



City of Mesquite Fire Department *Texas*



AGENCY EVALUATION & FIRE STATION LOCATION STUDY

Executive Summary

The City of Mesquite retained Emergency Services Consulting International (ESCI) to conduct an Agency Evaluation and Fire Station Location Study. ESCI is an international firm providing specialized, high quality, and professional fire, EMS, police, and communications consulting services to organizations throughout the United States and Canada. ESCI, the consulting arm of the International Association of Fire Chiefs (IAFC), has been meeting the needs of emergency services providers since 1976. ESCI consistently provides innovative and sustainable recommendations readily understood by the public and useful to elected officials for setting sound public safety policy. Utilizing over 30 consultants nationwide who are leaders in their respective fields, ESCI provides consulting services to municipalities, districts, non-profit organizations, and the industrial and commercial community.

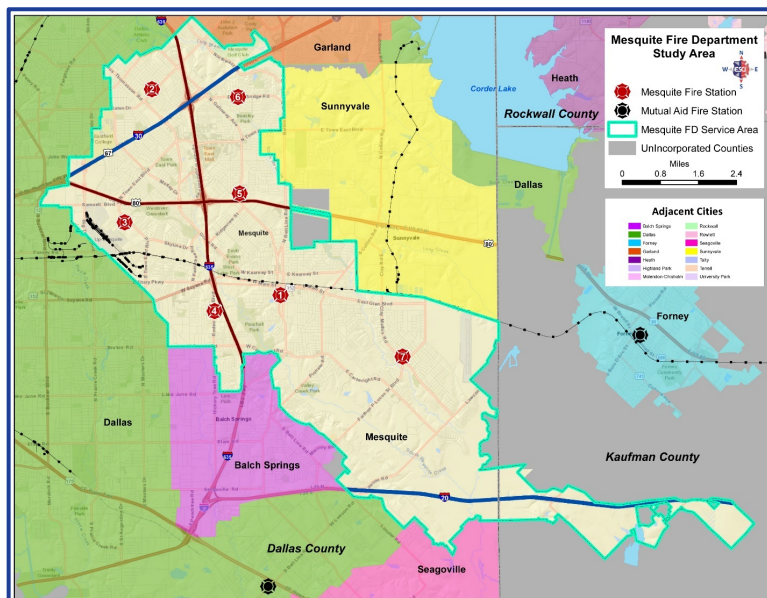
This document describes the Mesquite Fire Department's (MFD) community risks, response resources, deployment strategies, and service levels. The document identifies and discusses response time objectives and standards for measuring the effectiveness of fire department services and the deployment of its resources and makes recommendations to meet current demand, as well as increased services for the future, based on known and anticipated growth in population and needed services.

ORGANIZATIONAL OVERVIEW

The Organizational Overview component provides a summary of MFD's organizational configuration and the services that it provides. ESCI combined the data provided by MFD with information collected during our fieldwork to develop the overview.

The following figure displays a map of the study area for this report.

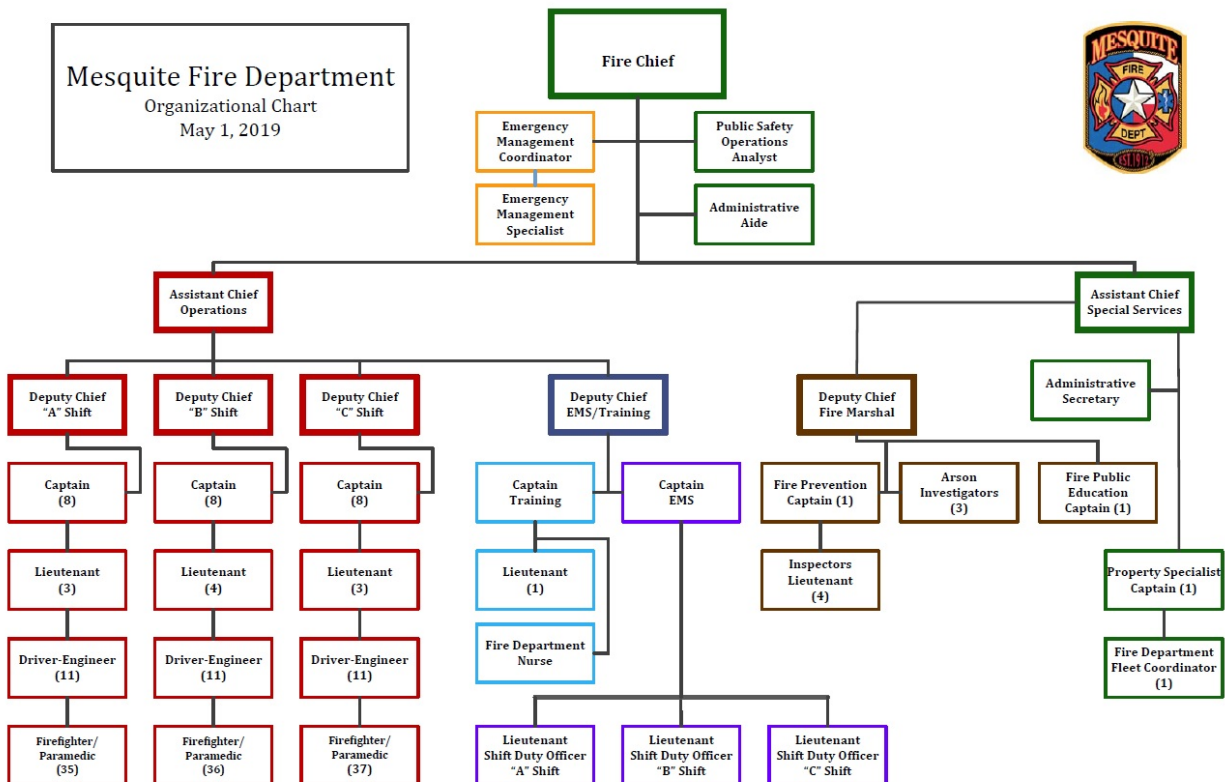
Figure 1: MFD Service Area Map



Organizational Design

The organizational design of an emergency services agency is vitally important to the agency's ability to deliver services in an efficient and timely manner while providing the necessary level of safety and security to the members of the organization, whether career, part-time, paid-on-call, or volunteer. The following organizational chart represents the current MFD structure and staffing. ESCI finds that the structure and function of the MFD are consistent with the risk, demand, and services provided. Recommendations for additional administrative staffing based on current and future demand are included later in the executive summary and report.

Figure 2: MFD Organizational Chart



Emergency Response Type and Frequency

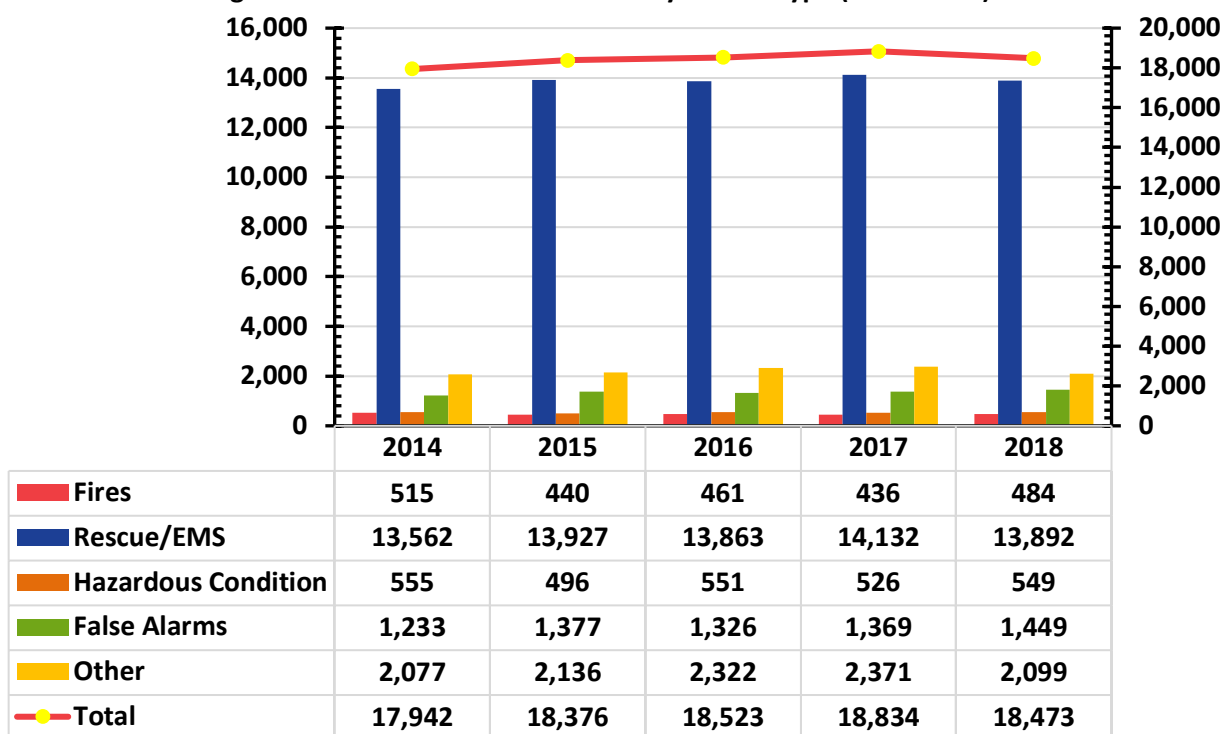
Emergency response and service demand are the primary drivers in determining staffing and capabilities of the MFD. MFD is a high performing all-risk fire department that handles multiple types of emergencies and provides services that address identified risk elements within the community. The department responded to 18,473 incidents in 2018. As is typically found, a high percentage of incidents are emergency medical calls (75% of the total in 2018). The following figure lists MFD's emergency calls by incident type and frequency for 2018.

Figure 3: Emergency Response Type and Frequency, 2018

Incident Type	Number	Percent of Total
Fire	484	2.62%
Rupture or Explosion	12	.65%
EMS/Rescue	13,892	75.2%
Hazardous Condition	549	2.97%
Service Call	1,132	6.12%
Good Intent Call	950	5.14%
False Call	1,449	7.84%
Severe Weather	3	.016%
Other	2	.010%
Total	18,473	100.00%

SERVICE DEMAND

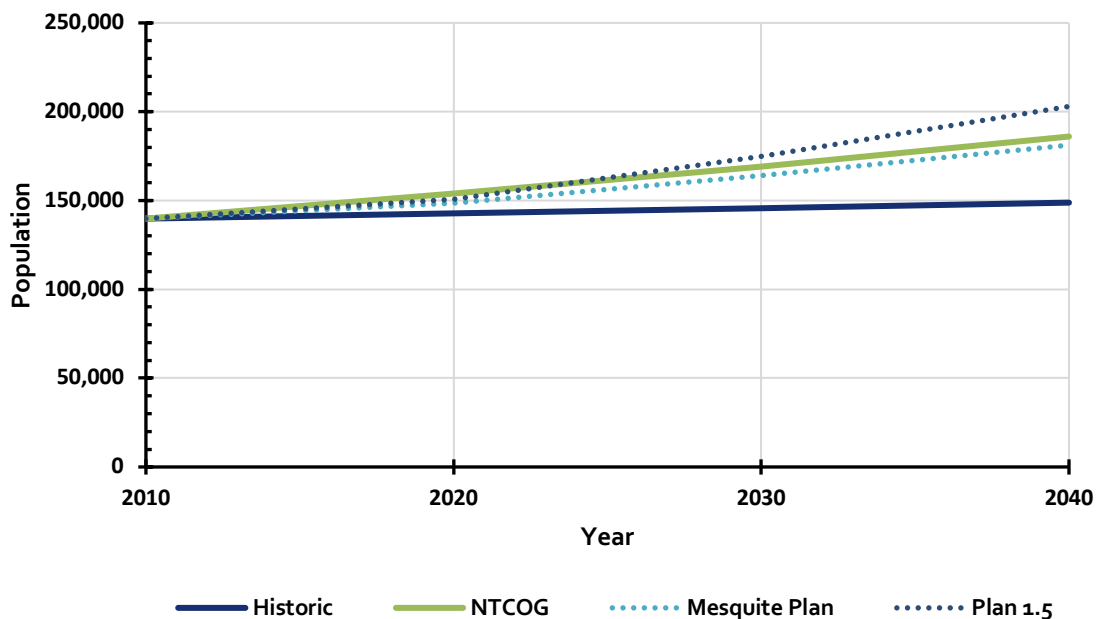
The demand for services is the primary determinant for managing all emergency services organizations. These service demand elements are the key indicators in conducting periodic studies and analysis to make adjustments to resource distribution and concentration. In the Service Demand section of the report, historical demand and the associated trends within the data are presented and examined for further discussion. The following figure displays MFD's historical service-demand by year, call-type, and frequency.

Figure 4: Historical Service-Demand by Year & Type (2014–2018)

Future Population Projections

The primary driver of service demand is population numbers and density. ESCI looked at historical and three sources of future population projections to establish a range of population increases that should be utilized in a manner that matches the conditions on the ground. Given the amount of undeveloped land in the city and its ETJ, this growth can accelerate at varying speeds in light of proactive management toward economic development and complete build-out of major neighborhood development projects such as Lucas Farms, Polo Ridge, and Spradley Farms.

Figure 5: Projected Population Increase, 2010–2040¹



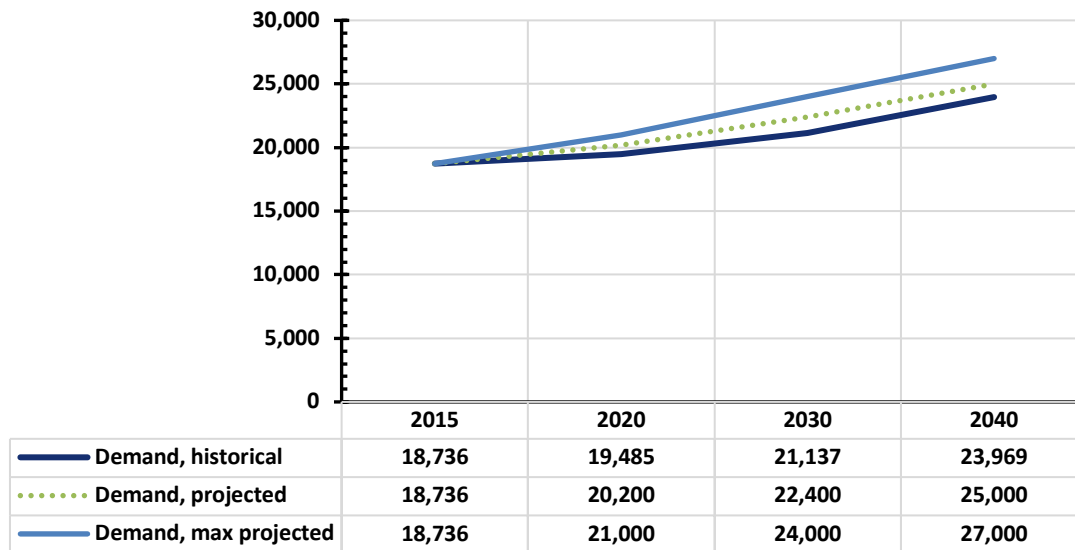
Future Service Demand Projections

After examining the current conditions and population projections, it is essential to look at future service demand to identify elements of the system that are too far away to respond to anticipated service demand in a timely manner or will be stressed or overutilized. Once these elements are known, data-driven triggers can be established to determine when additional, or reallocated resources are required to meet established response and outcome standards. Examination of MFD incident data reveals that service demand increased by only 3% from 2014 to 2018, or about 0.6% each year. This further suggests that population-based projections are appropriate for these service demand projections, given no major change in the MFD services provided. Thus, it is anticipated that future MFD service demands will follow similar patterns. However, if and when the identified future growth takes place, a subsequent increase in service demand will be realized and move the service projections toward the maximum projection.

¹ Includes information adapted from the "NCTCOG 2045 Forecast City Approximations, 2017," North Central Texas Council of Governments (NCTCOG). Retrieved from: <http://data-nctcogis.opendata.arcgis.com/datasets/nctcog-2045-forecast-city-approximations>.

Based on this assumption, ESCI was able to develop a range of projected increase in service demand—calls for service—from 2015 to 2040. This range was then compared to historical records to determine a projected increase in service demand, based on a comparison of population-based and historically-based service projections, as shown in the following figure.

Figure 6: Projected Service Demand, 2015–2040



OVERVIEW OF THE COMMUNITY RISK ANALYSIS

As part of the Agency Evaluation and Station Location Study, a community risk analysis was conducted that provided an assessment of potential risks present in the service area. Physical, economic, and demographic data is utilized to assess the hazards and risks threatening the community. This includes exposure to natural and human-made disasters.

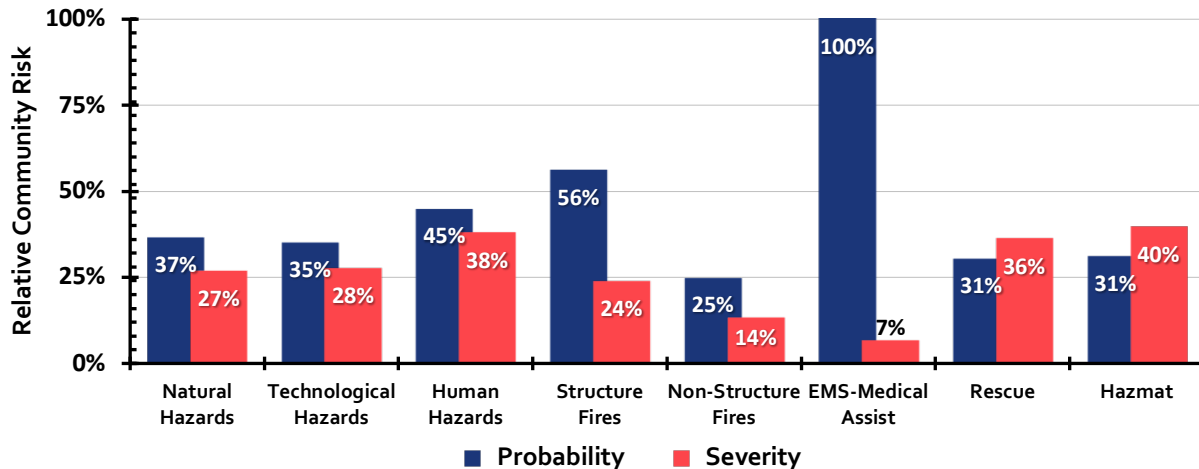
Hazard Vulnerability Analysis

The City of Mesquite is susceptible to hazards, both natural and technological/human-caused. Of the potential hazards that pose a risk to the City of Mesquite, the risk assessment included in this report identifies several because of the likelihood of everyday occurrence and/or potential consequences.

Community hazards were divided into broad categories, as follows: Structure Fires, Non-structure Fires, EMS-Medical Assist, Rescue, Hazardous Materials, Natural Hazards, Technological Hazards, and Human Hazards. These categories represent an accurate spectrum of the current and anticipated risks seen within the City of Mesquite. These vulnerabilities drive the services and capabilities that the MFD must maintain throughout the service area.

The probability and severity of each hazard determine the likelihood a call of that type will occur, and when it does, how severe is the anticipated impact on the community and fire department. Generally, the severity and probability match closely with the exception of EMS calls, which can be attributed to the utilization of MFD emergency resources for calls with moderate to low severity. This trend is addressed in the EMS recommendations with measures to assist with the alignment of the responding resource to the severity of the call.

Figure 7: Hazard-Specific Relative Probability and Severity



IMPROVEMENT GOALS

ESCI has identified the MFD as a high performing and effective fire department that provides excellent service with exceptional outcomes to the citizens of Mesquite. As with any comprehensive evaluation that looks at current conditions, projects future service demand and growth, and conducts a comprehensive risk assessment, ESCI has identified a number of opportunities for service enhancement and improvements for consideration.

The following general recommendations are intended to provide a foundation and measurement tool to accomplish the improvement goals listed below:

1. Define and adopt expected service levels and performance standards to be provided by the fire department.
2. Prioritize the following service level improvement goals for implementation based on adherence to the adopted service levels and standards and available funding.

The improvement goals are listed in the following figure, summarized in the pages that follow, and detailed in the Opportunities for Improvement section of this report.

Figure 8: MFD Improvement Goals

MFD Improvement Goals	
Improvement Goal A:	Formally Adopt Response Time Standards and Targets
Improvement Goal B:	Implement Processes to Reduce Call Processing Time
Improvement Goal C:	Improve Turnout Time Performance
Improvement Goal D:	Improve Upon Response Deployment and Effective Response Force Assembly
Improvement Goal E:	Improve the Delivery of Emergency Medical Services
Improvement Goal F:	Modify Resource Deployment Models and Dispatch Assignments to Ensure Adequate Personnel on High-Rise and High-Risk Fire Responses, as well as High and Low-Risk Hazardous Materials Responses
Improvement Goal G:	Optimize Additional Station Locations When Possible
Improvement Goal H:	Evaluate Current and Future Station Locations to Improve Response—Add One New Fire Station for Southeast Response in Polo Ridge/Spradley Farms Development and One New Fire Station for Lucas Farms Development
Improvement Goal I:	Consider Adding Lieutenant to Training Division and an Additional Deputy Chief (separate EMS and Training)
Improvement Goal J:	Seek Funding to Construct a New Training Facility
Improvement Goal K:	Conduct Annual Mandatory Fit-for-Duty Physicals that are Compliant with NFPA 1582 for All Operations/Uniformed Personnel

Improvement Goal A: Formally Adopt Response Time Standards and Targets

The response time continuum, the time between when the caller dials 911 and when assistance arrives, is comprised of several components. The following figure displays combined sample performance goals for consideration that address the various components of total response time:

Figure 9: Sample Response Performance Goals, 90th Percentile

	Call Processing Time	Turnout Time	Travel Time	Response Time Dispatched to First Apparatus On-Scene	Total Response Time Received at Dispatch to Arrival
Fire	01:00	01:20	06:00	07:20	08:20
EMS	01:00	01:20	05:30	06:50	07:50

Improvement Goal B: Implement Processes to Reduce Call Processing Time

ESCI has identified several best practices and recommendations for review and consideration by the MPCC dispatch system to utilize as appropriate. MPCC should monitor both call answering and call processing performance monthly and strive to maintain or exceed adopted standards.

Improvement Goal C: Improve Turnout Time Performance

Turnout time is the one component of total response time over which the fire department has control and is not affected by outside influences. Turnout time is the time from when the call is received by the response units (dispatched) to when the unit is en-route to the scene. ESCI recommends that MFD monitor turnout time performance and provide the information to emergency response personnel for self-correction.

Improvement Goal D: Improve Upon Response Deployment and Effective Response Force Assembly

Effective Response Force Performance Goals

A fire department's *concentration* is the spacing of multiple resources close enough together so that an initial "Effective Response Force" (ERF) for a given risk can be assembled on the scene of an emergency within the specific time frame identified in the community's performance goals for that risk type. The ability for MFD to assemble an ERF diminishes in the outer areas of the service area due to a decreased concentration of resources. This is most obvious in the southern portion of the service area, especially to the north and south of Interstate 20, and ultimately in the area of the proposed development in the far eastern section of the city.

Improvement Goal E: Improve the Delivery of Emergency Medical Services

Responses to requests for emergency medical services represent the greatest percentage of the MFD's response activity (75% in 2018). As the service most requested by its customers, MFD should consider the following elements to ensure EMS services are delivered as effectively and efficiently as possible.

Medical Priority Dispatch System

MFD should manage an MPDS system in a way that ensures timely and accurate dispatch and pre-arrival instructions, ensuring that all calls are prioritized and dispatched in accordance with established MPDS standards.

Implementation of Tiered Response to EMS Incidents

The implementation of a tiered EMS response system may only require a single first responder advanced life support (FRALS) unit or another alternative response vehicle to provide a patient evaluation. The use of tiered EMS responses can reduce the number of units sent to EMS incidents.

Implementation of Community Paramedicine Program

Conduct a comprehensive MIH needs assessment to identify the need, preferred model, and sustainability of an MIH-CP Program. Build a program around utilization and outcomes that optimize utilization of MFD emergency resources, and enhance patient care options, alternative patient destinations, and reimbursement strategies with private health care and city and county stakeholders.

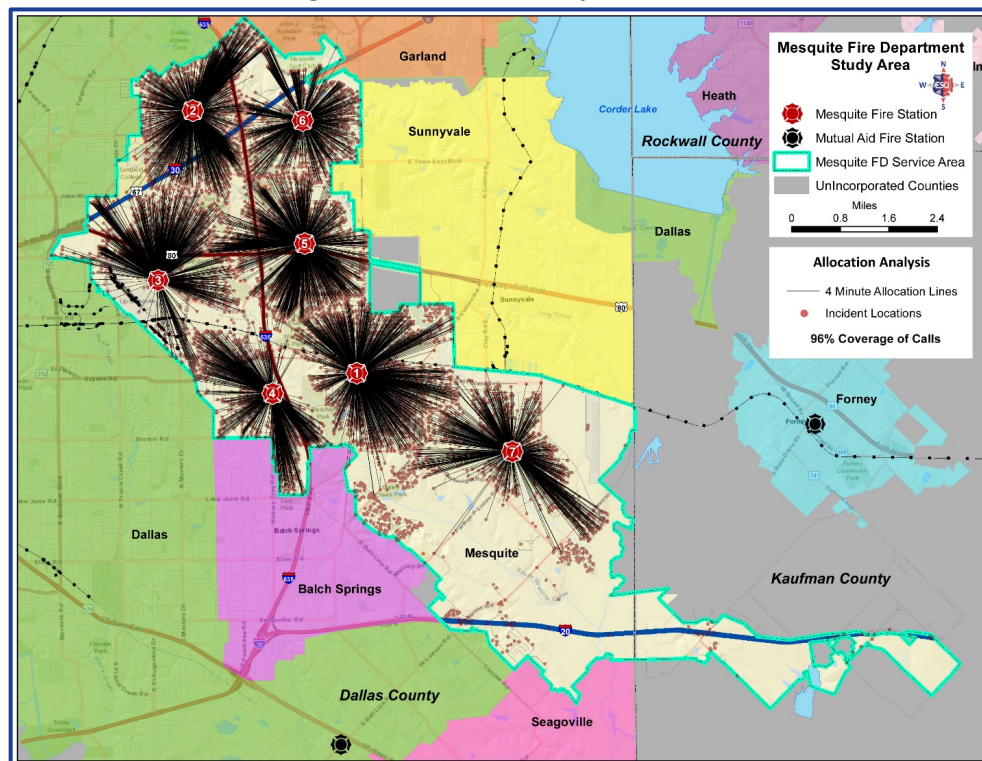
Improvement Goal F: Modify Resource Deployment Models and Dispatch Assignments to Ensure Adequate Personnel on High-Rise and High-Risk Fire Responses, as well as High and Low-Risk Hazardous Materials Responses

ESCI recommends that MFD work with Mesquite Police Communications Center to ensure adequate resources are dispatched to cover high-rise and high-risk fire responses, as well as high and low-risk hazardous materials responses. MFD should assess its current deployment model to those incidents and determine the additional resources needed to eliminate the gaps. This may include adding an additional MFD engine company to high-rise and high-risk fire incident responses and a Safety Officer (SDO) response to low and high-risk hazardous materials incidents. MFD should add these resources to the specific incidents or modify mutual/automatic aid agreements to ensure sufficient personnel and equipment are dispatched to the scene of these emergencies.

Improvement Goal G: Optimize Additional Station Locations When Possible

The following figure is a station optimization map. This map shows that the City of Mesquite fire stations are in optimal locations to serve the existing developed and populated service area. The intent of this analysis is to provide the City with optimized station locations given the current geography, development, existing service demand, and street patterns. Based on this analysis, the City of Mesquite currently has all existing fire stations in optimized locations. With future development and the addition of the two new recommended fire stations to serve the southeast portion of the city that includes the Trinity Pointe development area, the entire city limits should have an optimized fire service delivery system.

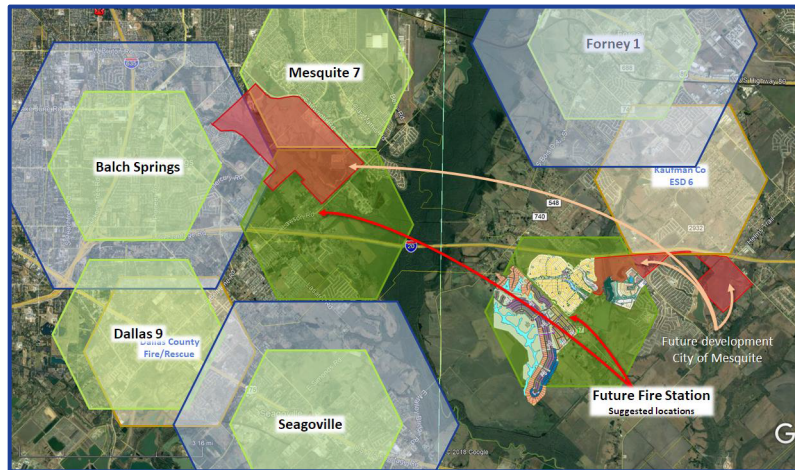
Figure 10: Fire Station Optimization



Improvement Goal H: Evaluate Current and Future Station Locations to Improve Response—Add One New Fire Station for Southeast Response in Polo Ridge/Spradley Farms Development and One New Fire Station for Lucas Farms Development

Given the anticipated growth in the Lucas Farms, Polo Ridge, and Spradley Farms developments, ESCI recommends the City of Mesquite consider adding two additional fire stations in these developments to ensure adequate coverage as these areas are constructed. The timing of building and staffing the additional stations should be in consideration of the recommended triggers in Figure 12.

Figure 11: Proposed New Fire Station Locations



The following figure offers criteria for determining when a new station is necessary.

Figure 12: New Station Deployment Decision Matrix

Action Choices	Travel Distance	Criteria		
		Response Time Parameter	Out of Area Calls	Building/Risk Inventory
Maintain the Status Quo	All risks within 1.5 miles	1 st due company is within 5 minutes total response time, 90% of the time	100% in the 1 st due area	Existing inventory and infill
Temporary Facilities and Minimal Staffing	Risks 1.5 to 3.0 miles from an existing station	1 st due company exceeds 4 minutes of travel time 10% of the time, but never exceeds 8 minutes	More than 10% of calls are in the adjacent area	The new area has 25% of same risk distribution as in the initial coverage area
Permanent Station Needed	Risk locations exceeding 4.0 miles from an existing station	1 st due company exceeds 4 minutes of travel time 20–25% of the time; some calls > 8 minutes	More than 20–25% of calls are in the outlying area	The new area has 35% of same risk distribution as in the initial coverage area
Permanent Station Essential	Outlying risk locations exceeding 5.0 miles from an existing station	1 st due company exceeds 4 minutes of travel time 30% of the time; some calls > 10 minutes	More than 30% of calls are in the outlying area	The new area has 50% of same risk distribution as in the initial area

Improvement Goal I: Consider Adding Lieutenant to Training Division and an Additional Deputy Chief (separate EMS and Training)

Currently, a single Deputy Chief manages EMS and Training. ESCI recommends creating stand-alone divisions with a Deputy Chief managing each division.

Improvement Goal J: Seek Funding to Construct a New Training Facility

Currently, the training facility is a structure built in 1960, with one classroom added in 2008. The building is in poor condition and lacks the necessary components to conduct an effective training program. ESCI recommends the identified site be approved along with a funding strategy to design and construct a new facility as soon as possible.

Improvement Goal K: Conduct Annual Mandatory Fit-for-Duty Physicals that are Compliant with NFPA 1582 for All Operations/Uniformed Personnel

ESCI recommends that MFD establish an annual fit-for-duty examination to ensure personnel are medically capable of performing tasks, and to help determine other medical conditions that may need to be addressed.

CONCLUSION

Based on information obtained throughout this process, MFD is provided with strong leadership and an innovative vision. The department is functioning at a high level commensurate with community expectations. While there is always room for improvement, the department is serving the citizens of Mesquite well. The fire department is well resourced and is commended for undertaking this project to initiate a formal plan for future service delivery.

The report referenced in this executive summary provides a considerable amount of technical data, much of which was provided by the Mesquite Fire Department and the City of Mesquite, and allows the reader to gain a clear understanding of the services provided by MFD as well as an indication of how those services may be provided in the future. This document is intended to provide department personnel and City policymakers with information from which to make informed, data-driven decisions about the future deployment of resources and services in the MFD service area.

ESCI is confident that the analysis, findings, and recommended goals in the report will provide the City of Mesquite and the MFD with a successful road map for the future. As these goals and enhancements are realized, and the city continues to grow in size and stature, the citizens of Mesquite will continue to receive an exceptional level of service and protection from the dedicated men and women of the Mesquite Fire Department.