- We need a 14-acre training facility, ASAP.
- I feel like we do have good training right now. But, limited to the extent of the training. As the training ground gets built, training will improve.
- We currently don't have a facility.
- Station 54 does not have a safe area for training at the station. I feel the areas we do have, that is adequate, is in front of the station and is really close to the road. I don't even like doing truck checks in front of the station. When we are out there we constantly hear people driving on the rumble strips as they pass by.
- Good training can be done with what we have. But, without a true training "facility," there are limits to the quality of training.
- Will strongly agree when the training facility is done. Personally, I like having a designated place for large training.
- Classrooms are good. Hands-on training needs improvement.
- Training is done in-house. A facility is in the works.
- We do not have any location dedicated to training. We need a spot where we can create real life scenarios.
- Some stations do not have adequate water supply to allow for flowing of handlines.

Question 4:

- Question does not pertain to the scope of everyday job assignment.
- I feel that we have a few stations that need to be updated to keep up with growth.
- Stations 54, 46, and 47 need to be updated or rebuilt.
- Silver Creek is in need of a bathroom/shower upstairs, an additional means of egress from the upstairs, new bay doors with windows, roof vents that will stay closed, a ceiling fan in the driver's bunk room, doors that close gently and open out to the bay, a front door that seals all the way around, additional lighting in the bay as there are several areas that could be lit up better.
- Stations are constantly being updated and given the mindset they need so far.
- Some stations need a little "TLC."
- Stations do not have grocery stores in their districts, resulting in stations having to spend their rest time (off duty) having to gather groceries for their 24-hour shift.

Question 5:

- Having young officers that think they are old pros, but are not, and could get someone hurt. The culture is still new for this organization. But it's the experienced officers that need to ensure the safety and culture.
- Question does not pertain to the scope of everyday job assignment.
- We have a lot of very young officers, both full and part-time. I have heard that we let people act as officers when they are not TCFD certified.
- We have had incidents over the past few months where all officers need to re-analyze their risk assessment priorities.
- I can't speak for everyone, but I'm sure it's the majority.
- We are quick to throw part-time/volunteer staff into leadership roles, sometimes under trained and not as invested as they should be.
- Most do. Unfortunately, some "step-ups," along with current officers, are only there for title and pay.
- I would like to see all officer spots filled with full-time qualified officers, instead of filling the spot with the most qualified person available.
- MOST officers do. But the citizens are who needs to be first.
- I feel that there is a Wild West culture adopted by certain members ... and has tacit approval. So, it's a culture issue for me.

- My personal safety is not always the top priority.
- I am genuinely concerned about full-time career firemen working under the guidance in station and operationally under part-time officers who are very young and "green" in the fire service as a whole.
- Communication disconnect.

Question 6:

- Our EMS culture is a joke, EMS always takes backseat to everything else. Very recently, the district has taken interest in providing good EMS care, but it feels more like a political move and less like a genuine interest in our patients. For the providers who already have their license, we provide only card classes and online CE, we don't sponsor anyone to go to EMS classes and we don't host any EMS classes, especially with the ambulance service.
- Could use more in "classroom" time on going over skilled based scenarios.
- Question does not pertain to the scope of everyday job assignment.
- We don't do enough EMS training.
- Being a medic with my full-time department has prepared me. The ESD as a whole to me appears to be afraid of EMS and wants to have nothing to do with it.
- Need more training and hands-on with patients. Often times we pull up with the medic or right behind them and they just wave and say we are good to clear.
- I feel that I am personally trained adequately, but believe that we have many that need further training to help with a better understanding in treating our patients.
- My shift trains regularly, but not as much on EMS as we could. I feel like we could have more district-wide training.
- I personally would love more hands-on training with EMS and the opportunity to further my cert levels.
- It would be nice to have a monthly EMS class at each station from Best EMS or other agency to help with CEs and skills.
- Our EMS training does need improvements. Some of our equipment is out of date. And the equipment needs to be spread out in different types of bags for the call.
- Again, due to my long background in fire service.
- I feel that we could use more training on the EMS side of things at ESD1. That being said, as part of the EMS FTO group I think we are headed in the right direction on EMS training.

- We need to upgrade our EMS/First Responder capabilities to an ILS/ALS responder level to better serve our citizens.
- Very basic BLS equipment and little EMS training.

Question 7:

- We have a very "bare minimum" attitude towards EMS care and equipment.
- Question does not pertain to the scope of everyday job assignment.
- There could be some positive upgrades made.
- I understand that we are a FRO system, but we could be a much more aggressive FRO system.
- I feel that an overhaul of the EMS bags and some additional equipment/meds could help us to serve our patients better.
- Equipment we do have is good, but we could make advancements to improve our ALS capabilities.
- We are well equipped for basic calls, but lack the personnel and equipment to handle advanced calls.
- We have the bare basics.
- As far as BLS goes.
- EMS seems to be an afterthought, and not a concern since we are not the primary care.
- We need different and better EMS bags. Preferably backpack style bags.
- I believe we need monitors on trucks so we can start 4 leads and 12 leads for medics. This would also allow us to run cardiac arrests a lot better.
- Same as above… Update equipment and spread the load of equipment. Instead of all in one bag-it will simplify the need.
- For a FRO I believe it is adequate. I don't want to see the ESD "chasing the rabbit down the hole" to be an EMS department.
- As we are improving our equipment for EMS treatment, I would like to see new EMS bags that have more room for our equipment. The bags we have now are cluttered and cramped. I've witnessed on multiple occasions things in the bag being damaged or torn open due to being overcrowded with other equipment.
- This doesn't have anything to do with our department, just our EMS County system.
- Again, very basic BLS equipment and little EMS training.
- Lifepak 15 or cardiac monitor would be great if ALS skills are to be a future goal.

Question 8:

- We do not have a regularly recurring pre-incident planning schedule for the crews.
- My officers took the initiative to explore these hazards on our own, not department mandated or encouraged.
- I'm very new to the department.
- Due to the large amount of growth, the crews that I choose to work with have been extremely proactive about identifying and studying target hazards in our district, and creating game plans to better serve the citizens.
- We have a very large area so some of the following takes time to develop an expertise on specific district hazards. Feel as though the more time and tenure the better.
- We are a large and diverse community that does not currently do inspections or pre-incident planning to my knowledge.
- I believe the officers at each station could do better in this area. Get out and walk through businesses and have fire plans.
- Access to more pre-plans would be appropriate.
- More time can always be spent in the community getting familiar.

Question 9:

- Still too many inexperienced personnel that want to freelance and do what they want when they want!!
- I've only been here 2 weeks, but from what I can tell "yes."
- Many times, we don't have chief officers on scene to run command, so we have company officers trying to be task-oriented as well as strategic oriented.
- We are getting much better at this.
- From what I have seen, everyone I work with is top notch. Even new guys no their role.

Question 10:

- There are some people that try to support the mission, but also there are people that don't care because they have other full-time jobs and this is a place to do what they want and can get away with some things!!
- I've only been here 2 weeks and don't have an assigned station yet.
- I believe my shift supports the overall mission, not necessarily my station.
- On my crew at my station, specifically, I am lucky to have a solid group of firemen. However, I have seen an influx of people that are simply here for the paycheck, and have no buy-in or eagerness to better themselves and the fire service in general. I strongly feel that these people have no place in ESD 1. I would also like to make note that the department does have many fine individuals who strive for excellence and are persistent in their pursuit of bettering themselves, their department, and the fire service (both full-time and part-time).
- We have allowed negative people to influence others. From laziness to gossip and rumors we are missing true brotherhood and traditions within the ESD. We need positive influences in leadership roles in the field.
- Our captain is responsible for this, does a great job.
- The best culture I've witnessed and or been a part of department wide.
- I'm about to embark in a new role at a new station. I hope my staff will get on board with the ESD fully. I have found some stations and crews are still operating as a single entity and I hope to remedy that culture.
- I moved departments because of this culture. And would like to see how great it can be.
- Yep.
- There is still quite a bit of volunteer mentality in our organization. Not that volunteers are not valuable and vital to our mission, but they need to get on board with the ESD as a whole and not section themselves off as a PCESD1 department just under the leadership of an ESD. We are one department, not 6 separate departments.
- I can only somewhat agree as I have not received a permanent assignment yet.

Question 11: No comments

Question 12:

- I am cleared to work as an Engineer.
- Prefer not to say.
- Commissioner
- FF/EMT and Engineer
- Guess who?
- Part-time Driver Operator/EMT
- Part-time Officer

APPENDIX B: HAZARD-SPECIFIC RISK TABLES

Figure 111: Natural Hazards Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Avalanche	0	0	0	0	0	0	0	**0%**
Animal Disease	1	1	1	3	1	1	1	**8%**
Biological/Pandemic	1	4	4	4	4	4	3	**24%**
Drought	2	1	1	1	1	1	1	**13%**
Earthquake	0	0	0	0	0	0	0	**0%**
Extreme Temperature	4	2	1	2	1	1	1	**33%**
Flood	3	2	2	2	2	2	2	**38%**
Hurricane / Tropical Storm	1	1	1	1	3	3	3	**13%**
Landslide / Sinkhole	0	0	0	0	0	0	0	**0%**
Thunderstorm / Hail / Lightning	4	2	2	2	2	2	2	**50%**
Tornado	3	3	3	3	2	2	2	**47%**
Tsunami	0	0	0	0	0	0	0	**0%**
Volcanic Eruption	0	0	0	0	0	0	0	**0%**
Wildfire	4	1	2	2	1	2	2	**42%**
Winter storm	3	2	1	2	2	2	2	**34%**
AVERAGE SCORE	1.73	1.27	1.20	1.47	1.27	1.33	1.27	**14%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
14%	43%	33%

Figure 112: Technological Hazards Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annua	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Communications Failure	3	2	1	1	3	3	3	**41%**
Electrical failure	2	1	1	1	1	1	1	**13%**
Fire Protection System Failure	2	2	3	2	3	3	3	**33%**
Flood, Internal	1	1	2	2	3	3	3	**15%**
Fuel Shortage	1	1	1	2	2	2	2	**10%**
Generator Failure	1	1	1	2	1	1	1	**7%**
HVAC Failure	1	1	1	2	1	1	1	**7%**
Information Systems Failure	2	1	1	3	2	2	2	**23%**
Medical Gas Failure	1	1	0	0	0	0	0	**1%**
Medical Vacuum Failure	1	1	0	0	0	0	0	**1%**
Natural Gas Failure	1	1	1	1	1	1	1	**6%**
Steam Failure	1	0	0	0	0	0	0	**0%**
Structural Damage	1	1	3	2	4	4	1	**16%**
Supply Shortage	1	1	1	1	1	1	1	**6%**
Transportation Failure	1	1	1	1	1	2	1	**7%**
Wastewater Failure	1	1	1	1	1	1	1	**6%**
Water Failure	1	3	3	3	1	1	1	**13%**
AVERAGE SCORE	**1.29**	**1.18**	**1.24**	**1.41**	**1.47**	**1.53**	**1.29**	**11%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
11%	**32%**	**34%**

Figure 113: Human-Related Hazards Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Active Shooter	2	3	1	2	1	1	1	**19%**
Bomb Threat	1	2	2	2	1	1	1	**9%**
Civil Disturbance	1	3	3	3	1	1	1	**13%**
Hostage Situation	1	3	1	2	1	1	1	**9%**
Kidnapping / Abduction	1	1	0	0	1	1	1	**4%**
Mass Casualty Trauma	1	3	1	3	1	2	1	**11%**
Mass Casualty Epidemic / Pandemic	1	4	4	4	4	4	3	**24%**
Terrorist Act	1	3	3	3	1	1	1	**13%**
VIP Situation	1	0	0	1	1	1	1	**4%**
Workplace Violence	2	3	1	2	1	1	1	**19%**
AVERAGE SCORE	**1.20**	**2.50**	**1.60**	**2.20**	**1.30**	**1.40**	**1.20**	**13%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
13%	**30%**	**43%**

Figure 114: Structure Fires Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annua	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
High Risk	1	2	3	3	2	2	3	**16%**
Moderate Risk	2	2	2	3	0	2	2	**23%**
Low Risk	4	1	1	1	0	2	2	**29%**
Wildland/Urban Interface	4	1	2	2	2	2	2	**46%**
AVERAGE SCORE	**2.75**	**1.50**	**2.00**	**2.25**	**1.00**	**2.00**	**2.25**	**32%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
32%	**69%**	**46%**

Figure 115: Non-Structure Fires Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
High Risk Urban	1	1	1	1	2	2	2	**9%**
Moderate Risk Urban	2	1	2	2	2	2	2	**23%**
Low Risk Urban	3	1	1	1	1	2	2	**25%**
Wildland/Urban Interface	4	1	2	1	1	2	2	**38%**
AVERAGE SCORE	**2.50**	**1.00**	**1.50**	**1.25**	**1.50**	**2.00**	**2.00**	**24%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
24%	**63%**	**39%**

Figure 116: EMS Medical Assists Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Advanced Life Support	4	3	0	0	4	4	0	**46%**
Basic Life Support	4	1	0	0	3	3	0	**29%**
First Responder	4	1	0	0	2	2	0	**21%**
AVERAGE SCORE	**4.00**	**1.67**	**0.00**	**0.00**	**3.00**	**3.00**	**0.00**	**32%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
32%	**100%**	**32%**

Figure 117: Technical Rescue Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Confined Space	1	2	1	1	4	3	2	**14%**
Ice	1	1	1	1	4	4	3	**15%**
Low / High Angle	1	1	1	1	3	3	2	**11%**
MVA Extrication	4	2	1	1	1	1	2	**33%**
Structural Collapse	1	3	3	3	4	3	2	**19%**
Trench	1	2	2	2	4	3	2	**16%**
Water, Rising	2	1	3	1	2	2	2	**23%**
Water, Swift	1	1	1	1	2	2	2	**9%**
Other	0	0	0	0	3	3	3	**0%**
AVERAGE SCORE	1.33	1.44	1.44	1.22	3.00	2.67	2.22	**17%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
17%	33%	50%

Figure 118: Hazardous Materials Risk Assessment

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = <1% annual 1 = > 1% annual 2 = > 25% annual 3 = > 50% annual 4 = > 75% annual	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0= N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1= Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	0 = Very High 1= High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Large Release, Night	1	3	2	2	3	3	2	**16%**
Large Release, Day	1	3	2	2	3	3	2	**16%**
Small Release, Night	2	2	2	2	2	2	1	**23%**
Small Release, Day	3	4	4	4	1	1	1	**47%**
AVERAGE SCORE	1.75	3.00	2.50	2.50	2.25	2.25	1.50	**26%**

**Threat increases with percentage.*

RISK = PROBABILITY * SEVERITY		
26%	44%	58%

APPENDIX C: TABLE OF FIGURES