FIRE DEPARTMENT OPERATIONAL STUDY

Fire/Rescue/EMS

January

2023

Lake Havasu City FIRE DEPARTMENT

Lake Havasu, Arizona

AP TRITON

VISION · INNOVATION · SOLUTIONS

Contents

Acknowledgments

AP Triton Consulting wishes to extend its sincere appreciation to each individual whose contributions and assistance made this project possible.

Our sincere appreciation is extended to each of you…

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…and each of the firefighters, officers, and support staff who daily serve the citizens and visitors of Lake Havasu City and the surrounding communities.

Introduction

In October 2021, AP Triton, LLC (Triton) submitted a proposal in response to a Notice of Request for Proposals (RFP) from Lake Havasu City. The RFP (#P22-LHCFD-500195) sought a qualified consulting firm to conduct a "Fire, Rescue, and Emergency Medical Services Comprehensive Operational Study" of the Lake Havasu City Fire Department (LHCFD). Triton was awarded the bid and a contract signed with Lake Havasu City at the end of December 2021.

As shown in the following pages, the result is a substantial and comprehensive study. However, it is important to note that studies such as these are "snapshots in time" and that some conditions may have changed subsequent to the completion of the report.

The study consists of six primary sections:

- Section I-A: Evaluation of Current Operations & Conditions
- Section I-B: Support Programs
- Section II: Community Risk Assessment
- Section III: Emergency Medical Services & Patient Transport
- Section IV: Findings & Recommendations
- Section V: Appendices

The first two sections review and analyze the current operations and conditions of LHCFD. This included multiple components of the fire department, including historical operational performance. The next section addresses the various potential risks to Lake Havasu City. Section III evaluates the current Emergency Medical Services (EMS) delivery system and patient transport services.

The report concludes with Findings and Recommendations, which are further divided into the following:

- Introduction to the Recommendations (with a Planning & Implementation section)
- General Recommendations by Category
  - Personnel & Staffing
  - Life Safety & Public Education (Prevention)
  - Emergency Communications & Dispatch
  - Fire Stations & Facilities

- Training & Continuing Education
- Operations & Deployment
- Miscellaneous Recommendations

- Recommendations by Priority
  - Short-Term Recommendations
  - Mid-Term Recommendations
  - Long-Term Recommendations
- Recommended Future Fire Station Locations
  - Future Fire Station 7
  - Projected Service Area Coverage from Fire Stations

The Appendices include a list of Risk Classifications and a future development map.

Section I-A:
EVALUATION OF CURRENT OPERATIONS & CONDITIONS

Overview of the Lake Havasu City Fire Department

The following section entails a general overview of the various components and services provided by the Lake Havasu City Fire Department (LHCFD)—also referred to as Lake Havasu City Fire, Rescue, and EMS.

LHCFD comprises a service area of just over 46 square miles within the city limits and unincorporated areas outside Lake Havasu.[1] This area consists of about 90% urban and 10% rural, with a 2020 population in Lake Havasu City of 57,144 persons.[2,3]

History of the Fire Department

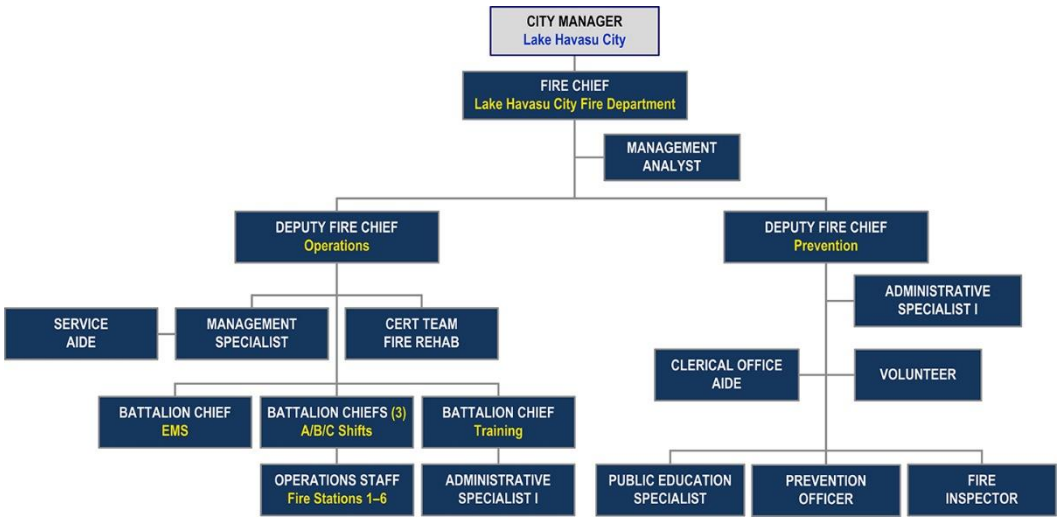
The Lake Havasu City Fire Department was originally established in 1966 as an all-volunteer organization. At that time, it was known as the Lake Havasu Volunteer Fire Company. In 1969, construction began on a new fire station at the corner of McCulloch Boulevard and Smoketree Avenue. It became a combination fire department in 1970 when it hired its first paid Fire Chief. In 2016, LHCFD celebrated 50 years of service to the community.

Figure 1: LHCFD in the 1960s

LHCFD Organization Structure

The next figure illustrates LHCFD's current organizational structure.

Figure 2: Lake Havasu City Fire Department Organization Structure (2022)



Governance & Lines of Authority

The Lake Havasu City Fire Department is a municipal fire department working within the city's Council-Manager form of government. The Fire Chief is a direct report to the City Manager.

As shown in the preceding figure, the Fire Chief directly supervises the Management Analyst, a Deputy Fire Chief (DFC) of Operations, and a Deputy Fire Chief of Prevention. In addition to managing emergency operations, the DFC is responsible for Training, EMS, the Community Emergency Response Team (CERT) & Rehabilitation, and other programs. The Prevention DFC also functions as the Fire Marshal and supervises fire prevention activities, special events, grant administrator, and public education.

Operations & Deployment

The Lake Havasu City Fire Department is an all-hazards public safety agency providing traditional structural fire protection, medical first-response (MFR) at both the Basic Life Support (BLS) and Advanced Life Support (ALS) levels, hazardous materials response at the Technician level, and various special operations and technical rescue services. LHCFD also maintains an Aircraft Rescue & Fire Fighting (ARFF) apparatus at the Lake Havasu City Airport fire station and a fire boat and lakeshore rescue services.

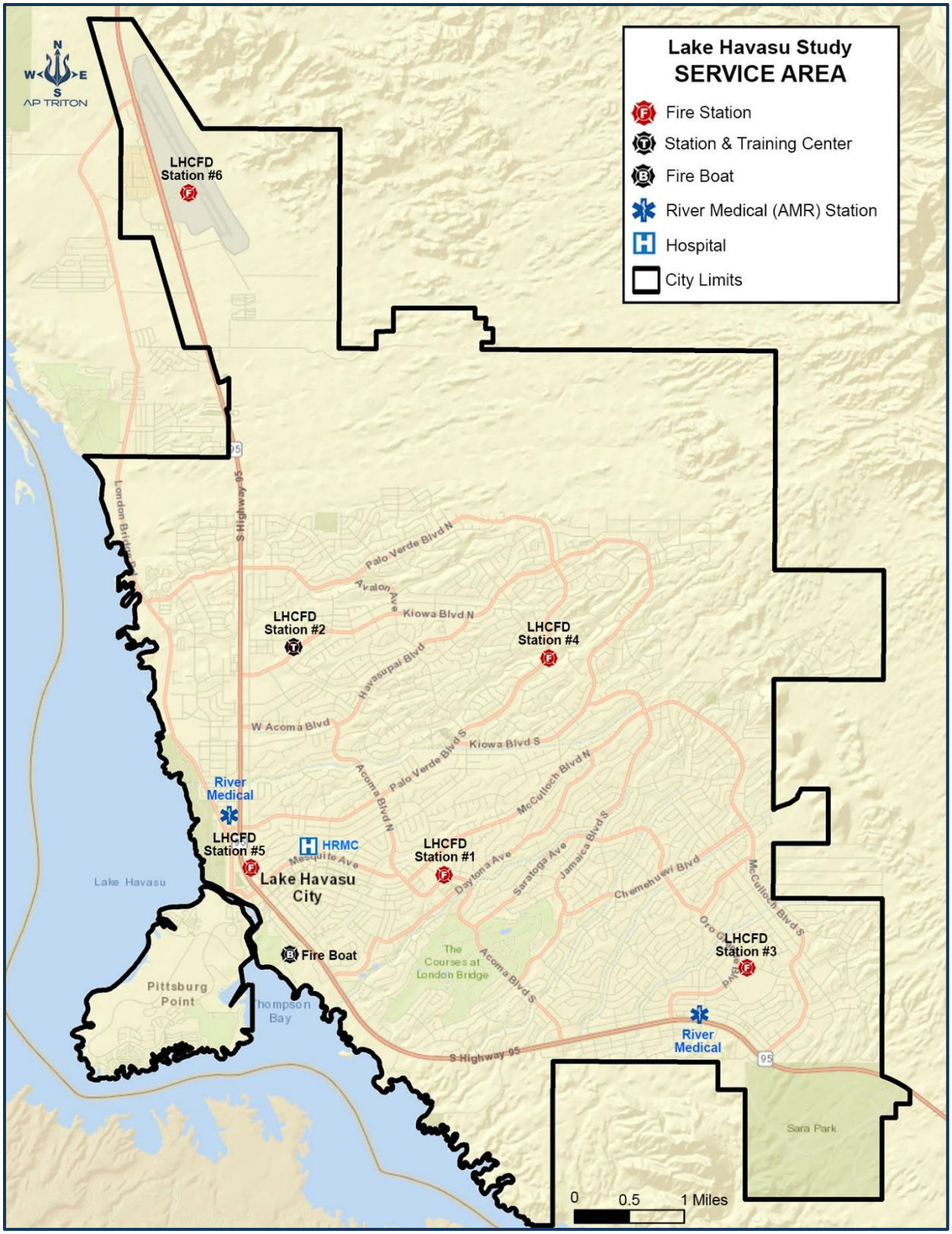
LHCFD deploys its personnel and apparatus from six fire stations staffed 24 hours daily. Every station has at least one frontline engine (pumper) staffed full-time with a minimum of three personnel. Fire Station 1 also deploys a medic unit staffed with two full-time personnel, one Shift Battalion Chief, and one truck that is cross-staffed with personnel.

In 2018, the Lake Havasu City Fire Department was assigned a Public Protection Classification (PPC®) grade of Class of 2 by the Insurance Services Office (ISO).

Service Area

The next figure illustrates the service area boundaries of the Lake Havasu City Fire Department and the locations of each of its current fire stations.

Figure 3: Lake Havasu City Fire Department Service Area



Other Public Safety Resources in the Region

The next section describes various public safety resources available to the Lake Havasu City Fire Department and the community.

Emergency Medical Transport

Ground Emergency Medical Transport

American Medical Response (AMR) is Lake Havasu City's primary ambulance service provider, although LHCFD operates one ALS ambulance out of Station 1. More details on ground transport by AMR are addressed later in this report.

Air Medical Transport

Air Methods® provides helicopter and fixed-wing aircraft for medical transport. The company maintains 300 air bases in 48 states. A helicopter is based at Havasu Regional Medical Center in Lake Havasu City. Air Methods provides ALS and critical care.

Mutual Aid Resources

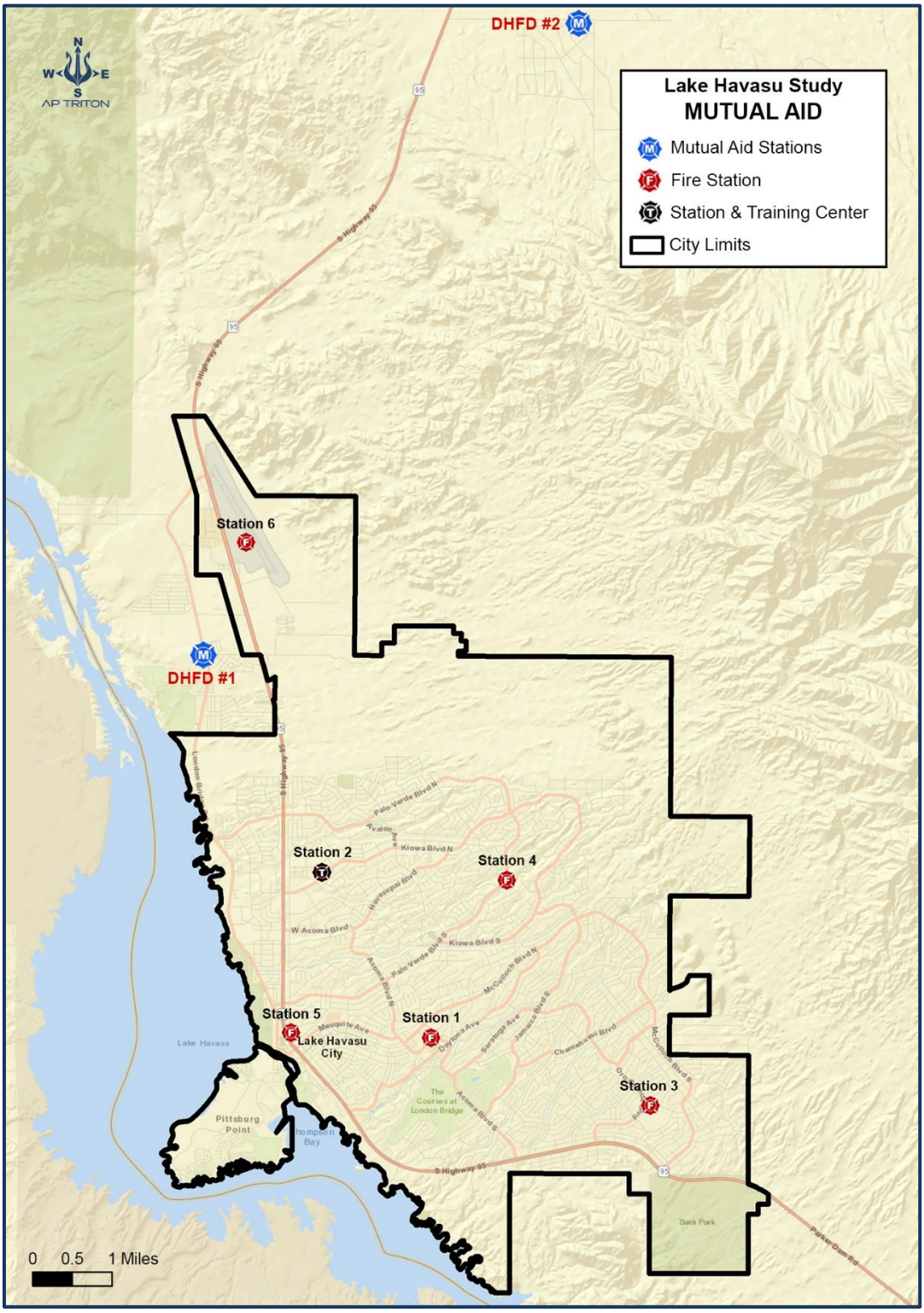
The Lake Havasu City Fire Department has few options regarding mutual aid fire departments that can arrive in the area within a reasonable response time. The Desert Hills Fire Department is the only agency that would be available within 7–15 minutes. The others are approximately 60 miles distant. The following figure lists the departments.

Figure 4: Mutual Aid Resources Available to LHCFD

Agency	Station	Engines	Aerials	Other Units	Staff
Desert Hills FD	#1	1	0	Type 6, tender, UTV	3–4
Desert Hills FD	#2	1	0	Type 3, tender	3
Kingman FD	#21	1	0	Type 6, heavy rescue	3
Kingman FD	#22	1	0	Hazmat, CEP Squad	5
Kingman FD	#23	1	1	—	4
Kingman FD	#24	1	0	—	3
Bullhead City FD	#1	1	0	Type 6, tender, medic	6
Bullhead City FD	#2	1	2	Type 6, fire boat, medic	2–4
Bullhead City FD	#3	1	0	Type 6, medic	2–4
Bullhead City FD	#5	1	0	Medic	2–4
Bullhead City FD	#6	1	0	Rescue, boat, medic	2–4

The following figure shows the locations of the two Desert Hills Fire Department stations.

Fiaure 5: Mutual Aid Fire Stations



Management Elements

This section of the report explores and explains the various organizational management components necessary to effectively and efficiently provide vital life safety services to Lake Havasu City's citizens.

Critical Issues

The Lake Havasu City Fire Department Fire Chief has identified at least six key issues facing LHCFD that should be addressed to ensure the continuation of high-quality, efficient, and responsive emergency services to the community. In addition, the following critical issues were identified and addressed in this study.

- **Critical Issue 1: "We need to analyze and determine adequate administrative and operational staffing levels and future staffing needs and impacts on recruitment, training, and retention."**
  As identified later in this report, LHCFD has several personnel who will soon reach retirement age. In addition, implementing a fire-based ambulance transport program is being considered. These two dynamics require careful assessment of future staffing needs, training and department culture impacts, and budget impacts.

- **Critical Issue 2: "Barriers to accurate data collection and methods to improve data collection, ongoing monitoring, and reporting must be identified."**
  Accurate and comprehensive data collection and analyses are necessary for contemporary fire agencies to objectively assess the effectiveness and efficiency of service delivery. Therefore, the fire department feels they need to do a better job collecting data and continually analyzing and reporting their performance.

- **Critical Issue 3: "Current workflow and budget practices need to be analyzed and streamlined where possible."**
  Some current administrative practices within LHCFD are considered somewhat duplicative and inefficient, leading to errors and extra work. Therefore, LHCFD wants to identify areas for improvement and suggest changes to improve workflow performance.

- **Critical Issue 4: "We need to assess the feasibility, cost, and, if justified, a deployment model for a fire-based ambulance transport program."**
  Fire agencies across the United States provide high-quality, responsive, cost-effective ambulance transport services as part of their emergency response mission. Given that LHCFD already provides BLS and ALS medical first-response service, they feel that providing continuity of care to the emergency room may be a more cost-effective and high-quality approach to treating and transporting patients.

- **Critical Issue 5: "The methods and processes for short and long-term fire department planning need to be determined."**
  Short, mid, and long-term planning is vital to ensuring the health and stability of any fire service organization. However, LHCFD has not conducted a comprehensive strategic planning process for several years and is looking for guidance and suggestions on the best approach to these processes, including key internal and external stakeholders.

- **Critical Issue 6: "Identify the need for future fire stations, potential locations, and timelines based on population growth and service demands."**
  City needs to determine if any existing fire stations should be relocated and the need for additional future fire stations.

Mission, Vision, & Values

An organization must have a plan with established goals, objectives, and metrics to measure effectiveness or achievement. As noted previously, LHCFD has the following established mission statement published in the department's annual report:

> *The Lake Havasu City Fire Department will safely protect life, property, and the environment by providing professional, efficient, and cost-effective services.*

Additionally, the Lake Havasu City Fire Department has adopted the following vision and values statements:

Vision Statements

Through innovative, ongoing, and progressive training, education, and resources, we will strive to be:

- An organization driven to provide a safe, cost-effective, and efficient fire department while honoring our values, mission, and professionalism to achieve our goals.
- Committed and accountable to those we serve.
- Role models in our community and leaders in our profession.

Value Statements

- *Customer Service:* Every customer contact will serve as an opportunity to improve the situation in a professional manner.
- *Job Performance:* We will respond to all requests for assistance safely, promptly, and efficiently.
- *Communications:* Communications will be clear, concise, courteous, and easy to understand.
- *Accountability:* We are accountable for our actions and how they affect others.
- *Leadership:* Our leadership style will be progressive, consistent, and adaptable by using accurate information to make appropriate decisions.

Mission, Vision, Values, Goals, and Objective statements are typically created during a formal strategic planning process, which results in the creation and formal adoption of a written strategic plan. This process often includes the following components:

- Internal and external environmental scan ("SWOT Analysis").
- Mission, vision, and values statements.
- Initiatives, goals, and subordinate objectives with performance metrics or outcome statements.
- Timelines are assigned to each objective.
- Initiative manager assigned to each.
- Responsible persons assigned to coordinate the achievement of each objective.

The strategic plan establishes timelines for the goals and objectives to be accomplished and assigns them to appropriate personnel to complete. A strategic plan prioritizes the goals and objectives, and timelines are created to establish a realistic and achievable workflow.

Personnel are then assigned to manage progress to achieve each objective and be accountable for their progress. All work and department activities should support the mission, propel the agency toward its vision, and reinforce the values of the personnel working in the organization.

Triton noted that LHCFD previously created strategic plans, with the most recent planning effort conducted in 2014. This planning process, facilitated by a third-party vendor, involved a small number of uniformed personnel from the various divisions, who created 20 "action items" or goals to achieve over the next five years. Each action item was broken into implementation steps, with an overall completion timeline goal. This plan was used for internal planning purposes only.

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 lost, or at the very least, severely damaged, leading to reliance on informal communication channels that spread false or misleading information.

Specific to internal communications, Triton noted that the Fire Chief conducts monthly administrative and operations staff meetings and annual "all-hands" State of the Department meetings. A quarterly newsletter is distributed to all employees. The Chief maintains an open-door policy for direct engagement with staff while maintaining appropriate Chain of Command protocols. All employees have access to email.

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

Lake Havasu City maintains the fire department's web page, including timely news, links to important fire code forms and information, safety information, interesting department facts, LHCFD's Mission and Values, and Emergency Preparedness information. The fire department does not maintain its own Twitter® or Facebook® accounts. However, a cursory review of each revealed that LHCFD activities are infrequently posted. The City's Twitter® account has slightly over 2,900 followers, and the Facebook page has over 11,000 followers. Lake Havasu City also maintains other social media accounts, including Pinterest,® LinkedIn,® YouTube,® and Instagram.®

Communications Discussion

Ensuring effective communication with external stakeholders often poses a challenge among many fire departments. This can be exacerbated by a lack of administrative resources, restrictive communications policies, and lack of understanding of the pressures exerted by the public for the immediate dissemination of information by public agencies during high visibility incidents. Additionally, communication gaps can lead to misunderstandings, a lack of trust (internally and externally), and lack of support for fire department programs and needs.

While LHCFD's current assignment for routine social media communications and engagement appears suitable for occasional community engagement, its social media presence through the existing City's resources should be bolstered to increase the frequency and level of engagement with the public via various social media channels.

Specifically, policies and procedures should be put in place—in close coordination with the Lake Havasu City administration—to allow for designated operations staff to rapidly disseminate important safety and incident information and respond quickly to public questions and concerns. This is the current reality in public safety agency communications, and should be exploited to the greatest extent possible.

Regulatory Documents, Recordkeeping, & Equipment Testing

Detailed documentation, secure archiving, and regularly reporting activities are critical functions in any government organization. In addition, sound management decisions require accurate data collection, analysis, and organizational public transparency. The Lake Havasu City Fire Department is transitioning to a third-party policy compliance company (Lexipol®) for creating and maintaining policies and procedures.

LHCFD has a sound process for document control. Hard copy employee records are secured by lock and key in file cabinets and electronically password-protected. Employee medical and health records are stored separately and redundantly secured. Stations are secured only by key locks. However, Lake Havasu City is currently evaluating conversion to electronic locks in various facilities and the installation of cameras.

Documentation & Compliance Testing

LHCFD uses the ImageTrend® records management system (RMS) to document fire and EMS incidents. In addition, mandated annual equipment testing, including ladder and hose testing, is contracted to third-party vendors, who provide detailed test results to the fire department.

Pump testing is conducted by LHCFD personnel. However, a third-party company will begin performing this testing within the next year. SCBA compressor/air storage testing is performed by an outside contractor. Atmospheric monitor calibration is performed in-house by LHCD's HazMat Team, and records of calibration results are maintained.

Staffing & Personnel Management

The next section of this report entails the various elements that involve fire department staffing, personnel management, and scheduling of operations staff.

Personnel Management

Policies, Rules, Regulations, & Guidelines

LHCFD employees are subject to the City's policies and internal fire department policies and procedures as a standalone municipal department. New employees are provided with a policy and procedure orientation and policies upon hire. These policies were only reviewed as needed, and old policies were archived. However, LHCFD will transition to *Lexipol*®—a web-based policy maintenance service—in the Fiscal Year 2022/23. The intent is to ensure that policies are contemporary and meet legal requirements.

A cursory review of LHCFD administrative and operational policies showed that they are periodically reviewed and revised as necessary. All new or revised policies, including those potentially impacting employee working conditions, are posted for review for a minimum of 14 days before implementation. In addition, identified issues with proposed policies may be discussed and resolved in labor/management committee meetings as necessary and desired.

Job Descriptions

As noted in this report, LHCFD comprises fire service positions commonly found in similar-sized fire departments. The Human Capital Management Department (HCMD) maintains online job descriptions for the following positions: Firefighter, Firefighter/Paramedic, Fire Engineer/Paramedic, Fire Engineer, Fire Inspector, Fire Prevention Officer, Fire Captain/Paramedic, Fire Captain, Battalion Chief, Deputy Fire Chief, and Fire Chief. In addition, there are non-uniformed administrative support positions, including Management Analyst, Administrative Specialist, Service Aide, and Management Specialist.

Compensation & Firefighter Association MOU

While the city is in a beautiful recreation area, which attracts businesses, residents, and employees to the area, LHCFD's ability to attract, hire and retain employees is influenced by the compensation and benefits packages offered. This is especially important in jurisdictions where the cost of living is greater than most cities and towns in Arizona and throughout the country.

The City has a formal agreement—known as a Memorandum of Understanding (MOU)—with the Lake Havasu City Firefighters Association, International Association of Fire Fighters (IAFF) Local 2974. The MOU defines the formal relationship and communication pathways between the Department and Association, certain shift-related scheduling and leave usage rules, discipline investigation processes, and leave usage rules, to name a few.

Lake Havasu City reviews current compensation structures, market competitiveness, and compensation philosophies periodically. These internal and external comparisons of equitable positions and workloads ensure that the agency can attract and maintain an effective workforce.

LHCFD's compensation review process is outlined in Article 8 of the MOU. The article mandates a biennial salary survey of at least three uniformed fire department positions determined by the Association.

Disciplinary Process

Under the existing organizational configuration, personnel-related decisions are made at different levels. In consultation and coordination with the City's Human Capital Management Department, the Fire Chief can hire, discharge, and promote, consistent with City policy and the MOU. Discipline can be issued at several levels of the organization based on the severity of the infraction. LHC Operating Policies and Procedures OPP 3.12: Corrective Action along with LHCFD Administrative Policy 1-209: Investigative and Disciplinary Procedures defines the general regulations, procedures, and infraction examples that govern the application of discipline.

Before implementation, HCMD must review and approve all significant disciplines, as personnel-related decisions can subject an organization to potentially extensive liability exposure.

Counseling Services

Firefighters often encounter extremely stressful and horrific situations. The nature of these emergent situations puts firefighters at risk of developing Post-Traumatic Stress Disorder (PTSD), which requires readily accessible professional support systems that genuinely understand an employee's circumstances and provide expert guidance. The Craig Tiger Act affords first responders in Arizona up to 36 licensed counseling visits per qualifying incident with the licensed mental health professional of their choice, paid for by the employer at rates set by the Industrial Commission of Arizona.

Lake Havasu City uses a third-party vendor (Uprise Health®) to provide City employees with an umbrella Employee Assistance Program (EAP). In addition, LHCFD has a Peer Support Team comprised of department members of all ranks, to provide critical incident peer counseling, defusing, and debriefings to employees who experienced abnormally high stress from emergencies.

Application, Recruitment, & Retention Processes

Lake Havasu City periodically publishes Firefighter and Firefighter/Paramedic operations positions on its website, social media, and job bulletin board. In addition, efforts are underway to bolster and expand the recruitment process through targeted "geofencing" and branding. The application, testing, and hiring process is administered jointly between LHCFD and HCMD.

The HR department performs minimum qualification, background, and reference checks. The City contracts with the National Testing Network® (NTN) to administer a written test and complete the Candidate Physical Ability Test® (CPAT). NTN's testing process must have been completed (written passing score of at least 70%) within 12 months of posting the job to be eligible for hire.

The minimum qualifications for testing include:

- Minimum of 18 years of age.
- High school diploma or GED.
- Graduate of a firefighting academy or equivalent combination of education and experience.
- Current Arizona EMT-Basic or National Registry EMT certification (Current Paramedic certification required for Firefighter/Paramedic applicants).

Possessing Firefighter I and Firefighter II certifications issued by a recognized state or federal training entity are desired additional requirements. However, LHCFD may hire a candidate without these certifications who must complete a fire academy training program within an agreed-upon timeframe.

In addition, Firefighter/Paramedic candidates who possess only a National Registry EMT-Paramedic certification must obtain their Arizona Paramedic certification within six months of hire.

Upon completing the written testing process, CPAT, and the oral interview process, candidates are placed on an eligibility list for up to two years. Once an opening occurs, the hiring list is forwarded to LHCFD for candidate selection. When the desired candidate is offered conditional employment, they must complete a background check, reference check, and a detailed medical examination based on the National Fire Protection Association Standard 1582: *Standard on Comprehensive Occupational Medical Program for Fire Departments.*

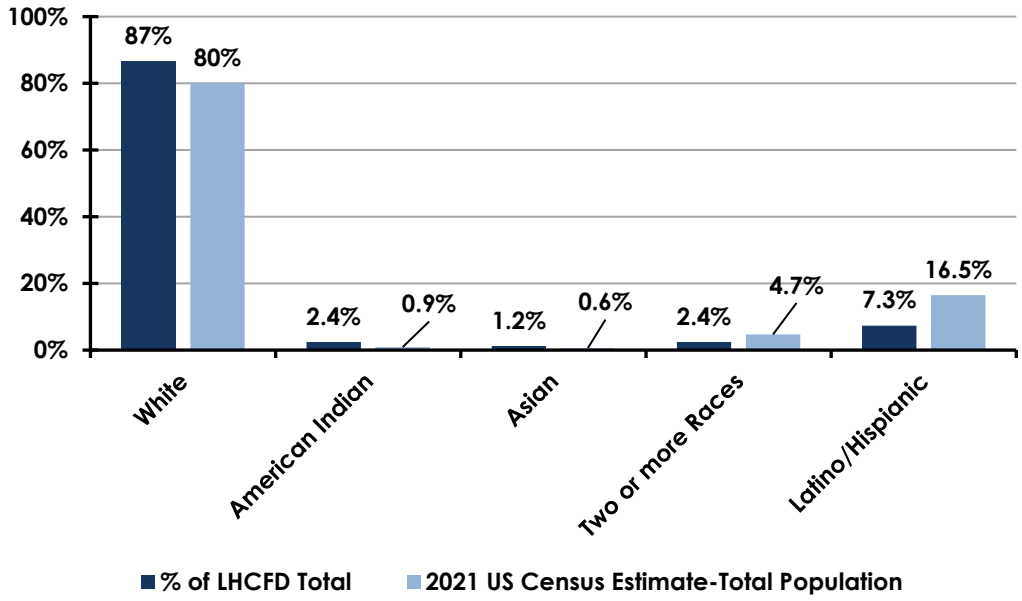
Hiring & Testing Process Discussion

The CPAT program, created jointly by the International Association of Fire Fighters (IAFF) and the International Association of Fire Chiefs (IAFC) in the late 1990s, has been scientifically and legally vetted and is considered the standard for fairly assessing a candidate's physical abilities to perform basic fireground tasks.

Triton's review of the LHCFD testing and hiring process was found to be contemporary and consistent with industry best practices. In addition, contracting with an outside agency for the expert administration of the written and physical agility testing process can limit liability exposure for the department, as previously described.

Triton noted that LHCFD has no uniformed female personnel. This compelled an analysis of the department's current diversity. The following figure summarizes the racial diversity of LHCFD's current uniformed employees and compares it to current U.S. Census Bureau estimates as of July 2021.

Figure 6: LHCFD Diversity Comparison (2021)



As shown in the preceding figure, most uniformed employees are white, slightly above Lake Havasu City's U.S. Census estimate. However, Latino/Hispanic employees reflect less than one-half of the estimated percentage of the Latino/Hispanic population in the community.

Except for gender, the preceding figure reveals only slight differences in diversity between Lake Havasu City's population and Lake Havasu City Fire Department employees. The fire service has historically had difficulty attracting females and minorities to apply for Firefighter positions. In highlighting this issue, one author offered the following perspective:

> *It's no secret that fire departments in many cities don't much resemble the communities they serve. In areas that have a high concentration of poverty, many fire departments are comprised primarily of members who live outside of the jurisdictions they serve and don't have a vested interest in the municipalities where they work. And as the number of fires has declined over recent decades, so has many fire department's community involvement. In most large cities, many residents no have interactions with members of the fire service only when they dial 911, typically for a medical emergency.*[4]

The author also noted that focused efforts to conduct community outreach targeting minority populations could successfully attract them to apply for Firefighter positions. Outreach techniques include hosting open houses at fire stations in minority neighborhoods and performing targeted recruitment drives, including helping interested citizens apply for the positions. In addition, Triton noted that the current Fire Chief appears well-versed in the issues surrounding diversity in fire department hiring practices and previously performed applied research on this topic for the U.S. Fire Administration's National Fire Academy.

LHCFD and the City participate in various community job recruitment and training programs to increase interest in pursuing a fire service career, including a fire service career technical education program with Lake Havasu High School, and a Fire/EMS preceptorship/apprentice program in partnership with Mohave Community College and the State's workforce development network ARIZONA@WORK. The department also has a ride-along program for those interested in learning more about a fire service career. However, according to department representatives, these programs have not resulted in increased interest by females or minority groups in applying for firefighter positions.

Due to planned retirements, the LHCFD anticipates a significant turnover rate in the near future, the City and its fire department should closely examine their recruitment practices and identify barriers and opportunities to motivate and compel females and minorities to seek a fire service career.

Performance Reviews & Promotional Processes

The Lake Havasu City Fire Department administers annual performance reviews for full-time, probationary, and rank-transitioning employees. Immediate supervisors are responsible for conducting and documenting the job performance of their assigned personnel. The review process is graded and recorded using the Human Resource Department's in-house electronic program that all city departments use. According to the Department, the process works well compared to the previous method.

Promotional testing is completed on an as-needed basis to establish eligibility lists for the following positions: Battalion Chief, Captain, and Engineer. As noted in the following figure, a multi-step process is used to establish each position's eligibility list weighting score.

Figure 7: Weighting Score by Position

Position	Written Test (Overall Weighting)	Oral Interview (Overall Weighting)	Assessment Center (Overall Weighting)
BC, Captain, Engineer	30%	30%	40%

Promotional candidates for each position must pass with a minimum score of 70% for each testing component to be eligible for the promotion. Third-party contractors administer the written test and assessment center. The assessment center components for the Battalion Chief and Captain positions typically include a tactical simulation, employee/organizational problem simulation, and a written exercise.

The Engineer examination includes a practical evaluation of the candidate's ability to operate fire apparatus and accurately solve mechanical and fireground issues.

According to the department, recent attrition has required administering various promotional examinations approximately every other year to ensure qualified candidates are available for promotion.

The performance evaluation and promotional processes used appear contemporary and should be considered best practices within the fire service. However, Triton noted that supervisors may not have received adequate initial or periodic updated training on assessing and fairly documenting employee performance.

Health & Safety

NFPA 1500: *Standard on Fire Department Occupational Safety & Health Program* is the industry standard for developing and administering a fire department safety program. At the time of this report, LHCFD has a formal labor/management safety committee. Establishing, empowering, and advocating a safety committee can improve employee workplace safety.

Administration & Operations Staffing

The following section explores LHCFD's current staffing levels and administrative functions, evaluates them against best business practices and national standards, and makes recommendations where appropriate at the end of this report.

Administrative & Support Staffing

Typical responsibilities of fire department administration and support staff include planning, organizing, directing, coordinating, and evaluating the various programs within the department. For example, this list of functions and other functions may be necessary depending on local conditions and the environment. It is also important to understand that these functions may occur concurrently, requiring the Fire Chief and administrative support staff to balance work in many different areas simultaneously.

The next figure lists the current administrative and support staff of LHCFD.

Figure 8: LHCFD Administrative & Support Staffing (2022)

Position Title	Number of Positions	Hours Worked/Week	Work Schedule
Fire Chief	1	40	Monday–Friday
Deputy Chief	2[A]	40	Monday–Friday
EMS Battalion Chief	1	40	Monday–Friday
Training Battalion Chief	1	40	Monday–Friday
Fire Inspector	1	40	Monday–Friday
Fire Prevention Officer	1[B]	40	Monday–Friday
Management Analyst	1	40	Monday–Friday
Administrative Specialist	2	40	Monday–Friday
Management Specialist	1	40	Monday–Friday
Public Education Specialist	1	40	Monday–Friday
Clerical Aide	2	Part-Time	Monday–Friday
Service Aide	1	Part-Time	Monday–Friday
Fire Pre-Plan Volunteer	Vacant	—	Vacant
Total Administrative Staff:	**15**		

[A]Fire Prevention Deputy Chief also performs construction plan reviews.

[B]Fire Prevention Officer also performs fire investigations.

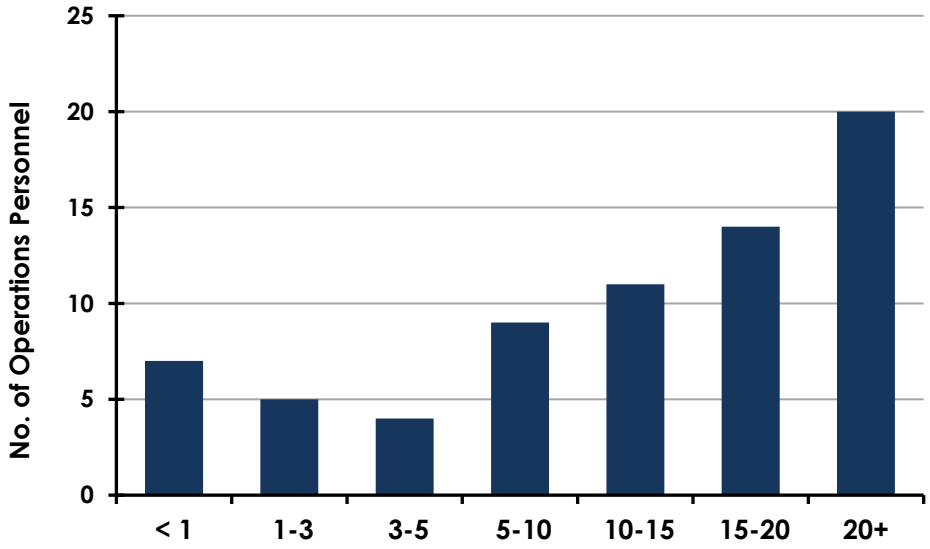
The preceding figure lists those individuals considered full-time or part-time staff primarily assigned to manage, plan, or support the activities of LHCFD and its programs.

The current administrative and support staffing level represents about 17% of LHCFD's total staffing. While there is no standard for the ratio of administrative staff to operations staff, LHCFD appears to be consistent with other fire departments, where effective and efficient administrations can range up to 15% or more. However, it is important to note that administrative support needs can vary depending on the services provided.

Years of Service

The seniority of LHCFD personnel was identified as a significant concern for the department, which anticipates significant future turnover due to retirements. Therefore, the current seniority of uniformed personnel was analyzed and shown in the following figure.

Figure 9: Personnel Seniority (2022)



The preceding figure shows that almost 50% of LHCFD personnel have at least 15 years of service, and 29% have over 20 years. In addition, nine of these employees are currently enrolled in Arizona's Deferred Retirement Option Plan (DROP), which requires participants to declare their retirement date. In return, Arizona pays out a one-time lump sum payment and a monthly benefit at the time of retirement.

These nine retirements are spread over the next 4–6 years, with the last person leaving by December 2028. This could significantly impact LHCFD's budget, training program, and promotional processes—not to mention the invaluable loss of experience and institutional knowledge. Therefore, the replacement of these personnel must be strategically planned for and budgeted over the next few years.

Administration

Current fire department administrative and operational responsibilities lie with the Fire Chief and two Deputy Chiefs. Typical responsibilities and duties of the Fire Chief include planning, organizing, directing, and budgeting for all aspects of the department's operations and serving as one of the City's senior management team members. In addition, a Fire Prevention Deputy Chief oversees fire prevention, fire code enforcement, public education programs, and serves on the City's Special Event Committee, and the Operations Deputy Chief oversees fire and EMS operations and training programs.

Support Services

A Management Specialist and Service Aide oversee the Support Services Division, which provides emergency and non-emergency support to the Operations Division. Additionally, the Support Services Division coordinates and purchases all departmental supplies, equipment, uniforms, and safety apparel. Support Services keeps track of all equipment and supplies owned by the department.

Community Emergency Response Team

The Lake Havasu City Community Emergency Response Team (CERT) is directed and operates solely at the discretion of LHCFD. The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as first aid, triage implementation, fire safety, light search and rescue, and team organization. CERT members who completed the training will staff a Fire Department Rehab Vehicle and respond to major incidents to assist the department. CERT also staffs first-aid stations at special events.

Fire Prevention & Life-Safety

LHCFD's Fire Prevention Division has seven employees who deliver the department's fire prevention, code enforcement, and life-safety public education programs. These activities typically include new construction plans review, fire inspections of existing commercial occupancies, fire hazard reduction programs, public education, and fire cause determination and investigations.

A Deputy Chief is responsible for overseeing the activities of the Fire Prevention Division staff, and also performs construction plan reviews, and a non-uniformed Fire Inspector performs field fire inspections. The division is administratively supported by an Administrative Specialist and two part-time Clerical Office Aides. A full-time Public Education Specialist oversees and delivers the department's various public safety and fire prevention programs. A Fire Prevention Officer performs fire inspections and conducts fire investigations. A volunteer position that periodically created and revised pre-fire plan reviews has been unfilled for the last two years, and pre-planning is now managed by a shift Captain.

Training

A Battalion Chief assigned to administration serves as LHCFD's Training Chief, responsible for all fire and special operations and the training program's design, coordination, activities, and evaluations. This includes the work activities of the civilian Administrative Specialist and other uniformed personnel with specialized knowledge and skills, who deliver training to Operations assigned personnel.

Operations Staffing

The following figure summarizes the budgeted LHCFD operations staff positions. This includes individuals considered full-time employees who are primarily assigned to provide emergency services at the operational level.

Figure 10: LHCFD Total Budgeted Operations Staff (2022)

Position Title	No. of Budgeted Positions	Hours Worked/Week	Work Schedule
Battalion Chief	3	56	48 on/96 off
Captain-Captain/Paramedic	18	56	48 on/96 off
Engineer-Engineer/Paramedic	18	56	48 on/96 off
Firefighter/Paramedic	18	56	48 on/96 off
Firefighter/EMT	12	56	48 on/96 off
Probationary FF/Paramedic	2	56	48 on/96 off
Firefighter Paramedic Trainee[A]	2	56	48 on/96 off
Total Operations Staff (FTEs):	**73**	**56**	48 on/96 off

[A]Position will transition to Firefighter/Paramedic upon completion of the Paramedic Program.

Triton noted that at the time of this study, the Lake Havasu City Fire Department had received approval to apply for funding for an additional 11 firefighter positions through the federal *Staffing for Adequate Fire & Emergency Response* (SAFER) Grant program.

Operations Division Scheduling

LHCFD utilizes a traditional three-platoon system operating on two consecutive 24-hour shift rotations per position. Per the Memorandum of Understanding with the Firefighters Association, fire operations personnel work 56 hours per week, averaged over a 14-day Fair Labor Standards Act (FLSA) defined work period.

This work schedule within the 14-day defined FLSA work period results in regularly scheduled overtime pay for all regular hours worked over 106 hours. For this study, Triton refers to this as "scheduled overtime."

The Operations Division operates with a Captain assigned to manage each fire station on each shift, who serves as the company officer on the assigned apparatus. LHCFD also uses promoted apparatus Engineers who are responsible for all aspects of maintaining and operating fire apparatus. Minimal staffing per station is at least one company officer, one Engineer, and one Firefighter/EMT or Firefighter/Paramedic. Currently, 24 personnel are assigned to two shifts and 25 on the third shift. However, minimum shift staffing is reduced to 21 when necessary to provide paid time off (PTO) leave coverage.

Operations Staff Scheduling Methodology

The total number of positions allocated to LHCFD is ultimately a policy decision by City leadership and management. Maintaining a minimum staffing level of 24 hours daily requires personnel to be available to backfill for scheduled vacation leaves and unscheduled sick leaves to maintain the minimum staffing level.

Providing this backfill is typically done by hiring off-duty personnel back on overtime or scheduling additional personnel on a shift to provide the necessary relief coverage. Determining the theoretical number of employees necessary to provide adequate relief coverage is often described as a "staffing relief factor."

Shift Rotation & FLSA Work Period

Full-time LHCFD Operations assigned firefighter personnel work an average 56-hour workweek, and the regular work schedule is exempt from overtime pay until more than 106 hours are worked within the defined 14-day work period, per the rules and regulations outlined in the Fair Labor Standards Act Section 207(k). This section applies to government employees with law enforcement or fire suppression responsibilities as a significant part of their job duties.

Operations personnel in fire departments across the United States work various schedules, typically in 24-hour blocks. Extremely busy metro departments, primarily on the East Coast, may work a split shift, such as a 10-hour and 14-hour shift, to provide 24-hour daily coverage while reducing fatigue. However, this shift schedule requires more employees.

The 24-hour shift, followed by at least 24 hours off duty, remains the predominant schedule for fire departments in the Southwestern and Western United States. However, some departments have transitioned to a 48-hour on, 96-hour off shift schedule, citing research suggesting longer periods of off duty time allows for full restoration of healthy sleep patterns and reduces work commuting. LHCFD has been working the 48-hour on, 96-hour off work schedule since 2006.

Triton noted that there is no LHCFD residency or proximity requirement for operations personnel and assumes some shift firefighters live some distance away from the city due to the overall cost of housing in the area.

One comparative analysis of the 24-hour and 48-hour schedules suggested the work/rest ratio was the same between the two schedules.[5] The author noted the benefits of increased relaxation and family engagement afforded by the 96-hour off-duty time and suggested this results in a better rested and healthier employee. However, she also cautioned that employees might be at risk for excessive fatigue in the second half of the shift if their sleep was significantly disrupted during the first shift. 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 long 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.[6]

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 fatigue issue among EMS providers and identify strategies to address the issue within the EMS environment. However, they clearly expressed their expert opinion that poor sleep and fatigue threaten the safety of EMS workers and their patients.

FLSA Work Period Analysis

As previously mentioned, the FLSA defines the maximum number of hours an employee with fire suppression responsibilities may work within a defined work period without receiving additional hourly compensation at one and one-half times their regular pay rate. In addition, because fire departments have varying schedules, as previously described, the FLSA established various hourly defined workweek thresholds.

The following figure outlines these thresholds for each workweek period.

Figure 11: Workweek Thresholds

Number of Days in FLSA Work Period	Maximum Regular Hours Worked
7	53
8	61
9	68
10	76
11	83
12	91
13	98
14	106
15	114
16	121
17	129
18	136
18	144
20	151
21	159
22	167
23	174
24	182
25	189
26	197
27	204
28	212

The City has established a 14-day FLSA work period for shift-assigned personnel and is required to pay overtime for all hours worked over the 106-hour threshold. Therefore, Triton analyzed the 2022 shift schedule through the first pay period of 2023 for both the 14-day FLSA work period and a 28-day work period, with an overtime threshold of 212 hours.

The 28-day work periods from January 2022 extending to January 2023 resulted in approximately 93 hours less overtime expense per employee when compared to the 14-day periods within the same timeframe. A similar analysis performed by the department of the FY 2022–2023 shift schedule showed approximately 89 hours difference per employee between the two FLSA work periods.

It is important to mention that the FLSA created the 40-hour workweek overtime exemption for fire and law enforcement officers because of the cost incurred by public safety agencies and governments related to providing 24/7 emergency response coverage. As such, the FLSA established that firefighters working a shift schedule do not have to be paid overtime for regular hours worked until they work more than 53 hours in a work week, as noted in the preceding figure.

It is Triton's experience that fire departments that established a 56-hour average work schedule typically have a lower base hourly rate that compensates for the scheduled overtime payment requirement. As a result, the overall cost of compensation may be comparable with similar regional or national fire agencies. However, other fire departments take a different approach and lower the average weekly hours and then calculate average annual hours worked by providing additional shifts off throughout the year in what is commonly called "Kelly Days." While this reduces the scheduled overtime cost, the cost is often offset by hiring additional employees to cover the shift vacancies.

The FLSA law only requires overtime pay for firefighters after they have *physically worked* in excess of the maximum standard hours for the adopted work period. For example, during the defined 14-day FLSA work period, the FLSA will require firefighters to receive FLSA overtime pay for all hours over 106 every 14 days. Firefighters working a shift schedule who utilize PTO leave hours during a 14-day work period may not be entitled to any FLSA overtime for working additional hours outside their normal schedule. FLSA overtime eligibility depends on the hours worked in the particular work period, not the firefighter's schedule.[7]

Triton understands that the City considers sick leave as hours worked under FLSA. In addition, the City's practice of combining all leaves into a common PTO bank results in all PTO leave (scheduled and unscheduled) time being considered hours worked within the defined FLSA work period. Practically speaking, this means that employees who are off on vacation are considered to be at work for the purpose of accruing regularly scheduled overtime hours during the 14-day work period.

One way to potentially reduce overtime cost or banked PTO time payout is by separating the PTO time into sick leave and vacation leave banks. This would eliminate the accrual of PTO time when employees are considered "off work" when using accrued vacation hours.

The rules related to the allocation and use of PTO are outlined in City policy and the Firefighters Association MOU.

Daily staffing needs are managed by the on-duty Battalion Chief, who creates the schedule in the web-based program Kronos® Telestaff.™ According to the department, once the daily schedule is created, the staffing data is stored in the program and downloaded into a spreadsheet, where regular and overtime hours codes are manually applied. This spreadsheet is then exported and entered into the City's payroll system. This process appears onerous and inefficient and likely introduces opportunities for payroll errors and the inability to track work and leave hours accurately.

Except for emergencies or forced holdovers to maintain minimum staffing, employees are prohibited from working more than 72 consecutive hours of regular time, overtime, or shift exchanges (substitute work), without at least 12 hours off duty to rest.

Operations Staff Relief Analysis

In evaluating the level and availability of LHCFD operations staff, the department's deployment and leave usage history were analyzed. This included comparing the minimum number of employees required to be on shift, the current total number of operations employees in the organization, and the historical average amount of leave used by these employees.

This information was then used to determine how many personnel the department *theoretically* needs to maintain the minimum number of operations positions daily. This is commonly referred to as a "Staffing Relief Factor" (SRF). The following schedule components and leave usage history were used to determine the theoretical minimum number of personnel needed to fill the minimum 21 daily staffing positions. Note that 2022 leave usage data provided by the City through its payroll software program only included the first three quarters of 2022. An average of these three-quarters was used to calculate a 2022 full-year estimate.

Figure 12: Elements used to Calculate the LHCFD Staffing Relief Factor (2020–2022)

Source: Lake Havasu City's Oracle Time & Attendance Reports

Shift Schedule	Annual Hours	Average Workweek	Average Unscheduled[A]	Average Scheduled[A]	Average Other Leaves[B]
48 on/96 off	2,912	56 hours	64.1 hours	309.8 hours	102.6 hours

[A]PTO leave per employee. Based on 72 Operations assigned FTEs. [B]Includes industrial injuries, STD, FMLA, Bereavement, Military, and other leaves.

Based on the preceding parameters, Triton calculated a Staffing Relief Factor (SRF) of 1.25. The SRF was then multiplied by three to determine the theoretical total number of personnel required for each 24-hour operations position. Based on the historical average leave usage, each position requires 3.75 FTEs, as shown in the following figure.

Figure 13: LHCFD Relief Factor Calculations

Description	Results
Relief Factor	**1.25**
Current Minimum Operations Positions Required per Shift	21
Calculated Theoretical Number of Required Personnel per Shift	26.25
Calculated Overage/Shortage of Personnel per shift	**-1.91**
Calculated Total Overage/Shortage of Personnel	**-5.755**

This SRF calculation does not consider the physical operations aspect of assigning staff where needed the most nor the unequal distribution of personnel across shifts, imbalanced leave usage, or long-term vacancies between the three shifts.

Operations Staffing Level Discussion

Triton understands that 73 personnel currently assigned to operations are spread across the three shifts to fill the 21 minimally staffed positions 24 hours daily. However, these positions are not equally distributed across the three shifts, resulting in one shift having one "extra" firefighter who could be used to provide scheduled and unscheduled leave coverage.

Using the staffing relief factor calculated previously, LHCFD theoretically does not have enough uniformed FTE firefighters to staff the 21 fire operations positions 24 hours daily. However, the department recently acquired approval and funding for 11 new positions through a Staffing for Adequate Fire & Emergency Response Grant, which is five more than what is theoretically required. However, the hiring and training process time for new employees can take up to a year or more to complete, and given the anticipated turnover due to upcoming retirements, these positions should help offset staffing shortages in the short term.

Furthermore, if an additional unit(s) are added, these employees could be moved to staff the units. Using the historical SRF, Triton calculated that 7.50 new firefighters would be needed for staffing a full-time two-person ambulance, and 11.25 firefighters would be needed for a full-time three-person engine company. Of course, these numbers are not divisible by three or are whole firefighters. Therefore, reducing or increasing personnel to 6 or 12 would increase or decrease the theoretical potential overtime exposure necessary to ensure minimum staffing levels.

Unique Scheduling Constraints & Overtime Coverage Discussion

LHCFD Standard Operating Procedure 1-201 *Staffing* requires three "classified officers" to be maintained when five stations are staffed, and four officers shall be maintained when six stations are operational. This, along with the lack of available qualified relief personnel on each shift, likely results in increased Captain overtime coverage.

Attempts to confirm this and other issues potentially related to excessive overtime through analysis of historical overtime coverage hours provided by the department proved problematic. As a result, LHCFD's current method of documenting overtime leave coverage involves assigning correct multiple pay codes and manually documenting the hours within the department's scheduling software and the City's payroll system.

However, an internal analysis by the City identified inconsistencies between the two databases in how overtime hours are being tracked, resulting in a lack of confidence in providing historical overtime coverage for Triton's analysis.

In discussions with LHCFD, the vast number of overtime tracking codes and the transfer of information from the internal department scheduling program into the City's payroll system were identified as potential failure points for accurate overtime hours tracking. Therefore, the City's Payroll Manager and LHCFD's administration should jointly address these issues.

Paid Time Off Usage

Fire Departments studied by Triton typically have different leave accrual rates. Some separate vacation and sick leave accruals and have different accrual rates and maximum hours caps. As previously noted, the City lumps together accrued leave time as Paid Time Off (PTO).

As summarized in the following figure, the LHCD PTO accrual rates and leave accrual rates from other comparable Arizona fire departments that responded to AP Triton's email request for information are summarized in the following figure. Some of the respondents only listed their accrual rates by pay period. For comparison purposes, these numbers were multiplied by 26, which is the number of bi-weekly pay periods in 2022.

Figure 14: Annual PTO Leave Time Accrual Rates

Years of Service	LHCFD Hours	Avondale FD Hours	Maricopa FD Hours	Northwest Fire Hours	Prescott FD Hours	Yuma FD Hours	Buckeye FD Hours
1	**196.30**	391.92	336.00	263.00	224.22	190.34	269.08
2	**196.30**	391.92	336.00	263.00	224.22	190.34	269.08
3	**229.84**	420.00	392.00	263.00	252.18	190.34	291.48
4	**229.84**	420.00	392.00	263.00	252.18	190.34	291.48
5	**252.46**	420.00	448.00	312.00	280.13	190.34	313.88
6	**263.64**	453.28	448.00	312.00	308.08	337.22	313.88
7	**263.64**	453.28	448.00	312.00	308.08	337.22	313.88
8	**263.64**	453.28	448.00	312.00	308.08	337.22	313.88
9	**274.82**	453.28	448.00	335.92	336.04	337.22	313.88
10	**274.82**	453.28	504.00	335.92	336.04	348.86	336.28
11	**286.00**	486.82	504.00	335.92	336.04	348.86	336.28
12	**286.00**	486.82	504.00	335.92	336.04	348.86	336.28
13	**297.18**	486.82	504.00	335.92	336.04	348.86	336.28
14	**297.18**	486.82	504.00	335.92	336.04	348.86	336.28
15	**308.36**	509.44	560.00	360.10	336.04	372.16	392.28
16	**319.54**	509.44	560.00	360.10	336.04	372.16	392.28
17	**330.72**	509.44	560.00	360.10	336.04	372.16	392.28
18	**341.90**	509.44	560.00	360.10	336.04	372.16	392.28
19	**353.08**	509.44	560.00	360.10	336.04	372.16	392.28
20	**364.26**	509.44	560.00	384.02	336.04	395.46	392.28
21	**420.42**	509.44	560.00	384.02	336.04	395.46	392.28
22	**420.42**	509.44	560.00	384.02	336.04	395.46	392.28
23	**420.42**	509.44	560.00	384.02	336.04	395.46	392.28
24	**420.42**	509.44	560.00	384.02	336.04	395.46	392.28
25+	**476.32**	509.44	560.00	384.02	336.04	395.46	392.28

[A] Includes Sick, Vacation, and PTO Leave banks

Comparative analysis shows that LHCFD has more incremental steps for leave accrual hours than the respondent fire departments. The accrual hours are approximately 22% behind the respondents over the first 16 years and is only 0.6% behind the respondents from 20 years or more of service.

Uniformed shift personnel can "bank" up to 672 hours of unused PTO, which can be cashed out at their current pay rate when they terminate employment. Additionally, per department policy, employees can trade shifts and PTO shifts with supervisor approval.

PTO scheduling and parameters for use are addressed in LHCFD Standard Operating Procedure 1-201 and the MOU. Shift personnel can request by seniority up to 168 hours of scheduled PTO in April and May for the following fiscal year. However, scheduling and using the previous year's PTO accrual is not required. Up to four personnel can be scheduled off on PTO each shift, except for days restricted by the department due to the anticipated increased workload. These include Memorial Day, Fourth of July, and Labor Day. The policy also allows the donation of PTO between employees essentially without restriction. Triton noted that donated hours taken also count as hours worked by the employee who uses the donated hours.

In addition, personnel can request PTO for sickness or vacation by using the same scheduling parameters and notice requirements. The reasons for the PTO usage are not tracked separately via detail code and staffing software. Unused non-medical/sick PTO may be requested throughout the year, as long as it is submitted by 10:00 a.m. 48 hours prior to the start of the shift of the PTO date requested.

Additionally, up to five personnel may be scheduled off on PTO on 21 calendar days per calendar year. These dates are selected by the Firefighters Association President and posted at least two months before the end of the calendar year.

PTO Scheduling & Use Discussion

Balancing shift assignments and leave usage is an art as much as science, and fire departments often assess leave usage and personnel availability across the shifts and may move personnel from one shift to the next to reduce potential overtime impacts, consistent with collective bargaining agreements or MOUs.

Triton noted that LHCFD's PTO leave bank does not differentiate between sick leave and vacation leave hours—either accrued or used. Many fire departments studied by Triton accrue and track vacation and sick leave separately and have separate policies and procedures governing their scheduling and use. Furthermore, vacation shifts are often chosen, typically based primarily on seniority, months in advance, allowing the departments to anticipate better, plan, and monitor staffing needs and leave usage throughout the year.

Triton suspected that the current classified officer staffing requirements of ensuring at least three or four classified officers are on duty 24 hours daily may exacerbate an inequitable allocation of unscheduled overtime to Captains. However, an analysis of FY 2021–2022 payroll records related to call-back overtime hours revealed that the distribution of call-back hours was reasonably proportional, with Captains having approximately 32% of the call-back hours, Engineers having approximately 28% of the call-back hours, and Firefighters having approximately 35% of the total call-back hours. In addition, it was noted that LHCFD requires all Engineers to be Officer qualified and can assign them to an Acting Captain role to maintain minimum staffing. However, Firefighters are not currently allowed to fill an Acting Captain position, even if they are Engineer-qualified and have completed a company officer course.

The cost of adding employees to ensure adequate staffing versus simply paying current employees overtime to provide relief coverage must be carefully balanced due to the additional cost of employee benefits, which for LHCFD averaged approximately 72% or more of total Operations assigned employee salaries. This additional cost is not factored into overtime expenses, potentially making overtime expenditures more cost-effective.

However, suppose the total number of available employees is significantly diminished, requiring a substantially higher use of overtime backfill to meet minimum daily staffing levels, including the use of mandatory overtime, where an off-going firefighter is required to work additional hours due to an inability to find off-duty replacement personnel. These situations may result in employee "burnout" and the inability to meet minimum daily staffing requirements. This may be especially acute when crews work a 48/96 schedule.

Financial Analysis

Historical Financial Overview

Lake Havasu City operates on a fiscal year from July 1 through June 30. As a government entity, the City uses the fund accounting method to record revenues and expenditures. This methodology recognizes all receipts as revenue and all expenditures as expenses—regardless of the typical accounting characterization. For example, loan proceeds and repayment would be treated as revenues and expenditures.

Comprehensive financial policies are necessary to safeguard the resources of any business but more so for public entities using taxpayer funds. Accordingly, the City has developed a set of financial policies designed to protect its resources.

The annual budget is the City's planning tool and includes all proposed expenditures and the source of funds to finance them. In addition, contingency funds are built into the annual budget to provide for unanticipated expenditures of emergency events. The result of its planning efforts is the financial ratings assigned to the General Obligation Bonds of the City, AA-/Aa3 by Standard & Poor's Rating Group and Moody's Investor Services, respectively. The City has received the Government Financial Officers Association (GFOA) Certificate of Achievement for Excellence in Financial Reporting for its Annual Comprehensive Financial Report each year since 1986.

The City utilizes numerous funds to record its transactions, with the General Fund being the City's chief operating fund and is utilized to record revenues not specifically identified or allocated to designated functions. Lake Havasu City uses three funds in its governmental funds group: the General Fund, a Special Revenue Fund, and a Capital Improvement Projects Fund. This study will focus on the General Fund activities and those funds specific to fire protection and Emergency Medical Services.

For analysis and presentation of the finances of Lake Havasu City and the Lake Havasu City Fire Department, Triton classifies revenues and expenses as either recurring or non-recurring, with those identified as recurring being expected items on an annual basis and can be quantifiable. Non-recurring items, conversely, are items not expected on an annual basis or are not easily quantifiable.

Examples of recurring revenues are property and sales taxes, other taxes such as business, utility users, franchise taxes, and licenses and permits. Non-recurring revenues include loan and lease proceeds, grant revenues, insurance proceeds, and investment earnings. Recurring expenses include salaries and benefits, office expenses, repairs and maintenance, fuel, utilities, and technology costs. Non-recurring expenditures include capital acquisitions, debt retirement, and transfers to other funds.

The local economy endured the COVID-19 pandemic very well, and restrictions in the surrounding states of California and Nevada were stricter, resulting in more temporary and long-term visitors. This significantly increased vacation rentals and hotel occupancies and drove sales tax revenue growth by $1,300,000. In addition, sales taxes from online marketplace sales increased by $839,000.

Sales tax revenue is the largest contributor to the General Fund. Transaction Privilege Tax collections increased approximately 25% between Fiscal Year (FY) 2020 and FY 2021. In addition, the hotel/motel tax increased 115%, and the restaurant and bar 1-cent tax increased 38% between FY 2020 and FY 2021. Included in this increase was a one-time payment from Arizona Cares of approximately $7,000,000.

Property tax assessed values have not rebounded to the level of values before the 2011 recession but have increased since 2012. Primary property values were $786 million in 2021—an increase of 10% over 2020 and $802 million in 2022—an increase of another 6%. The City is statutorily restricted to setting its primary property tax rate to only increase property tax revenues by 2% annually plus tax revenues created by new construction.

General fund expenditures include costs related to various departments of the City, including general government, fire department, police department, recreation, tourism, and transportation. Non-recurring expenditures are debt service and transfers to other funds.

General Fund reserve balances are critical to a governmental entity's ability to weather an economic downturn or have a significant emergency expenditure. Lake Havasu City has a reserve balance exceeding 65% of annual recurring expenses, a robust amount compared to other jurisdictions. The City has established a Budget Stabilization Reserve policy requiring a balance of 50% of the average of five year's expenditures. Funds in excess of these 50% amounts are unencumbered and available resources for other expenditures.

General Fund reserve balances are critical to a governmental entity's ability to weather an economic downturn or have a significant emergency expenditure. Lake Havasu City has a reserve balance exceeding 65% of annual recurring expenses, a robust amount compared to other jurisdictions.

The next figure is a historical review of the General Fund revenues, expenditures, and fund balances of the General Fund of Lake Havasu City.

Figure 15: Lake Havasu City General Fund Historical Revenues & Expenditures[8]

Revenue/Expenses	FY 16–17 Actual	FY 17–18 Actual	FY 18–19 Actual	FY 19–20 Actual	FY 20–21 Actual
Sales tax	21,750,919	25,583,147	25,600,426	28,509,382	35,735,174
Property tax	4,318,694	4,436,925	4,663,797	4,960,238	5,228,217
Franchise tax	2,017,919	1,915,660	1,920,789	1,899,083	2,073,506
Total Tax Revenue:	**28,087,532**	**31,935,732**	**32,185,012**	**35,368,703**	**43,036,897**
Intergovernmental revenue	15,229,136	15,811,588	16,222,587	16,552,424	26,235,964
Fines & forfeitures	1,325,656	1,233,252	1,379,444	1,264,447	1,477,270
Licenses & permits	2,109,402	2,631,312	2,523,596	2,610,734	3,225,243
Charges for service	1,228,056	1,257,008	1,262,243	940,297	797,245
Rents & royalties	85,969	100,130	95,269	112,110	106,195
Contributions & donations	108,386	59,144	33,781	31,202	173,949
Investment earnings	111,095	138,987	993,642	1,106,995	101,325
Other	295,756	182,055	226,149	195,626	441,454
Total Recurring Revenue:	**48,580,988**	**53,349,208**	**54,921,723**	**58,182,538**	**75,595,542**
Transfers In	1,717,237	1,675,422	1,545,784	1,532,078	508,744
Long-term debt proceeds	11,048,653	12,614,000	—	—	881,502
Non-recurring Income:	**12,765,890**	**14,289,422**	**1,545,784**	**1,532,078**	**1,390,246**
TOTAL REVENUE:	**61,346,878**	**67,638,630**	**56,467,507**	**59,714,616**	**76,985,788**
General government	15,257,873	15,812,082	15,202,192	13,771,227	14,124,078
Police	14,949,730	15,348,063	15,402,486	15,049,217	17,009,174
Fire	12,029,045	12,147,909	12,734,531	12,919,568	14,055,854
Recreation	3,287,776	4,069,418	3,043,090	5,430,346	5,570,806
Tourism promotion	2,011,849	2,263,539	2,438,028	2,405,167	2,867,170
Transportation	259,255	289,066	287,125	255,892	802,445
Total Recurring Expenses:	**47,795,528**	**49,930,077**	**49,107,452**	**49,831,417**	**54,429,527**
Transfers out	1,855,011	5,460,188	2,041,030	2,243,574	3,515,197
Principal retirement	2,195,944	9,217,626	7,543,000	6,331,000	74,874
Interest on debt	102,137	266,211	156,484	11,765	19,396
Issuance costs	164,174	111,070	—	—	—
Non-recurring Expenditures:	**4,317,266**	**15,055,095**	**9,740,514**	**8,586,339**	**3,609,467**
TOTAL EXPENDITURES:	**52,112,794**	**64,985,172**	**58,847,966**	**58,417,756**	**58,038,994**
Net Increase (Decrease):	9,234,084	2,653,458	(2,380,459)	1,296,860	18,946,794
Beginning Fund Balance	29,636,641	38,870,725	41,524,183	39,143,724	40,440,584
Ending Fund Balance	**38,870,725**	**41,524,183**	**39,143,724**	**40,440,584**	**59,387,378**

Financial Overview of the Lake Havasu City Fire Department

The fire department operates as a component of the General Fund. There are several divisions at LHCFD: Administration, Suppression, Fire Prevention, and Support Services. The following figure is a summary, by division, of the annual expenditures of the Lake Havasu City Fire Department for the past five years.

Figure 16: Operating Expenses by Division of the LHCFD

Expenses	FY 16–17 Actual	FY 17–18 Actual	FY 18–19 Actual	FY 19–20 Actual	FY 20–21 Actual
Administration	658,326	648,873	612,822	565,620	544,962
Suppression	10,046,127	10,455,118	13,965,374	13,774,363	11,812,755
Fire Prevention	388,618	397,158	465,282	488,380	536,051
Support Services	935,979	798,846	860,400	1,215,813	1,622,602
LHCFD Total:	**12,029,050**	**12,299,995**	**15,903,878**	**16,044,176**	**14,516,370**

LHCFD's General Fund expenses are offset by revenues generated from services billed to the businesses and residents of the City, false alarm charges, public education supply funding, and donations. These funds are minimal but are identified in the following figure.

Figure 17: Historical Revenues Attributable to LHCFD

Revenues	FY 16–17 Actual	FY 17–18 Actual	FY 18–19 Actual	FY 19–20 Actual	FY 20–21 Actual
Fire Department Services	22,011	24,581	10,694	29,969	44,647
False Alarm Charges	150	1,275	2,427	2,652	1,854
Horizon 6 Fire Services	14,648	14,699	15,576	1,455	(70)
Public Education Supplies	—	2,004	1,674		1,333
Donations & Contributions	—	3,285	6,200	22,000	33,477
Public Safety Misc.	—	—	—	—	3
LHCFD Revenues:	**36,809**	**45,844**	**36,571**	**56,076**	**81,243**

The EMS system utilizes American Medical Response as its primary transport provider. LHCFD maintains one medical response unit that may be activated to support AMR. Fire department units are staffed with Paramedics and ALS-level equipment but only provide first responder services to assist AMR.

Other than the issuance of debt and the use of unencumbered funds which may be used for capital needs, there is no formalized funding mechanism in place to provide for apparatus and equipment replacement costs.

Financial Projections

The Lake Havasu City Manager and staff prepare an annual budget and projections for the four succeeding years. The FY 21–22 budget presentation indicates that the economy of Lake Havasu City remains strong, with sales tax revenues increasing more than 20% and property tax assessed values increasing by 6.30%. The City Council has elected to hold the property tax levy rate at the level of the prior fiscal year, providing an additional $263,000 in property tax revenue in the FY 21–22 budget and allowing the City to enjoy an additional property tax revenue capacity of approximately $1.7 million should the City Council choose to increase the levy rate by the legally allowable amount. Pension cost contributions to the Arizona State Retirement System are projected at $10.1 million in FY 21–22; however, the City's unfunded pension and OPEB liability are approximately $105.3 million, required payments of which may negatively impact the significant growth of municipal services. Employee healthcare costs are budgeted to increase by 3.9% in FY 21–22. These projections are summarized and incorporated into this study in the following figure.

Figure 18: Lake Havasu City Financial Projections

Revenues/Expenses	FY 21–22 Budget	FY 22–23	FY 23–24	FY 24–25	FY 25–26
Sales tax—City	26,102,900	26,885,900	27,692,500	28,523,300	29,379,000
Sales tax—R&B and Bed tax	2,954,000	3,042,600	3,133,900	3,227,900	3,324,800
Property tax	5,637,695	5,806,800	5,981,000	6,160,500	6,345,300
Franchise tax	2,184,000	2,227,000	2,272,000	2,317,000	2,364,000
Other taxes	260,000	265,000	270,500	275,900	281,500
Total Tax Revenue:	**37,138,595**	**38,227,300**	**39,349,900**	**40,504,600**	**41,694,600**
Intergovernmental revenue	18,131,770	18,537,300	18,662,100	18,798,400	18,943,800
Fines & forfeitures	1,412,500	1,454,900	1,498,500	1,543,500	1,589,800
Licenses & permits	2,988,041	3,077,700	3,170,000	3,265,200	3,363,000
Recreation	936,600	964,700	993,600	1,023,500	1,054,200
Public safety revenues	285,100	293,600	302,500	311,500	320,900
Transit revenue	10,000	10,500	11,025	11,600	12,200
Investment earnings	23,8183	242,900	247,800	252,800	257,800
Other	1,231,400	238,300	245,500	252,900	260,500
Total Recurring Revenue:	**62,372,189**	**63,047,200**	**64,480,925**	**65,964,000**	**67,496,800**
Grants	10,397,265	—	—	—	—
Non-Recurring Income:	**10,397,265**	—	—	—	—
Total Revenues:	**72,769,454**	**63,047,200**	**64,480,925**	**65,964,000**	**67,496,800**
Recurring expenses	77,497,123	59,824,916	61,302,336	62,120,867	63,753,245
Transfers to other funds	3,916,679	2,550,000	2,315,000	2,170,000	2,205,000
Total Expenditures:	**81,413,802**	**62,374,916**	**63,617,336**	**64,290,867**	**65,958,245**
Increase (Decrease) in Funds	**(8,644,348)**	**672,284**	**863,589**	**1,673,133**	**1,538,555**
Beginning fund balance	59,387,378	50,743,030	51,415,314	52,278,903	53,952,036
Ending fund balance	50,743,030	51,415,314	52,278,903	53,952,036	55,490,591
Budget stabilization reserve	13,871,040	14,415,165	14,932,150	15,481,620	15,901,510
Resources Available:	**36,871,990**	**37,000,149**	**37,346,753**	**38,470,416**	**39,589,081**

The future projections begin with the adopted FY 21–22 budget and are modified based on recent conversations with the Fire Chief. These projections will be considered "conservative" as LHCFD will look at scenarios beginning July 1, 2022. The Fire Chief indicated the department has received approval to hire a Management Analyst in place of an Executive Assistant and two part-time inspectors in the Fire Prevention Division, which has been accomplished. These personnel costs will be added after the base amount in the FY 21-22 budget increases by 3% for a possible COLA increase. However, funding for related costs is not included in the projections. These positions would be instrumental in reducing overtime costs. Salaries are projected to increase by 1.5% annually after that.

The FY 21–22 budget included significant one-time professional services costs for various studies. As a result, the base amount for FY 22–23 has been reduced to $40,200. In addition, utilities are projected to increase 5% in FY 21–22 due to the energy crisis created by the Ukraine invasion. As a result, service and supply costs are projected to increase by 2% annually after the FY 21–22 budget year.

The long-term projections indicate fire department capital expenditures in FY 24–25 and FY 25–26. Fire department debt service is projected to be eliminated in FY 22–23.

Figure 19: Lake Havasu City Fire Department Projected Costs

Expenses	FY 21–22 Budget	FY 22–23	FY 23–24	FY 24–25	FY 25–26
Salaries—Full-time	6,396,081	6,653,050	6,752,846	6,854,139	6,956,951
Salaries—Part-time	35,398	92,056	93,437	94,838	96,261
OT, Holiday, Standby & Shift Differential	1,383,960	1,425,479	1,446,861	1,468,564	1,490,592
Benefits & taxes	5,968,519	6,416,158	6,897,370	7,414,673	7,970,773
Other	55,310	56,969	57,824	58,691	59,572
Total Salaries & Benefits:	**13,839,268**	**14,643,712**	**15,248,338**	**15,890,905**	**16,574,149**
Professional services	145,800	40,200	41,004	41,824	42,661
Utilities	94,000	98,700	100,674	102,687	104,741
Equipment/land leases	1,100	1,100	1,122	1,144	1,167
Repairs & maintenance	295,200	275,000	280,500	286,110	291,832
Meetings, training & travel	57,000	57,000	58,140	59,303	60,489
Supplies	696,365	700,000	714,000	728,280	742,846
Other	59,600	62,000	63,240	64,505	65,795
Total Services & Supplies:	**1,349,065**	**1,234,000**	**1,258,680**	**1,283,854**	**1,309,531**
Total Recurring Expenses:	**15,188,333**	**15,877,712**	**16,507,018**	**17,174,758**	**17,883,679**
Capital outlay	1,404,216	—	—	350,000	4,025,000
Debt service	291,058	291,058	—	—	—
Total Non-Recurring Exp.:	**1,695,274**	**291,058**	**—**	**350,000**	**4,025,000**
Total Expenditures:	**16,883,607**	**16,168,770**	**16,507,018**	**17,524,758**	**21,908,679**

Capital Facilities & Equipment

Trained personnel, apparatus and vehicles, firefighting and emergency medical equipment, and fire stations are the essential capital resources necessary for a fire department to carry out its mission. No matter how competent or numerous the firefighters, if appropriate capital equipment is not available for operations personnel, it would be impossible for the Lake Havasu City Fire Department to perform its responsibilities effectively. The essential capital assets for emergency operations are facilities, apparatus, and other emergency response vehicles. This section of the report assessed LHCFD's fire stations, vehicles, and apparatus.

Fire Station Features

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. Conversely, a poorly located station can mean the difference between confining a fire to a single room and losing the structure or survival from sudden cardiac arrest. Fire stations also need to be designed to adequately house equipment and apparatus and meet the organization's and its personnel's needs.

In gathering information from the Lake Havasu City Fire Department, Triton asked the department to rate the condition of its fire stations using the criteria from the next figure. The results will be seen in each of the figures after that. The information presented in the following pages is intended to provide a cursory overview of the current fire stations.

Figure 20: 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. Building design and construction match the building's purposes. Age is typically less than ten years.
Good	The exterior has a good appearance with minor or no defects. Clean lines, good workflow design, and only minor wear on the building interior. The roof and apparatus apron are in good working order, absent any significant full-thickness cracks, crumbling of the apron surface, or visible roof patches or leaks. Building 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 with potentially 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 multiple repairs. The interior is poorly maintained or shows advanced deterioration with moderate to significant non-structural defects. Problematic age-related maintenance and major defects are evident. It may not be well-suited to its intended purpose. Age is typically greater than 40 years.

LHCFD Fire Stations

The following figures describe the basic features of each of LHCFD's fire stations.

Figure 21: LHCFD Station 1

Address/Physical Location:	96 Acoma Blvd S., Lake Havasu City, AZ 86403

General Description:
This station is over 20 years old and in good condition. Although the facility has a single-fan vent system, it does not have a direct-source exhaust capture and removal system. Turnout gear storage is in a separate room just off the apparatus bays but lacks adequate ventilation.

Structure						
Date of Original Construction	2000 & August 2001					
Seismic Protection	No					
Auxiliary Power	Generator					
General Condition	Good					
Number of Apparatus Bays	Drive-through Bays	2	Back-in Bays	0		
ADA Compliant	Public Areas					
Total Square Footage	10,0000					
Facilities Available						
Sleeping Quarters	6	Bedrooms	10	Beds	0	Dorm Beds
Maximum Staffing Capability	11					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer/Extractor	Yes					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	Decontamination room; no biological disposal					
Security System	No					
Apparatus Exhaust System	Single-fan vent system					

Figure 22: LHCFD Station 2 (and Training Center)

Address/Physical Location:	2065 N Kiowa Blvd., Lake Havasu City, AZ 86403

General Description:
Station 2 is about 27 years old. It is a single-story building that houses a Type 1 engine, reserve ambulance, reserve 100-foot aerial, and hazmat unit. It does not have a direct-source exhaust capture and removal system. The Training Battalion Chief and EMS Battalion Chief maintain offices at this station.

Structure						
Date of Original Construction	1994/1995					
Seismic Protection	Built to local codes					
Auxiliary Power	Generator					
General Condition	Good/Fair					
Number of Apparatus Bays	Drive-through Bays	2	Back-in Bays	0		
ADA Compliant	Yes					
Total Square Footage	11,005					
Facilities Available						
Sleeping Quarters	4	Bedrooms	8	Beds	0	Dorm Beds
Maximum Staffing Capability	8					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer/Extractor	Yes					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	Decontamination room; no biological disposal					
Security System	No					
Apparatus Exhaust System	Single fan vent system					

Training Center at Station 2

Station and training grounds sit on 7.2 acres, with the Training Tower being built in 2006. It includes three burn rooms and is an all-steel and concrete four-story facility that is 4,290 square feet. Live fire, flashover, LPG, TRT, auto extrication, and hazmat props are included.

The following are images of the Training Center located adjacent to Station 2.

Figure 23: LHCFD Training Center at Station 2

Additional Property at Station 2

The Lake Havasu City Fire Department owns a large lot on the southwest side of the Training Center. This could be utilized for future expansion and, for example, provide a logistics and fire fleet maintenance facility location.

Figure 24: LHCFD Station 3

Address/Physical Location:	3620 Buena Vista Ave., Lake Havasu City, AZ 86406

General Description:
Station 3 is an older—although remodeled in 2008—single-story fire station. It has two back-in bays and houses a Type 1 engine, a 110-foot aerial, and a 4 x 4 pickup truck with a Polaris Ranger on a trailer. Unfortunately, it does not have a direct-source exhaust capture and removal system.

Structure						
Date of Original Construction	1973 with a remodel in 2008					
Seismic Protection	Built to local codes					
Auxiliary Power	Generator					
General Condition	Good					
Number of Apparatus Bays	Drive-through Bays	0	Back-in Bays	2		
ADA Compliant	Yes					
Total Square Footage	3,384					
Facilities Available						
Sleeping Quarters	4	Bedrooms	5	Beds	0	Dorm Beds
Maximum Staffing Capability	8					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer/Extractor	Yes					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	No					
Security System	No					
Apparatus Exhaust System	Single fan vent system					

Figure 25: LHCFD Station 4

Address/Physical Location:	3270 Palo Verde Blvd S., Lake Havasu City, AZ 86404

General Description:
This is an older single-story station sitting on a large lot. It has three back-in bays, an additional apparatus outbuilding behind the station that houses the desert rescue response unit, and a Polaris trailer. It houses an engine, rescue, 4 x 4 pickup truck with a Polaris Ranger on a trailer. There is no direct-source exhaust capture system.

Structure						
Date of Original Construction	1978/1979					
Seismic Protection	Built to late 1970's local code					
Auxiliary Power	Generator					
General Condition	Fair/Poor					
Number of Apparatus Bays	Drive-through Bays	0		Back-in Bays	3	
ADA Compliant	No					
Total Square Footage	3,136					
Facilities Available						
Sleeping Quarters	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Staffing Capability	4					
Exercise/Workout Facilities	Doubles as a crew office					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer/Extractor	Washer/dryer; no extractor					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	Decontamination; no biological disposal					
Security System	No					
Apparatus Exhaust System	Single fan vent system					

Figure 26: LHCFD Station 5

Address/Physical Location:	145 N Lake Havasu Ave., Lake Havasu City, AZ 86403

General Description:
Station 5 is a large older single-story station. Two of the back-in bays are located behind the main station building. The kitchen and bathrooms were remodeled over the past few years. A portion of one side of the station is used as a United Way office, which is separate from the station. There is no direct-source exhaust capture and removal system.

Structure						
Date of Original Construction	1968 with an addition built in 1974/1975					
Seismic Protection	Built to 1968 local codes					
Auxiliary Power	Generator					
General Condition	Poor					
Number of Apparatus Bays	Drive-through Bays	1	Back-in Bays	4		
ADA Compliant	No					
Total Square Footage	Building is 10,495, but Fire only occupies 8,000					
Facilities Available						
Sleeping Quarters	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer/Extractor	Washer/dryer; no extractor					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	Decontamination; no biological disposal					
Security System	No					
Apparatus Exhaust System	Single fan vent system					

Figure 27: LHCFD Station 6

Address/Physical Location:	5600 Highway 95 N., Lake Havasu City, AZ 86404

General Description:
Station 6 is a small single-story facility. An engine backs into the bay on the airport terminal side, and the ARFF backs into the bay from the tarmac. The station is configured to house three personnel. An additional bedroom can be configured as needed. This station also serves as the small power tool/chain saw maintenance and repair facility.

Structure						
Date of Original Construction	1994					
Seismic Protection	Built to 1994 local codes					
Auxiliary Power	Generator					
General Condition	Good/Fair					
Number of Apparatus Bays	Drive-through Bays	1		Back-in Bays	0	
ADA Compliant	No					
Total Square Footage	3,740					
Facilities Available						
Sleeping Quarters	3	Bedrooms	3	Beds	0	Dorm Beds
Maximum Staffing Capability	3					
Exercise/Workout Facilities	Minimal					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer/Extractor	Washer/dryer; no extractor					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decon & Biological Disposal	No					
Security System	No					
Apparatus Exhaust System	Single fan vent system					

Summary & Discussion of LHCFD Fire Stations

The following figure summarizes some of the primary features of the six Lake Havasu City Fire Department fire stations.

Figure 28: Summary of LHCFD Fire Station Features

Station	Square Footage	Apparatus Bays	Maximum Staffing	General Condition	Station Age
Station 1	10,000	2	11	Good	21 years
Station 2	11,005	2	8	Fair/Good	27 years
Station 3[A]	3,384	2	8	Good	14 years
Station 4	3,136	3	4	Poor/Fair	43 years
Station 5[B]	8,000	5	4	Poor	54 years
Station 6	3,740	1	3	Fair/Good	28 years
Totals:	**39,265**	**15**	**38**		

[A]Built in 1973; remodeled in 2008. [B]Building is larger, but fire only occupies 8,00 square feet.

As shown, Lake Havasu City fire stations have a combined capacity of 15 apparatus bays with a maximum staffing capacity of 38 personnel. Together, LHCFD's fire stations have an average age of just over 31 years—although some of the older stations have had some remodeling done. None of the fire stations were considered in "Excellent" condition.

Fire Stations Discussion

The preceding overview of the LHCFD fire stations represents a cursory overview of each facility. Lake Havasu City will be conducting a Property Condition Assessment (PCA) of Stations 1, 2, 3, 4, and 6 during FY 22–23, which will include more detailed evaluations. In addition, Station 5 was previously assessed, and the opinion of the architectural firm was that the station was past its useful life—although its life could be extended with significant and costly renovations.

Some common issues found among all or most of the stations were the lack of direct-source exhaust capture and removal systems, no commercial grade exhaust fans in turnout storage rooms, lack of decontamination facilities and biohazard disposal, and limited security systems. Late in the study process, Triton was informed that LHCFD had been awarded an Assistance to Firefighters Grant (AFG) in the amount of $285,200 to purchase source capture exhaust systems.

Apparatus & Vehicles

Apparatus Staffing

When necessary, LHCFD cross-staffs apparatus at Station 1 and maintains at least two staffed apparatus daily along with a Battalion Chief. The other five stations staff at least one apparatus with a minimum of three personnel daily.

Fire apparatus, medic units, and other emergency response vehicles must be sufficiently reliable to transport firefighters and equipment rapidly and safely to an incident scene. In addition, such vehicles must be properly equipped and function appropriately to ensure that the delivery of emergency services is not compromised.

As a part of this study, Triton requested that the Lake Havasu City Fire Department provide a complete inventory of its fleet (suppression apparatus, ambulances, command and support vehicles, specialty units, etc.). For each vehicle listed, LHCFD was asked to self-rate its condition utilizing the criteria described in the next figure.

Figure 29: Criteria Used to Determine Apparatus & Vehicle Condition

Components	Points Assignment Criteria
Age:	One point for every year of chronological age, based on the date the unit was originally placed into service.
Miles/Hours:	One point for every 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).
Condition:	This category considers 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 2 or more times per month on average; while a 1 would be assigned if in the shop on average once every 3 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	Fair (consider replacement)
28 points or higher	Condition IV	Poor (immediate replacement)

As shown in the following figure, LHCFD maintains six frontline Type 1 structural engines, of which all but one (Engine 4) are considered to be in "Poor" condition. In addition, the single ARFF apparatus is also rated as in "Poor" condition. Two Type 1 structural engines (Engines 52 and 53) are maintained in reserve, and both are in "Poor" condition.

The department utilizes one 105-foot aerial considered to be in "Good" condition and two aerial apparatus in "Poor" condition in reserve (Trucks 2 and 3).

LHCFD maintains a large inventory of support vehicles, specialty units, and command and staff cars. The Fire Prevention Division's fleet comprises four Chevrolet Silverado 1500s in "Poor" or "Fair" condition. In addition, the Deputy Fire Chief of Prevention is assigned a 2020 Ford F-150 pickup in "Excellent" condition.

The next figure lists the inventory of LHCFD frontline apparatus and other vehicles utilized in emergency operations.

Figure 30: LHCFD Frontline Apparatus Inventory Vehicle Type (2022)

Unit	Type	Manufacturer	Year	Condition	Features
Engines & Aerial Apparatus					
Engine 1	Type 1	E-One	2006	Poor	1030 gal./1500 gpm
Engine 2	Type 1	Pierce	2014	Poor	750 gal./1500 gpm
Engine 3	Type 1	Pierce	2014	Poor	750 gal./1500 gpm
Engine 4	Type 1	Pierce	2014	Fair	750 gal./1500 gpm
Engine 5	Type 1	Pierce	2014	Poor	750 gal./1500 gpm
Engine 6	Type 1	Pierce	2007	Poor	750 gal./1500 gpm
Truck 1	Quint (105')	Pierce	2014	Good	500 gal./1500 gpm
Medics/Rescues/Other					
Medic 1	Ambulance	Wheeled Coach	2011	Good	
Rescue 3	TRT	Chevrolet	2008	Good	
Rescue 4	TRT	Ford	2002	Fair	
Rescue 42	Rescue	Spartan	2006	Good	
Airport 1	ARFF Engine	E-One	1999	Poor	1640 gal./1500 gpm

Apparatus Discussion

Of LHCFD's six engines, five were rated to be in "Poor" condition and one in "Fair" condition. By 2023, Engine 1 will be 17 years old and Engine 6 will be 16 years of age. The remaining engines are each nine years old. Combined, LHCFD's engines average 12 years of age, while Truck 1 is nine years old and in "Good" condition.

LHCFD has scheduled the refurbishment of one engine in November or December 2022 and another starting in January 2023. The department has ordered one new engine with an estimated delivery date of October 2023.

Frontline Command & Supervisor Vehicles

The following figure lists LHCFD's inventory of command and supervisor vehicles.

Figure 31: LHCFD Frontline Command & Supervisor Vehicle Inventory (2022)

Unit	Assigned To	Manufacturer	Year	Condition
Battalion 1	On-duty Battalion Chief	Chevrolet	2020	Excellent
Fire 50	Fire Chief	Chevrolet	2021	Excellent
Fire 51	Deputy Chief	Chevrolet	2020	Excellent
Fire 56	Training Officer/BC	Chevrolet	2017	Excellent
Fire 59	EMS Battalion Chief	Chevrolet	2007	Poor

As shown in the preceding figure, all but one of the command and supervisor vehicles are in "Excellent" condition.

The next figure lists the LHCFD inventory by fire station assignment. The inventory includes support apparatus and specialty units. In addition, most stations are assigned a pickup truck or side-by-side for use as a station utility vehicle.

Figure 32: LHCFD Inventory of Frontline Apparatus & Other Vehicles by Station

Unit	Type
Station 1	
Engine 1	Type 1
Truck 1	Quint (105')
Medic 1	Ambulance
7098	Express van
7102	Pickup
7120	BC 2 Pickup
Station 2	
Engine 2	Type 1
Support 2	Hazmat
7104	Pickup
Station 3	
Engine 3	Type 1
Rescue 3	TRT
7099	Side-by-side
7106	Pickup
Station 4	
Engine 4	Type 1
Rescue 4	Technical Rescue
Rescue 42	Medium rescue
Rescue 4	TRT vehicle
7108	Side-by-side (TRT)
7103	Pickup
Station 5	
Engine 5	Type 1
Rehab	Step van
7101	Pickup
Station 6	
Engine 6	Type 1
Airport 1	ARFF Engine
7094	Pickup

The Lake Havasu City Fire Department also maintains a Munson Fire Rescue fireboat at the Water Safety Center just off Arizona 95. It is considered to be in "Good" condition.

In addition to its frontline apparatus and vehicles, the Lake Havasu City Fire Department maintains reserve units in its fleet. The following figure is a list of the reserve apparatus.

Figure 33: Inventory of Reserve Apparatus

Unit	Type
Station 1	
Medic 12	Ambulance
Station 2	
Truck 2	Quint
Medic 2	Ambulance
Station 3	
Truck 3	Quint
Station 5	
Engine 52	Engine
Engine 53	Engine

As shown in the preceding figure, it appears that LHCFD maintains an adequate number of engines, aerial apparatus, and ambulances in reserve.

Apparatus Maintenance & Replacement Planning

No piece of mechanical equipment or vehicle can be expected to last indefinitely. As apparatus and vehicles age, repairs become more frequent and complex. Parts may become more difficult to obtain, and downtime for repair and maintenance increases. Since fire protection, EMS, and other emergencies prove critical to a community, downtime is one of the most frequently identified reasons for apparatus replacement.

Because of the expense of fire apparatus and medic units (ambulances), most communities develop replacement plans. To enable such planning, fire departments often turn to the accepted practice of establishing a life cycle for apparatus that results in an anticipated replacement date for each vehicle.

The reality is that it may be best to establish a life-cycle for planning purposes, such as the development of replacement funding for various types of apparatus, yet apply a different method (such as a maintenance and performance review) for determining the actual replacement date, thereby achieving greater cost-effectiveness when possible.

LHCFD Replacement & Refurbishing Program

The Lake Havasu City Fire Department has established a "Fire Apparatus Replacement/Refurbishing Program." The 10-year plan extends from 2021 through 2031 and includes a pilot program for refurbishing at least one or more engines and replacing others through purchasing or leasing. LHCFD is also planning to sell one of its reserve ladder trucks and replace it with an engine.

Economic Theory of Apparatus Replacement

A conceptual model utilized by some fire departments is the *Economic Theory of Vehicle Replacement*. As a vehicle ages, the theory states that the cost of capital diminishes, and its operating costs increase. The combination of these two costs produces a total cost curve. The model suggests that the optimal time to replace any apparatus is when the operating costs begin to exceed the capital costs. This optimal time may not be a fixed point but a range of time.

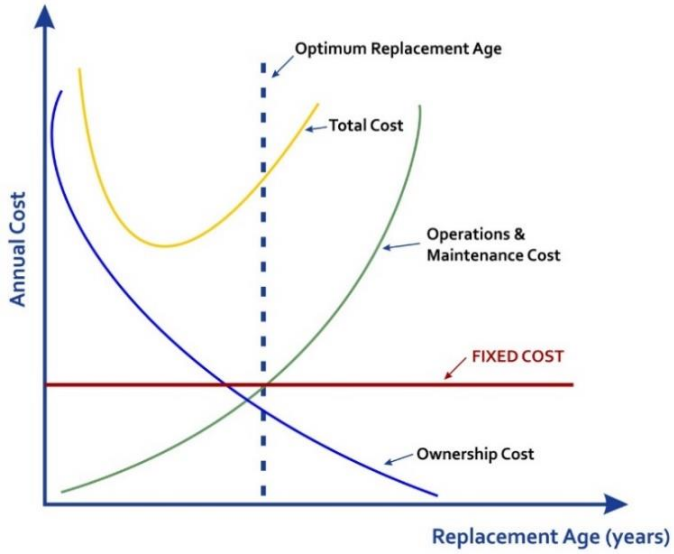
Shortening the replacement cycle to this window allows an apparatus to be replaced at optimal savings to the fire department. However, if an organization does not routinely replace equipment promptly, the overall reduction in replacement spending can quickly increase maintenance and repair expenditures.

Fire officials, who assume that deferring replacement purchases is a good tactic for balancing the budget, need to understand two possible outcomes that may occur because of that decision:

- Costs are transferred from the capital budget to the operating budget.
- Such a deferral may increase overall fleet costs.

The next figure is a representation of the *Economic Theory of Vehicle Replacement*.

Figure 34: Economic Theory of Vehicle Replacement



Regardless of its net effect on current apparatus and vehicle costs, the deferral of replacement purchases unquestionably increases future replacement spending needs. The deferral may also impact operational capabilities, including the safe and efficient use of apparatus.

Future Apparatus Serviceability

An important consideration for fire departments is the cost associated with the future replacement of major equipment. Apparatus service life can readily be predicted based on vehicle type, call volume, age, and maintenance considerations.

NFPA 1901: Standard for Automotive Fire Apparatus recommends that fire apparatus 15 years of age or older be placed into reserve status and that apparatus 25 years or older be replaced.

NFPA 1901 is a general guideline, and it recommends using the following objective criteria in evaluating fire apparatus lifespan:

- Vehicle road mileage.
- Engine operating hours.
- Quality of preventative maintenance program and availability of replacement parts.
- 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.
- Quality of workmanship by the original manufacturer.
- Quality of the components used in the manufacturing process.

It is important to note that age is not the only factor in evaluating serviceability and replacement. Vehicle mileage and pump hours on engines must also be considered. For example, a two-year-old engine with 250,000 miles may need replacement sooner than a 10-year-old one with 2,500 miles.

Triton uses a calculation tool to determine the replacement costs of apparatus. Utilizing the original costs of the vehicles, the following figure applies a 15-year life expectancy for each engine, 20 years for the quint, and 10 years for the medic unit.

Figure 35: LHCFD Estimated Costs & Year to Replace Frontline Apparatus (2022)

Apparatus	Replacement Cost[A]	Current Cash Requirements	Annual Cash Requirements
Engine 1	$850,000	$850,000	N/A
Engine 2	$1,013,112	$540,327	$67,541
Engine 3	$1,013,112	$540,327	$67,541
Engine 4	$1,013,112	$540,327	$67,541
Engine 5	$1,013,112	$540,327	$67,541
Engine 6	$720,000	$720,000	N/A
Medic 1	$607,753	$445,686	$40,517
Truck 1	$1,450,296	$1,088,158	$139,020
Totals:	**$7,680,497**	**$5,265,152**	**$449,701**

[A]Estimated using a 5% inflation rate. [B]Based on typical estimated life expectancy.

It must be emphasized that the dollar amounts in the preceding figure are intended as estimates and for discussion purposes only. The exact costs to replace vehicles and apparatus will depend on the type and configuration of each. Consequently, apparatus costs may be higher or lower than the preceding figure shows. In addition, the poor condition of the engines likely warrants replacement sooner than a 15-year life expectancy.

Apparatus & Vehicle Discussion

The Lake Havasu City Fire Department's frontline fleet of engines and other apparatus appear to be relatively poor. LHCFD's FY 21–22 budget includes a Community Emergency Response Team (CERT) vehicle, two command vehicles, a support vehicle, the refurbishment of one engine, and a new engine.

The fire department has limited access to fleet preventative and routine maintenance by qualified mechanics. LHCFD does not have its own fleet maintenance technicians. Mechanics that maintain fire apparatus and ambulances require specialized emergency vehicle technicians (EVT) training. These qualifications are defined in NFPA 1071: Standard for Emergency Vehicle Technician Professional Qualifications.

Capital Medical & Rescue Equipment

Medical Equipment

The fire department maintains an inventory of 13 Physio-Control Lifepak® 15 cardiac monitor/defibrillators manufactured from 2013 to 2021. All have the same features, including 12-lead capabilities, SpO_2, $etCO^2$, and blood pressure monitoring.

In 2021, the Lake Havasu City Fire Department implemented an annual replacement program for its cardiac monitor/defibrillators. In addition, the requirement for maintaining the cardiac monitor/defibrillators is described in SOG 1-305.7.

Figure 36: LHCFD Lifepak 15 Inventory (2022)

Year Manufactured	Age	Qty.
2013	9 years	6
2015	7 years	2
2019	3 Years	1
2021	1 year	4

In addition to the Lifepak 15s, LHCFD owns five Cardiac Science Powerheart® G5 Automated External Defibrillators (AED).

LHCFD uses three Stryker Power-PRO XT powered ambulance cots and one Stryker MX Pro in its medic units. The Power-PRO XT is a battery-powered hydraulic lift system that raises and lowers the cot at the push of a button.

The department is currently demonstrating two Stryker (formerly Physio-Control) LUCAS 3 chest compression systems. This device delivers automatic high-performance continuous chest compressions in place of manual compressions by EMS providers. A grant is pending to purchase several of the LUCAS 3 devices.

Rescue & Extrication Equipment

LHCFD maintains a broad inventory of extrication equipment assigned primarily to Truck, Rescue 42, and Engines 2, 3, 4, and 5. All equipment was manufactured by Holmatro Rescue Equipment™ and includes gasoline and electric tools (cutters, rams, spreaders, combi-tools, etc.) and an assortment of pneumatic airbags.

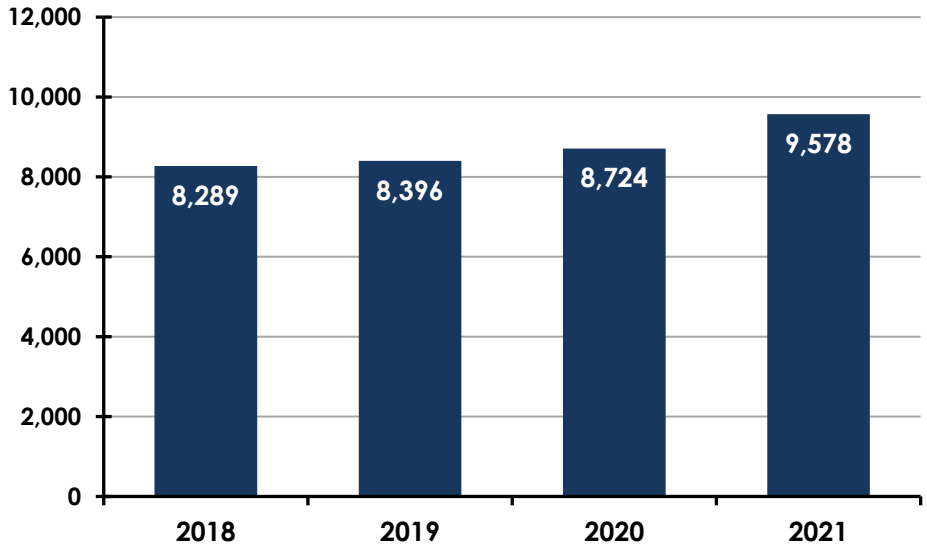
Service Delivery & Performance

Evaluation of how a fire department delivers its services to a community is one of the best ways to determine the organization's effectiveness and efficiency. For this study component, Triton will illustrate and discuss the areas of service demand, distribution, resource reliability, response performance, and the ability of the department to assemble an effective response force.

Service Demand

For departments to be adequately resourced with equipment and personnel, it is necessary to evaluate historical and potential future service demand. In some cases, departments may be over-resourced, resulting in unnecessary inefficiencies. In others, under-resourced departments may see a degradation in service delivery performance. Therefore, this analysis begins by reviewing the historical total service demand, as illustrated in the following figure.

Figure 37: Historical Total Service Demand



The preceding figure shows that the overall service demand for LHCFD has steadily increased over the past four years. It shows a 1.5% incident growth rate during the study period, or approximately a 3.8% average annual growth rate. There was a significant increase in 2021 over the previous years. LHCFD speculates that this was due to the return of tourism following the COVID-19 pandemic.

It is useful to evaluate how this service demand is distributed across various incident types. The following figure illustrates service demand categorized into fires, rescue/medical, and other incident types.

Figure 38: LHCFD Historical Service Demand by NFIRS Type (2018–2021)

Incident Type Description	% of Total*
Medical/Rescues	66%
Service Calls	17%
Good Intent	9%
False Alarms	5%
Fires	2%
Hazmat Calls	1%
All Other Incidents	< 1%

*Percentages rounded to the nearest integer.

As expected, the preceding figure shows that medical and rescue responses are LHCFD's heaviest service demand. This is common for departments that serve as the primary medical first responder in a jurisdiction. The next figure shows the historical service demand by LHCFD's frontline apparatus.

Figure 39: Historical Unit Responses by LHCFD Apparatus (2018–2021)

Apparatus	Quantity	% of Total*
Truck/Engine 1	8,951	19%
Engine 2	6,816	15%
Engine 3	7,802	17%
Engine 4	6,724	15%
Engine 5	8,456	18%
Engine 6	1,560	3%
AR1/Medic 1	5,862	13%
Totals:	**46,172**	**100%**

*Percentages rounded to the nearest integer.

As noted in the preceding figure, Engines 3, 5, and Truck/Engine 1 had the highest service demand volumes from 2018 through 2021. The next figure shows the historical service demand by each of the LHCFD fire stations. It must be noted that these totals do not include mutual aid or automatic aid response zone areas outside the city.

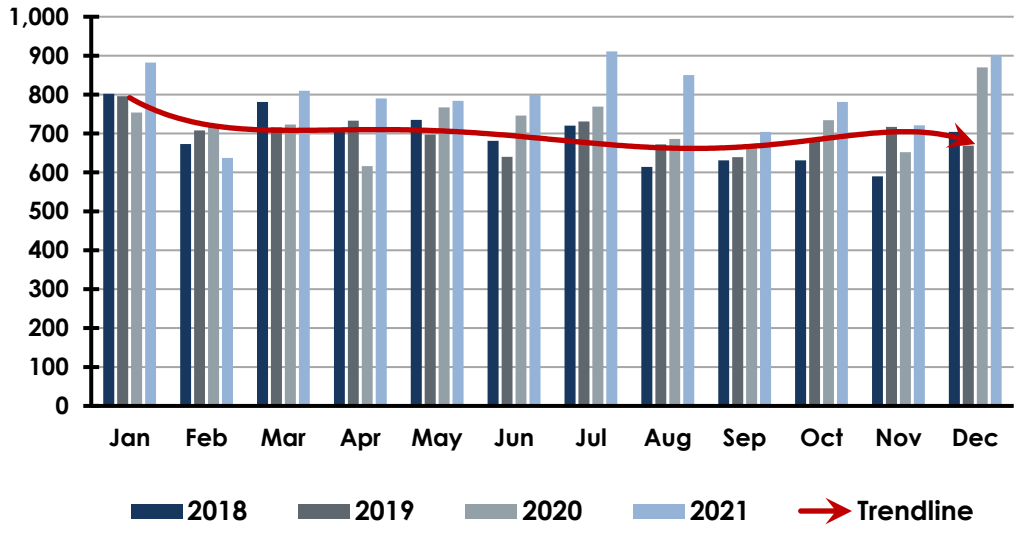
Figure 40: LHCFD Service Demand by Fire Station (2018–2021)

Station	2018	2019	2020	2021	Totals	% Total
Station 1	1,897	1,773	1,991	2,269	**7,930**	**23%**
Station 2	1,215	1,209	1,388	1,360	**5,172**	**15%**
Station 3	1,960	2,000	1,999	2,193	**8,152**	**23%**
Station 4	1,245	1,283	1,390	1,599	**5,517**	**16%**
Station 5	1,805	1,944	1,789	1,959	**7,497**	**22%**
Station 6	102	126	113	133	**474**	**1%**
Totals:	**8,224**	**8,335**	**8,670**	**9,513**	**34,742**	**100%**

Temporal Analysis

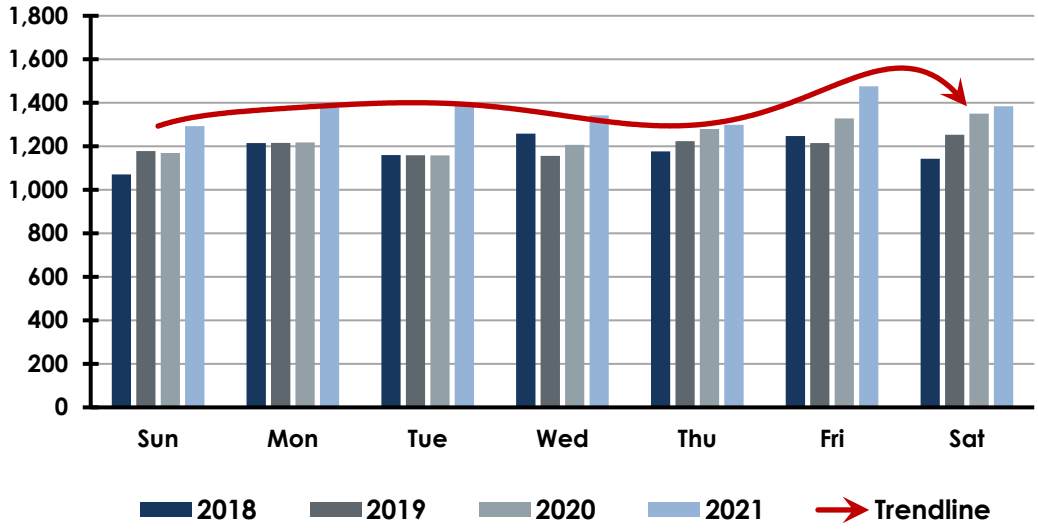
It is also useful to evaluate when service demand is higher or lower so resources can be more effectively deployed. The following three figures illustrate how overall service demand is distributed by month, day, and hour of the day.

Figure 41: Total Service Demand by Month



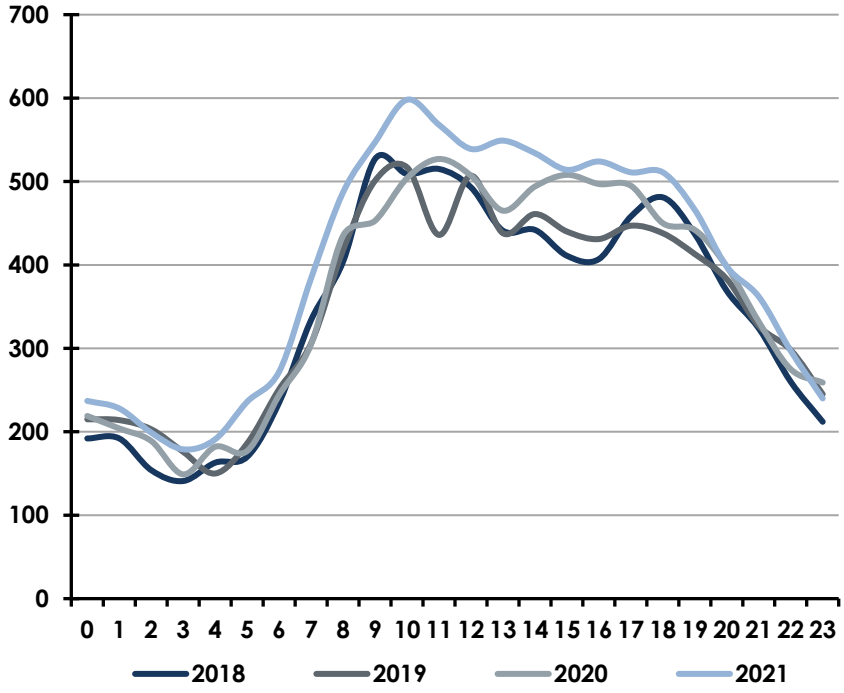
Based on the preceding analysis, January is the busiest month of the year. However, July and December proved the busiest months in 2021.

Figure 42: Total Service Demand by Day of Week



For the Lake Havasu City Fire Department, Mondays were statistically the busiest day of the week; however, Fridays and Saturdays have shown to be busier in the last couple of years.

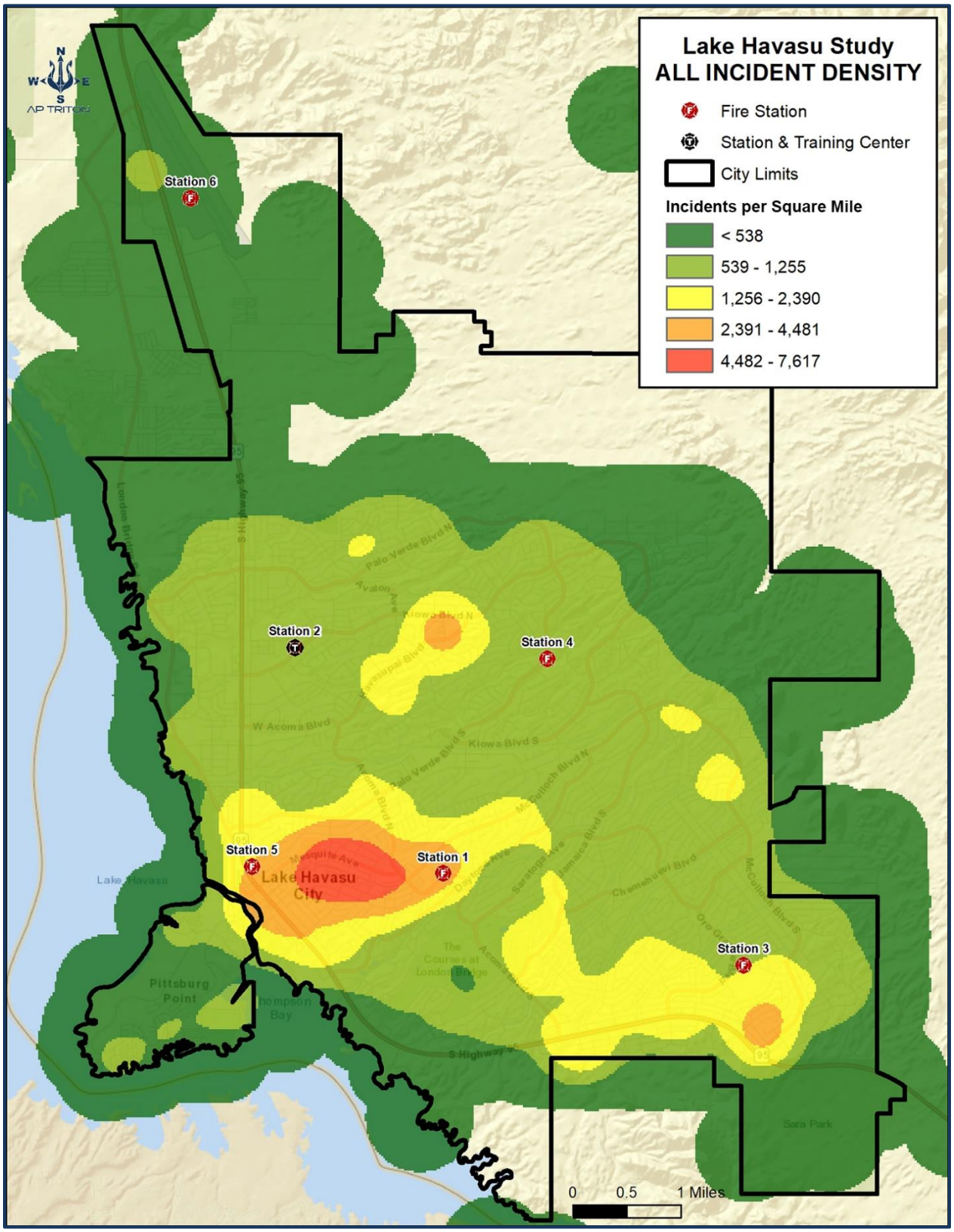
Figure 43: Total Service Demand by Hour of Day



As is expected for an emergency services organization, service demand for LHCFD begins to increase between 7:00 a.m. and 8:00 a.m., peaking mid-morning, before declining into the evening hours after 7:00 p.m.

In addition to numerical service demand, it is also important to view this demand geographically to ensure resources are placed appropriately to respond most efficiently and effectively. For example, the following figure illustrates total service demand over the past four years and is read much like a weather map in that the higher intensity colors (orange and red) indicate a higher concentration of incidents.

Figure 44: Service Demand Density—All Call Types (2018–2021)



The following figure illustrates where fires occurred throughout the City over the past four years, followed by an illustration of structure fires only during that same period.

Figure 45: Fire Density (2018–2021)

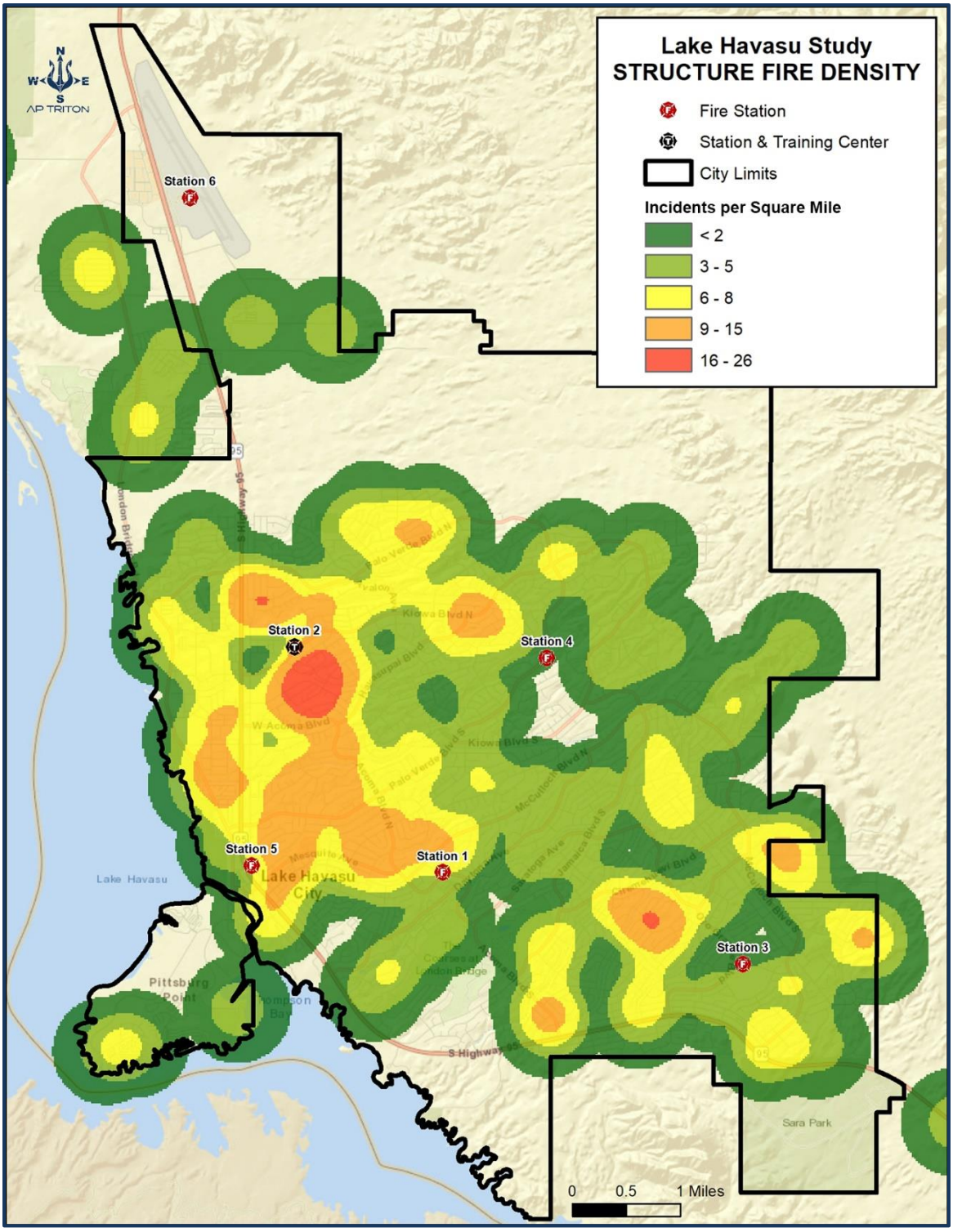
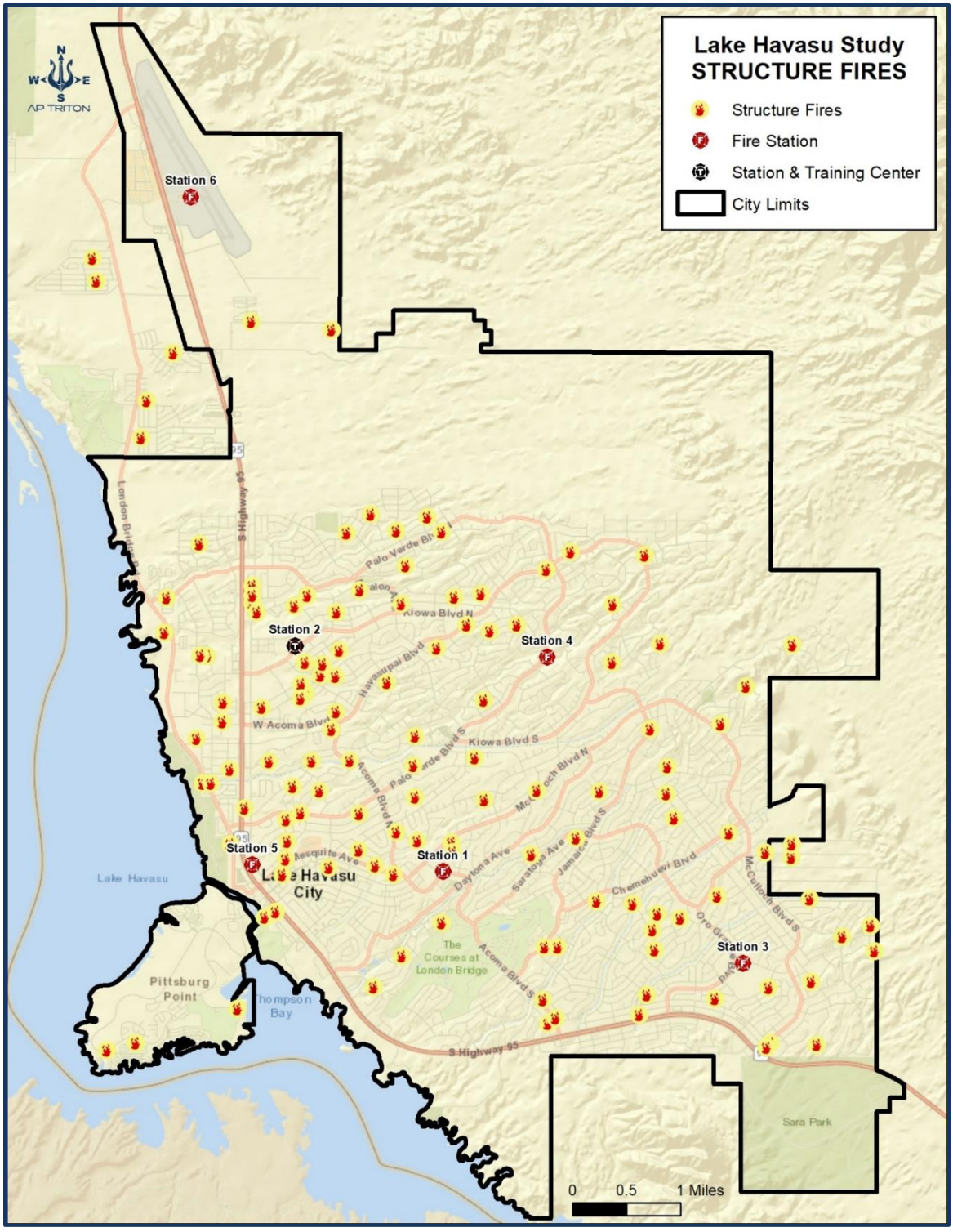


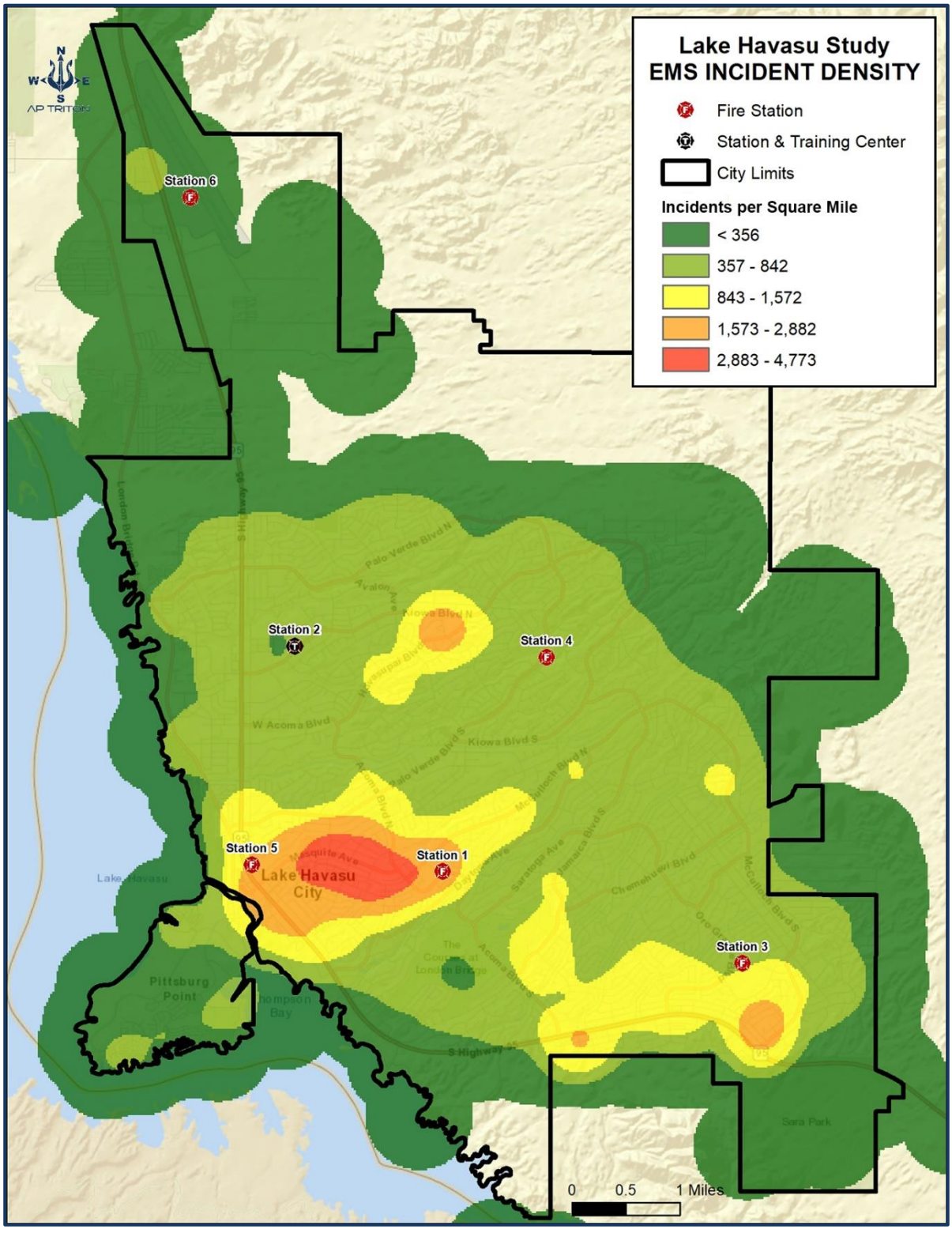
Figure 46: Structure Fires (2018–2021)



Although stations were initially placed based on the quickest response to fires across the City to reduce property loss, most of LHCFD's service demand is medical.

The following figure illustrates EMS demand over the past four years.

Figure 47: EMS Incident Density (2018–2021)



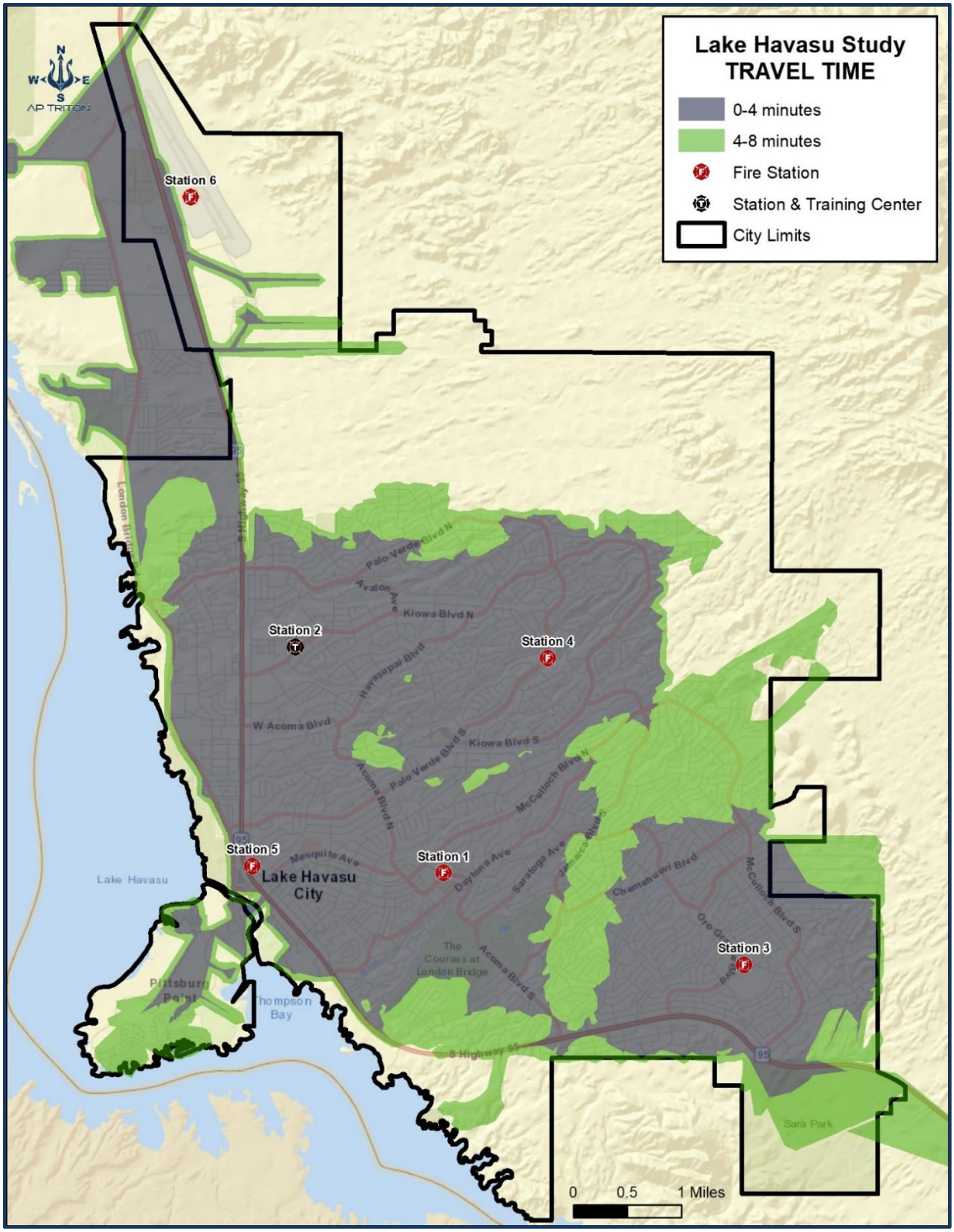
Considering current fire station locations and historical incident data, the existing LHCFD facilities are well-positioned to respond to those areas with the highest service demand.

Resource Distribution & Reliability

Resource distribution analyzes how well a community is covered by the existing facility and apparatus locations. This is important from a service delivery perspective and to receive maximum credit under the Insurance Services Office (ISO) rating system, which can affect homeowner's insurance rates. Further, published standards from the National Fire Protection Association (NFPA) indicate that departments serving urban areas should be able to respond to 90% of the service area within four minutes of travel time or less. Further, all calls should be within eight minutes of a station to serve the highest percentage of the population.

The following figure illustrates LHCFD's four- and eight-minute projected travel capabilities from existing station locations using Geographic Information System (GIS) technology. Calculations were based on the variable speed limits within Lake Havasu City while also considering the various curves along the road network.

Figure 48: Travel Times—4 Minutes & 8 Minutes



Just over 79% of incidents were within four minutes of travel from a fire station. Nearly 99% were within eight minutes of travel from a fire station.

Similarly, from an ISO perspective, structures should be within 1.5 road miles of a fire station containing an engine and 2.5 miles of an aerial apparatus to receive maximum credit. In addition, structures within five road miles of a fire station tend to pay less for insurance. The following figure illustrates those criteria.

Figure 49: 1.5-Mile ISO Coverage

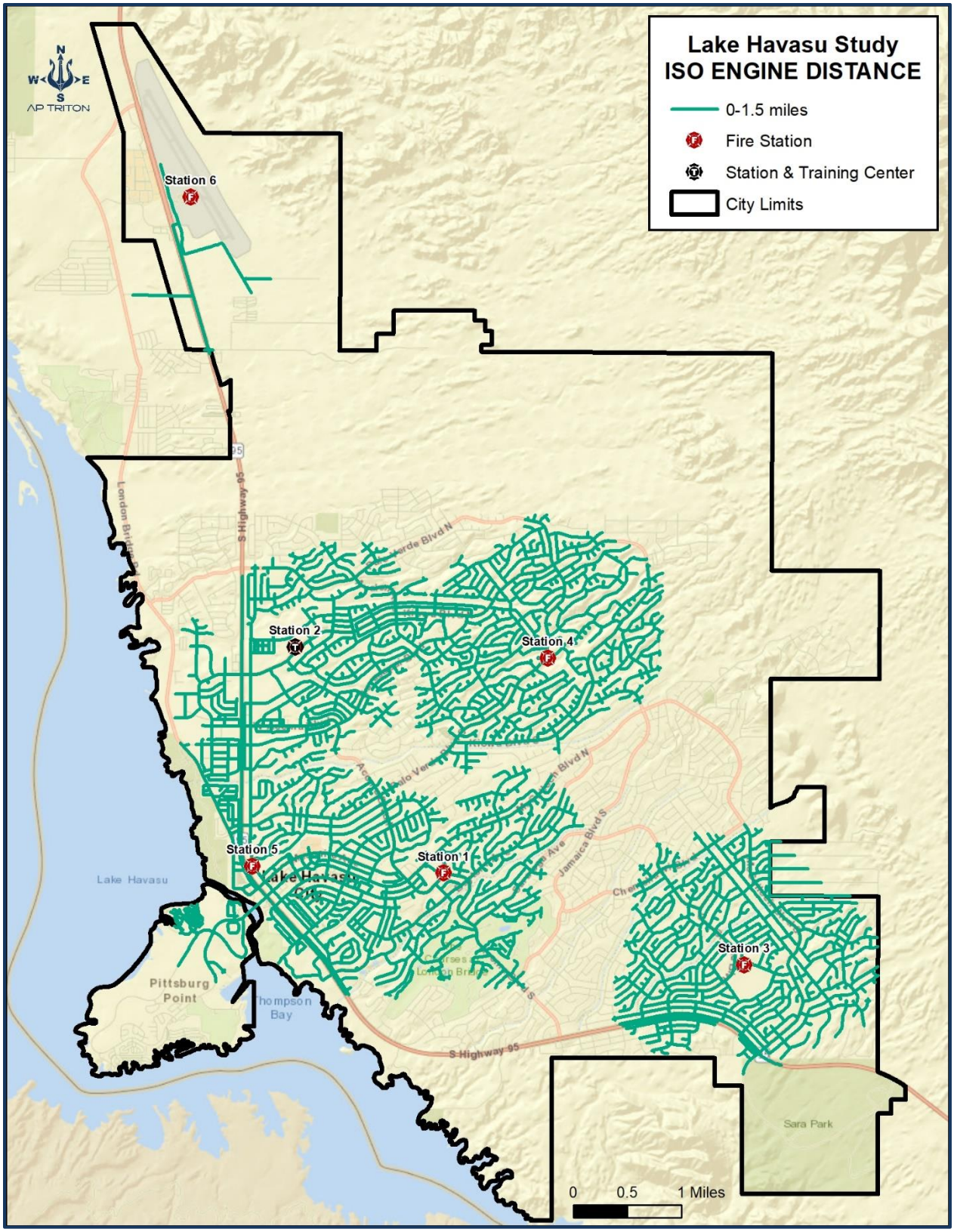


Figure 50: 2.5-Mile ISO Coverage

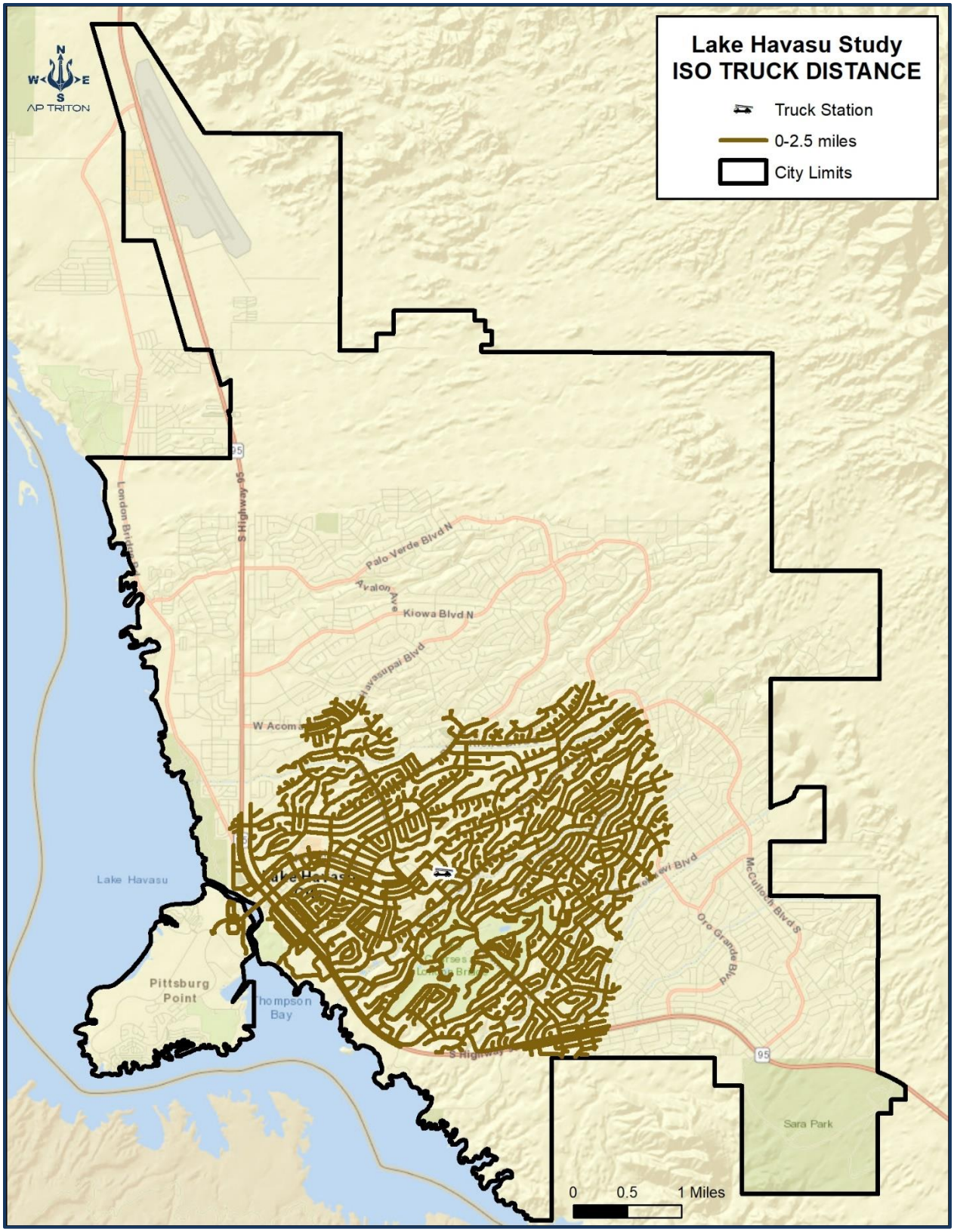
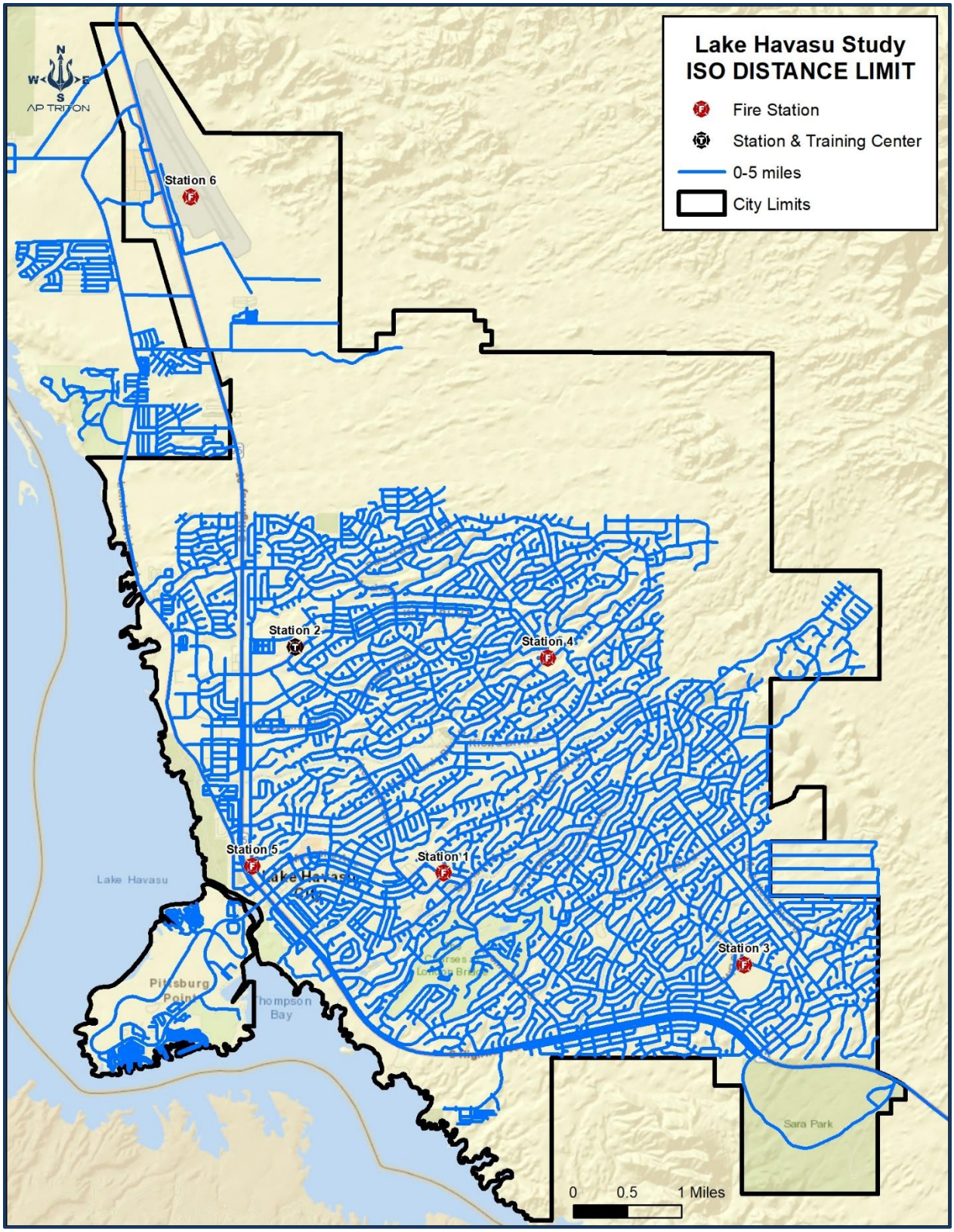


Figure 51: 5-Mile ISO Coverage



Based on this analysis, approximately 60.6% of addresses are within 1.5 miles of a fire station, and 37% are within 2.5 miles of an aerial apparatus. Additionally, 95% of the address points are within five miles of an existing station.

Unit Hour Utilization

Unit hour utilization (UHU) is calculated by dividing the total time a unit is committed to all incidents during a year and divided by the total time in a year. It describes the percentage of time a unit is unavailable for a response since it is already committed. The larger the percentage, the greater the UHU and the less available it is for assignment to an incident. This analysis only measures response to incidents and does not include other unmeasured activities in the dataset, such as training time and station duties.

The following figure shows the UHU rates by individual apparatus for 2018–2021.

Figure 52: LHCFD Unit Hour Utilization (2018–2021)

Apparatus	2018	2019	2020	2021	Aggregate
Engine 1	—	—	0%	6%	**1%**
Engine 2	9%	9%	10%	9%	**9%**
Engine 3	11%	12%	10%	11%	**11%**
Engine 4	9%	10%	9%	10%	**9%**
Engine 5	11%	12%	11%	11%	**11%**
Engine 6	2%	3%	2%	2%	**2%**
Truck 1	10%	10%	9%	3%	**8%**

In May 2015, the Henrico County (Virginia) Division of Fire (HCDF) published an article in *Fire Engineering* about its method for studying EMS workload.[9] The study resulted in developing a general commitment factor scale, as will be shown in the following figure. The method utilized by Triton to analyze UHU is the same as used by HCDF.

Figure 53: Commitment Factor Scale

Factor	Indication	Description
16–24%	Ideal Range	Personnel can maintain training requirements and physical fitness and can consistently achieve response time benchmarks. Units are available more than 75% of the day.
25%	System Stress	Community availability and unit sustainability are not questioned. First-due units respond to their assigned areas 75% of the time; response benchmarks are rarely missed.
26–29%	Evaluation Range	The community served will experience delayed incident responses. Less than 30% of the day, first-due ambulances are unavailable; thus, neighboring responders will likely exceed goals.
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. At or exceeding 30%, personnel assigned to units may show signs of fatigue and burnout and may be at increased risk of errors. In addition, training and physical fitness sessions are not consistently completed.

It is important to note that the preceding figure results from a single study and that UHU is only *one* measure of apparatus workload. However, if the factors developed by the Henrico County Division of Fire are relevant to the Lake Havasu City Fire Department, the historical workload for each frontline apparatus fell within the "Ideal" range during each year and in the aggregate.

Concentration

Concentration analysis evaluates a fire department's ability to assemble the appropriate resources (apparatus and personnel) for incidents within the response area, particularly structure fires. This is also known as Effective Response Force (ERF). Triton used a moderate risk, single-family, detached residential structure as identified NFPA standards for this analysis.

This analysis assumes that each apparatus included is staffed and available to respond and begins with the ERF for apparatus. 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 states that a full-alarm assignment (ERF) should be achieved within eight minutes of total travel time for structures other than high-rise buildings and 10 minutes for those structures.[10,11]

The following figure illustrates what percentage of land area and population in which the Lake Havasu City Fire Department can generate an ERF of apparatus.

Figure 54: Apparatus Concentration

Apparatus	% Covered*
1 Engine, 1 Ladder, 1 EMS unit, 1 Battalion Chief	7%
2 Engines, 1 Ladder, 1 EMS, 1 Battalion Chief	28%
3 Engines, 1 Ladder, 1 EMS, 1 Battalion Chief	25%
4 Engines, 1 Ladder, 1 EMS, 1 Battalion Chief	8%

*Percentages rounded to the nearest integer.

Figure 55: Effective Response Force—Apparatus

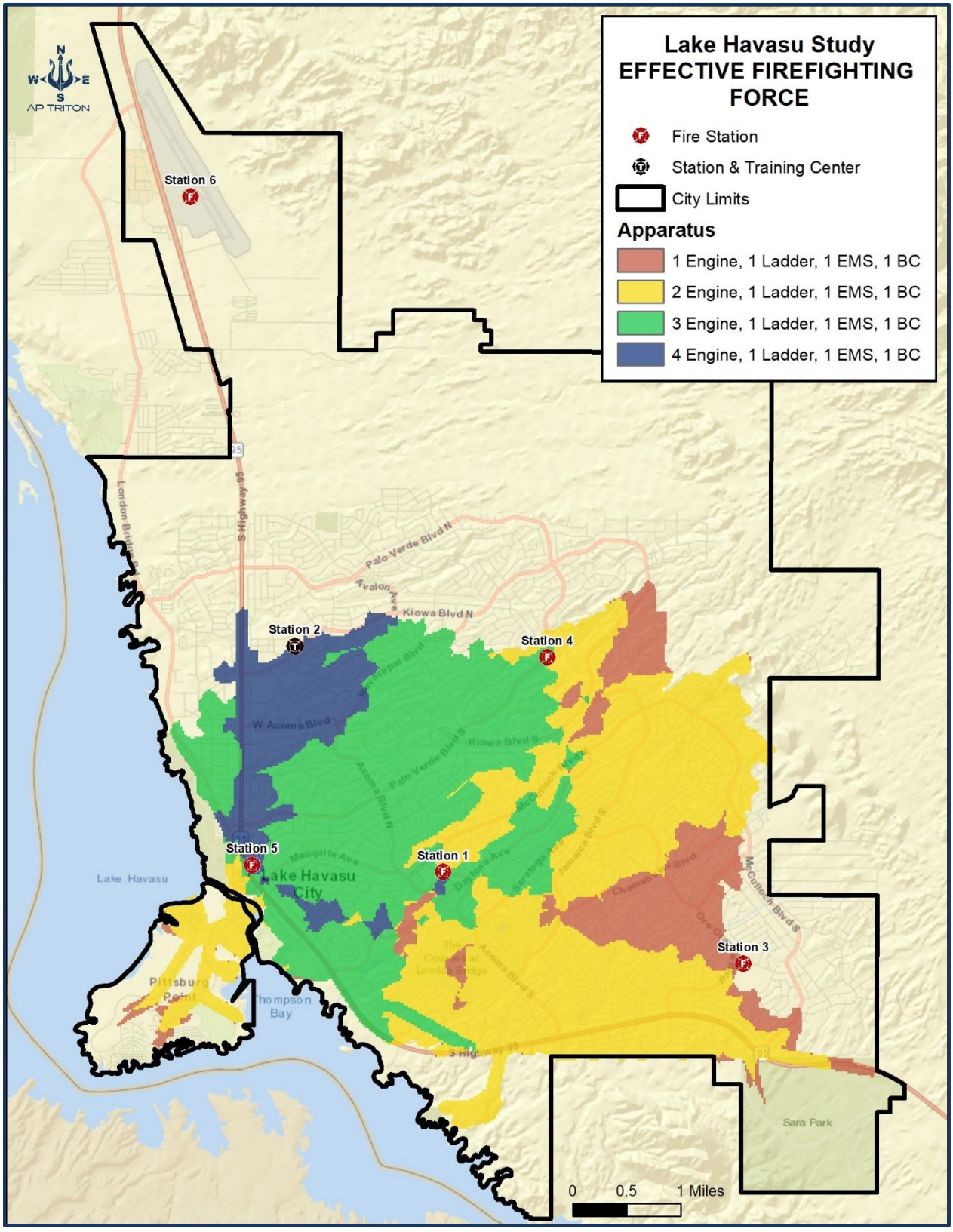
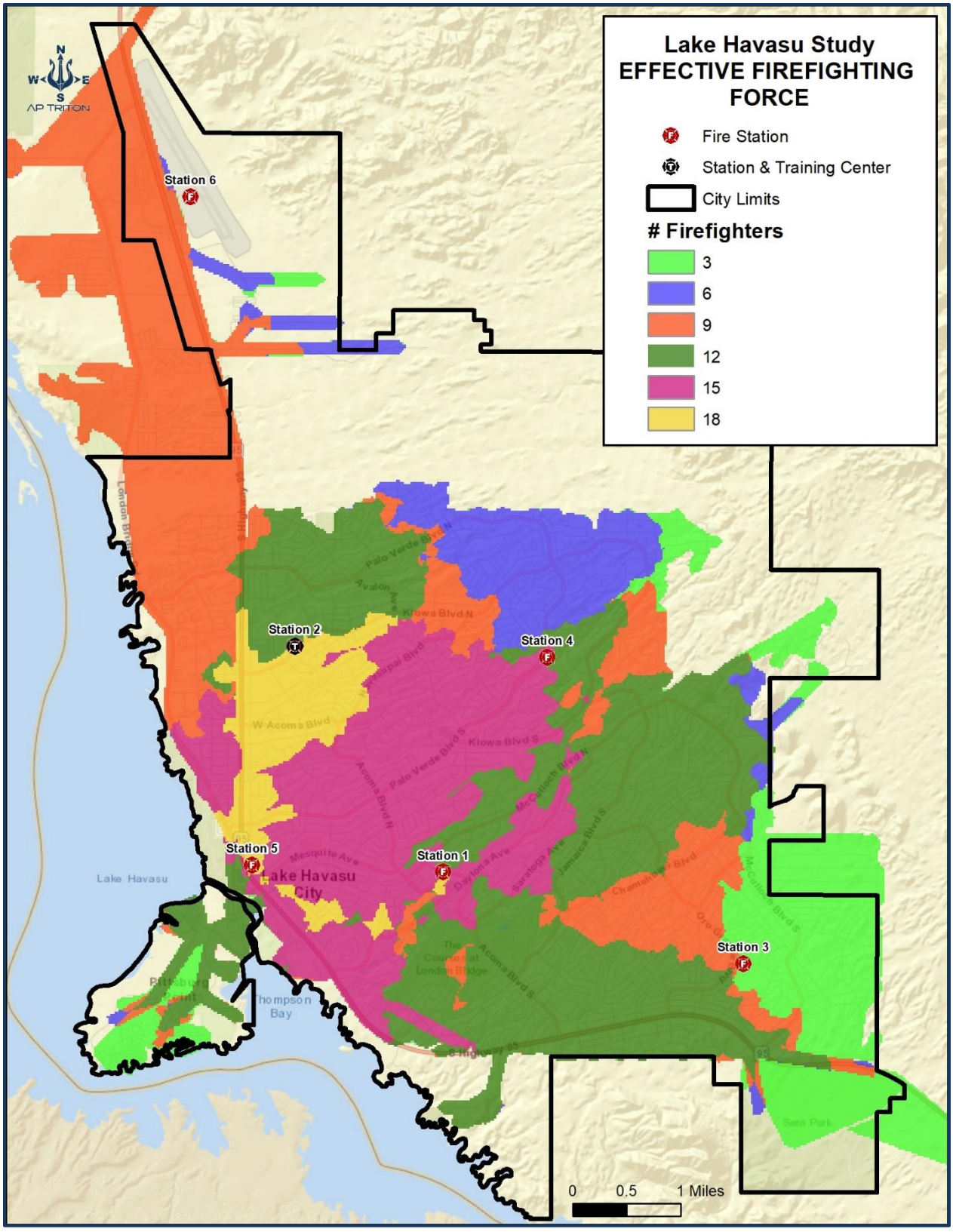


Figure 56: Effective Response Force—Personnel



The next figure illustrates what percentage of land area and population LHCFD can generate an ERF of personnel.

Figure 57: Personnel Concentration

No. of Personnel	Addresses*
3 Personnel	9%
6 Personnel	7%
9 Personnel	15%
12 Personnel	35%
15 Personnel	25%
18 Personnel	8%

*Percentages rounded to the nearest integer.

Reliability Analyses

Incident Concurrency

The concurrency analysis evaluates how often units are already engaged in an incident and unable to respond to service requests. The more time a unit spends engaged on incidents, the less available it is for subsequent or concurrent incidents. This is also known as response reliability analysis, evaluating the frequency of concurrent incidents.

Figure 58: Incident Concurrency (2020)

Simultaneous Calls	% of Total*
One call	53%
Two calls	33%
Three calls	11%
Four calls	3%
Five calls	1%
Six calls	<1%

*Percentages rounded to the nearest integer.

As expected, most incidents occurred one at a time. However, a large percentage of incidents occurred two at a time, and a fair number occurred three at a time.

Storms or other large events can influence call concurrency, stressing a system, so response reliability should be monitored periodically.

Reliability by Fire Station

A process called "queuing analysis" was used to evaluate how well each fire station serves the community by the hour of the day. This process utilized a probability analysis to determine the likelihood that a crew from a particular fire station would or would not be available to respond to an incident. It uses the following variables: incidents per hour, number of available response units, number of incidents occurring during the day (0900–2059 hours) and number occurring at night (2100–0859), and average time committed per incident (one hour).

Although useful, a queuing analysis has limitations. It assumes that incidents occur at a constant rate. This is not always true in emergency services. It also assumes that each incident requires an equal amount of time from the response units. While the average time committed to an incident was used for service time, some incidents require less or substantially more than the average.

The following figure shows the number of responses by station by the hour of the day for 2021. Based on the number of units available to LHCFD at each fire station, the right-hand columns show the probability that an apparatus would not be available for an incident. Percentages above 10% indicate a system with insufficient resources to ensure a reliable response. For example, the following figure shows that the probability of waiting for an LHCFD apparatus is highest during the day and at Stations 3, 4, and 5, respectively.

Figure 59: Wait Probability at LHCFD Fire Stations (2021)

MFD Station	No. Day Calls	No. Night Calls	Calls/Hour (0900–2059)	Calls/Hour (2100–0859)	Wait Probability	
					Day	Night
Station 1	1,459	810	0.33	0.18	**1%**	**0%**
Station 2	886	474	0.20	0.11	**9%**	**5%**
Station 3	1,436	757	0.33	0.17	**15%**	**8%**
Station 4	1,042	557	0.24	0.13	**11%**	**6%**
Station 5	1,384	575	0.32	0.13	**15%**	**6%**
Station 6	96	37	0.02	0.01	**1%**	**0%**

Night calls at each fire station are below the 10% threshold. Therefore, incidents during the day have the highest probability of a "customer" being required to wait for the next closest or available apparatus.

Triton also did a queuing analysis using cumulative data from 2018–2021. The results were nearly exactly the same as those found in the 12-month period during 2021.

Reliability Discussion

As shown, Stations 3, 4, and 5 are all over the 10% threshold during the 12-hour daytime hours of 0900–2059. This is highest at Stations 3 and 5 with a 15% wait probability based on 2021 data. One option to address this would be to deploy one or more 12-hour peak-demand units during the daytime hours.

Since the majority of calls are EMS, deploying a two-person quick-response vehicle might be the most efficient and cost-effective option. However, should LHCFD acquire a limited 911 Certificate of Necessity for ground ambulance transport (described later in this report) for two medic units, the wait probability at these stations may possibly be reduced.

Response Time Performance

Response times are the most widely used measure of overall performance for an emergency services agency. Average response times are frequently quoted, but NFPA standards effectively use percentiles to illustrate response performance. For career fire departments, that percentile is 90% in most cases. However, total response performance is measured in specific periods from when a request for service is received by the communications center and ends when help arrives at the service location. The components of total response time include: call processing time, turnout time, and travel time and will be evaluated separately and collectively to illustrate total response time.

Call Processing Time

Call processing time is when the communications center receives the call for service to when appropriate units are dispatched. NFPA 1225 states that 90% of high-priority incidents be dispatched within 60 seconds or less following receipt of the call.[12] The standard makes no distinction between fire and medical incidents. The following figure illustrates the Lake Havasu City Police Department Communications Center's call processing performance for emergency incidents.

Figure 60: Call Processing Performance (2018–2021)

Year	Average	90th Percentile
2018	00:01:34	00:02:30
2019	00:01:34	00:02:28
2020	00:01:43	00:02:41
2021	00:01:42	00:02:42

Call processing times for LHCPD's communications center are longer than the industry standard. Recognizing that there may be staffing deficits within the dispatch center, there may be changes that could be adopted that would lead to improved times.

Turnout Time

Turnout time is defined as the interval between when a unit is dispatched and when it begins to respond to the call. NFPA 1710 recommends a turnout time of 80 seconds for fires and special operations responses and 60 seconds or less for medical responses when measured at the 90th percentile.[13] The following figure illustrates LHCFD's turnout time performance for emergency incidents over the past four years, where data were available.

Figure 61: Overall Turnout Time Performance (2018–2021)

Year	Average	90th Percentile
2018	00:01:16	00:02:06
2019	00:01:13	00:02:05
2020	00:01:11	00:02:02
2021	00:00:59	00:01:45

Travel Time

Travel time has been discussed previously but is defined as the interval between the time an apparatus goes en route and the time it arrives at the incident scene. NFPA 1710 suggests that career fire departments respond to all emergency incidents within four minutes or less of travel time at the 90th percentile.[14] The following figure illustrates LHCFD's travel time performance for emergency incidents over the past four years, where data was available for all responded units.

Figure 62: Overall Travel Time Performance (2018–2021)

Year	Average	90th Percentile
2018	00:05:02	00:08:03
2019	00:05:12	00:08:27
2020	00:05:14	00:08:17
2021	00:05:10	00:08:15

In most cases, however, the first arriving unit can initiate operations or medical care to begin to mitigate the incident. The following figure illustrates the first arriving unit travel time performance for the data period.

Figure 63: First Arriving Unit Travel Time Performance (2018–2021)

Year	Average	90th Percentile
2018	00:04:45	00:07:18
2019	00:04:51	00:07:27
2020	00:04:55	00:07:33
2021	00:04:53	00:07:34

Total Response Time

Total response time for a fire department is the cumulative amount of time it takes from receiving the request for service (911 call) until the unit arrives at the incident scene. Per NFPA 1710, the cumulative response time for emergency incidents should be 6 minutes for medical incidents and 6 minutes, 20 seconds for fire and special operations incidents, measured at the 90th percentile. The following figure illustrates the historical total response time of LHCFD over the last four years for emergency incidents.

Figure 64: Overall Total Response Time Performance (2018–2021)

Year	Average	90th Percentile
2018	00:06:27	00:09:40
2019	00:06:31	00:10:02
2020	00:06:36	00:10:07
2021	00:06:15	00:09:28

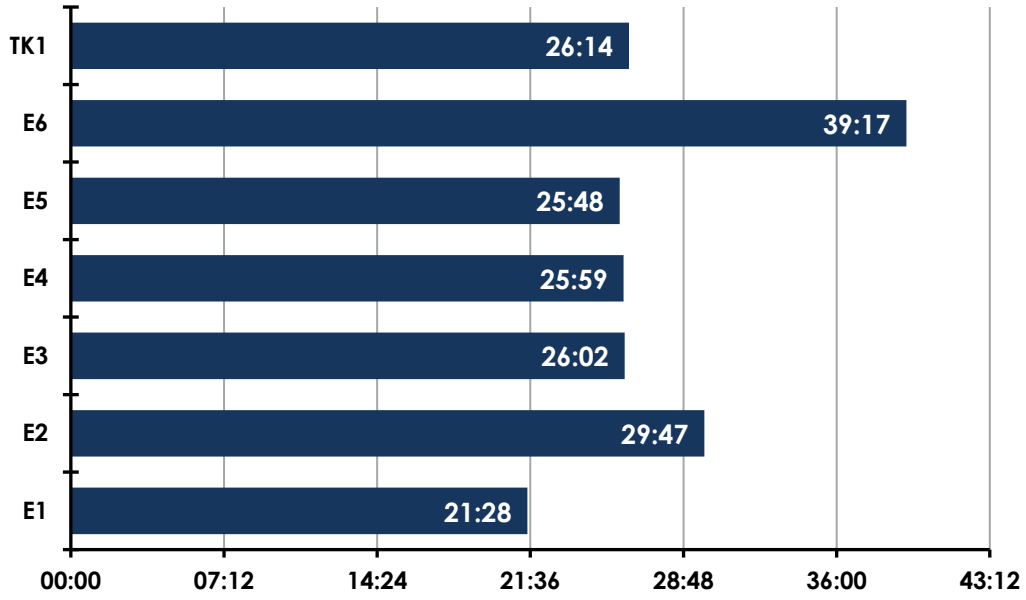
As discussed previously regarding travel time, the first arriving unit's total response time performance is provided in the next figure.

Figure 65: First Arriving Unit Total Response Time Performance (2018–2021)

Year	Average	90th Percentile
2018	00:05:58	00:08:36
2019	00:05:58	00:08:39
2020	00:06:06	00:08:52
2021	00:05:47	00:08:34

The next figure illustrates the average time committed on scene by individual LHCFD frontline apparatus.

Figure 66: Average Time Commitment by LHCFD Apparatus (2018–2021)



As shown in the preceding figure, Engine 6 had a substantially higher average on-scene time commitment than all other apparatus. This *may* be attributed to EMS incidents and its proximity to Havasu Regional Medical Center (approximately 7–9 miles distant).

Review of Response Standards & Targets

The Lake Havasu City Fire Department provides fire protection, EMS, and other emergency services to an area consisting of urban and suburban areas and comprising over 46 square miles. Therefore, specific critical tasks must be accomplished with each type of incident and corresponding risk, and certain numbers and types of apparatus should be dispatched.

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 action, the commanding officer must prioritize the tasks and complete some in chronological order rather than concurrently. These tasks include the following:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention

Critical task analyses also apply to non-fire-type emergencies, including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to control an emergency effectively. The department's ability to quickly muster needed numbers of trained personnel to make a difference is critical to successful incident outcomes.

The following figure illustrates the minimum emergency incident staffing recommendations of the Commission on Fire Accreditation International (CFAI). The following definitions apply to the figure:

- **Low Risk**: Minor incidents involving small fires (fire flow less than 250 gallons per minute), single patient non-life-threatening medical incidents, minor rescues, small fuel spills, and small wildland fires without unusual weather or fire behavior.

- **Moderate Risk**: Moderate-risk incidents involving fires in single-family dwellings and equivalently sized commercial office properties (fire flow between 250 gallons per minute to 1,000 gallons per minute), life-threatening medical emergencies, hazardous materials emergencies requiring specialized skills and equipment, rescues involving specialized skills and equipment, and larger wildland fires.
- **High Risk**: High-risk incidents involving fires in more significant commercial properties with a sustained attack (fire flows more than 1,000 gallons per minute), multiple patient medical incidents, significant releases of hazardous materials, high-risk rescues, and wildland fires with extreme weather or fire behavior.

Figure 67: Staffing Recommendation Based on Risk

Incident Type	High Risk	Moderate Risk	Low Risk
Structure Fire	29	15	6
Emergency Medical Service	12	4	2
Rescue	15	8	3
Hazardous Materials	39	20	3

Establishing resource levels needed for various emergencies is a uniquely local decision. Factors influencing local decisions for incident staffing include the type of equipment operated, training levels of responders, operating procedures, geography, traffic, and the nature of buildings and other protected risks. Therefore, LHCFD has developed the following Critical Task Analyses using risk matrices for various incident types.

Critical Tasks & Alarm Assignments

The following figures list the minimum number of personnel needed by incident type accompanied by the alarm assignments.

Critical Task Analysis

Critical tasks are those activities that must be conducted early on and promptly by firefighters at emergency incidents to control the situation, stop loss, and perform necessary tasks required for a medical emergency. Additionally, LHCFD is responsible for ensuring those responding companies can promptly, efficiently, and safely perform all described tasks.

Alarm Assignments

The first alarm response assignments have been established to ensure sufficient personnel and apparatus are dispatched to an emergency event to ensure sufficient personnel and apparatus are dispatched to an emergency event. "Total Staffing Needed" is the number identified in the accompanying Critical Tasking Analysis figures. The number of personnel and apparatus required to mitigate an active and complex working incident will require additional resources above and beyond the numbers listed next.

Critical Tasks & Alarm Assignments for Fires

Figure 68: Critical Task Analysis—Low Fire Risk

Task Description	Personnel Needed
Command	1
Safety	1*
Size-Up (360°)	1*
Engineer (driver or pump operator)	1
Fire Attack	1
Effective Response Force:	**5**

*Temporary assignment

Figure 69: Alarm Assignments—Low Fire Risk Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
Engine/Pumper	1	3	0	0	0	0	
Ladder/Aerial	0	0	0	0	0	0	
Battalion Chief	0	0	0	0	0	0	
Totals:	**1**	**3**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**3**		**0**		**0**	**3**
Staff Needed:							**3**
Deficiency:							**0**

*Temporary assignment

Figure 70: Critical Task Analysis—Moderate Fire Risk

Task Description	Personnel Needed
Command	1
Safety	1
Size up (360°)	1*
Driver/Engine or Pump Operator	2
Fire Attack	2
Backup and Search & Rescue	2
Ventilation/Utilities	3
Rapid Intervention Team (on deck)	3
EMS Unit—ALS	2
Effective Response Force:	**17**

*Temporary assignment

Figure 71: Alarm Assignments—Moderate Fire Risk Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
Engine/Pumper	3	9	0	0	0	0	
Ladder/Aerial	1	3	0	0	0	0	
Rescue	0	0	0	0	0	0	
Battalion Chief	1	1	0	0	0	0	
EMS	1	2	0	0	0	0	
Totals:	**6**	**15**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**15**		**0**		**0**	**15**
Staff Needed:							**17**
Deficiency:							**-2**

*Temporary assignment

Figure 72: Critical Task Analysis—High Fire Risk

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size up (360°)	1*
Driver/Engine or Pump Operator	3
Water Supply	1
Standpipe/Sprinkler Control	1
Fire Attack	2
Search & Rescue	2
Ventilation/Utilities	3
Back-up Line	3
Rapid Intervention Team	3
EMS Unit—ALS	2
Effective Response Force:	**24**

*Temporary assignment

Figure 73: Alarm Assignments—High Fire Risk Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
Engine/Pumper	5	15	0	0	0	0	
Ladder/Aerial	1	3	0	0	0	0	
Rescue	0	0	0	0	0	0	
Battalion Chief	1	1	0	0	0	0	
EMS	1	2	0	0	0	0	
Totals:	**8**	**21–25**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**21–25**		**0**		**0**	**21–25**
Staff Needed:							**29**
Deficiency:							**-4–8**

*Temporary assignment

Figure 74: Critical Task Analysis—Maximum Fire Risk

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size up (360°)	1*
Driver/Engine or Pump Operator	3
Water Supply	2
Standpipe/Sprinkler Control	1
Fire Attack	4
Search & Rescue	4
Ventilation/Utilities	3
Back-up Line	2
Rapid Intervention Team (Two Teams)	6
EMS Unit—ALS	2
Effective Response Force:	**31**

*Temporary assignment

Figure 75: Alarm Assignments—Maximum Fire Risk Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
Engine/Pumper	5	15	0	0	1	3	
Ladder/Aerial	1	3	0	0	0	0	
Rescue	0	0	0	0	0	0	
Battalion Chief	2	2	0	0	0	0	
EMS	1	2	0	0	0	0	
Totals:	**9**	**22–26**	**0**	**0**	**1**	**3**	**Totals**
Staff Available:		**22–26**		**0**		**3**	**26–29**
Staff Needed:							**31**
Deficiency:							**-2–5**

*Temporary assignment

Emergency Medical Services

Figure 76: Critical Task Analysis—Low EMS Risk

Task Description	Personnel Needed
Safety	1*
Documentation	1*
Family/Bystander Liaison	1*
Basic Life Support Treatment	2
Advanced Life Support Treatment	1
Effective Response Force:	**6**

*Temporary assignment

Figure 77: Alarm Assignments—Low Fire EMS Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	1	3	0	0	0	0	
Other:	0	0	0	0	0	0	
Totals:	**1**	**3**	**1**	**2**	**0**	**0**	**Totals**
Staff Available:		**3**		**0**		**0**	**5**
Staff Needed:							**6**
Deficiency:							**-1**

*Temporary assignment

Figure 78: Critical Task Analysis—Moderate Risk EMS Incident

Task Description	Personnel Needed
Command	1
Safety	1*
Size up (360°)	1*
Family/Bystander Liaison	1*
Basic Life Support Treatment	2
Advanced Life Support Treatment	2
Extrication/Hazard Mitigation	2
Effective Response Force:	**10**

*Temporary assignment

Figure 79: Alarm Assignments—Moderate Risk EMS Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	1	2	0	0	
Fire Unit	3	7	0	0	0	0	
Totals:	**3**	**7**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**7**		**2**		**0**	**9**
Staff Needed:							**10**
Deficiency:							**-1**

*Temporary assignment

Figure 80: Critical Task Analysis—High-Risk EMS Incident

Task Description	Personnel Needed
Command/Support	1
Safety	1
Size up (360°)	1*
Triage Group	2
Basic Life Support Treatment	2
Advanced Life Support Treatment	4
Transport Group	2
Effective Response Force:	**13**

*Temporary assignment

Figure 81: Alarm Assignments—High-Risk EMS Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	1	2	0	0	
Fire Unit	4	10	0	0	0	0	
Totals:	**4**	**10**	**0**	**2**	**0**	**0**	**Totals**
Staff Available:		**10**		**2**		**0**	**12**
Staff Needed:							**13**
Deficiency:							**-1**

*Temporary assignment

Figure 82: Critical Task Analysis—Maximum Risk EMS Incident

Task Description	Personnel Needed
Command	2
Safety	1
Operations	1
Triage Group	2
Basic Life Support Treatment	5
Advanced Life Support Treatment	5
Evacuation Group	4
Transport Group	2
Staging	1
Other: Private Sector Liaison	1
Effective Response Force:	**24**

*Temporary assignment

Figure 83: Alarm Assignments—Maximum Risk EMS Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	1	2	0	0	
Fire Unit	8	21	0	0	0	0	
Totals:	**8**	**21**	**0**	**2**	**0**	**0**	**Totals**
Staff Available:		**21**		**2**		**0**	**23**
Staff Needed:							**24**
Deficiency:							**-1**

*Temporary assignment

Wildland Incidents

Figure 84: Critical Task Analysis—Low-Risk Wildland Incident

Task Description	Personnel Needed
Command	1
Safety	0
Size-Up (360°)	0
Engineer (driver or pump operator)	1
Fire Attack	1
Effective Response Force:	**3**

*Temporary assignment

Figure 85: Alarm Assignments—Low-Risk Wildland Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	1	3	0	0	0	0	
Totals:	**1**	**3**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**3**		**0**		**0**	**3**
Staff Needed:							**3**
Deficiency:							**0**

*Temporary assignment

Figure 86: Critical Task Analysis—Moderate Risk Wildland Incident

Task Description	Personnel Needed
Command	1
Safety	1
Recon Group	1
Driver/Engine or Pump Operator	2
Flank Divisions	4
Water Supply	1
Structure Protection	4
Staging	1
Effective Response Force:	**15**

*Temporary assignment

Figure 87: Alarm Assignments—Moderate Risk Wildland Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	3	7	0	0	2	5	
Totals:	**3**	**7**	**0**	**0**	**2**	**5**	**Totals**
Staff Available:		**7**		**0**		**5**	**12**
Staff Needed:							**15**
Deficiency:							**-3**

*Temporary assignment

Figure 88: Critical Task Analysis—High-Risk Wildland Incident

Task Description	Personnel Needed
Command	2
Safety	1
Recon Group	2
Lookout	1
Driver/Engine or Pump Operator	3
Flank Divisions	9
Water Supply	2
Holding	4
Structure Protection	10
Staging	1
Effective Response Force:	**35**

*Temporary assignment

Figure 89: Alarm Assignments—High-Risk Wildland Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	5	13	0	0	4	9	
Totals:	**5**	**13**	**0**	**0**	**4**	**9**	**Totals**
Staff Available:		**13**		**0**		**9**	**22**
Staff Needed:							**35**
Deficiency:							**-13**

*Temporary assignment

Technical Rescue

Figure 90: Critical Task Analysis—Low-Risk Technical Rescue Incident

Task Description	Personnel Needed
Command	1
Safety	0
Basic Life Support Treatment	1
Extrication/Hazard Mitigation	2
Effective Response Force:	**4**

*Temporary assignment

Figure 91: Alarm Assignments—Low-Risk Technical Rescue Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	1	3	0	0	0	0	
Totals:	**1**	**3**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**3**		**0**		**0**	**3**
Staff Needed:							**4**
Deficiency:							**-1**

*Temporary assignment

Figure 92: Critical Task Analysis—Moderate Risk Technical Rescue Incident

Task Description	Personnel Needed
Command	1
Safety	1
Size Up (360°)	1*
Basic Life Support Treatment	1
Advanced Life Support Treatment	2
Extrication/Hazard Mitigation	2
Effective Response Force:	**7**

*Temporary assignment

Figure 93: Alarm Assignments—Moderate Risk Technical Rescue Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	3	7	0	0	0	0	
Totals:	**3**	**7**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**7**		**0**		**0**	**7**
Staff Needed:							**7**
Deficiency:							**0**

*Temporary assignment

Figure 94: Critical Task Analysis—High-Risk Technical Rescue Incident

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size Up (360°)	*1
Operations	1
Rescue Teams	6
Rescue Support Group	6
Basic Life Support Treatment	2
Advanced Life Support Treatment	4
Effective Response Force:	**22**

*Temporary assignment

Figure 95: Alarm Assignments—High-Risk Technical Rescue Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	1	2	0	0	
Fire Unit	6	18	0	0	0	0	
Rescue	1	3	0	0	0	0	
Totals:	**7**	**21**	**1**	**2**	**0**	**0**	**Totals**
Staff Available:		**21**		**2**		**0**	**23**
Staff Needed:							**22**
Deficiency:							**+1**

*Temporary assignment

Figure 96: Critical Task Analysis—Maximum Risk Technical Rescue Incident

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size Up (360°)	*1
Operations	1
Entry team leader and teams	7
Rescue Support Group	6
Basic Life Support Treatment	4
Advanced Life Support Treatment	6
Staging	1
Effective Response Force:	**28**

*Temporary assignment

Figure 97: Alarm Assignments—Maximum Risk Technical Rescue Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	1	2	0	0	
Fire Unit	6	18	0	0	0	0	
Rescue	1	3	0	0	0	0	
Totals:	**7**	**21**	**1**	**2**	**0**	**0**	**Totals**
Staff Available:		**21**		**2**		**0**	**23**
Staff Needed:							**28**
Deficiency:							**-5**

*Temporary assignment

Hazardous Materials Incidents

Figure 98: Critical Task Analysis—Low-Risk HazMat Incident

Task Description	Personnel Needed
Command	1
Safety	1*
Size Up (360°)	1*
Hazard Mitigation	3
Other (2 in 2 out)	2
Other (Protection line)	1
Effective Response Force:	**9**

*Temporary assignment

Figure 99: Alarm Assignments—Low-Risk HazMat Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	0	0	0	0	0	0	
Fire Unit	2	7	0	0	0	0	
Totals:	**2**	**7**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**7**		**0**		**0**	**7**
Staff Needed:							**7**
Deficiency:							**0**

*Temporary assignment

Figure 100: Critical Task Analysis—Moderate Risk HazMat Incident

Task Description	Personnel Needed
Command	1
Safety	1*
Size Up (360°)	1*
Pump Operations/Decon	2
Hazmat Group Supervisor	1
Hazard Mitigation	4
Other (2 in 2 out)	3
Other: Protection line	1
Effective Response Force:	**14**

*Temporary assignment

Figure 101: Alarm Assignments—Moderate Risk HazMat Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	1	2	1	2	0	0	
Fire Unit	3	7	0	0	0	0	
Totals:	**4**	**9**	**1**	**2**	**0**	**0**	**Totals**
Staff Available:		**9**		**2**		**0**	**11**
Staff Needed:							**14**
Deficiency:							**-3**

*Temporary assignment

Figure 102: Critical Task Analysis—High-Risk HazMat Incident

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size Up (360°)	1*
Operations	1
Entry Team Officer and Team	3
Back-up Entry Team	2
Hazmat Support Group	6
Decon Group	4
Medical Group	3
Effective Response Force:	**23**

*Temporary assignment

Figure 103: Alarm Assignments—High-Risk HazMat Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	1	2	1	2	0	0	
Fire Unit	7	19	0	0	0	0	
Totals:	**8**	**21**	**1**	**0**	**0**	**0**	**Totals**
Staff Available:		**21**		**0**		**0**	**21**
Staff Needed:							**23**
Deficiency:							**-2**

*Temporary assignment

Figure 104: Critical Task Analysis—Maximum Risk HazMat Incident

Task Description	Personnel Needed
Command/Support	2
Safety	1
Size Up (360°)	1*
Operations	1
Entry Team Officer and Team	5
Back-up Entry Team	4
Hazmat Support Group	8
Decon Group	4
Medical Group	4
Staging	1
Effective Response Force:	**31**

*Temporary assignment

Figure 105: Alarm Assignments—Maximum Risk HazMat Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
EMS Unit	1	2	0	0	0	0	
Fire Unit	7	19	0	0	0	0	
Rescue	0	0	0	0	0	0	
Totals:	**8**	**21**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**21**		**0**		**0**	**21**
Staff Needed:							**31**
Deficiency:							**-10**

*Temporary assignment

Aircraft Rescue & Firefighting (ARFF)

Figure 106: Critical Task Analysis—Low-Risk ARFF Incident

Task Description	Personnel Needed
Command	1
Safety	1
Size Up (360°)	1
Operations Section	0
Fire/Rescue Standby	0
Effective Response Force:	**3**

*Temporary assignment

Figure 107: Alarm Assignments—Low-Risk ARFF Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
ARFF Unit	1	1	0	0	0	0	
Fire Unit	1	2	0	0	0	0	
Totals:	**2**	**3**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**3**		**0**		**0**	**3**
Staff Needed:							**3**
Deficiency:							**0**

*Temporary assignment

Figure 108: Critical Task Analysis—Moderate Risk ARFF Incident

Task Description	Personnel Needed
Command	1
Safety	0
Size up (360°)	0
Fire Attack Group Standby	2
Rescue Group Standby	3
Effective Response Force:	**6**

*Temporary assignment

Figure 109: Alarm Assignments—Moderate Risk ARFF Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
ARFF Unit	1	1	0	0	0	0	
Fire Unit	3	6	0	0	0	0	
Totals:	**4**	**7**	**0**	**0**	**0**	**0**	**Totals**
Staff Available:		**7**		**0**		**0**	**7**
Staff Needed:							**6**
Deficiency:							**+1**

*Temporary assignment

Figure 110: Critical Task Analysis—High-Risk ARFF Incident

Task Description	Personnel Needed
Command	1
Safety	1
Size Up (360°)	1
Operations Section	1
Fire Attack Group	4
Rescue Group	4
Medical Group	4
Staging	1
Other: Airport Liaison	1
Effective Response Force:	**18**

*Temporary assignment

Figure 111: Alarm Assignments—High-Risk ARFF Incident

Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
ARFF Unit	1	1	1	2	0	0	
Fire Unit	4	9	0	0	1	3	
Totals:	**5**	**10**	**1**	**2**	**1**	**3**	**Totals**
Staff Available:		**10**		**2**		**3**	**15**
Staff Needed:							**18**
Deficiency:							**-3**

*Temporary assignment

Figure 112: Critical Task Analysis—Maximum Risk ARFF Incident

Task Description	Personnel Needed
Command	2
Safety	1
Size Up (360°)	1*
Operations Section	1
Fire Attack Group	4
Rescue Group	4
Triage Group	2
Basic Life Support	3
Advanced Life Support	6
Transport Group	1
Staging	1
Effective Response Force:	**26**

*Temporary assignment

Figure 113: Alarm Assignments—Maximum Risk ARFF Incident

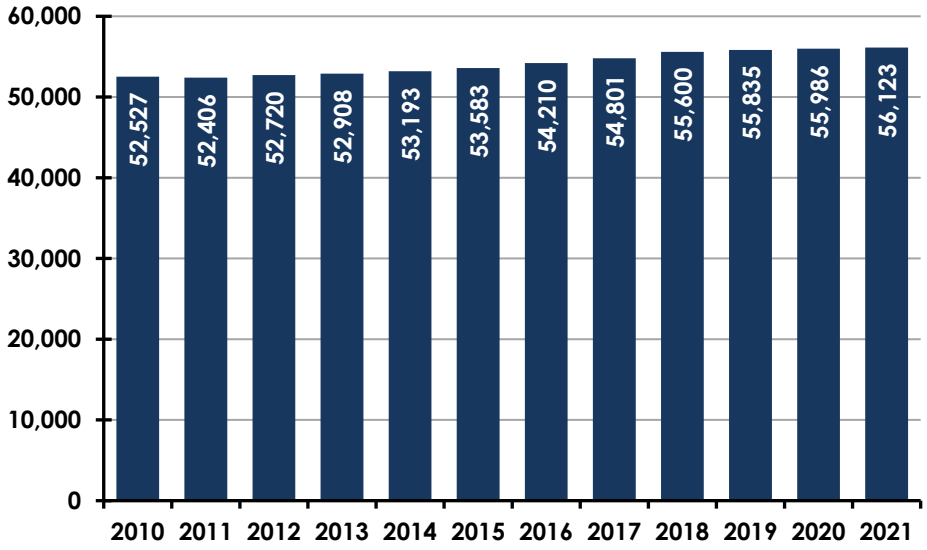
Unit Description	LHCFD		Auto Aid		Mutual Aid		
	Units	Staff	Units	Staff	Units	Staff	
ARFF Unit	1	1	1	2	0	0	
ARFF Pumper	0	0	0	0	0	0	
Fire Unit	6	18	0	0	1	3	
EMS Unit	1	2	0	0	0	0	
Totals:	**8**	**21**	**1**	**2**	**0**	**0**	**Totals**
Staff Available:		**21**		**2**		**3**	**26**
Staff Needed:							**26**
Deficiency:							**0**

*Temporary assignment

Population Growth & Service Demand Projections

In most cases, population determines service demand for emergency services providers. For example, service demand tends to be much higher in more populated areas than in less densely populated areas. Therefore, to adequately predict future service demand, it is first necessary to evaluate potential changes in the future population. This process begins with the previous population growth, as illustrated in the next figure.

Figure 114: Historical Population (2010–2021)[15]

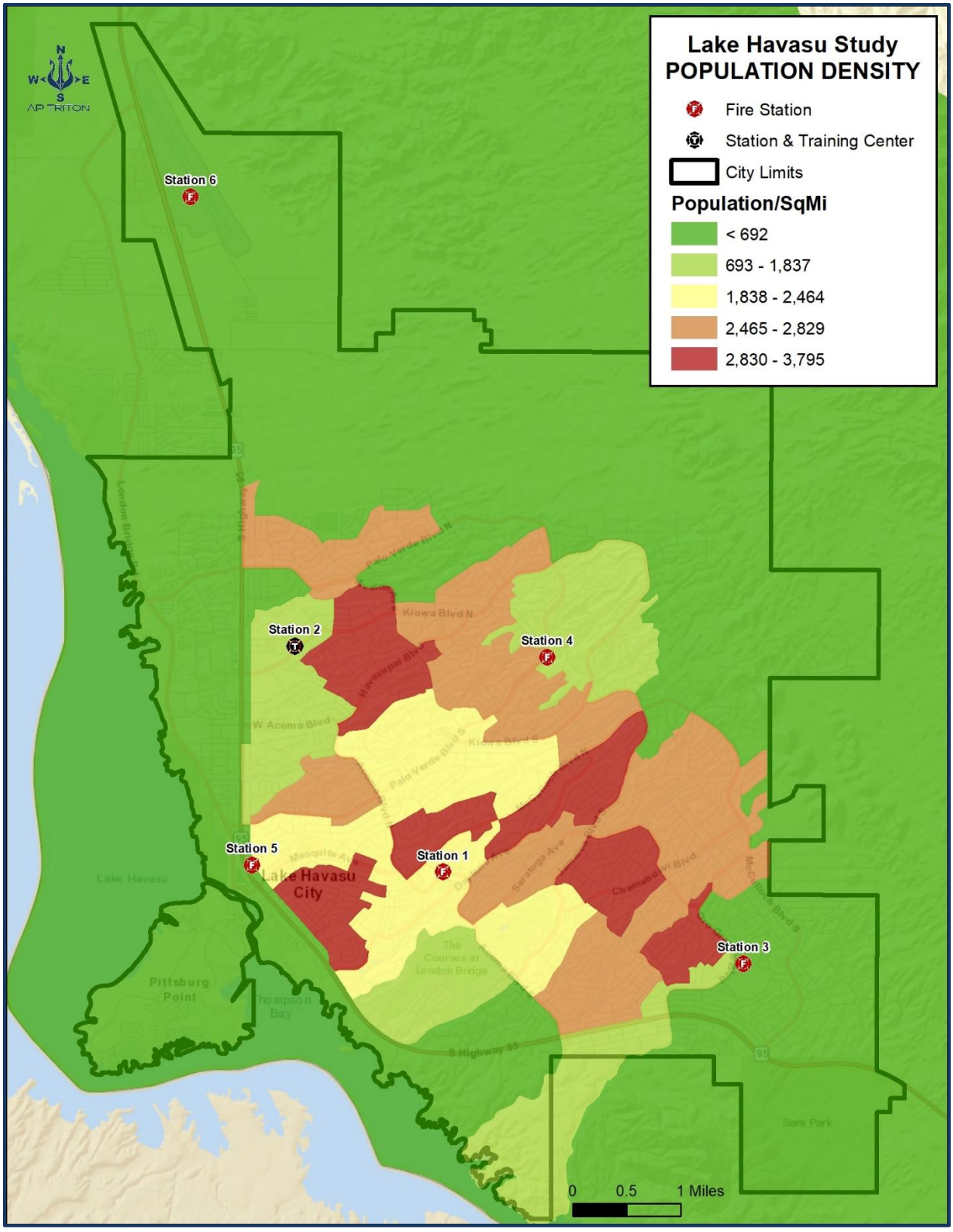


The preceding figure represents data collected from the United States Census Bureau. However, other sources estimate a 2021 population ranging from 52,527 to 58,284.[16]

The population of Lake Havasu City has increased at an average annual rate of 0.55%, an overall increase of 5.61% since 2010, with an increase of 33.20% since 2000. However, it should also be mentioned that the city has a negative population impact due to the commuting of 3,617 residents that work elsewhere.[17]

During daytime hours in business areas, those with higher population density also typically see higher service demand. The following figure illustrates the population density of Lake Havasu City.

Figure 115: Population Density

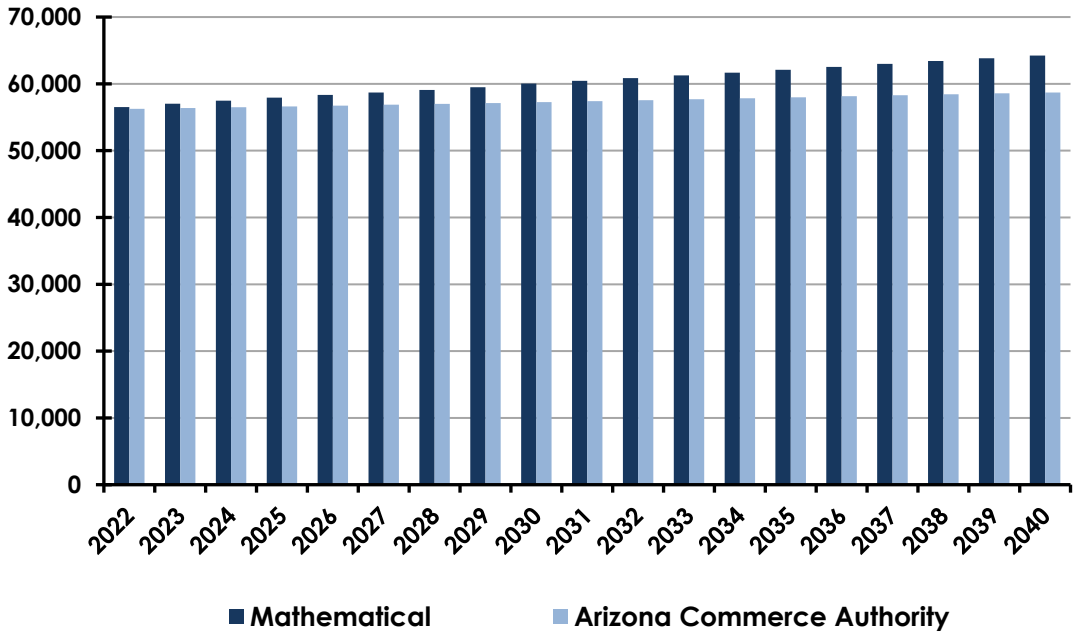


Population Growth Forecasts

Predicting population growth can be challenging, especially in areas with dynamic growth due to increased development or recreational areas. For example, the Lake Havasu City General Plan states, "Our vision for Lake Havasu City is to remain a picturesque, master-planned desert community on the shores of the Colorado River in western Arizona."[18] However, that plan also states, "According to the Arizona Office of Employment and Population Statistics, the City is projected to add around 14,000 additional residents by 2040."[19]

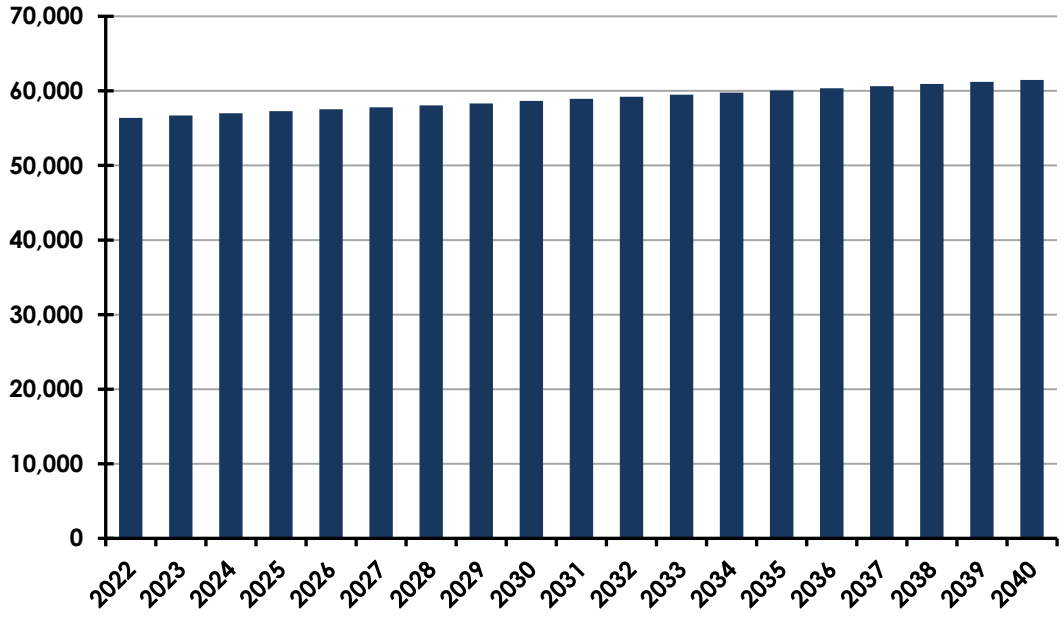
Although this data could not be located, Triton retrieved population projection data from the Arizona Commerce Authority—as illustrated in the next figure—and compared it to a mathematical projection based on historical population estimates.

Figure 116: Population Projections (2022–2040)[20]



The preceding figure includes a mathematical projection for population data for 2020 through 2035 based on historical population growth from 2010 to 2020. This function was completed in Microsoft Excel®, as well as projections from the Arizona Commerce Authority. Those two datasets are averaged in the next figure.

Figure 117: Average Population Growth Projection (2022–2040)

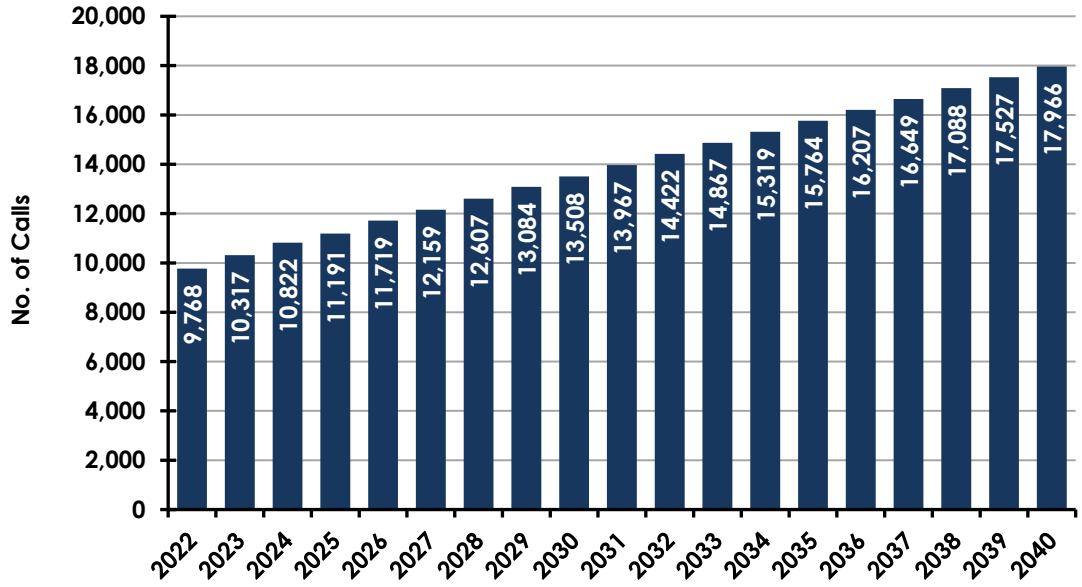


Between 2010–2020, Lake Havasu City had an estimated growth of nearly 9%, about 11% during 2010–2022, and annual growth of 1.47% as of 2022.[21] The city is expected to see a potential growth of 14.7% over the next 10 years through 2032.[22]

Service Demand Projections

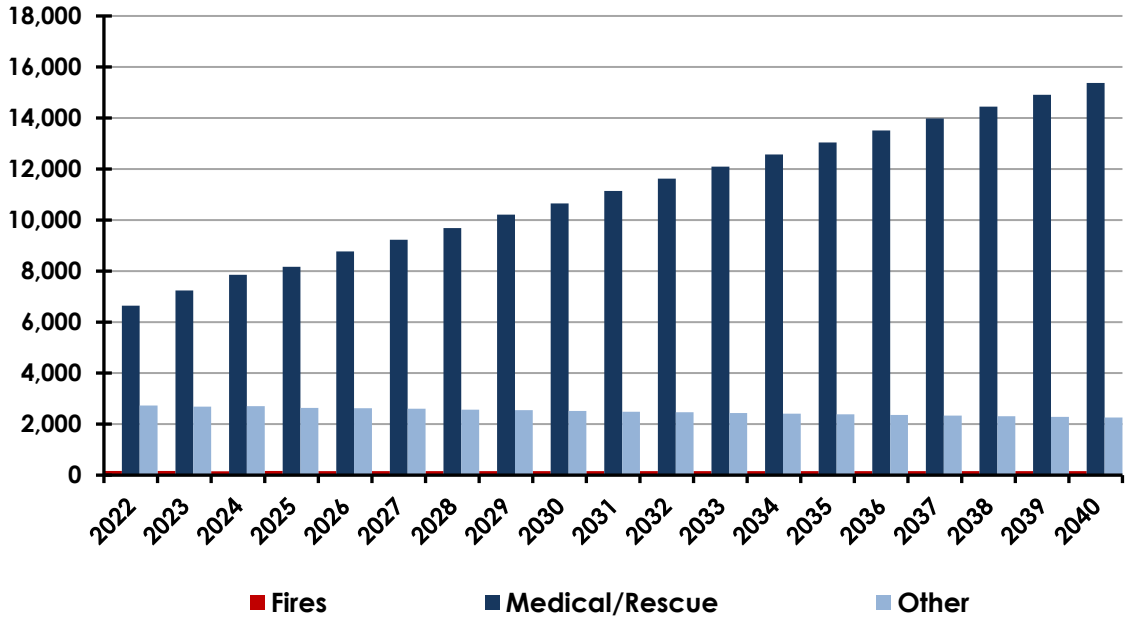
Triton uses the information presented in the previous sections to predict future service demand. These predictions will allow the department to determine if changes are required for future deployment and resource allocation. Using the historical service demand compared to historical populations, the team was able to identify an incident per person ratio that is then carried forward through the projected population data sets. The following figures identify the projected service demand based on that ratio and assumes a level use of LHCFD services.

Figure 118: Total Service Demand Projection (2022–2040)



Although total service demand indicates future needs, if this information is further evaluated by incident type, resources can be adjusted to fit the projected need. The following figure categorizes the projected total service demand by fires, medical/rescue, and other incident types.

Figure 119: Projected Service Demand by Incident Type (2022–2040)



Section I-B:
SUPPORT PROGRAMS

Emergency Communications

Overview

The Lake Havasu City Communications Center (LHCCC) is Lake Havasu City's Public Safety Answering Point (PSAP). LHCCC is responsible for answering all 911 calls in the city, including calls in need of Police and Fire response, 24 hours a day, 365 days a year. In addition, requests for medical assistance are handled by the private ambulance service provider.

The Police Support Services Manager is responsible for the Dispatch Center and Records Unit. The Dispatch Center is normally staffed with two Dispatch Supervisors and 14 Dispatchers, although with staffing issues, that number currently is one Dispatch Supervisor and 13 dispatchers. The Dispatch Center dispatches for the Lake Havasu City Fire Department and Lake Havasu City Police Department (LHCPD), including Animal Control. The Center is also responsible for answering all after-hours calls for the city, including the Water Division, Street Division, Parks Division, and Wastewater Division. The Dispatch Center also provides TDD services for the hearing and speech-impaired, language translation services for over 170 languages, and can receive text to 911 messages.

There are four other PSAPs in Mohave County:

- Mohave County Sheriff's Dispatch
- Kingman Regional Dispatch
- Bullhead City Dispatch
- Colorado City Dispatch

Governance

Lake Havasu City Communications Center is owned and operated by the LHCPD. The Center is supervised by the Support Services Manager. The Manager reports that the Center has a good relationship with the fire department.

Funding/Budgeting

LHCCC is funded by the City's general fund through the LCHPD budget. LHCFD does not allocate any funds from its budget. The Center's budget has increased 21% since FY 2018–2019, with major increases in salaries and benefits (and purchased services in the Radio/Pager/Internet/ISP, Meetings/Training/Travel, and Dues/Subscriber/Memberships categories.

Figure 120: Historical Annual LHCPD Budgets

Description	FY 18–19	FY 19–20	FY 20–21	FY 21–22	Increase Over FY 18–19
Salaries & Wages	814,158	835,064	859,253	1,016,608	25%
Total Benefits	333,315	361,841	340,252	367,741	10%
Total Purchased Services:	**17,690**	**10,260**	**19,910**	**27,640**	**56%**
Materials & Supplies	7,550	5,950	5,950	7,230	-4%
Other Expenditures	0	24,000	0	0	0%
Total Budget	**1,172,713**	**1,237,115**	**1,225,365**	**1,419,219**	—
% Increase Previous Year:	—	5%	-1%	16%	21%

There are no capital facilities and equipment plans or upgrades in the annual budget. However, the Center does receive 911 equipment and upgrades directly from the State of Arizona 911 Office at no cost.

Facility

LHCCC is housed at the LCHPD Headquarters building, 2360 McCulloch Boulevard North. The facility is of cinder block construction.

Figure 121: Communications Center

Physical Security

LHCCC is in the middle of the building, adjacent to the jail. There are no windows to the outside of the building, but there are windows that look into the jail. The windows are reflective one-way glass and are impact resistant. There are two locked doors between the Center and public access areas, accessible by key card.

Power

Emergency power is provided by a 350-kW generator that supports the entire building. The diesel engine is rated to use 24.9 gallons per hour. With a 500-gallon diesel tank, the generator will last 20 hours without refueling. The NFPA 1225 standard is to have enough fuel to last 72 hours without refueling.[23] Individual workstations in the Center have uninterruptable power supplies (UPS) to maintain the systems between a power failure and the generator coming up.

HVAC

The communications center has its own HVAC system, with a thermostat in the room. Unfortunately, there is not a redundant/backup system in place in case of failure of the main system.

Restrooms/Breakroom

There is a restroom directly off the dispatch floor. There is a breakroom for employees only that is behind locked doors. There are no provisions for a sleeping area in case of a lockdown.

Dispatch Workstations

There are five workstations on the dispatch floor, all identical in configuration and equipment.

Auxiliary Areas

There is a radio tower on the roof of the building. Antennas connect with mountain-top transceivers.

Backup Facility

LHCCC's operations can be moved to the Mobile Communications Center (MCC) in case the building needs to be evacuated. The MCC has a full complement of radios, but all 911 calls are forwarded to Mohave County Sheriff's Office.

Technology

Computer-Aided Dispatch

The Computer-Aided Dispatch (CAD) system is from HTE (now CentralSquare®) and was installed in 2015. The system receives software updates regularly, but Central Square is not developing any new features on the HTE system, with a plan for phasing HTE systems out in favor of other Central Square products. In addition, the LHC IT Department requires a reboot of the CAD computers twice a week. The network reportedly failed twice last year, including computers and the phone system.

The Center is looking at options for a new CAD system—they have had demonstrations from Mark43 and Spillman (now Motorola Solutions).

Mobile Data Computers

The Mobile Data Computers (MDC) software is by HTE, running on Dell® tablets. Reportedly, the MDCs are functioning well.

Alerting Systems

The Lake Havasu City Fire Department uses a Zetron® MAX fire station alerting system. In addition, there is a small VHF system patched into the trunked system primarily for radio paging. CAD interfaces with e-Dispatch® and Nixle® (Everbridge) Alert applications are used for paging off-duty personnel.

Response Plans

There are only two response plans; one for fire and one for law enforcement. The Dispatch Manager and the Supervisor are responsible for maintaining the response plans in CAD.

Mapping

The CAD system has a map module. The maps are maintained by the City GIS Department and updated as needed.

Records Management Systems

LHCFD uses ImageTrend Elite™ for its records management system. CAD downloads event data to RMS. There have not been any issues with this interface with CAD. However, RMS for LCHPD is from Central Square, and LCHPD feels there are many issues with the software.

Radio

The radio system for the city is a P25 Phase 2 Trunked Radio System. LHCFD operates primarily on Channel 1 (Main) but has TAC 3 and TAC 4 for fireground operations. In addition, there is a direct channel that Fire Apparatus Operators mostly use. Some talk groups are encrypted.

Antennas on the tower at the Center talk to three sites in the mountains surrounding LCH. Motorola provides portable and mobile radios. Radio coverage is good within the city limits. However, outside the city limits, it can be infrequent.

Figure 122: Antenna Location

Mass Notification

Mohave County maintains a mass notification system that the Center has access to. The vendor is Code Red.

Telephone Systems

The Center's 911 system is VESTA® 9-1-1 by Motorola. Arizona 911 pays for the customer-premise equipment and handles all maintenance and updates. The Center is scheduled for an upgrade to Next Generation 911 in the near future.

Logging Recorder

All radio and telephone traffic is recorded utilizing a system provided by NICE Public Safety. Recordings are held for one year in accordance with the Arizona State Library, Archives and Public Records, General Records Retention Schedule for All Public Bodies Law Enforcement Records, pursuant to ARS 41-151.12.

Staffing

Center Management

The Public Safety Dispatch Supervisor's job description is to be the frontline supervisor responsible for the day-to-day operations of the dispatch center, but staffing has forced them to work shifts in one of the dispatcher vacancies. As time allows, the Public Safety Dispatch Supervisor handles recordings, shift scheduling, evaluations, quality assurance (when needed), and personnel issues and is the backup for the Records Supervisor.

The Center has the following authorized positions:

- 1—Police Support Services Manager
- 2—Public Safety Dispatch Supervisors
- 14—Public Safety Dispatchers

Included in the 14-dispatcher count are two lead dispatchers, who are in charge of the shifts in the absence of the Police Support Services Manager or the Public Safety Dispatch Supervisor, and two System Security Officers (SSO), who are responsible for ACJIS/NCIC compliance. The dispatchers are represented by the Fraternal Order of Police Associates (FOPA).

As with most communications centers in the nation, the Center is severely understaffed—the Center is down eight positions—at 47% of authorized staffing. Staffing issues are ongoing and not strictly COVID-related. Several people have recently quit or have been released from employment. There are currently five dispatchers working, with four more in training. In addition, the Dispatch Supervisor is often required to work the board, taking them away from their normal duties.

Shift Schedules

Dispatchers work three 12-hour shifts one week and four 12-hour shifts the next week. Shifts start at 6 a.m. and 6 p.m. Requests for any time off require someone to volunteer to cover the shift.

Minimum staffing is two per shift. One works police radio, one works fire radio, and both share call-taking duties. Dispatchers rotate between the fire department radio and police department radio every three hours due to the high volume of radio traffic on the police department side. If they were fully staffed, they would have a minimum of three people on duty. However, the Center has been forced to lower its minimum staffing to two people for most of the week because of staff shortages. The exception is on Friday and Saturday nights when a third person works overtime to supplement the busiest days and times.

While the COVID-19 pandemic has certainly exacerbated the shortage, staffing has been a national problem for many years. As a resort community, Lake Havasu City has the added complication that dispatchers cannot afford housing in the city for whom they are employed. Most dispatchers are long-time residents and bought homes before the cost-of-living outpaced salaries. Both of the new hires live in and are long-time Lake Havasu City residents. The closest town for dispatchers to live in is a minimum of 30 minutes away. The next sizable community is over an hour's driving time. The salary range for a dispatcher is $19.95 to $29.12 per hour. They receive pay increases in annual steps, with 12 steps possible. While in training, new dispatchers receive $1 per hour less until they pass all certification tests.

Technical Staff (CAD, Radio, Network)

The Communications Supervisor does CAD administrative work—there is a City IT Department, but they only work on the CAD hardware, not software. The local Motorola Repair Center does radio repairs and programming. The City Information Technology Department handles all network issues. Frontier Communications has been under contract with the State of Arizona to maintain the 911 phone system, but with the implementation of Next Generation 911, that responsibility has transferred to AT&T/Motorola.

Hiring & Training

While staffing has remained constant, the Center has seen an increase in its attrition rate.

Figure 123: Lake Havasu City Staffing Levels & Attrition Rate

Employees	2017	2018	2019	2020	2021
At Start of Year	12	11	11	12	11
At End of Year	11	12	12	11	11
Hired this Year	2	4	4	4	4
Left this Year	2	2	3	3	5
Average Staffing	11.5	11.5	11.5	11.5	11
Attrition Rate:	**17%**	**17%**	**26%**	**26%**	**45%**

Nationally, most local government agencies have seen an average attrition rate of 19.5% over the past five years.[24] Therefore, the Center is well above the national average.

Attracting new employees can be difficult in a resort town like Lake Havasu City. Most new dispatchers cannot afford to live in the city, where the average rent is $1,500–$2,000 a month. So, for new employees to move into the area to work, they find places to live away from the river, where there are high-rent areas like Lake Havasu City and Bullhead City.

Hiring practices

Currently, there is an open application period for a dispatcher position. Interested people can apply on the City's HCMD website. Once the applications are screened for minimum qualifications, they follow the below process:

- Candidates must participate in a multi-tasking exercise produced by CritiCall®—a job-related assessment to measure the knowledge, skills, abilities, and personal characteristics necessary for success in the position.
- All applications are reviewed by the Police Chief, who makes recommendations for remaining and continuing the process.
- Candidates participate in an Oral Interview Panel consisting of the Communications Manager, Dispatch Supervisor, and Records Supervisor.
- Candidates passing the Oral Interview start the Background Investigation, including a polygraph, medical, and drug test.
- The hiring process takes between two and three months to complete, depending on the time it takes to complete the background check.

Training

Because of limitations in trainers and workstations, there can only be a maximum of four people in the training program at any one time. LHCPD created and developed the first Dispatch Academy in the State of Arizona and continues to facilitate this academy twice a year. The Academy is three weeks, and is hosted at the Western Arizona Law Enforcement Academy facilities. LHCPD trainers are APCO, CPR, and EMD certified. There is a structured on-the-job training program with an assigned Field Training Officer (FTO). The FTOs are certified training officers and strictly follow our extensive and very detailed manual. It will take an average of six to seven months to complete the training program.

The Arizona Criminal Justice Information System (ACJIS), a statewide network housing various databases on persons and property in this state, requires the Center to have a minimum of two people trained as System Security Officers to monitor ACJIS compliance.

Operations

Although LHCFD works with the dispatch center staff, it has no direct input on Communications Center operations.

Standard Operating Guidelines

Standard Operating Guidelines (SOG) are in place—they are a part of the LCHPD SOGs. The SOGs are extensive and very detailed. In addition, the Center's Dispatch Training Manual is also extensive and very detailed.

Emergency Medical Dispatch

The Center uses Priority Dispatch's Emergency Medical Dispatch (EMD) program. EMD is a system the enhances services to callers in a medical emergency. It allows the call-taker to determine the caller's type of medical or trauma condition and send the appropriate units in the proper response mode (lights and sirens versus no lights and sirens).

Their protocols are also designed to allow the dispatcher to send a private ambulance for calls that are not time critical. LHCPD does quality assurance on both PD and FD calls, but the Priority Dispatch quality assurance module was not purchased, so LHCPD is not an accredited center through the International Academies of Emergency Dispatch (IAED). They are accredited by the Arizona Chief of Police Association's ALEAP accreditation.

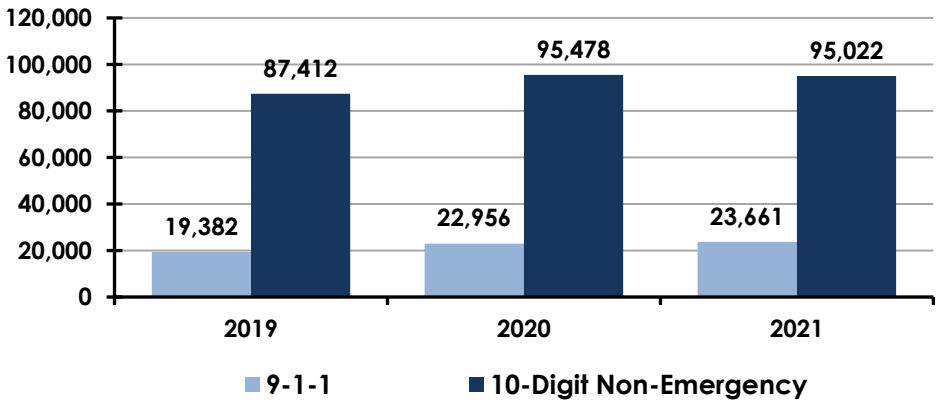
Radio Operations

Events have increased by 10% since 2019. It is thought that this is because of the influx of California residents and a greater interest in Lake Havasu City tourism. LHCFD reports that dispatchers are sometimes slow to answer radio calls or will ask them to "standby, on 911." Apparently, the frequency of this is not high, although it does occur on occasion.

Telephones

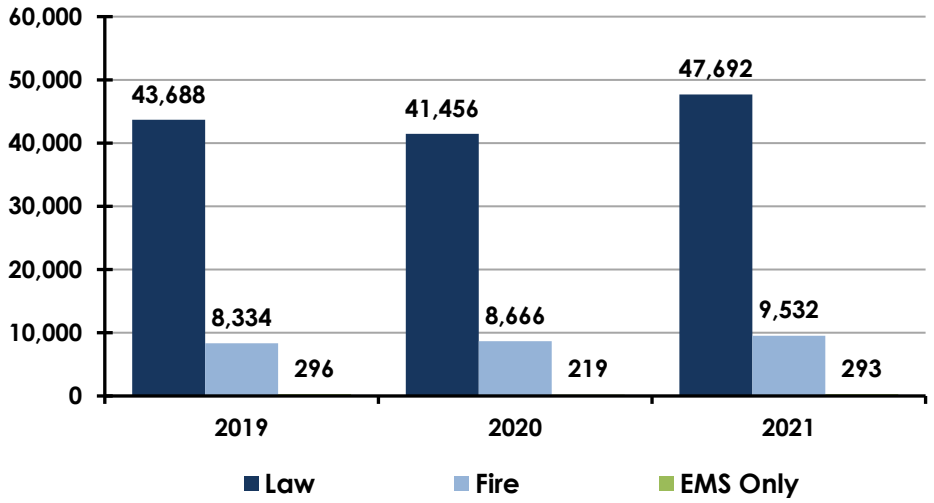
There are significantly more non-emergency calls than emergency calls. This is partly due to the Center answering all incoming LCHPD administrative calls and being the City's after-hours number for all City services.

Figure 124: Incoming Telephone Calls (2019–2021)



As the following figure shows, law enforcement calls are the highest percentage of total calls. This is typical in combined law enforcement and fire department communication centers.

Figure 125: Total Events Dispatched (2019–2021)



Other Duties as Assigned

A component of the dispatcher's workload can be transparent to field units. While the Records section handles public counter requests, there are other duties for the dispatchers to fulfill:

- Warrants—entering, clearing, modifying
- ACJIS entries
- Animal Control
- Security watch— entries dispatchers make for extra patrols, traffic concerns, and vacation watches.
- Training
- Continuing Education
- TIP line (online)
- Road closures
- LHCPD app site—keeping it current
- Rebooting CAD computers once a week
- Justice Web Interface—a system integrated with Courts/DPS—makes it easier to enter warrants
- Run statistical reports monthly
- Knox Box CAD maintenance
- Control the doors in the jail (on occasion)

Training & Continuing Education

A comprehensive training program is one of the most critical factors in ensuring the safe and effective delivery of emergency services. Failure to continually provide necessary and effective training may result in the incremental degradation of knowledge, skills, and abilities, resulting in increased danger to firefighters and the citizens they serve while exposing the fire department to potential legal liabilities.

Delivering a high-quality, comprehensive training program requires knowledgeable, qualified instructors and sufficient training resources and facilities. These resources are typically found within the organization, externally with regional partners, or a combination of both. Fire administrators and instructors must ensure firefighters, EMS personnel, and officers are competent and confident in their knowledge and skills while performing in high-stress situations.

The types of operational training to consider when developing a training program for a public safety organization like LHCFD include the following:

- Basic and advanced firefighter suppression
- Basic and Advanced EMT
- Incident Command
- Basic and advanced medical care
- Driver/pump/aerial operations
- Hazardous materials response and mitigation
- Fire prevention and code enforcement
- Firefighter safety and survival
- Technical rescue
- Wildland firefighting operations
- Lake and swift water rescue & watercraft operations
- Officer development training

Training Administration & General Training Competencies

A variety of training standards and requirements apply to fire department training programs, including those from the following:

- National Fire Protection Association (NFPA)
- International Fire Service Training Association (IFSTA)
- International Fire Service Accreditation Congress (IFSAC)
- National Incident Management System (NIMS)
- National Wildfire Coordinating Group (NWCG)
- Arizona Department of Forestry and Fire Management (ADFFM)
- Arizona Department of Emergency Medical Services & Trauma System (ADEMST)
- Local Medical Director

The LHCFD Training Division is managed by a Battalion Chief assigned to administration. EMS training is coordinated by another Battalion Chief assigned to administration. These positions recently became rotational on a three-year basis, with the Operations Battalion Chiefs expected to rotate through the Training Division and an officer-qualified Paramedic expected to rotate into the EMS Training Battalion Chief position.

Training administrative support is provided by an assigned secretary, who reports to the Training Chief. The Training Division manages a separate budget ($84,811 in 2022).

New Hire Training

LHCFD provides an in-house recruit academy that results in Firefighter I and Firefighter II certifications. In addition, LHCFD supports the Mohave Community College (MCC) fire academy, which consists of a 272-hour course resulting in certification in the following:

- Arizona State Firefighter I and Firefighter II
- Hazardous Materials Awareness and Operations
- NWCG Wildland S-130 and S-190
- NIMS ICS 100, 200, 700, and 800

Preference may be given to test applicants who have Firefighter I and Firefighter II certifications, but it is not a requirement for testing for Firefighter/Paramedic Trainee positions. Applicants must have current Arizona or National Registry EMT or Paramedic certifications to apply for a position with the Lake Havasu City Fire Department.

Continuing Education

Department-specific continuing education (CE) and continuing medical education (CME), fireground manipulative skills maintenance, and other specialized training are regularly conducted to meet minimum state, Insurance Services Office, and LHCFD requirements. Specialized continuing education training is provided for the following disciplines:

- Hazardous Materials Operations and Technician levels.
- Fireboat operations.
- Technical Rescue (High/Low angle, Desert Rescue, Swift Water, and Lakeshore).

Additional training is provided annually for EMS Basic Life Support and Advanced Life Support topics, defensive driving, active shooter drills (with the Lake Havasu City Police Department), and vehicle extrication.

The next figure summarizes the 2021 training hours (including practical skills training) information as provided by LHCFD.

Figure 126: 2021 Training Activity Summary

Training Components	Training Hours
Fire-Related Training	12,344
EMS-Related Training	4,781
Other Training	2,865
Total Training Hours Delivered:	**19,990**
Average Annual Hours per Person:	**222**

Additionally, the fire department has annual training hours and task subject requirements, as shown in the next figure.

Figure 127: Annual Training Hours & Task Requirements by Position

Position	No. Hours	Required Task Completion
Deputy Chief	240	1 exposure report
Battalion Chief/Paramedic	237	3 Captain meetings, 3 minimum company standard drills, 1 exposure report
Battalion Chief/EMT	227	3 Captain meetings, 3 minimum company standard drills, 1 exposure report
Captain Paramedic	237	12 fire pre-plans, 1 inspection
Captain EMT	227	12 fire pre-plans, 1 inspection
Engineer Paramedic	237	1 exposure report
Engineer EMT	227	1 exposure report
Firefighter Paramedic	257	1 exposure report, 3 online classes
Firefighter EMT	215	1 exposure report

The previously listed requirements represent those that are considered the minimum. Personnel also log additional activities that can also be considered task-oriented training, such as daily and weekly self-contained breathing apparatus (SCBA) checks, apparatus inventory, and building inspections and familiarization.

Training Schedules

Most operational training is scheduled for the entire year and placed on the Operations calendar, except for "pop-up" unique training opportunities and courses. Scheduled training includes online courses, minimum company standard drills, hazardous materials operations refresher training, technical rescue drills, IMS training, annual SCBA fit testing, and breathe-down drills.

Training Facilities

Specially designed and configured training facilities, props, and equipment are critical components of a safe, effective, and realistic emergency operations training program. Contemporary training center facilities incorporate sufficient and flexible classroom and drill ground space(s), computer and audiovisual tools, incident simulation equipment, and individualized study resources.

LHCFD has the benefit of owning a large training facility with a dedicated drill ground, props, and a four-story drill tower. The key features of this facility include:

- Four-story drill tower with a smoke maze, three burn rooms, technical rope, confined space anchors, and space configurations.
- Flashover prop.
- Junk vehicles for extrication practice.
- Two classrooms with audiovisual and computer enhancements.

Due to the extreme heat and constant use, live-fire burn props and facilities require periodic maintenance and inspection to ensure they are safe to use. Currently, the burn props at LHCFD can only be used with Class A combustibles. The burn room panels were recently replaced to prevent damage to the training tower structure.

Training Procedures, Manuals, & Protocols

New probationary employees are assigned a training manual that includes a schedule of required objectives and performance requirements that must be completed by the end of their probationary period. However, there is currently no standard operational procedure committing probationary firefighters (PFF) to engine work during their probationary period. The current practice allows the shift Battalion Chiefs to assign PFFs as they see fit, including Medic/Rescue assignments. This feature of their current probationary period is concerning, given (1) the limited amount of time an engine company has to train and evaluate a PFF as well as (2) the extensive depth of knowledge, skills, and abilities necessary to be a functional member on an engine company.

Members who want to act in a temporary higher position (Engineer, Captain, Battalion Chief) are assigned a "task book" that includes required training objectives for the higher position. These objectives must be satisfactorily completed before assignment in a higher position.

Training Recordkeeping

The Lake Havasu City Fire Department uses the web-based education service Vector Solutions® (previously called Target Solutions®) to deliver and document a significant number of didactic classes. These classes are scheduled and delivered individually or as crews on a case-by-case basis and are consistent with the annual training plan and monthly training calendar. Once the participants complete an online class, it is automatically entered into the database for documentation and reporting purposes.

In addition, company officers enter multi-company and crew training and drills into the database. This information is used to create an annual training report disseminated to the public, City officials, and fire department personnel.

Other training elements, including manipulative skills training and drills conducted by individual crews and occasionally multi-company crews, are documented using skill sheets containing the required performance goals, requirements, and tasks—also known as "Job Performance Requirements." This training is also entered into Vector Solutions, and the completed skill sheets are forwarded to the Training Division for archiving. All Captains assigned to Operations are credentialed at the International Fire Service Training Instructor I level. Some Battalion Chiefs are certified Blue Card Train-The-Trainers. In addition, EMS instructors are credentialed by the American Safety & Health Institute.

Training Program Discussion

Triton understands that the transition of assigning an Operations Battalion Chief and Battalion Chief that is a certified Paramedic into the Training Battalion Chief and EMS Battalion Chief positions was implemented in July 2021. The current administrative rotation is every three years and the Training and EMS Divisions have new Battalion Chiefs serving in them.

The intent of rotating officers into these positions is to provide administrative experience and career development, and to enable the sharing of operational experience of senior officers across all three shifts.

Rotating operations personnel into administrative support assignments is a common approach used by fire agencies for similar compelling reasons. However, there may be challenges with this approach as well. The following provides examples of potential benefits and challenges with rotating operations personnel through the various administrative positions:

Advantages & Benefits

- Opportunity to learn and use new administrative procedures and programs, including planning and administrative software programs.
- Shorter average annual hours worked.
- Increased opportunities to attend industry conferences and training courses.
- Continual exposure to personnel, cultures, and unique processes and procedures across shifts.

- A more frequent response to significant emergency incidents.
- Opportunity to share significant operational knowledge and lessons learned across shifts.
- Ability to affect significant change across shifts.
- Ability to apply knowledge, skills, abilities, and perspectives gained through an administrative assignment when reassigned to Operations.

Disadvantages

- Loss of institutional knowledge and programmatic momentum after an officer leaves the administrative assignment.
- Decreased operations overtime opportunities.
- Increased visibility and potential scrutiny by immediate supervisor.
- Personnel may be forced into a position they do not want, leading to poor job performance and personnel issues.

Triton understands that one of the current Battalion Chiefs assigned to Operations is enrolled in the Arizona Deferred Retirement Option Plan (DROP), whereby they declare their retirement date within the upcoming 5–7 years.

Live Fire & Rescue Boat Training

LHCFD has a training facility that can accommodate live fire training. Concerns arose from operational staff during live burns because of disruptions in live-fire training drills where companies were left without back-up support while other companies responded to incidents. No extra response coverage was provided during mandatory training drills. In addition, the advent of the COVID-19 pandemic limited training drills.

The rescue boat is housed separately from any LHCFD fire station. Triton understands that the standard practice is to have all members operate the boat if there is an emergency incident on Lake Havasu. LHCFD has been challenged with attempting to get all operations personnel trained (as well as operational skills practicing) with the boat. This has limited the number of trained and experienced boat operators.

Life-Safety Services & Public Education

Community Risk Reduction Program

Each of the following is part of an overall Community Risk Reduction program that can be defined as "The identification and prioritization of risks followed by the integrated application of resources to improve public safety and reduce increasing call volumes."[25] Simply put, CRR examines problems and develops prevention or mitigation strategies to reduce hazards and firefighter risks. The goal is to incorporate emergency operations with prevention efforts at the fire station level and integration with all divisions of LHCFD. The station-level approach is preferred because risks vary from one station to another and even within a station's response area.

Data collected for this operational study and continued analysis in the future creates an opportunity to determine if specific hazards are increasing or decreasing based on incident response. Additionally, risks may shift as new development, or demographic change occurs in Lake Havasu City and the overall service area, impacting LHCFD.

Although LHCFD provides risk reduction with a public education specialist, it is not a comprehensive or coordinated effort. Therefore, when developing strategies, they should use the "Five E's."

- Education—Will education help the public: who, where, when?
- Engineering—What engineering or technology is available to help?
- Enforcement—Is additional or more substantial enforcement needed?
- Economic Incentives—Could incentives increase compliance?
- Emergency Response—Would changes in response make a difference?

When developing a CRR plan, LHCFD must determine what strategies have already been implemented in the community to prevent duplication. Outside resources may be available through partnerships with many community organizations such as law enforcement, nonprofits, health departments, EMS, religious, and local businesses. These groups may provide staff with a different perspective and offer additional funding and resources to mitigate limitations within the fire department.

Preparing a CRR plan should align with the department's mission and strategic plan. Creating a plan at the station level allows personnel to engage the community they serve. It empowers staff to interact, learn more about their community, and take ownership of the program. Station personnel will begin to understand the importance of collecting accurate data to support their plan, developing strategies using partnerships, gaining their input, soliciting feedback from the community, and deciding what risk(s) to prioritize.

The following figure is one basic methodology offered by Vision 20/20 to identify and analyze risks within a community. In addition, Vision 20/20 includes a coalition of national organizations and experts that exemplify how collaboration, communication, and commitment to data-based solutions can save lives and properties.

Figure 128: The Community Risk Assessment Process

The risk assessment portion of this report can provide a foundation for a departmental CRR plan that can impact the entire community. For CRR to become an integrated function at LHCFD, the organization must consider how an incident could be prevented through the entire department, not just the fire prevention bureau.

Code Enforcement & Permitting

A primary component of any risk reduction program is to provide a comprehensive fire and life safety inspection and permitting process. The goal is to prevent or mitigate a fire or injury before it occurs.

Fire & Life Safety Inspections

LHCFD fire code enforcement officials inspect commercial properties for fire and life safety violations that may endanger employees or occupants. The department's fire prevention bureau consists of the Fire Marshal and two Fire Inspectors, and they enforce the 2018 International Fire Code with Lake Havasu amendments.

LHCFD does not have a defined schedule for when the occupancies should receive an inspection but has developed a new Fire Prevention Inspection Program guideline and waiting on final approval. Based on risks, the guideline provides an inspection frequency schedule to ensure all occupancies are visited at least every three years. The following figure provides an example of the International Building Code occupancy groups and the risk category. LHCFD should use this as an example to develop a schedule for periodic inspections of businesses in its jurisdiction.

Figure 129: Occupancy Classifications

Risk	IBC Group	Examples
High	A-1, A-2	Nightclubs, restaurants, theaters, airport/cruise ship terminals
	A-3, A-4, A-5	Arenas, museums, religious
	H-1, H-2, H-3, H-4, H-5	Hazardous materials sites (Tier II)
	B	All government & public buildings, other office buildings over two stories
	E	Schools, daycare centers
	I-1, I-2, I-3, I-4	Hospitals, assisted living centers, correctional
	M	Strip malls, closed-air shopping malls, big box stores
	R-1, R-3	Hotels, motels, dormitories, apartments, board & care facilities
	Special Risk	Railroads, interstate highways, airports
	(Target hazard)	Any building with life safety risk beyond the reach of preconnected hose lines > 200 feet
Moderate	B	Outpatient clinics, general business, offices <3 stories
	F-1	Fabrication or manufacturing of combustible materials
	M	Mercantile, free-standing
	I-2, R-4	Foster group homes, assisted living homes
	S-1	Storage of combustible materials, car repair facilities, hangars
Low	F-2	Fabrication or manufacturing of non-combustibles
	R-1, R-2	1- and 2-family dwellings, foster homes
	S-2	Storage of combustible materials
	U	Barns, silos, other unclassified buildings

NFPA 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code enforcement, Plan Review, Investigation, and Public Education Operations guides how an FPB should operate and needed staffing levels. The following figure lists the average personnel hours of 1,456 available during a calendar year after deducting non-duty time.

Figure 130: Available Working Hours of Staff

Average Personnel Hours	Hours
Annual hours at 100% Availability	2,080
Annual leave and Holiday	336
Estimated Sick Leave Usage	—
Annual Training	80
Uncertainty Factor	208
Total Hours per Staff:	**1,456**

After identifying the hours available for staff to complete their daily duties, the workload is determined by calculating their tasks and the associated time to complete each, including commute and other time. The following figure provides the type of job function and the average time for each task for the LHCFD.

Figure 131: Job Function Tasks & Times

Job Function/Task	No. of Tasks[1]	Average Time[2]	Average Commute[2]	Other Time[3]	Total Time
Plan Reviews	602	0.75	.25	150.5	752.5
New Const Inspections	1,324	0.5	0.25	331	975
Fire Investigations	21	4	0.5	42	369
Inspections & Reinspections	2,788	0.5	0.5	697	2,174
Fire Prevention/Pub. Ed.	266	2	0.5	72	25
Emergency Mgmnt. Support	151	0.75		38	151.25
				Total:	**6,220.5**

[1]Includes preparation, administrative duties, research, follow-ups, and reports

[2]Per task

[3]Includes personnel functions, interruptions, cleaning, and maintenance

The following figure shows that the number of hours available is -396. This does not allow LHCFD to take on additional tasks, such as implementing a schedule to inspect all commercial buildings per its draft policy or by the risks.

Figure 132: LHCFD Available Staff Hours

Annual Task Time Hours	Total Available Staff Hours	Hours
6,220.5	5,824	-396

Permitting

The LHCFD's fire prevention bureau issues permits for functions such as a carnival, fireworks, fire sprinklers, alarms, and engineered suppression systems. The city currently does not issue operational permits as allowed in the fire prevention code Section 105.6. The issuance of permits for occupancies, including a place of assembly, flammable and combustible liquids, high-piled storage, hazardous materials, or a repair garage, should be considered to ensure compliance with these operations. This new permitting process can be combined with a schedule for periodic inspections and offer another city revenue source.

Building Plan Review

The review process provides information on how the construction may affect the fire department's access to the building during an incident, type of construction, or a change of use.

Plan reviews should begin when the initial concept is presented for permitting. The initial review allows the fire department to provide suggestions and enforce existing requirements before permitting. For example, the site plan should include fire apparatus access, fire department connection location if a sprinkler system is present, size and height of the building, hydrants, or other features that impact emergency responders.

Proper permit applications and processes are necessary to assist the contractor when submitting plans for review and ultimate approval. Reviewing construction plans allows fire service representatives to ensure code compliance for exiting, fire sprinkler and alarm systems, emergency lighting, or other processes. In addition, a permitting system allows the organization to require changes to plans if they do not meet code requirements before construction begins.

LHCFD is part of the plan review process for all new developments and buildings in the city. New site plans are submitted to the Development Services Division and distributed to the Pre-application Committee members for review. LHCFD reviews all plans and issues all permits associated with fire protection systems per the adopted fire code.

Fees

LHCFD has adopted a fee schedule to recover the cost of services provided by the Fire Prevention Bureau and activities provided by the LHCFD. The fees include not only construction permits but also alarm responses (false or miscellaneous), hazardous materials incidents, and emergency fire or medical services (responses outside of the city). Fees are not charged for most fire inspections, only those mandated by the state. It is recommended that LHCFD conduct a fee study to determine if a fee for all periodic inspections should be adopted. These additional fees could be used to hire additional staff to ensure all businesses are inspected based on a schedule created by LHCFD.

Fire & Life Safety Education Programs

Prevention or mitigation of unintentional injuries or fires is a critical function of a fire department. Educational programs provide the best opportunity to reduce fires and injuries in the community.

A fire and life safety program to reduce risks requires a coordinated approach and should include other partner organizations in the community that may provide the same or similar services. These partnerships allow LHCFD to become a community partner and build relationships to reduce risks. In addition, developing fire and life safety programs requires a continual review of incident data to determine the types and frequency of responses.

The current Public Education Specialist provides numerous programs in the community. Programs for the local schools are provided, including direct instruction for kindergarten through second graders. The program utilizes a fire engine and firefighters to demonstrate their tools and equipment for kindergarten and first grade, while the second-grade classes receive a fire station tour. They provide hands-only CPR and Stop the Bleed for ninth-grade classes. A new program for high school-age students has been developed to expose them to fire and EMS careers. Those attending can take emergency medical technician classes and participate in a fire academy.

The Public Education Specialist participates in local health fairs and is the department's only Child Passenger Safety Seat Technician (CPSS). They provide the child passenger safety seat education by appointment only. LHCFD should consider adding more CPSS technicians to the organization for this risk reduction effort to benefit the entire community.

The current Public Education Specialist coordinates the City's automated external defibrillators and ensures they are inspected monthly. The City has started creating safety videos for the its Facebook and YouTube pages to reduce risks in the community.

To align with national risk reduction efforts, it is recommended that the Public Education Specialist's title change to Community Risk Reduction Coordinator. This change will better reflect the services provided in the community—reviewing all risks, not just fires. They should also coordinate risk reduction efforts and develop a department-wide CRR program that includes all organization members.

Fire Investigations

Fire causes may include intentional, unintentional, failure of equipment, an act of nature, under investigation, or undetermined. Documenting the types of ignition is required by the National Fire Incident Reporting System (NFIRS) for all fires and is necessary for fire investigations.

Determining the origin and cause of fire allows LHCFD to develop prevention programs that reduce future incidents. Any program designed should use data to review the cause of the fire and show trends of potential problems within the community. Data such as name, age, and gender may identify a specific person or group to target prevention programs such as a Juvenile Firesetter, which is designed as an intervention program for children between the ages of 2–14 who have shown to have fire-related behaviors. The Public Education Specialist coordinates LHCFD's program.

There are two fire investigators for LHCFD, and they work in conjunction with the Lake Havasu City Police Department (LHCPD). Investigators are trained through the Arizona chapter of the International Association of Arson Investigators. The investigators take photos and create reports for investigations, and the LHCPD collects all evidence.

Special Operations

Special Operations within the LHCFD consist of hazardous materials and technical rescue programs, Aircraft Rescue & Fire Fighting (ARFF), and desert rescue. These are services offered above and beyond normal day-to-day operations and are specialty areas that require substantial amounts of additional training, equipment, and funding. This report section will review those service areas.

Hazardous Materials Response Program

Hazardous materials response is a specialized component of any fire department, with several levels by which response can be defined. The lowest and least technical level is Awareness, followed by Operations, Technician, and Specialist. *OSHA 1910.120 Hazardous Materials* defines each level and requires training, duties, and responsibilities.

Awareness: First responders at the awareness level are likely to witness or discover a hazardous substance release and have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to demonstrate competency in the following areas objectively:

- An understanding of what hazardous substances are and the risks associated with them in an incident.
- An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
- The ability to recognize the presence of hazardous substances in an emergency.
- The ability to identify hazardous substances, if possible.
- An understanding of the role of the first responder awareness individual in the employer's emergency response plan, including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.
- The ability to realize the need for additional resources and make appropriate notifications to the communication center.[26]

Operations: First responders at the operations level are individuals who respond to releases, or potential releases, of hazardous substances as part of the initial response to the site; to protect nearby persons, property, or the environment from the effects of the release. They are trained to respond defensively without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposure. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas, in addition to those listed for the awareness level, and the employer shall so certify:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper personal protective equipment provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.[27]

Technician: Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping them. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training above the first responder operations level; and, in addition, have competency in the following areas, and the employer shall so certify:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification, and verification of known and unknown materials using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.

- Be able to perform advance control, containment, and confinement operations within the capabilities of the resources and personal protective equipment available within the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.28

Specialist: Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local, and other government authorities regarding site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level, and in addition, have competency in the following areas, and the employer shall so certify:

- Know how to implement the local emergency response plan.
- Understand classification, identification, and verification of known and unknown materials using advanced survey instruments and equipment.
- Know the state emergency response plan.
- Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.
- Understand in-depth hazard and risk techniques.
- Be able to perform specialized control, containment, and confinement operations within the capabilities of the resources and personal protective equipment available.
- Be able to determine and implement decontamination procedures.
- Must have the ability to develop a site safety and control plan.
- Understand chemical, radiological, and toxicological terminology and behavior.[29]

Level of Hazardous Materials Response

LHCFD independently delivers hazardous materials response at the operations and technician level and receives additional mutual aid assistance from Kingman Fire Department to supplement internal personnel. The department also has six members trained to operate ARFF apparatus.

Training & Response

The LHCFD Hazardous Materials Response Team receives training and certification at the state and federal levels. In addition, continuing education is provided to each member of the team for 48 hours annually. Guidelines for response and operations for all participating personnel are reviewed regularly to ensure that best practice is achieved.

Equipment

The LHCFD hazardous materials team is well equipped to meet its response mission. This includes a dedicated vehicle and support trailer as well as Level A and Level B suits, full decontamination equipment, necessary software for chemical identification, reactivity, and plum modeling, and required meters and other detection equipment. In addition, all equipment is inventoried, with all specialized equipment tested and calibrated as required. The team also has adequate equipment and supplies for training.

Technical Rescue

Technical rescue is an ancillary duty or responsibility of fire departments across the country that may also be referred to as "heavy rescue," "extrication," or "search and rescue." The discipline requires extensive training over and above what is usually required by fire department personnel, and operations can be extremely dangerous. This section reviews the technical rescue program for LHCFD.

LHCFD re-started its technical rescue program in 2020 and follows NFPA standards 1670 and 1006 as its guide for training and deployment. This should be considered a best practice. The following services are provided at the respective levels.

Figure 133: LHCFD Technical Rescue Services

Discipline	Service Provided
Vehicle/Machinery Extrication	Yes
Rope (High- & Low-Angle)	Yes
Confined Space	Yes
Surface/Swift Water Rescue	Yes
Land/Desert Search*	Yes
Dive	*No*
Tower/Antenna	*No*
Structural Collapse	*No*
Trench Collapse	*No*

[1]LHCFD maintains a drone to assist in desert searches.

Delivery of Technical Rescue Services

Technical rescue services are delivered by on-duty personnel as an additional duty. The team consists of 24 total members (12 TRT and 12 Hazmat Team members), with a minimum number on duty each day. LHCFD provides these services across Mohave County and has little in the way of mutual aid assistance. Off-duty personnel would be called upon to return to work if needed for additional resources.

Technical Rescue Training

Arizona currently offers certification for technical rescue that is modeled on NFPA 1670. State certification is the standard established by LHCFD. The team leaders determine a detailed annual training calendar and circulate it to its members for continued education and skills maintenance. Training records are maintained for each member to ensure knowledge, skills, and abilities are maintained, including annual confined space entries made per OSHA 1910.146.

The team also has adequate supplies to support its training needs and takes advantage of specific sites for scenario or skills-based training within its service area. Although most supplies for training are used from the response cache, it is replaced as needed to remain response-ready. Each team member receives at least 48 hours of training per year.

Equipment

Equipment maintained by the team meets its stated level of service. All specialized equipment is inventoried and maintained, with a complete list maintained by the team leader. This would include maintenance and testing records and accurate records for all life safety ropes per NFPA 1983.

Hazmat & Special Operations Budgets

LHCFD Special Operations is funded through the general budget of the fire department. In the current fiscal year, $136,000 was dedicated to all Special Operations responses from the General Fund, and the department also received an Arizona Department of Homeland Security grant for $39,000 for hazardous materials, tools, and equipment.

Aircraft Rescue & Firefighting Services

As mentioned previously, the Lake Havasu City Fire Department maintains a fire station (Station 6) at the Lake Havasu City Municipal Airport. It is an active general aviation airport with no commercial airline services. The airport maintains instrument approach capabilities and has an 8,001-foot runway.

The Lake Havasu City Airport 2020 Airport Master Plan estimates that there were approximately 1,700 air-taxi, 22,000 general aviation, and 350 military annual airport operations activities (takeoffs and landings). As part of the Master Planning process, forecasts for future growth in various aspects of commercial and private aircraft operations were developed, including the re-introduction of commercial air carrier operations at the airport. In summarizing the forecast for commercial carrier flights, the Plan noted:

> "*Due to the lack of historical context for commercial service activity, it is difficult to predict which of these scenarios is more likely to occur and, in fact, there is no guarantee that the airport will be able to develop and maintain consistent commercial service activity at all. The purpose of preparing enplanement projections is to provide Lake Havasu City with the ability to plan for facilities and services to accommodate commercial activities should they develop in the future.*"

Potential Risk

There have been significant aircraft accidents at or near the airport. As recently as September 2021, a small plane crashed while departing the airport, which caught fire and involved one fatality.

The airport is utilized frequently by the military and there have been other incidents involving military aircraft, including a fighter jet high-speed runway overrun with a pilot ejection that was witnessed and immediately responded to by the Station 6 crew.

Various branches of the U.S. military often land at this airport and refuel their aircraft through a contract between the U.S. Government Defense Logistics Agency (DLA) and a local fixed-base operator (FOB), Havasu Air Center. For example, directly in front of Station 6, Triton observed several Bell Boeing V-22 Osprey aircraft (from different branches of the military) being simultaneously refueled by fuel tankers on the tarmac while their engines and turboprops remained running, in what is called "hot refueling" Other military aircraft, including fighter jets, helicopters, and multiengine cargo aircraft also routinely refuel at this airport.

Triton understands that this method of refueling military aircraft occurs almost daily, and, according to LHCFD personnel, this procedure introduces increased risk of fire or injury—especially when simultaneous hot-refueling operations of multiple aircraft is conducted.

Triton was unable to determine if the contract between the FOB and DLA identified any fire protection services requirements that would impact LHCFD operations. Hot refueling of aircraft requires a high degree of safety awareness and adherence to special fueling procedures and ground operations.

ARFF Operations

The Lake Havasu City Fire Department houses and deploys a fully equipped Aircraft Rescue & Fire Fighting (ARFF) apparatus (and Type 1 engine) at Station 6. According to the Airport Master Plan, the ARFF unit meets the federal fire apparatus requirements for an Index B airport. However, according to the City's most recent Airport Master Plan, the airport does not maintain ARFF certifications for LHCFD ARFF equipment or Station 6 personnel. According to LHCFD, six operations personnel are trained in ARFF operations.

The Station 6 structural Type 1 engine responds from the airport terminal side, and the ARFF engine responds from the aircraft operations side of the complex. The crew cross-staffs the apparatus, and almost all of the incident response activity occurs off airport property to incidents in their first response territory and the rest of the City. The Service Delivery section of the report provides detail on the emergency response history for Station 6.

The Station 6 crew and apparatus respond to aircraft incidents at and around the airport along with other LHCFD crews and command staff.

ARFF Facility

As mentioned previously in this report, the Station 6 facility revealed that the size of the apparatus bay is too small to efficiently store the assigned apparatus. The apparatus are backed into the bays, and there are only inches of clearance in front of and behind the apparatus, and Triton noted evidence of minor damage to the apparatus as a result of the lack of clearance. The rest of the facility appears in good condition with an adequate size to support the station's programs and crew.

ARFF Training

LHCFD does not send personnel to specialized recurrent annual ARFF recertification training, as the airport operations do not meet ARFF index classification thresholds.

Section II:
COMMUNITY RISK ASSESSMENT

Community Characteristics

Lake Havasu City is located along the western border of Arizona, in Mohave County. The population from the 2020 Census was 57,144, and the median household income was $53,605. The lake was formed when the Parker Dam was constructed in the 1930s and created 450 miles of shoreline. Lake Havasu City was founded in 1963 as the *Lake Havasu City Irrigation & Drainage District* and was officially incorporated in 1978. The area that eventually became Lake Havasu City was developed by Robert McCulloch, who was looking for a location to test his boat engines. He partnered with C.V. Wood to develop the area and targeted people in colder climates. As a result, the population can fluctuate during the year as residents come to the area during the colder months.

The city is the home of London Bridge, which connects the mainland with what was Pittsburgh Point and is now considered an island. The area in and surrounding the city attracts many tourists for watersports, hiking, fishing, boating, golfing, cycling, and off-roading.

Lake Havasu City's climate and its lake are its major assets. It is considered a retirement haven frequented by visitors during the winter months. During the summer, thousands flock to the area to use the water and other recreational opportunities and visit the London Bridge.

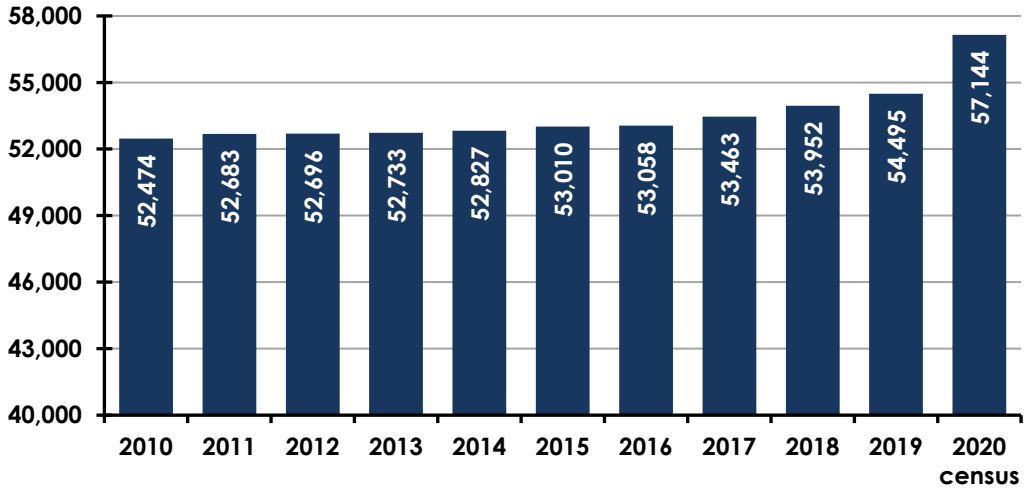
All-Hazards Community Risk Assessment

Population and demographics can influence the type of services provided in a community. Social conditions such as poverty, the locations of high-risk areas, and housing types can impact the service delivery provided by LHCFD.

Population

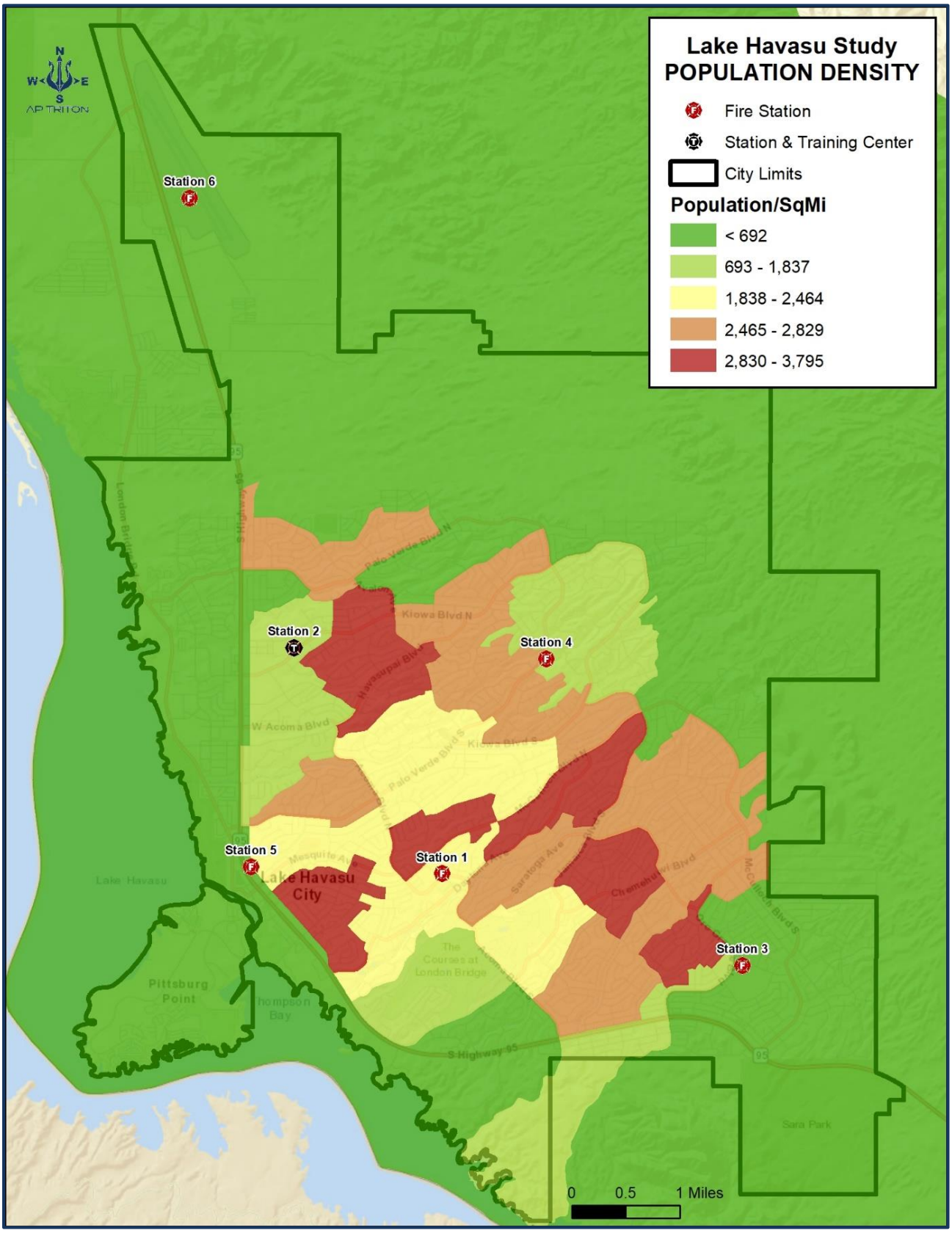
The population of a response area directly affects the number of incidents, and as growth increases, there is an expectation that higher requests for service will occur. The following figure provides the annual population from the 2020 American Community Survey (ACS) 5-year estimates and the U.S. Census for Lake Havasu City. The ACS shows a slow population increase from 2010 to 2016. In 2017, a larger increase began occurring and cumulating with the 2020 Census, where there is a substantial growth in population to 57,144, as shown in the following figure.

Figure 134: Population Growth (2010–2020)



The population density for Lake Havasu City varies, but the highest is in the eastern portion, as shown in the following figure.

Figure 135: Population Density



Demographics

At-Risk Populations

An area's population has residents at a higher risk of fires and other unintentional injuries. When an incident occurs, it affects service delivery for the department. The LHCFD response area is considered urban but has other rural areas, ranging from single-family homes, multifamily apartments, older adult communities, and commercial and recreational areas. NFPA has identified groups with an increased risk of injury or death from a fire, as indicated below.[30]

- Children under five years of age
- Older adults over 65 years of age
- People with disabilities
- Individuals with a language barrier
- People in low-income communities

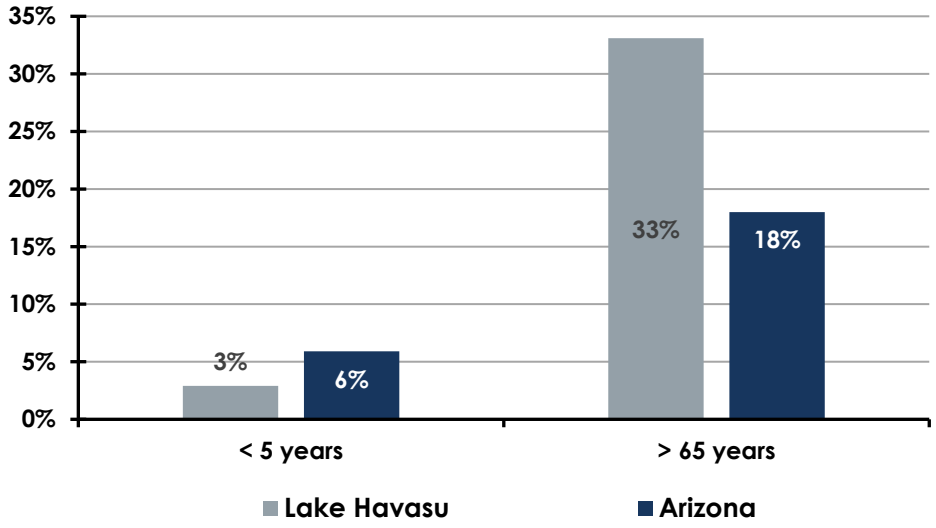
Data from the 2020 U.S. Census American Community Survey 5-year estimates identified several groups in these categories that are more likely to need emergency services, specifically EMS, than other populations.[31]

Age

A person's age in a high-risk population directly relates to increased unintentional injuries and death or injury from a fire. These age risks increase service demand, specifically for older adults needing additional medical care. For example, older adults are 2.6 times more likely to die in a fire than the United States' overall population.[32] In addition, older adults over 65 make up 32.9% of Lake Havasu City's population, much higher than the state's 17.6%; this population requires more medical services as they age. This higher percentage for Lake Havasu City of older adults is confirmed by a median age of 55.5 compared to Arizona at 37.9.

Children under five are at higher risk because of their inability to care for themselves and their need for additional assistance during an emergency. Recent trend data (2018) from the U.S. Fire Administration indicates that increased fire prevention education lowered this age group's relative risk of dying in a fire by 30% in the last ten years. The percentage of children under five is 3.3%, which is lower than Arizona's at 6.0%.

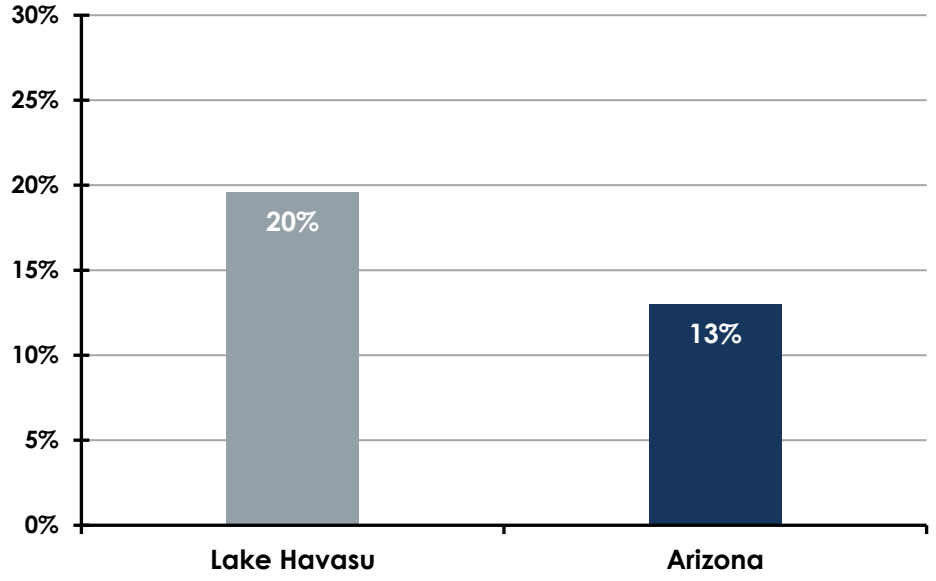
Figure 136: Percentage of At-Risk Populations



Disabilities

The residential population with disabilities is 19.6% in Lake Havasu City is higher compared to the state at 13%. This population group may be unable to self-evacuate a building during an emergency or need additional medical services because of their disability. This may create additional demand for medical services, specifically as they age. The following figure depicts the percentage of households with a disability.

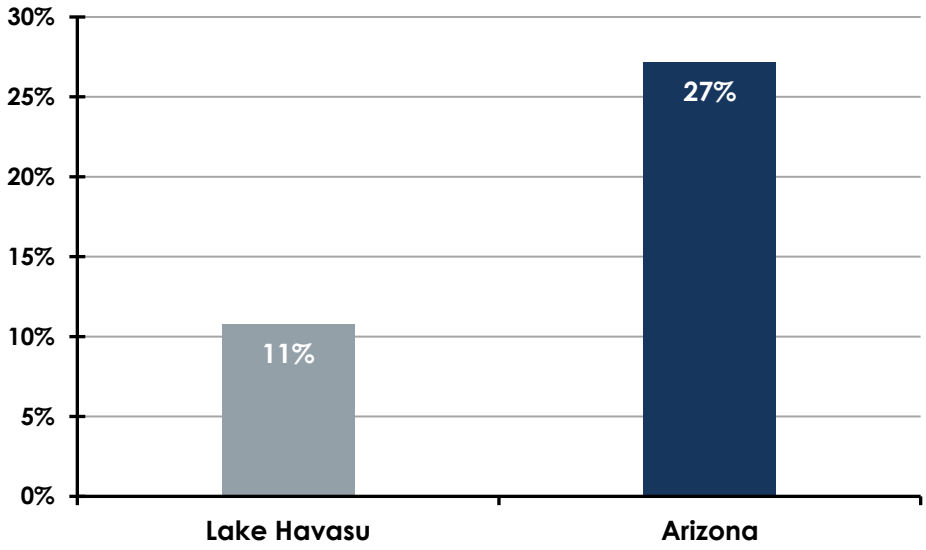
Figure 137: People with Disabilities



Language Barriers

LHCFD may encounter someone who needs another type of communication. The number of people over five speaking another language than English is approximately 11%, substantially lower than the state at 27%. This population may not understand smoke alarm technology designed to provide early warning during a fire, increasing the risk of injuries or death in their home.

Figure 138: Language Barriers

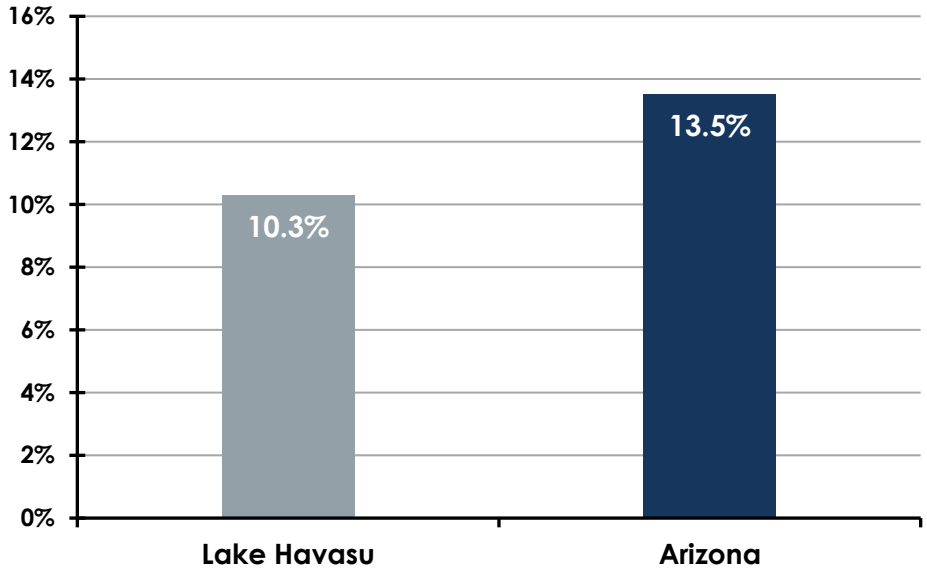


Poverty & Income

The lack of high incomes increases the risk of fires and medical illnesses. Factors may include the inability to receive adequate medical services because of no health insurance, thus unable to pay, and the condition of their housing.

People living below the poverty level are considered at the highest risks when combined with other factors such as education levels, disabled, or unable to work. The COVID-19 pandemic has adversely affected these families because schools were closed and childcare was unavailable. In addition, low income can lead to higher mental health impacts. A report from the World Economic Forum states that depression and anxiety are nearly three times as likely in people with low incomes. The median household income of $55,887 is substantially lower than the state's $61,529. The following figure provides the percentage of households in poverty.

Figure 139: Population in Poverty

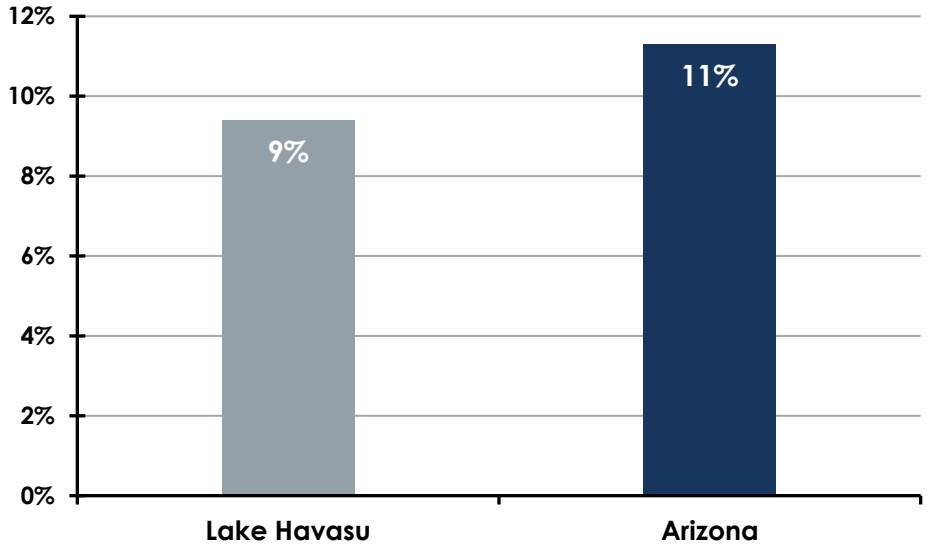


Additional Demographics

Persons without Health Insurance

Populations without adequate health care can burden service delivery and increase the rate of medical incidents. In addition, a lack of health insurance may affect lower-income populations at a higher rate since they cannot pay for medical visits. For example, 9% of the population between ages 0–64 are without health insurance in Lake Havasu City, compared to 11% in the state. The following figure provides the percentage of people between 0–64 with no health insurance.

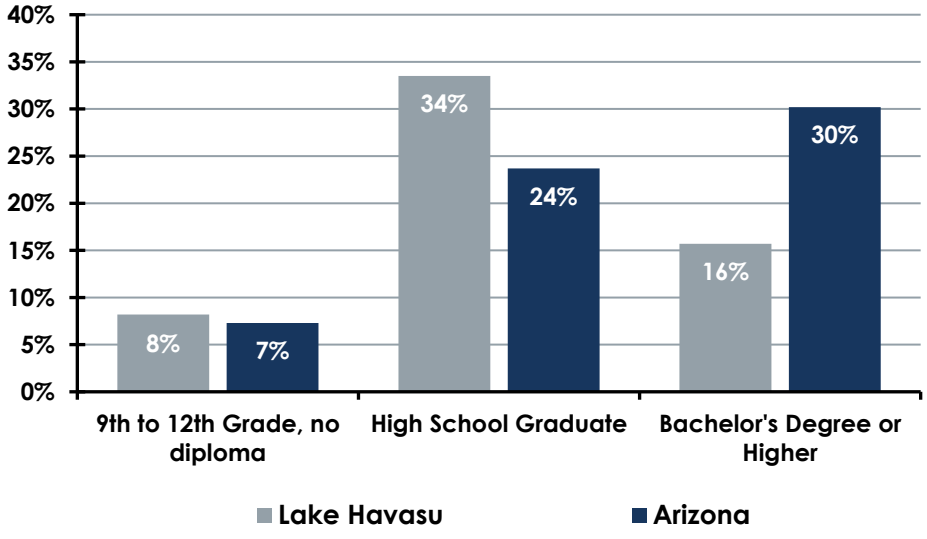
Figure 140: Percentage of People without Health Insurance (0–64 Years of Age)



Education Levels

Educational attainment is not considered one of the at-risk populations but is recognized as another risk group when developing fire and life safety education programs. In Lake Havasu City, 8% of the population does not have a diploma compared to 7% of the state, while 34% have at least a high school diploma. Additionally, 16% have a bachelor's degree or higher compared to the state at 30%. This group may fall into other categories, such as lower incomes and no health insurance. The following figure provides information on the levels of education in Lake Havasu City.

Figure 141: Education Levels



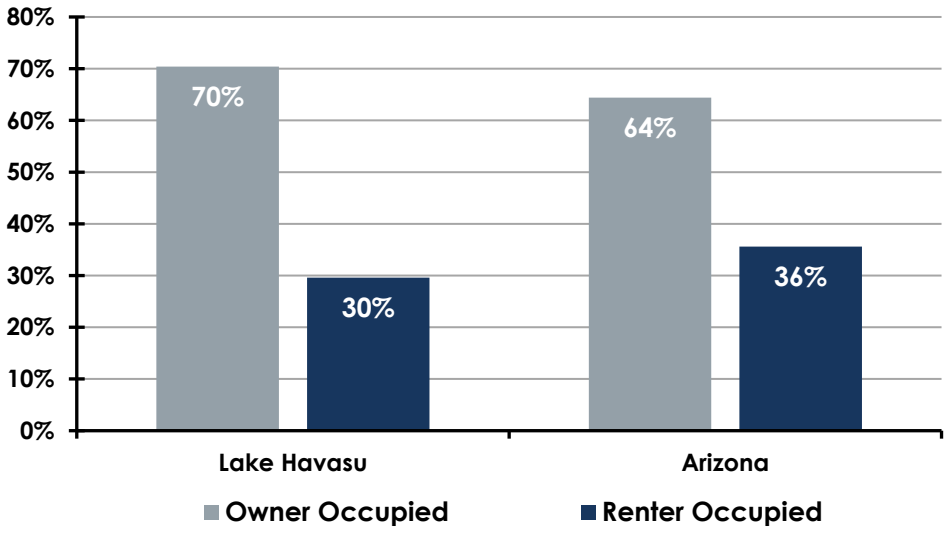
Housing Characteristics

Lake Havasu City has approximately 35,410 housing units, while 9,392 are vacant. The vacancy rate is high because many homeowners reside in Lake Havasu for only a part of the year. The housing types vary in a community and can provide insight into ownership, the age of the home, and the number of units in the building. Vacant structures can pose a risk to the fire department and community if the building is not secured to prevent entry. If the building is not maintained, the structural integrity can degrade and present problems during a fire. Vandalism may create additional problems for the fire department and law enforcement.

Housing Ownership

Homeownership in Lake Havasu City is 70% compared to the state at 64%. The following figure shows the percentage of owner and rented occupied housing in Lake Havasu City and the State of Arizona.

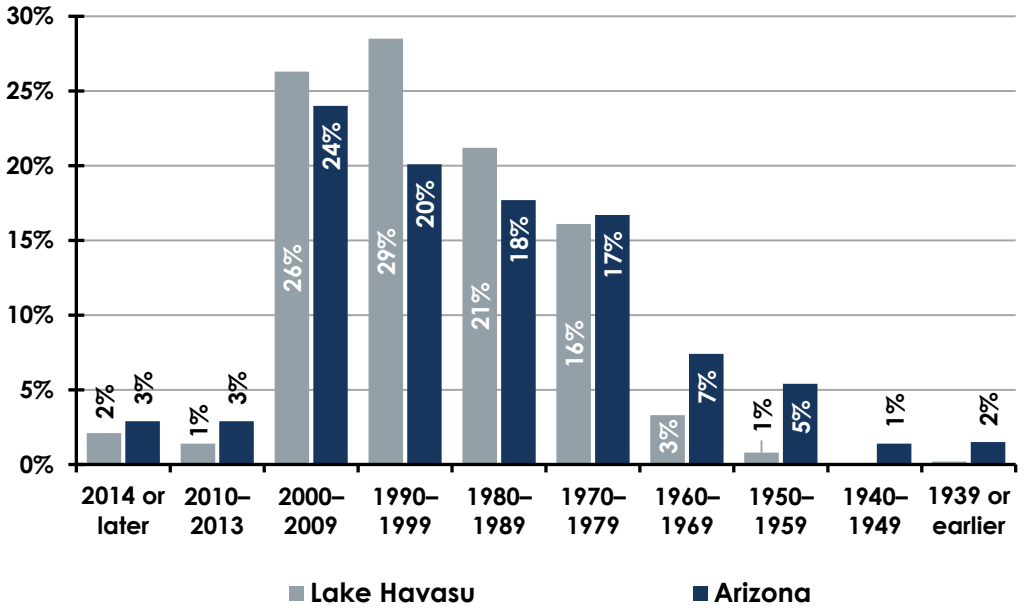
Figure 142: Home Ownership



Age of Housing

As buildings age, the cost of maintaining the structure increases over time. Therefore, homes built before smoke alarm installation requirements create a higher risk if none are present. Although the number of homes built before 1980 is 20%, they still pose a risk if working smoke alarms are not present. The following figure provides the age of housing by decade.

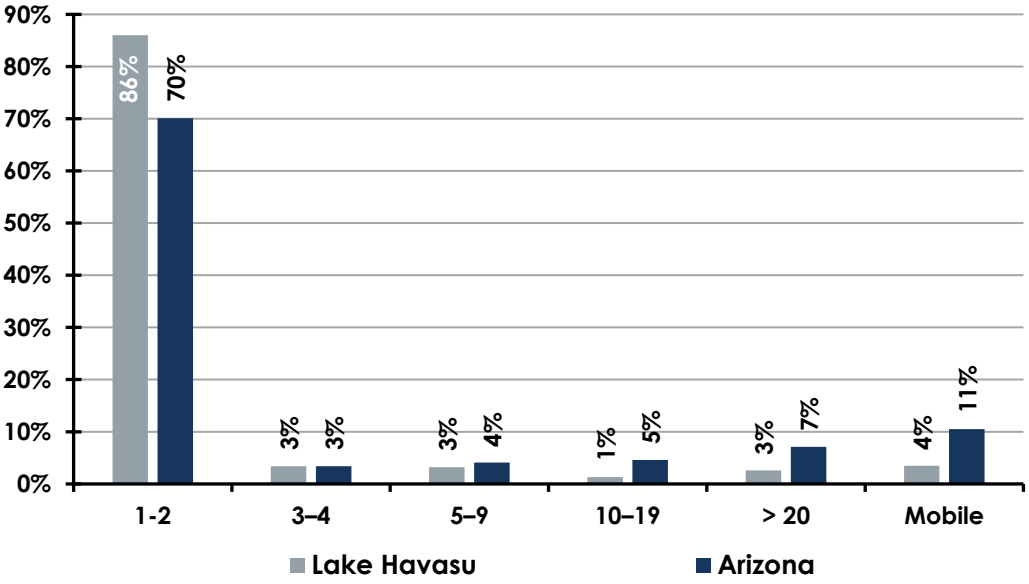
Figure 143: Age of Housing



Housing Units

The number of people living in one- or two-family dwellings is 86% compared to the state at 70%. This high percentage is reflective of homeownership. The following figure lists the percentage of housing units per building.

Figure 144: Housing Units per Building



Risk Classification

Risk Assessment Methodology

Developing a score to determine risks in a community is necessary to provide an organization with a method for creating response protocols for an incident. The Three-Axis Heron model establishes a score by reviewing probability, consequence, and impact factors and assigning a score between 2–10 in each category.[33] A description of the incident types for each risk is located in Appendix A.

Use of the Three-Axis Heron Formula includes the following equation:

$$Risk = \sqrt{\frac{(C \cdot P)^2}{2} + \frac{(P \cdot I)^2}{2} + \frac{(I \cdot C)^2}{2}}$$

The risk is graphically illustrated through a three-axis model as follows:

- **P** = Probability (Y-Axis)
- **C** = Consequences (X-Axis)
- **I** = Impact (Z-Axis)

When developing the score, it should be recognized that each of the three scoring components is based on LHCFD incident data.

Probability

Probability is the likelihood of an incident occurring in the community over time. It can range from a rare event to one that occurs often. This axis reflects the probability of a particular incident occurring (contributing to the risk level). Many factors include the time of day, location, hazards present, the season of the year, building construction and maintenance, demographic factors, and more. The following figure defines the score, category, and probability or likelihood of occurrence during an incident.

Figure 145: Probability or Likelihood of Occurrence

Score	Category	Probability or Likelihood
2	Minor	Unlikely: < 0.02% of total call volume. Expected to occur very rarely
4	Low	Possible: 0.02%–0.07% of total call volume. Expected to occur rarely
6	Moderate	Probable: 0.07&–0.3% of call volume. Expected to occur monthly
8	High	Likely: 0.3%–2% of call volume. Expected to occur multiple times weekly
10	Extreme	Frequent: > 2% of call volume. Expected to occur one or more times daily

Consequence

The consequence of an incident can vary from minor casualties to severe impacts that may destroy historical or major facilities in the community and create a significant loss of employment or life.

Figure 146: Consequence to the Community

Score	Category	Consequence to the Community
2	Minor	1–2 people affected (injuries/deaths). < $10,000 loss
4	Low	< 5 people affected (injuries/deaths). < $500,000 loss
6	Moderate	5–50 people affected (injuries/deaths). $500,000–$1,000,000 loss
8	High	50–100 people affected (injuries/deaths). $1,000,000–$5,000,000 loss
10	Extreme	> 100 people affected (injuries/deaths). > $5,000,000 loss

Impact

The third factor in determining the risk is the fire department's impact and the critical tasking needed to control or mitigate an incident. This includes the number of emergency responders and apparatus available internally or from external agencies. It measures the department's ability to respond to a given risk or incident while providing service to the remaining parts of the service area.

Figure 147: Impact on Operational Forces

Score	Category	Impact on Operational Forces
2	Minor	≥ 90% Remaining Apparatus/Crews
4	Low	≥ 75% Remaining Apparatus/Crews
6	Moderate	≥ 50% Remaining Apparatus/Crews
8	High	≥ 25% Remaining Apparatus/Crews
10	Extreme	< 25% Remaining Apparatus/Crews

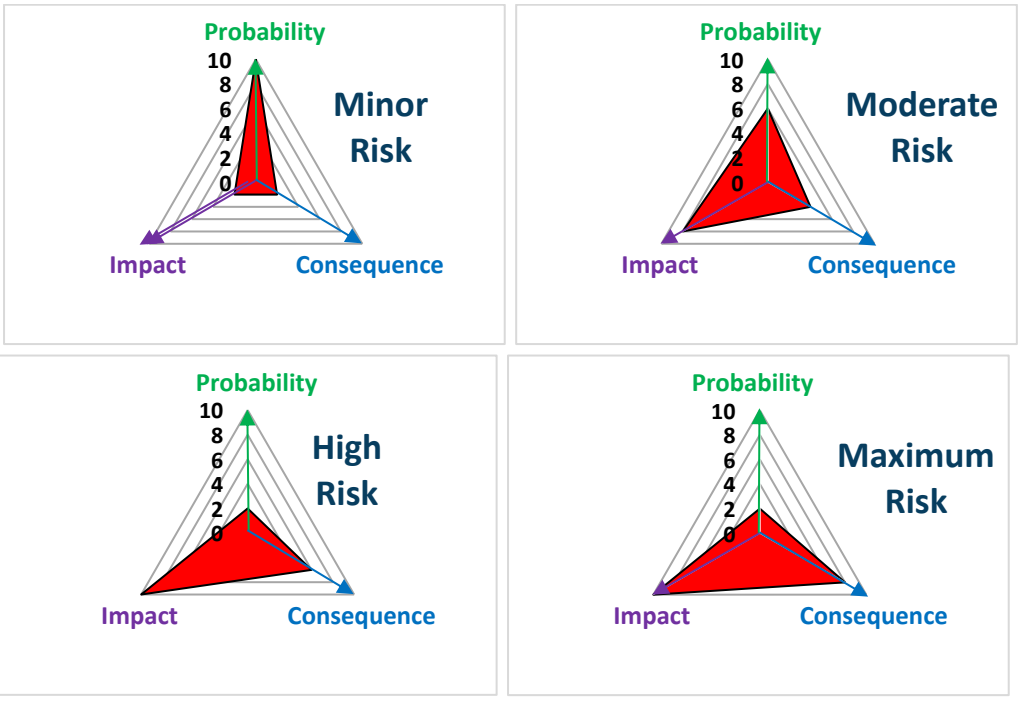
Fire Response

LHCFD is the primary provider of prevention or mitigation of fire-related incidents in its community. These range from low-risk incidents such as a vehicle fire to a maximum risk for a fire involving a school. Fire risks for a vehicle fire are considered low compared to a maximum risk for a school that houses students. This scoring is applied to four different types of fire incidents in LHCFD to provide staffing needs to meet critical tasks on the fire ground. The following figures provide the risk score and classifications assigned to each type of fire risk in LHCFD's service area.

Figure 148: Fire Response Risk Assessment

Description	Low			Moderate			High			Maximum		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	10	2	2	6	4	8	2	6	10	2	8	10
Score Assigned	20.2			44.2			45.5			59.4		

Figure 149: Fire Risk Classifications



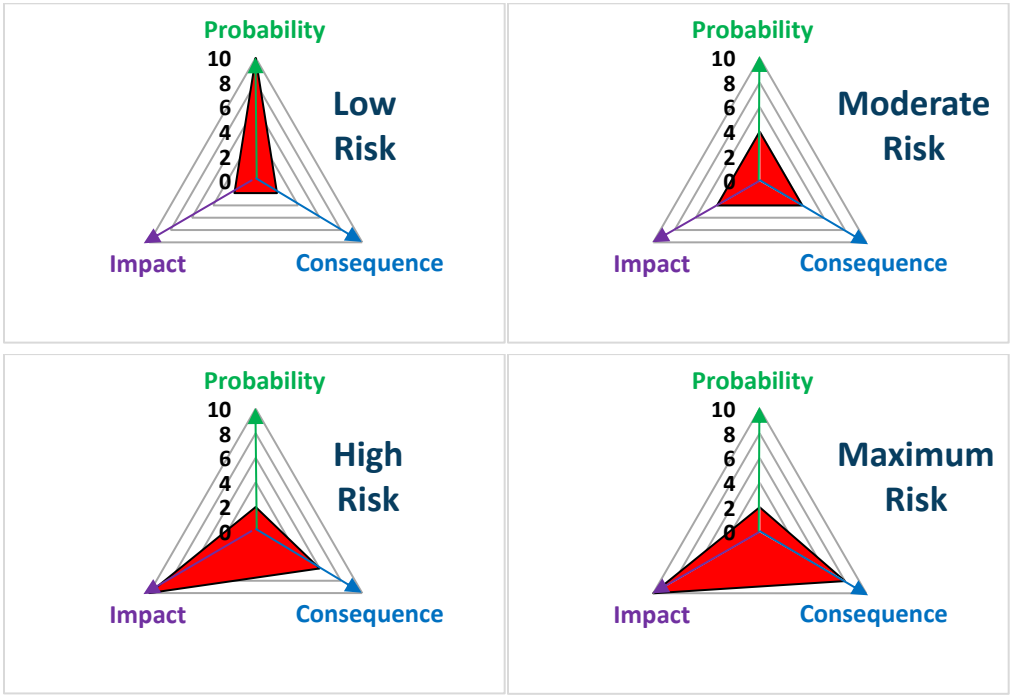
Emergency Medical Services Response

LHCFD provides basic and advanced life support emergency medical care in its service area, and AMR provides transport services. Low-risk incidents range from a medical assist to a maximum for an active shooter. The following figures provide the risk score and classifications assigned to each type of EMS risk in LHCFD.

Figure 150: EMS Response Risk Assessment

Description	Low			Moderate			High			Maximum		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	10	2	2	4	4	4	2	6	10	2	8	10
Score Assigned	20.2			19.6			45.5			59.4		

Figure 151: EMS Risk Classifications



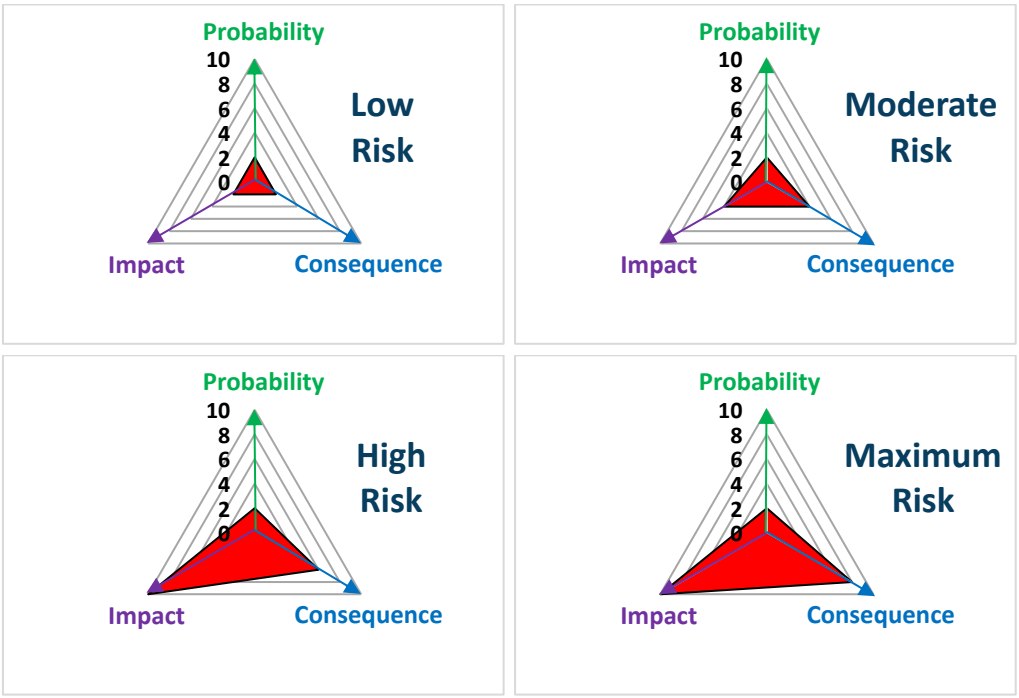
Technical Rescue Response

Rescue services can vary from a low-risk incident, such as accessing a locked vehicle with a child inside, to a confined space incident (maximum) that potentially requires many personnel to mitigate the incident. The following figures provide the risk score and classifications assigned to each type of technical rescue risk in LHCFD's service area.

Figure 152: Technical Rescue Response Risk Assessment

Description	Low			Moderate			High			Maximum		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	2	2	2	2	4	4	2	6	10	2	8	10
Score Assigned	4.9			13.9			45.5			59.4		

Figure 153: Technical Rescue Risk Classifications



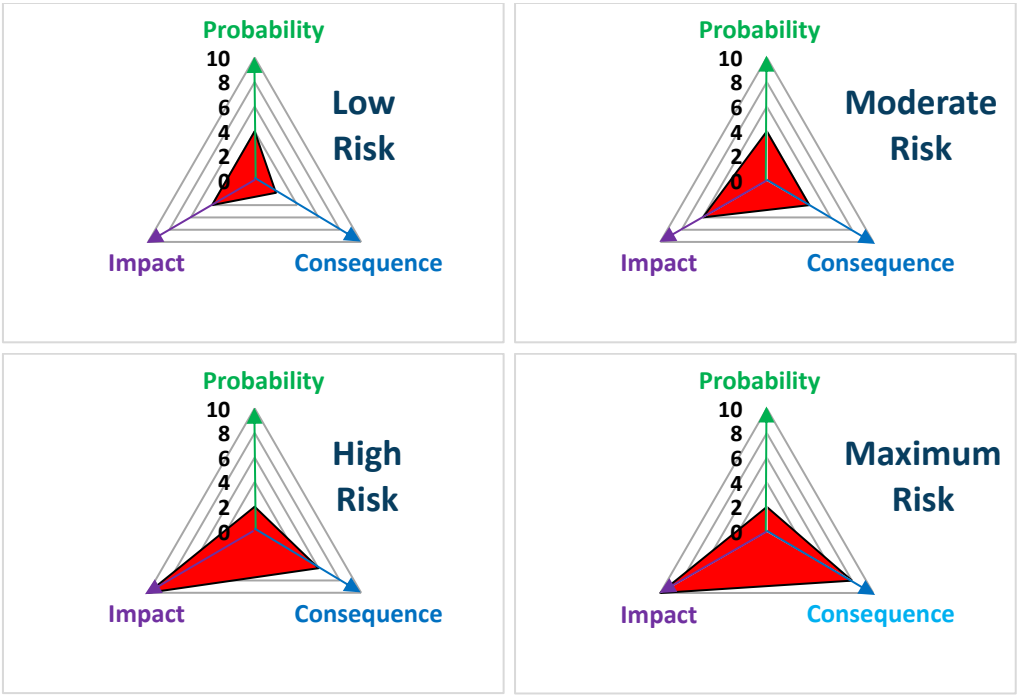
Hazardous Materials Response

Hazardous materials responses can vary from low-risk odor investigations to the maximum risk for a fuel tanker fire in higher populations. Most of these incidents can be managed by LHCFD, but higher risks may need assistance from outside resources. The following figures provide the risk score and classifications assigned to each type of hazardous materials risk in LHCFD. The following figures provide the risk score and classifications assigned to each type of hazardous materials risk in LHCFD's response area.

Figure 154: Hazardous Materials Response Risk Assessment

Description	Low			Moderate			High			Maximum		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	4	2	4	4	4	6	2	6	10	2	8	10
Score Assigned	13.9			26.5			45.5			59.4		

Figure 155: Hazardous Materials Risk Classifications



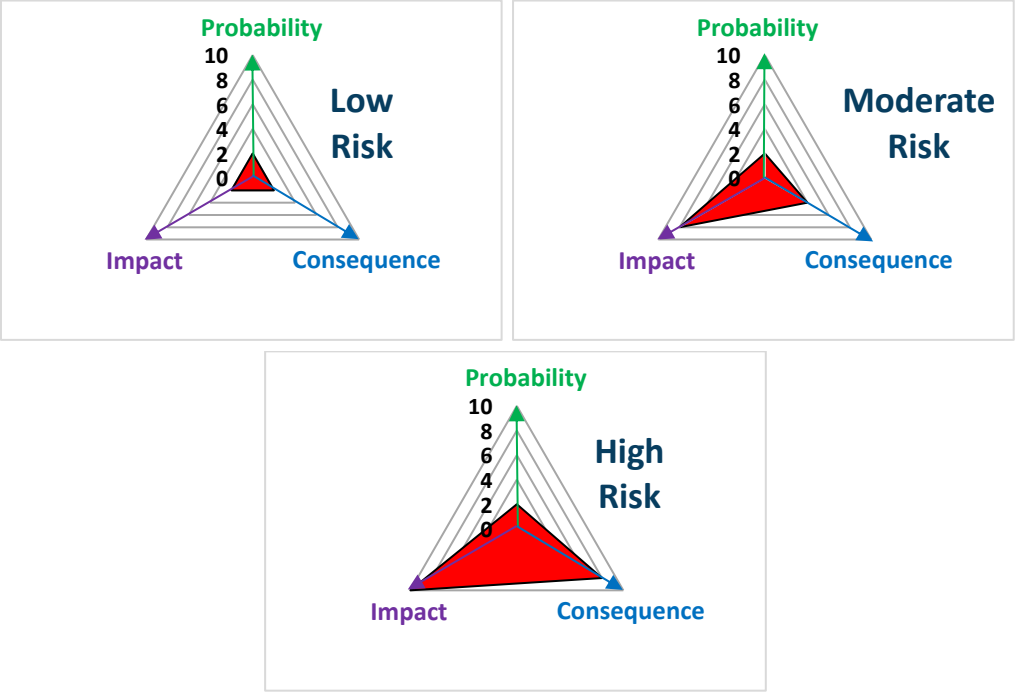
Wildland Fires Response

The types of wildland fire risk vary from small grass to large forest fires requiring many internal and external resources. The following figures provide the risk score and classifications assigned to each type of wildland fire risk in LHCFD's response area.

Figure 156: Wildland Fires Response Risk Assessment

Description	Low			Moderate			High		
Risk Score	P	C	I	P	C	I	P	C	I
	2	2	2	2	4	8	2	8	10
Score Assigned	4.9			25.9			59.4		

Figure 157: Wildland Fires Risk Classifications



Aircraft Rescue & Firefighting

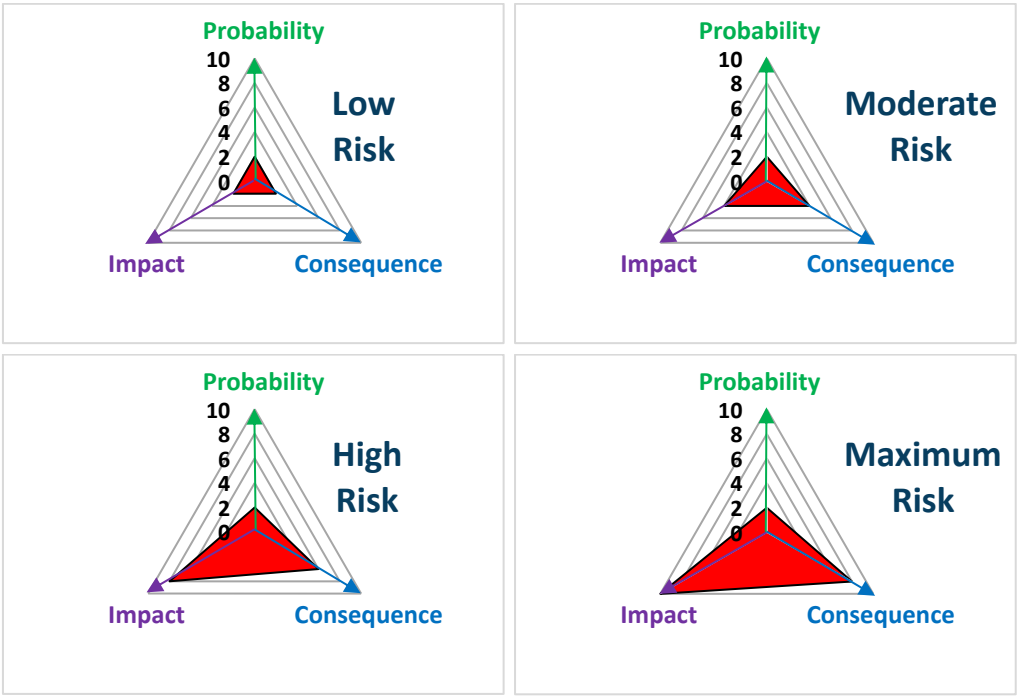
Aircraft emergencies can range from minor fuel leaks to crashes involving multiple casualties or victims. A large incident requires additional internal and external resources to manage the incident. The issue of "hot refueling" military aircraft has been addressed in the Special Operations section of this report, and has the potential for a major incident.

The following figures provide the risk score and classifications assigned to each type of aircraft rescue and firefighting risk in LHCFD's response area.

Figure 158: Aircraft Rescue & Fire Fighting Response Risk Assessment

Description	Low			Moderate			High			Maximum		
Risk Score	P	C	I	P	C	I	P	C	I	P	C	I
	2	2	2	2	4	4	2	6	8	2	8	10
Score Assigned	4.9			13.9			36.8			59.4		

Figure 159: Aircraft Rescue & Fire Fighting Risk Assessment



Physical & Environmental Hazards

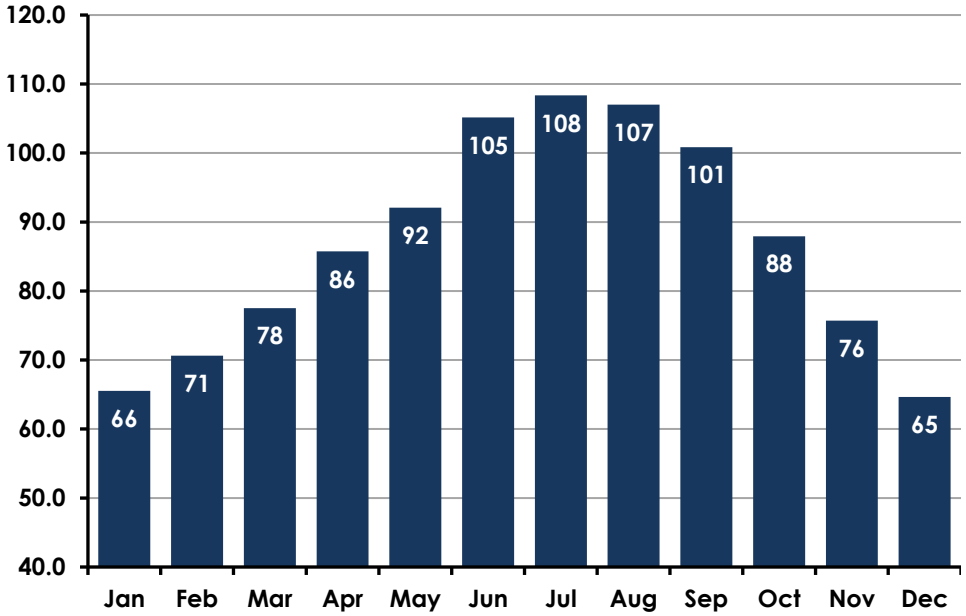
A physical hazard is generally described as a natural disaster or weather event that affects the community. The event may last a few hours or extend for a lengthy period, such as a heatwave or drought. The National Weather Service (NWS) issues watches, warnings, or advisories for these hazards when conditions exist or are in the immediate forecast.

Weather Conditions

Temperature

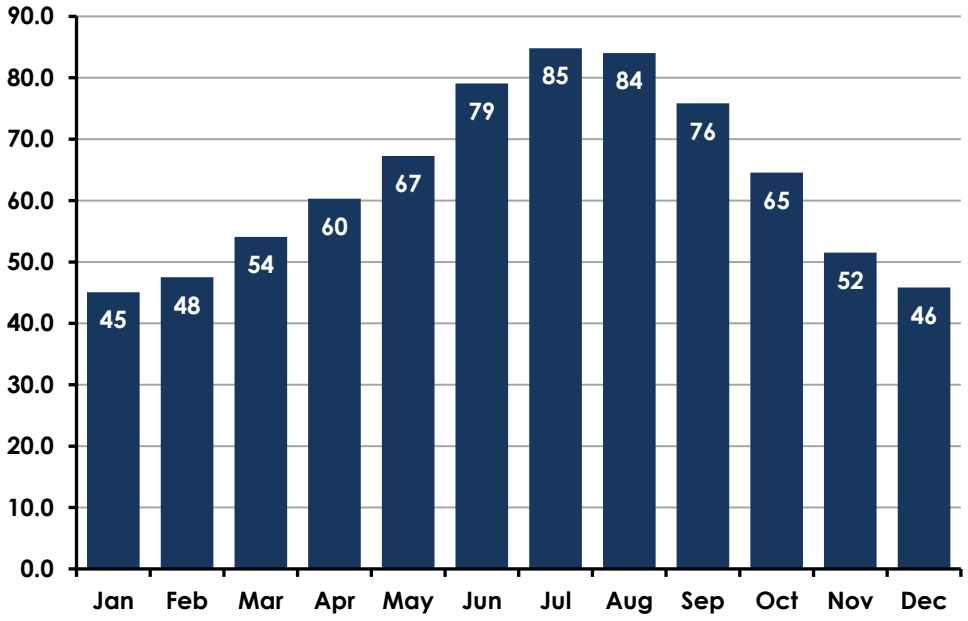
The weather conditions in an area can impact the fire department and the entire community during the year.[34] When temperatures are high, they affect firefighters during extended incident operations and require rehabilitation to prevent heat exhaustion. The average high temperatures range from a low of 65 °F during December to a high of 108 °F in July. The 2022 Mohave County Multi-Jurisdictional Hazard Mitigation Plan (HMP) ranks the probability of extreme heat at 3.25, which is the second-highest in Mohave County, along with Bullhead City and the Fort Mohave Indian Tribe. The following figure provides the average monthly high temperature.

Figure 160: Average Monthly High Temperature



The average daily low temperature occurs in January at 45 °F, and the warmest is during July at 84 °F. The following figure shows the average daily low temperatures.

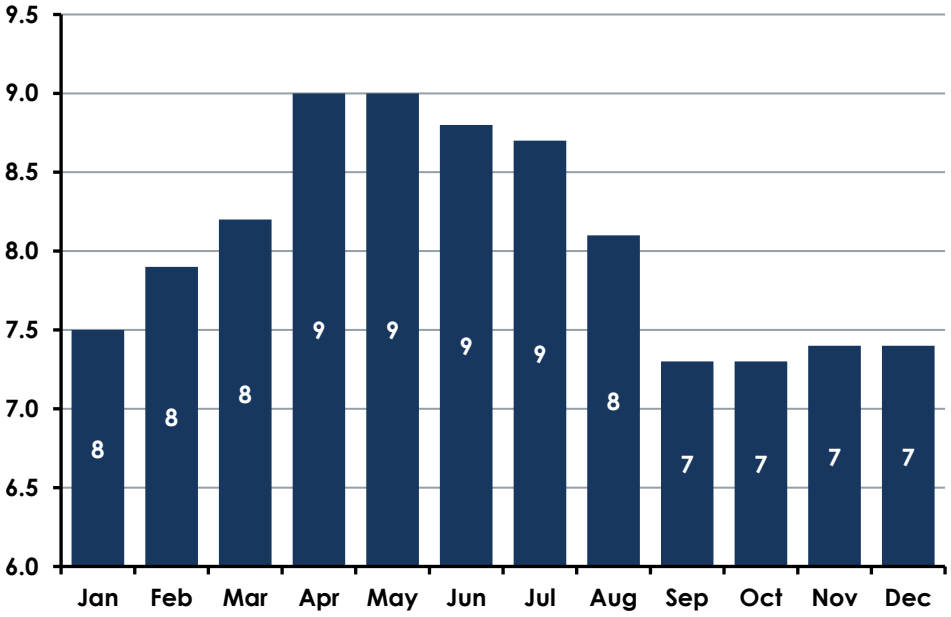
Figure 161: Average Daily Low Temperatures



Winds

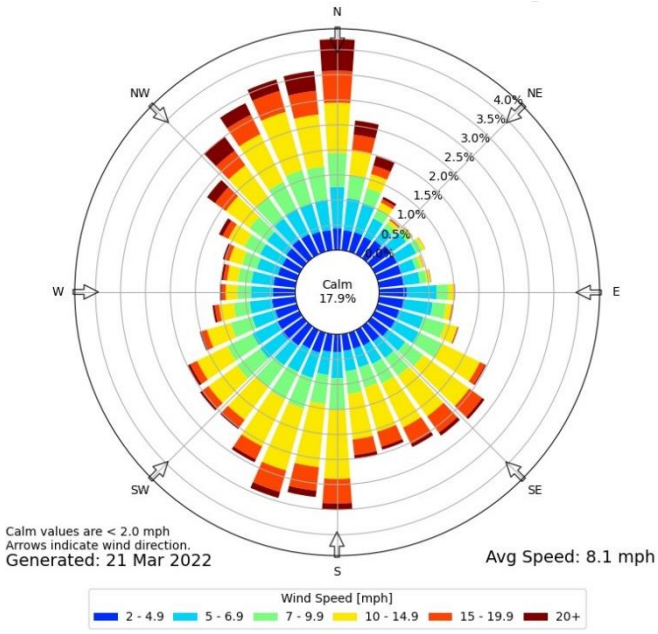
Wind speed and direction influence how LHCFD manages events such as a wildfire or hazardous materials incidents. The 2022 Mohave County Multi-Jurisdictional Hazard Mitigation Plan (HMP) scored severe winds at 2.85, which is slightly less than Mohave County at 3.04. The highest average winds occur between May and August of each year.[35] The following figure shows the average monthly wind speeds.

Figure 162: Average Monthly Wind Speeds



Data from Lake Havasu City Airport shows that the prevailing winds are from the north and northwest from October to March and the south beginning in April through September. The following figure shows that the combined wind rose from 1973 to 2022.

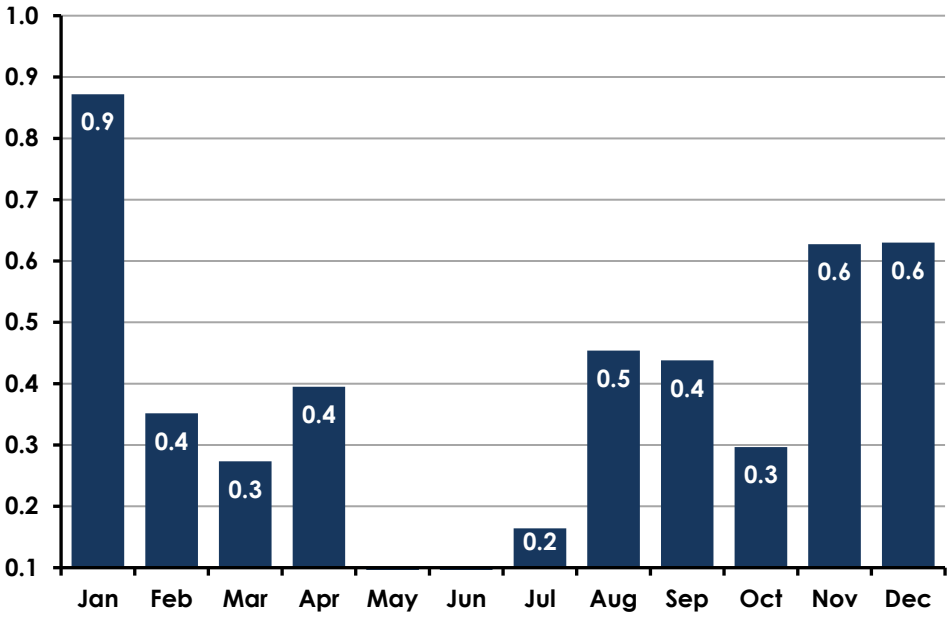
Figure 163: Lake Havasu City Airport Wind Rose (1973–2022)



Precipitation

Precipitation can vary monthly, but little rainfall occurs during the year. The following figure shows the average monthly rainfall between 2010 and 2021. January has the highest average monthly rainfall.

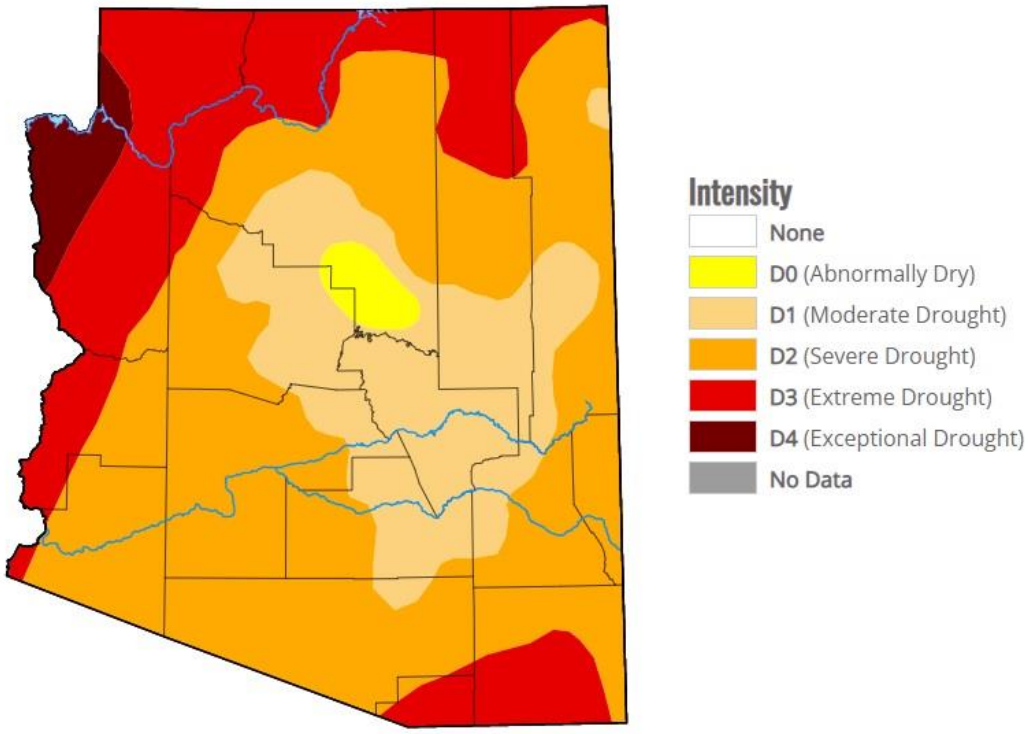
Figure 164: Average Monthly Precipitation



Drought

Because Lake Havasu is in the Mohave Desert, it is constantly in drought conditions. The city receives its drinking water from underground aquifers and is not subjected to Lake Havasu's water levels. The HMP scored a drought at 2.95, and the probability is Highly Likely. The following figure shows the drought conditions as of June 2022.

Figure 165: Drought Conditions[36]



Environmental Hazards

An environmental hazard is an event that can threaten a community and affect the population to include natural disasters. Since 1978 there have been 15 Federal Emergency Management Agency (FEMA) declarations in Mohave County, including major disaster, fire management, and emergency declaration.[37]

Figure 166: Federal Disaster Declarations

Disaster Type	Number
Drought	1
Biological (COVID-19)	2
Fire	3
Flood	4
Severe Storm	4
Hurricane*	1

*Hurricane Katrina Evacuation

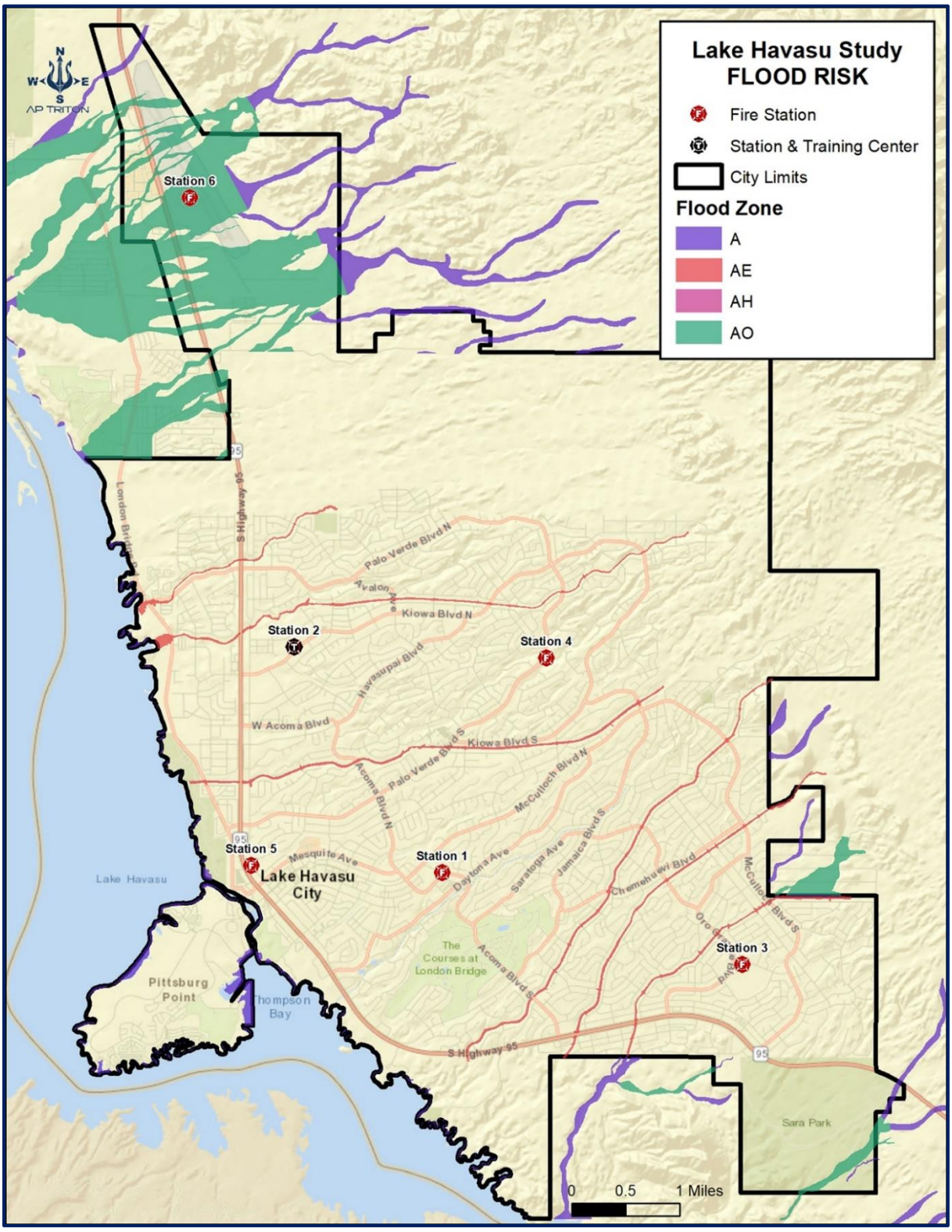
Flooding

The HMP listed flooding as the highest-ranking hazard at 3.4, and the probability is *Highly Likely*. According to FEMA's website, there are "A.E." regulatory floodways and other flood-prone areas in the LHCFD service area. However, no critical facilities are at risk.[38]

- An area classified as an "A" zone is exposed to a 1% chance of a flood event but does not have a "…detailed hydraulic analysis."
- The "A.E." designation is considered Areas subject to inundation by the 1-percent-annual-chance flood event determined by straightforward methods and is further defined as a 26% chance of a flood occurring in 30 years.
- The "A.H." area is subject to inundation by a 1% annual chance of shallow flooding (usually sheet flow on sloping terrain) where average depths are one to three feet. Base flood elevations are determined from detailed hydraulic analyses.
- An "A.O." designation is a location subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone.

The following figure provides the flood risk zones.

Figure 167: Flood Risk



Dam Failure

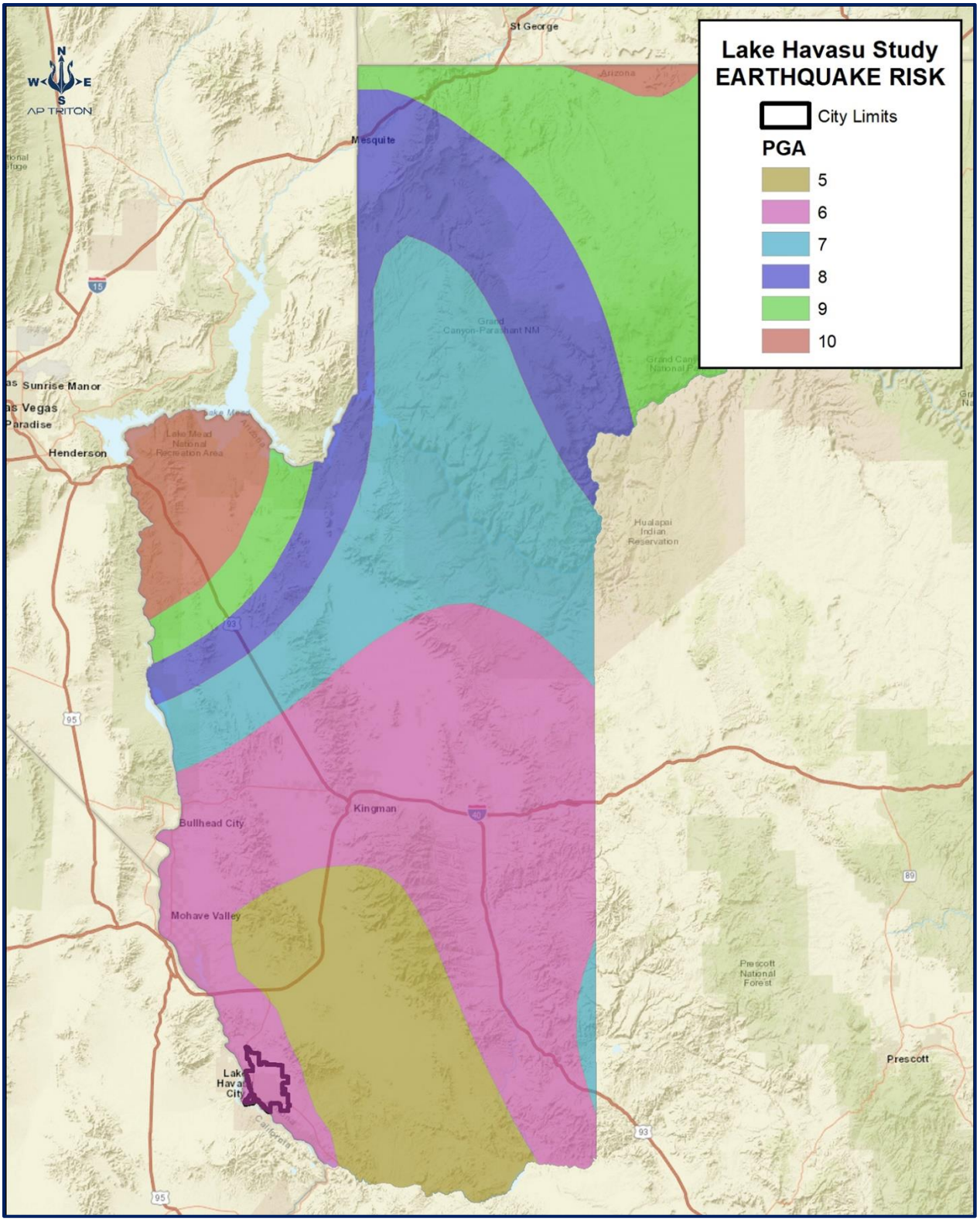
The HMP identified that a potential failure of the Davis Dam north of the city resulted in Lake Havasu City receiving a ranking of 2.8 in the HMP. The area subject to possible inundation includes the shoreline of Lake Havasu City and the island accessed by London Bridge. The probability of a failure occurring is considered a possibility, and the magnitude or severity is critical. The HMP states that two critical facilities are exposed to flooding and approximately 1,484 people and 1,039 buildings from a failure.

Earthquake

The risk of an earthquake is now in the current HMP. Although the risk only received a score of 1.95, and the probability is *unlikely*, it was added after shaking was felt from a 2019 7.1 magnitude earthquake in Ridgecrest, California. The southern end of Mohave County has the least risks compared to the county's northern section. New information from the Arizona Geological Survey and the United States Geological Survey (USGS) caused the county to review potential mitigation efforts to reduce the effect of an earthquake.

The USGS has identified faults on the California side of the Colorado River across from Desert Hills. The California Geological Survey identified the Chemehuevi graben fault, but the mapping certainty is considered poor. The following figure shows the peak ground acceleration.

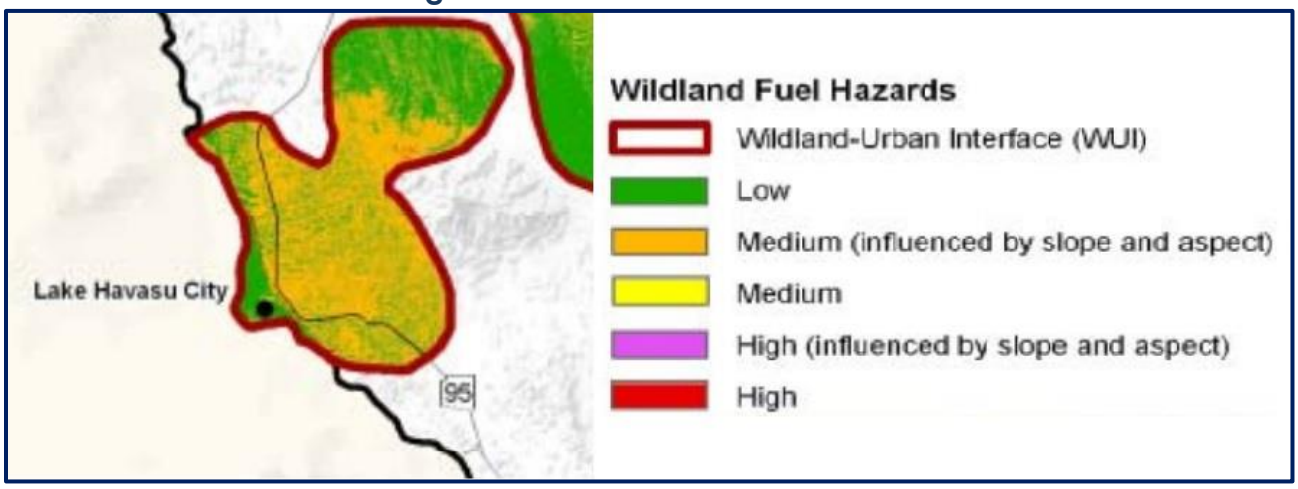
Figure 168: Peak Ground Acceleration



Wildfire

The wildfire risk in Lake Havasu City is considered low and received a score of 1.45 in the HMP. The current Mohave County Community Wildfire Protection Plan (CWPP) was completed in 2008 and did not include any recent growth in Lake Havasu City since the report was developed. The CWPP states that the primary vegetative brush at greatest is Sonoran-Paloverde-Mixed Cacti Desert Scrub and Sonora Mohave Mixed Salt Desert Scrub. The highest risk is associated with Sonoran-Paloverde-Mixed Cacti Desert Scrub but is considered low or medium. The following figure identifies the wildland fuel hazards in Lake Havasu City.

Figure 169: Wildland Fuel Hazards[39]



Land Use & Occupancies

Land Use

The concept of land use regulation is to provide attractive social and environmental outcomes to assist in the management of development efficiently. Land use for a community is designed to classify properties within a geographical area, generally under governmental control. Zoning areas may vary from one portion of the service area with a mixture of low-, moderate- and high-risk properties.

- **Low Risk:** Zoned areas for agricultural purposes, open spaces, low-density residential, and low-intensity use.
- **Moderate Risk:** Areas zoned for medium-density single-family properties, small commercial and office uses, low-intensity retail sales, and similarly sized business activities.
- **High Risk:** High-intensity business districts, mixed-use areas, high-density residential, industrial, storage facilities, and large mercantile centers.

Lake Havasu City's 2016 General Plan is a broad, long-range policy document to guide the future growth of the community. Most development will occur in the original platted area of the City which is surrounded by land that is owned by Arizona State Trust Lands and the United States Bureau of Land Management. As a result, growth is somewhat limited and focuses on infilling and redeveloping existing properties, including the downtown area, Highway 95 corridor, and the Bridgewater channel area. The following figure provides the land use percentages in Lake Havasu City.

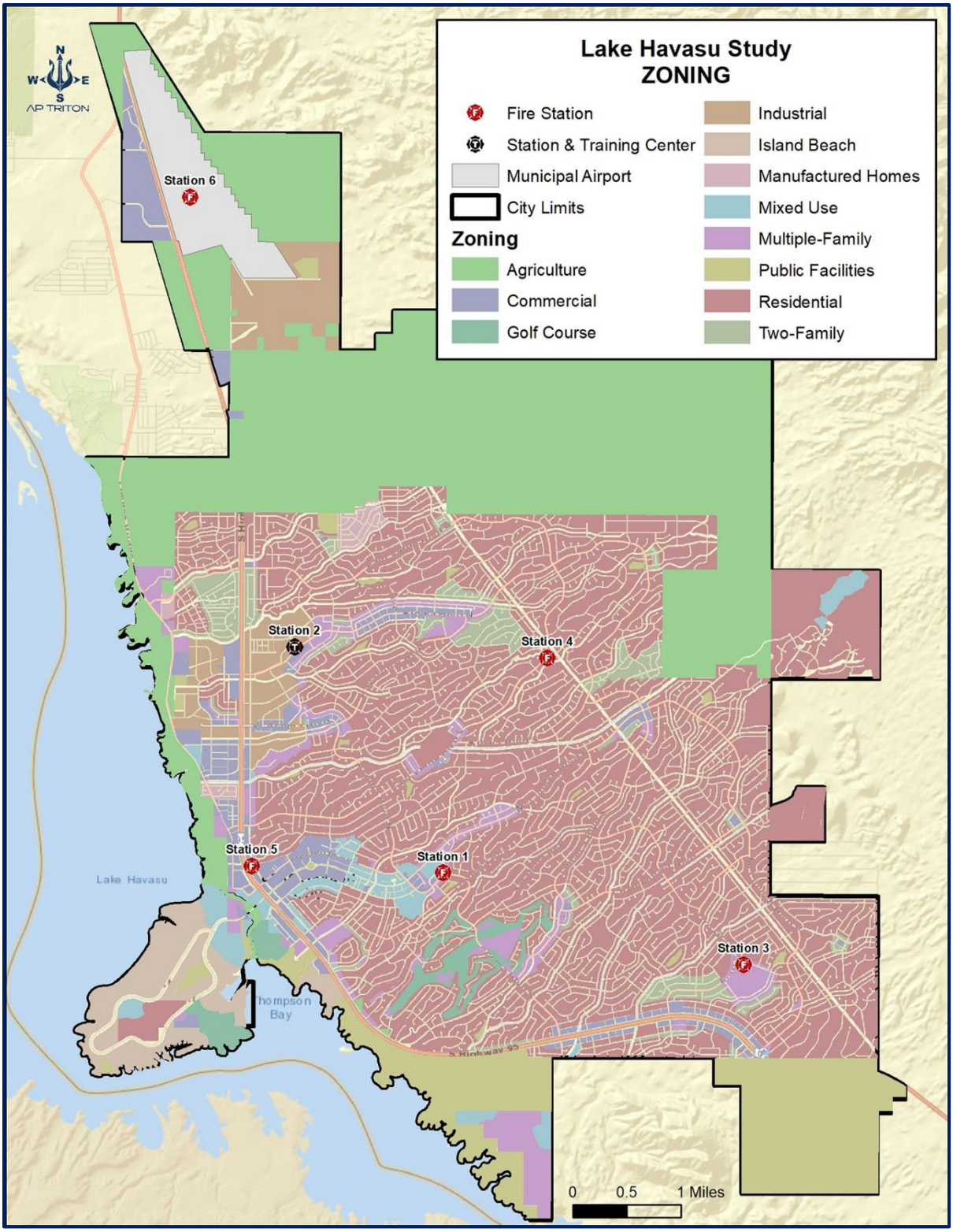
Figure 170: Land Use Percentages

Land Use	Percentage*
Single-Family	42%
Multifamily	7%
Healthcare/Assisted Living	0.5%
Retail/Office	5%
Industrial/Technology/Logistics	8%
Mixed Use	2%
Gov't Infrastructure	9%
Agricultural/Undeveloped	28%

*Percentages rounded to the nearest integer.

Havasu Foothills Estates and Havasu Riviera are two sub-divisions that are currently being developed. Havasu Foothills Estates is located along the Northeast edge of the City limits and Havasu Riviera is located along the Southwest edge of the city limits. Havasu Foothills Estates is approved for approximately 700 residential lots, and about 90% of these lots have final plats. Havasu Riviera's preliminary plat shows approximately 550 residential lots, and about 62% of these lots have final plats. Since the Havasu Foothills Estates and Havasu Riviera developments only have a single all-weather fire apparatus access road, all structures are required to be equipped with automatic fire sprinkler systems. The development of these additional housing units will impact the service delivery of LHCFD. The following figure shows the zoning classifications for Lake Havasu City.

Figure 171: Lake Havasu City General Zoning Types



Occupancies

Commercial occupancies or properties are considered target hazards in every community because of the special or unique risks to emergency responders and the occupants during an incident or event. Fires occurring in buildings can present responding personnel with special or unique problems. Many different types of occupancies may exist in a response area. LHCFD should have a comprehensive pre-incident planning process to develop strategies and tactics during a fire or other emergency. The surveys allow responders to become familiar with the building, property, and special hazards to assist them when making tactical and strategic decisions during an incident.

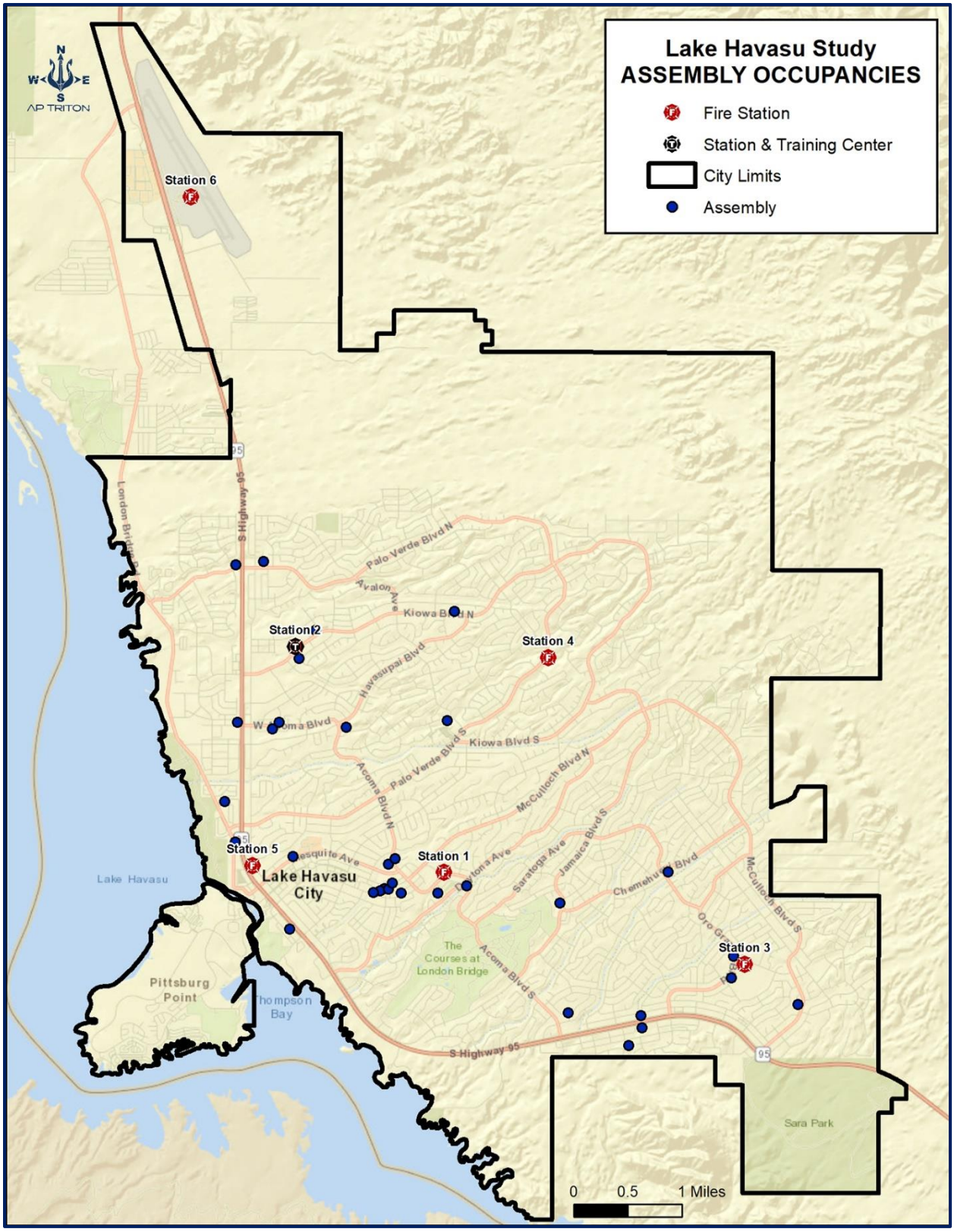
LHCFD is transitioning to a new pre-incident planning software (Blazemark) to improve its process. This new system should include scheduling pre-incident plans for operations staff to ensure they are completed. Like fire inspections, pre-incident plans should have a risk-based approach that prioritizes high-risk occupancies and critical infrastructure.

Assembly

Risks increase when a large group gathers in a single location or building, such as a place of worship, entertainment, or eating establishment. Other special events may include outside festivals such as street fairs or large sporting venues.

These occupancies or outdoor venues may require many responders during an incident if a fire or active shooter incident occurs. Therefore, significant outdoor events should be required to submit a public safety plan. The plan should include emergency vehicle access and egress, fire protection, emergency medical services, public assembly areas, directing of vehicular traffic and attendees, vendor, and food concessions, need for law enforcement, fire or EMS personnel, and weather monitoring. Permits for special events are issued through the city manager's office, and LHCFD participates in the planning process for these events. The following figure indicates the locations of assembly occupancies on LHCFD.

Figure 172: Assembly Occupancies



Educational & Daycare Facilities

Public and private schools and childcare facilities increase risks in any community and require substantial assistance during a significant event, such as a mass casualty or fire response. In LHCFD, numerous schools and childcare facilities require inspections and pre-incident plans to ensure the property is safe and that emergency responders are familiar with the location and site-specific hazards. Daycare facilities pose a special concern because of the children's young age and, in some cases, the inability to evacuate during an emergency. In addition, these facilities require childcare workers to assist small children or physically carry infants when an evacuation is necessary.

The following figures provide the location of educational and daycare occupancies.

Figure 173: Educational Occupancies

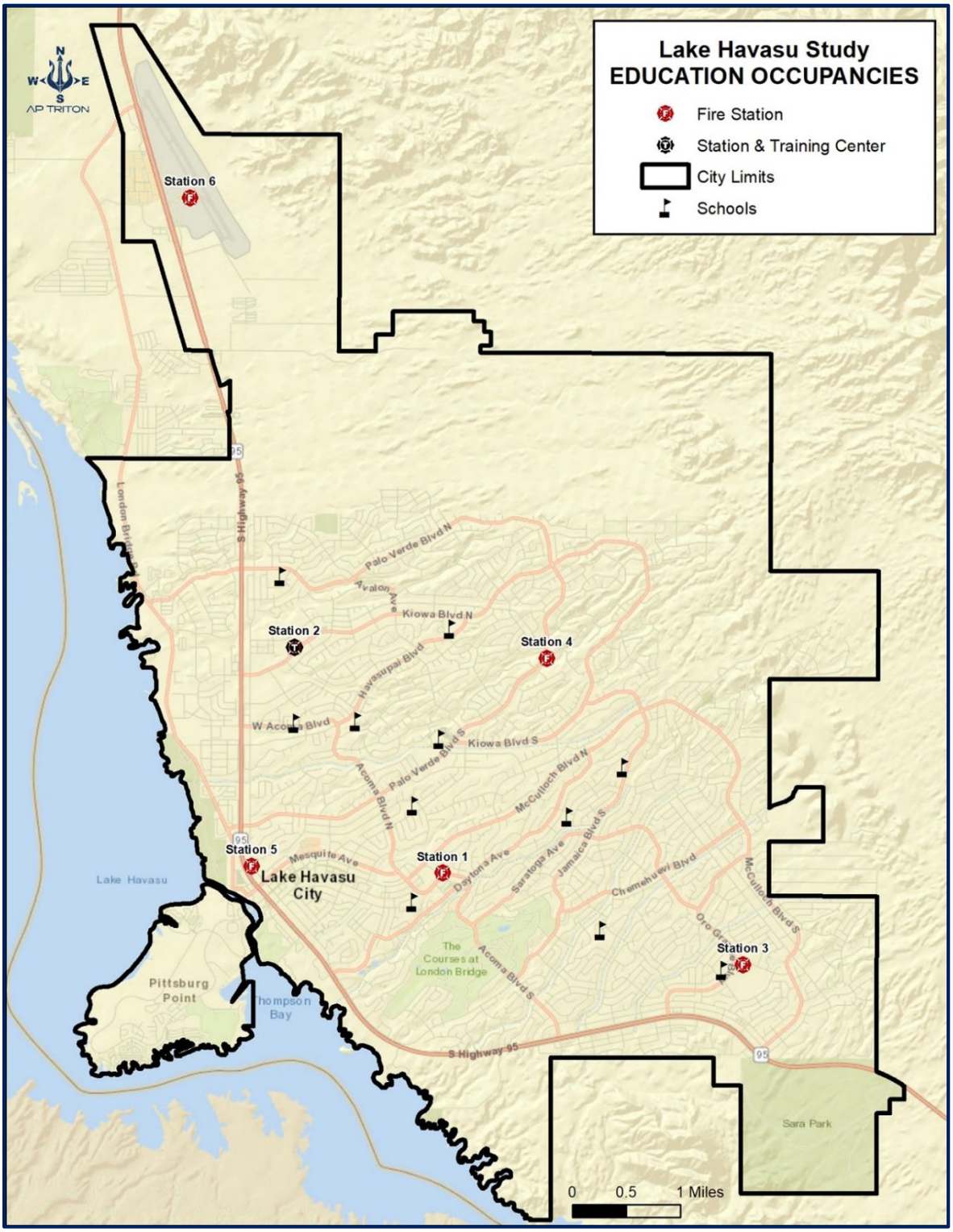
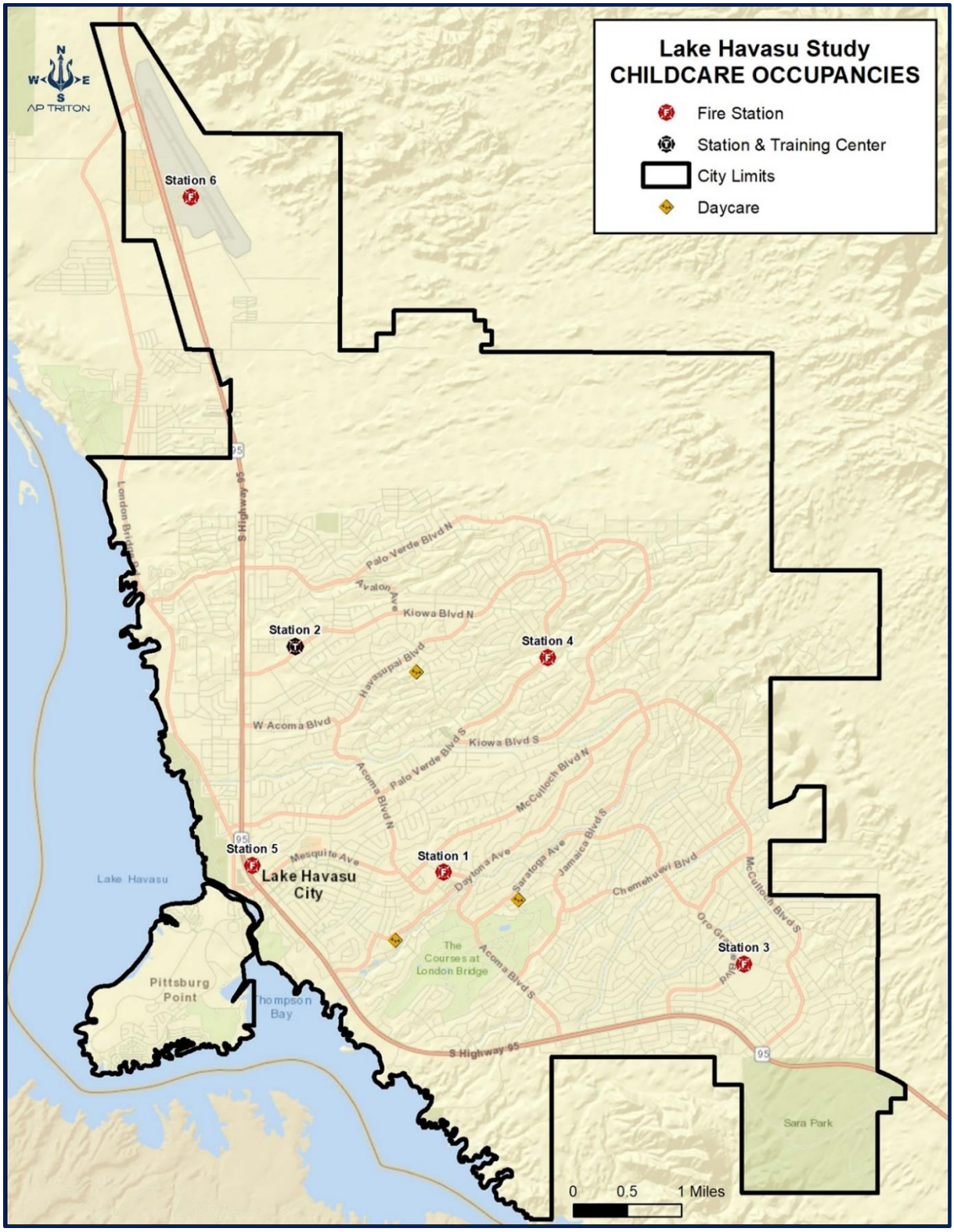


Figure 174: Childcare Occupancies



Hospitals & Medical Facilities

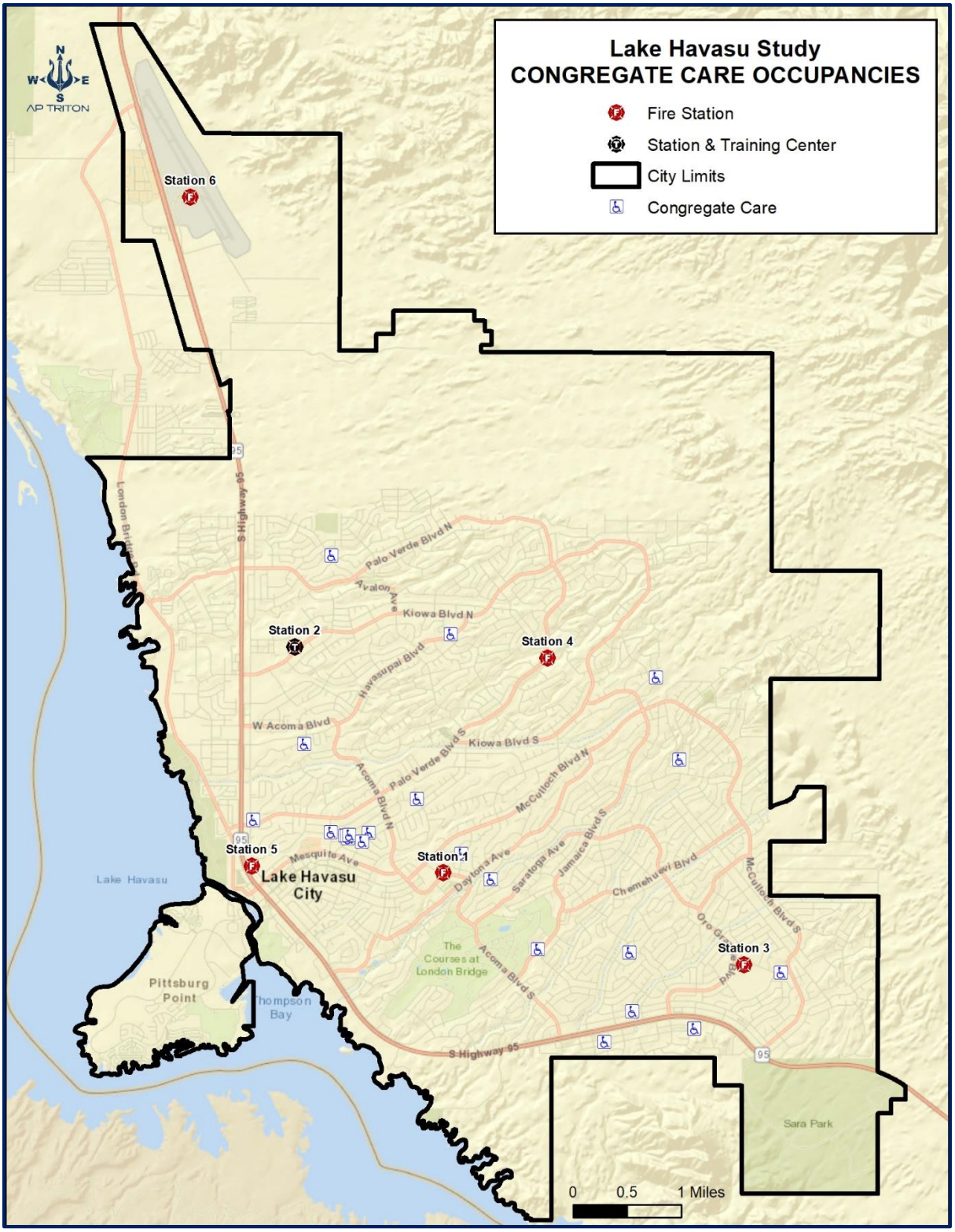
These facilities provide medical care in the community to assist the sick or people seeking medical attention. Hospitals are at a higher risk because of the inability of patients to self-evacuate the facility. These locations require more fire and life safety requirements than medical clinics to enhance the occupants' protection. Other protection includes a fire alarm to notify the occupants of an emergency or a fire sprinkler system to control or extinguish a fire.

Havasu Regional Medical Center is the region's primary medical facility, with 171 beds. The hospital is a Level III trauma center with a 24-hour emergency room and provides numerous healthcare services, including cardiac, cardiopulmonary, imaging, labor and delivery, orthopedics, therapies, and surgery.

Congregate Care Facilities

As people age, additional care may require them to seek a facility to meet their needs. Depending on their mobility or cognitive conditions, they may need more assistance evacuating the building. Staff should have developed plans for removing the occupants or patients during an emergency. These locations require additional fire protection systems to protect the occupants, like a hospital. Special locking arrangements for areas where patients with dementia or Alzheimer's are living are allowed to prevent them from leaving the facility. The following figure shows the congregate care facilities in the LHCFD service area.

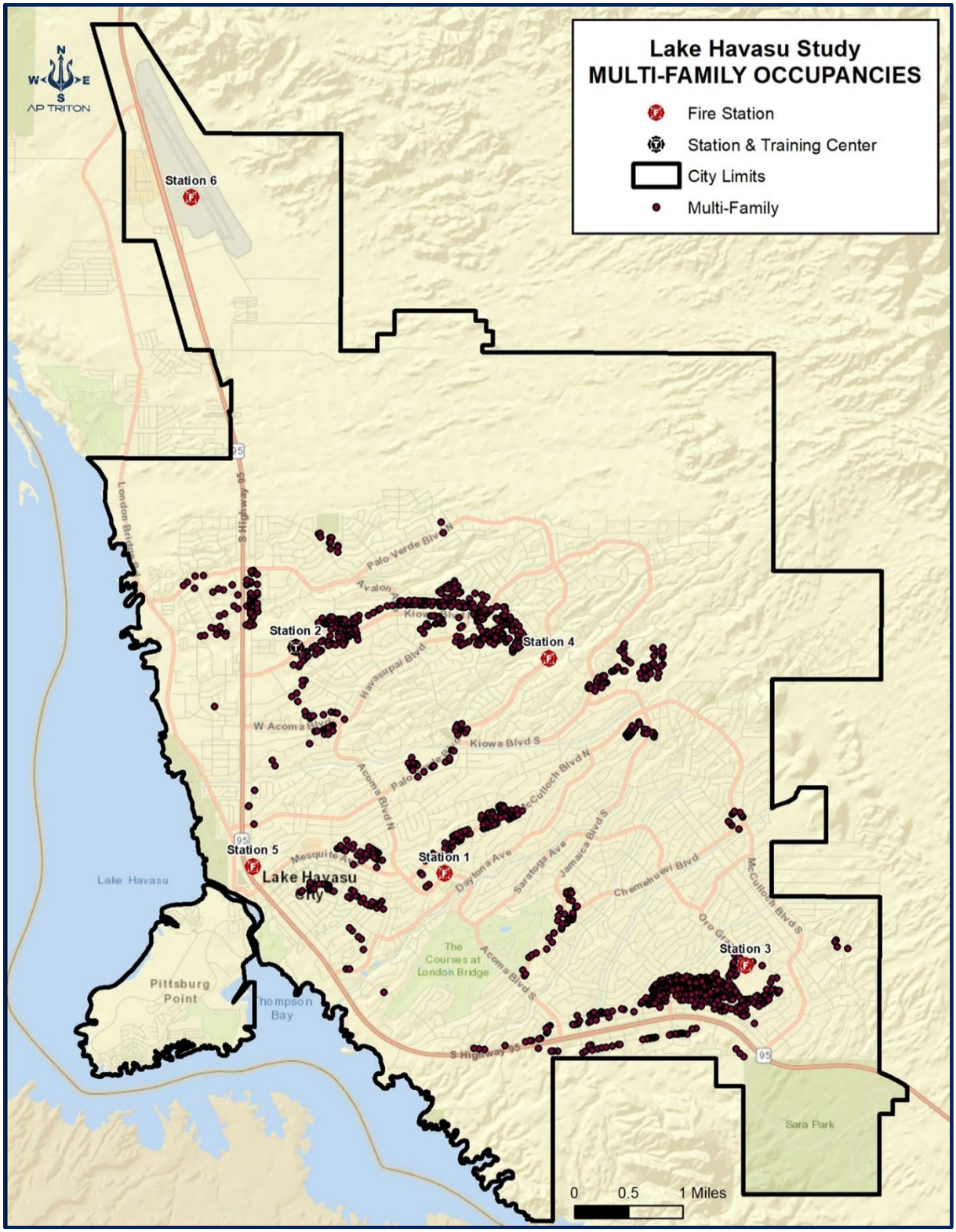
Figure 175: Congregate Care Occupancies



Multifamily

Although multifamily housing has fewer fires caused by electrical or heating malfunctions, the risk of cooking fires is twice the rate of other building fires.[40] Updated building and fire codes now require these buildings to have a residential fire sprinkler system installed and interconnected smoke alarms in all bedrooms, hallways, and floors. These fire protection systems are designed to provide enough time for the occupants to evacuate the building. Lake Havasu City should be commended for its foresight in requiring the installation of sprinklers in residential facilities. The following figure provides the locations of multifamily housing.

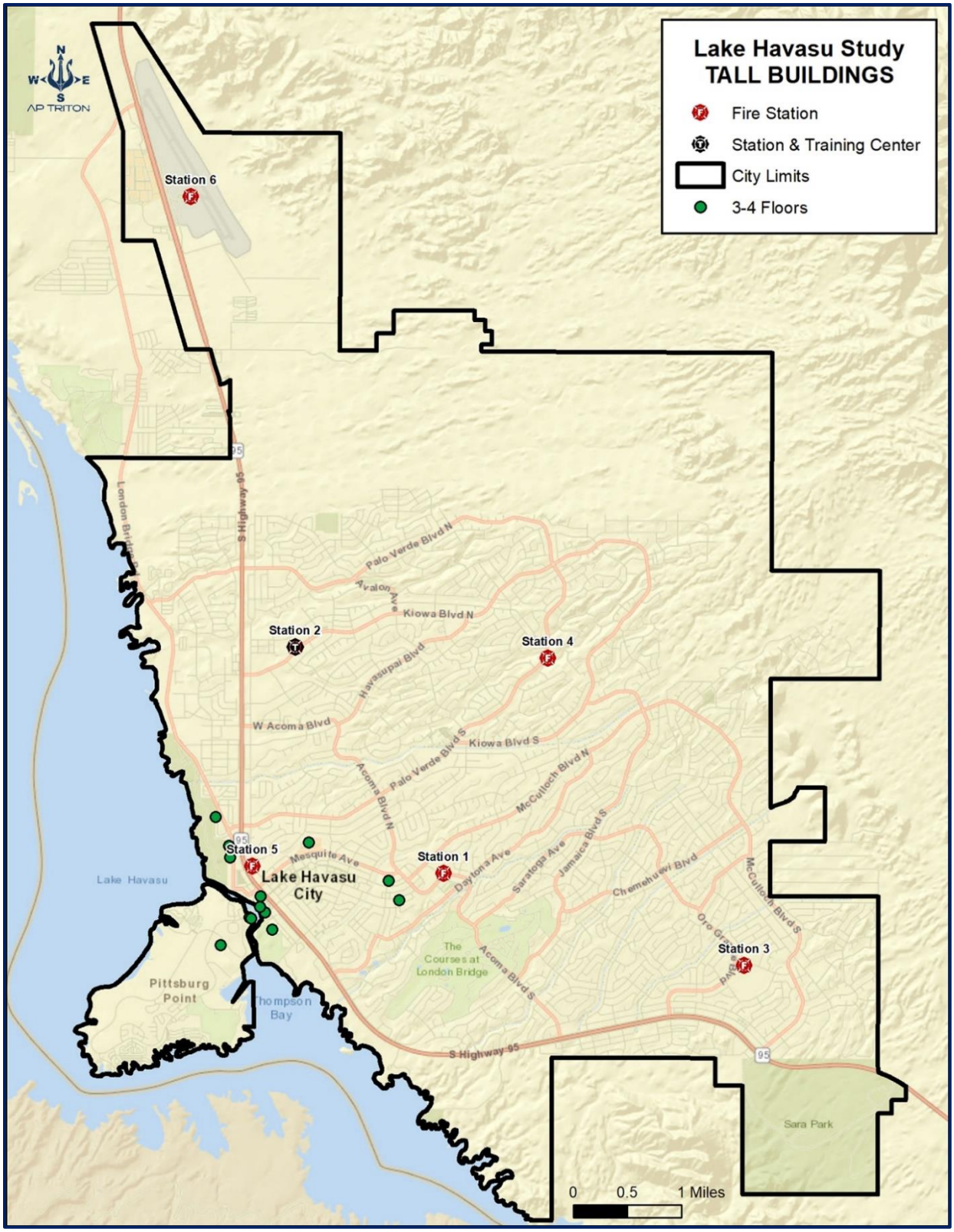
Figure 176: Multi-family Occupancies



Buildings Three or More Stories in Height

Structures that are three or more stories in height require a response of an aerial apparatus with elevated master stream capabilities. The Insurance Services Office (ISO) reviews the coverage area for all buildings within 2.5 miles of a ladder truck. A ladder truck may be necessary to access these higher buildings' upper floors or roofs since most ground ladders cannot reach these heights. The following figure displays the location of the 11 buildings more than three stories in height.

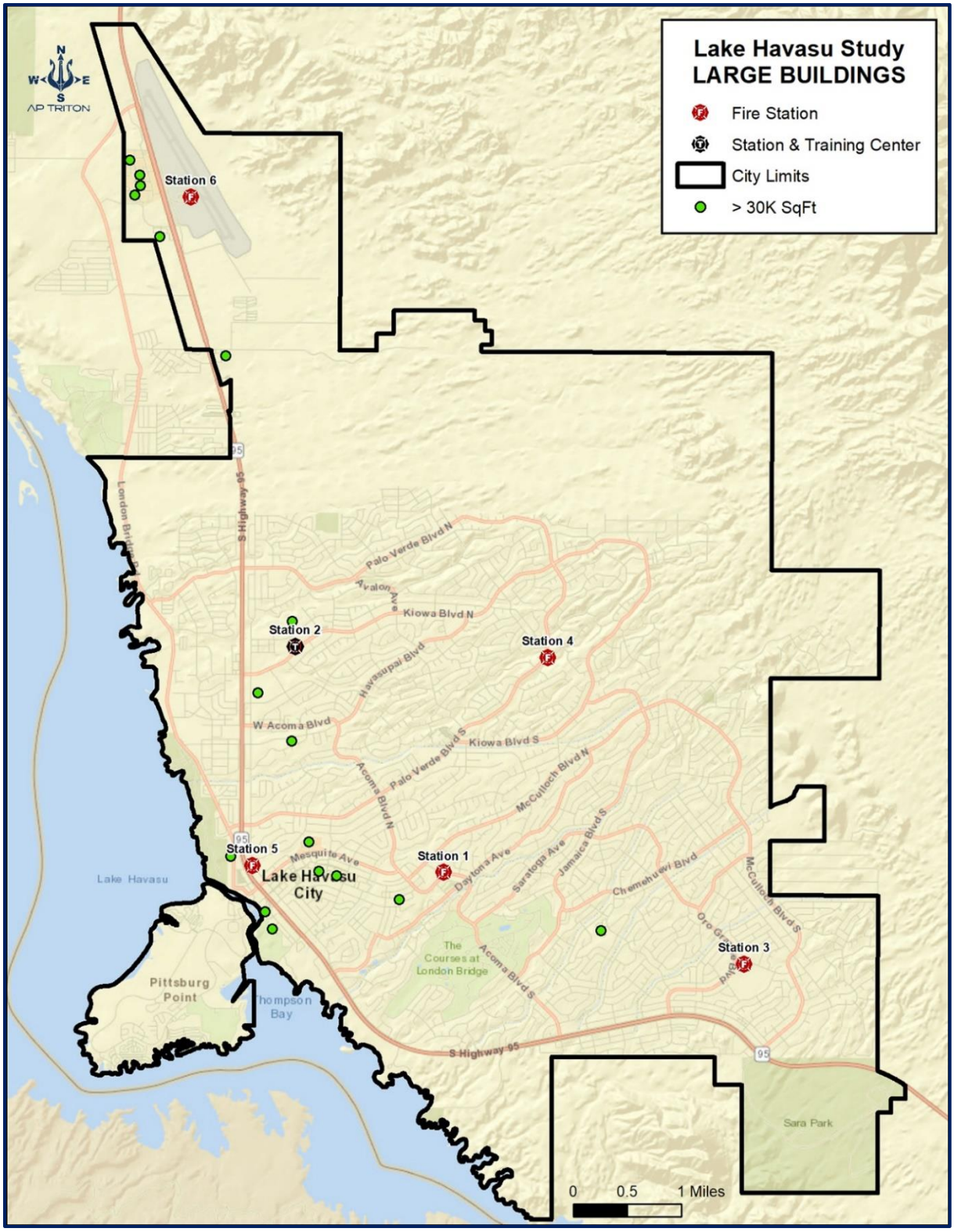
Figure 177: Buildings Three or More Stories in Height



Large Square Footage Buildings

Large buildings, such as warehouses, strip malls, and large "box" stores, need more significant volumes of water for firefighting and require more firefighters to advance hose lines long distances into the building. As a result, an incident at these locations may overwhelm LHCFD and require outside assistance. There are six buildings greater than 30,000 square feet, as shown in the following figure.

Figure 178: Buildings Greater than 30,000 Square Feet



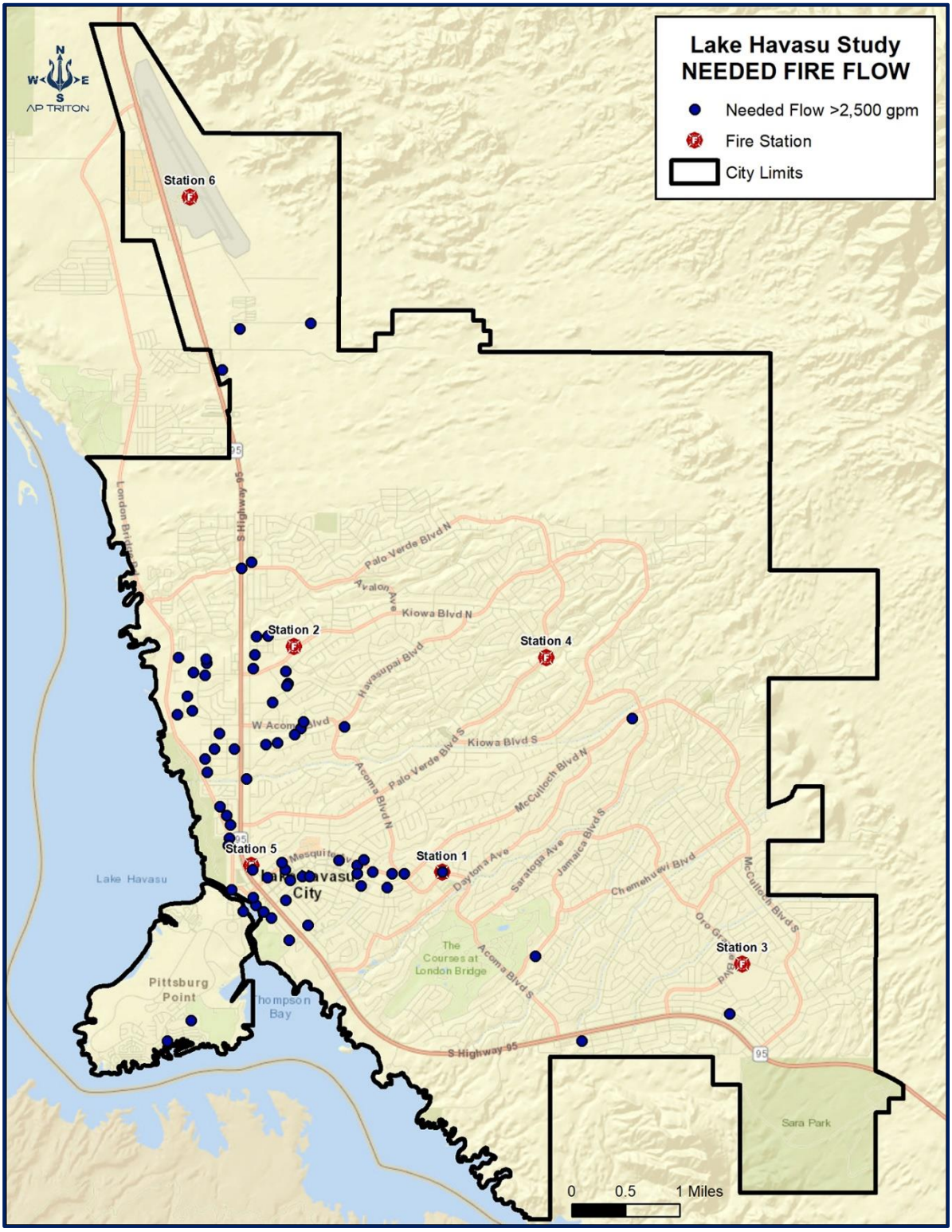
Large Fire-Flow Occupancies

Occupancies are classified according to risk level. Risk factors that classify occupancies as low, medium, or high include the size of the building(s), construction type, the presence or absence of fire suppression features such as sprinklers and standpipes, the needed fire flow, the risk to life, the presence of chemicals or hazardous processes, and the amount of water available to control or extinguish the fire.

Many buildings with high fire flow requirements are identified by the Insurance Service Office (ISO) and provide a needed fire flow for select buildings in LHCFD.

The next figure lists 52 occupancies with a fire flow greater than 2,500 gallons per minute.

Figure 179: Occupancies with Fire Flow 2,500 gpm or Greater



Critical Infrastructure

Critical infrastructure and key resources (CIKR) explain what is crucial for a community to function in a modern 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 sixteen defined Critical Infrastructure Sectors (CIS):[41]

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

Other buildings to consider as target hazards could include occupancies with a potential for a significant loss of life, such as places of public assembly, schools and childcare centers, medical and residential care facilities, and multifamily dwellings. Other considerations include buildings with substantial value to the community—economic loss, replacement cost, or historical significance—that, if damaged or destroyed, would have a significant negative impact.

Responses to target hazards may require many LHCFD resources and automatic aid during an incident.

Transportation Network

Emergency personnel needs a transportation network to respond efficiently to an incident. A delayed response can occur without a system of interconnected roads and streets. Interconnectivity provides multiple access points to a location if another approach is unavailable.

Some local streets in the LHCFD service area are on a grid system, but many are winding streets that provide good interconnectivity. Some cul-de-sacs in the street network only provide one access route, thus preventing quick response if the street is blocked and inaccessible. Lake Havasu City does provide traffic signal preemption to assist responding units in navigating intersections safely if the signal is red when they are approaching.

The primary thoroughfare through Lake Havasu City is Arizona Highway 95. This north-south highway connects Interstate 40 to the north and Interstate 10 to the south.

Figure 180: Average Annual Daily Traffic: Vehicles

Location	Avg. Annual Daily Traffic: Vehicles	Avg. Annual Daily Traffic: Trucks
Arizona Hwy 95 south of Industrial Blvd.	27,160	815
Acoma Blvd south of Clarke Drive	12,130	177
McColloch Blvd east of Beachcomber Blvd.	9,809	N/A
Acoma Blvd north of Stroke Drive	12,346	326
Oro Grande Blvd near Kearsage Drive	5,956	89

Airport

Lake Havasu City Municipal Airport serves the area but does not provide commercial services. In the 1980s, construction began on the current location to replace the original facility on Pittsburg Point, which opened in 1991. The airport has an 8,001-foot general aviation aircraft runway, instrument approach capabilities, and an automated weather observation station on 646 acres. The 5,700 square-foot terminal building serves customers and can provide ticketing and baggage claims if commercial service begins at the airport. Two fixed-based operators and car rentals are available at the airport. Fueling for aircraft is available from two aboveground storage tanks with a storage capability of 12,000 gallons each. Self-service is provided for the 100LL type of aviation fuel, and Desert Skies Executive Air Terminal operates two 2,000-gallon fuel trucks for fueling aircraft. Havasu Air Center also provides fueling for military aircraft, including hot fueling capabilities. Fire Station 6 resides on the property, and LHCFD has several members trained for ARFF and is working on updating the procedures for the airport.

Energy

The ability to provide energy is a necessary component of a thriving community. The community depends on energy sources: electricity generation and transmission systems, fuel distribution and storage tanks, or natural gas pipelines and regulator stations.

Electricity

UniSource Energy Services is the electrical utility for the LHCFD service area and has more than 3,600 miles of distribution and transmission lines. Several high-voltage electrical transmission lines pass through and terminate in the service area. Each line is 230-kilovolts. Several electrical substations in the service area step down the voltage in the distribution system. Any incident involving an electrical substation requires assistance from UniSource Energy Services, and LHCFD personnel should not enter the site until advised.

Natural Gas

UniSource Energy Services provides natural gas services in the service area. There are no natural gas interstate natural gas pipelines in the area, but there is a system of distribution pipelines with pressures ranging from ¼ pound to 200 at a gate station. The customer distribution lines operate at different pressures, and regulator control devices reduce the pressure for everyday use. Locating services indicate where a gas line is buried before digging to reduce the chance of an accidental break. Natural gas leaks can occur when a contractor or homeowner damages the line. Education is critical to reducing accidental damage that may require a fire department response.

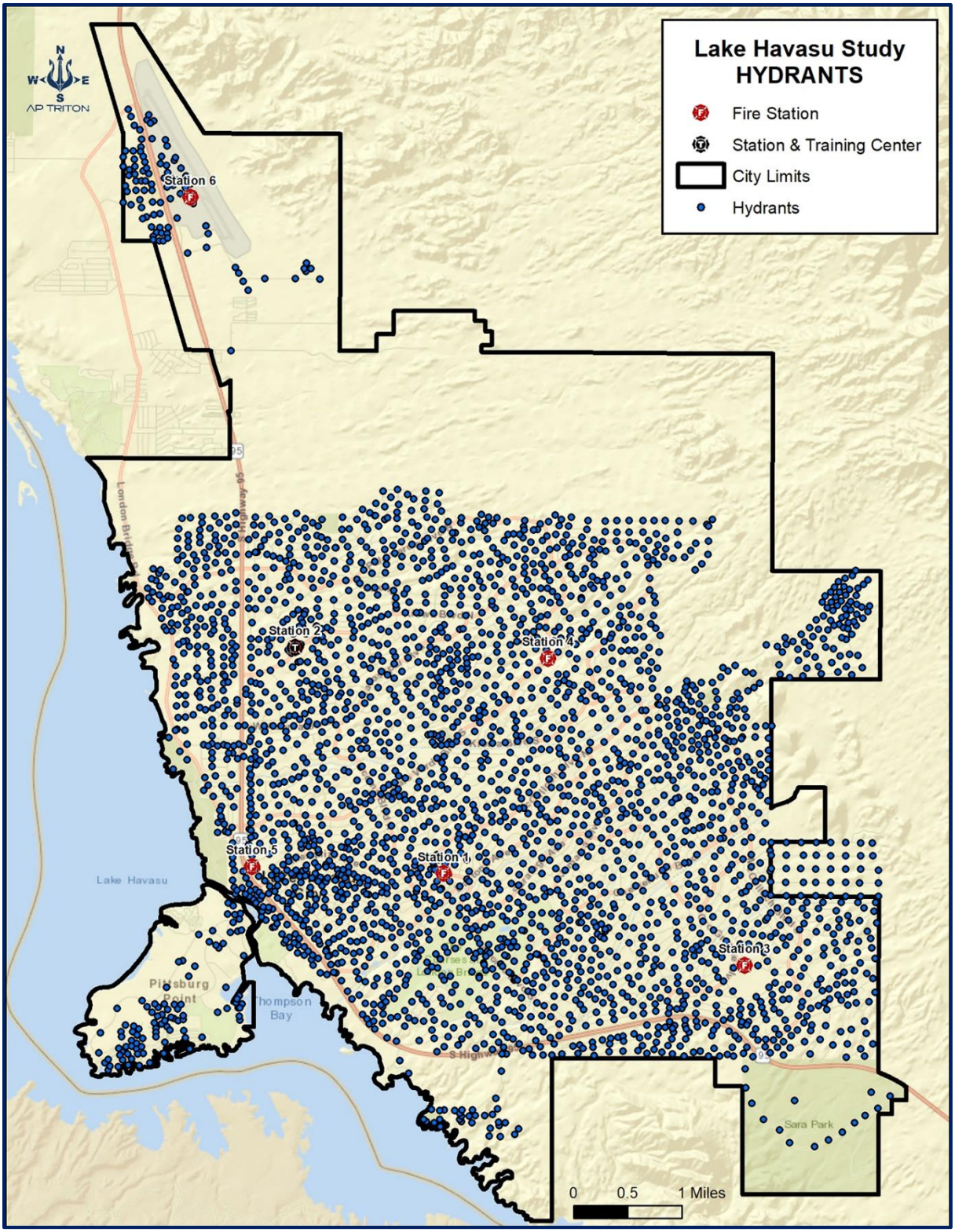
Water

Controlling a fire becomes challenging without an adequate water supply and distribution system consisting of water storage, mains, and a fire hydrant system. A system of well-distributed hydrants and appropriately sized water mains are necessary to provide the required water for fireground use.

Lake Havasu City operates a water division within the Public Works Department, and the division provides water for the city. The division maintains a water treatment plant capable of producing 26 million gallons per day (MGD) and can be expanded to 32 MGD.[42]

The water from wells is transported to the water treatment plant by a 48" diameter pipe. After treatment, water is pumped into two distribution lines that connect to four transmission lines that provide water to their customers. All hydrants and inspected and maintained by the public works department. The following figure shows the locations of fire hydrants.

Figure 181: Fire Hydrant Locations



Communications

When an incident occurs, essential facilities to receive and transmit alarm information require a communication center to communicate with emergency responders properly. Other communications are critical to the community, such as cellular phones, Voice over Internet Protocol (VoIP) telephone systems, or transmission lines from the local telephone company. These systems allow the public to notify emergency services of an incident. Internet services are essential for the public, commercial establishments, and emergency services to conduct daily business. Whether the internet services are through cellular access or an internet service provider, the failure of these communication systems can significantly impact emergency services and the public.

The Lake Havasu City Police Department operates the city's primary Public Safety Answering Point (PSAP) and dispatches the police and fire departments. The 911 Center utilizes a mobile communication trailer as a backup if the primary PSAP must be evacuated. If the 911 telephone lines fail, they can be transferred to cell phones or Mohave County Sheriff's Department. Although there are no certification requirements in Arizona, each telecommunicator attends a three-week school through the Western Arizona Law Enforcement Academy and receives American Public-Safety Communications, CPR, and Emergency Medical Dispatch (EMD) certifications.

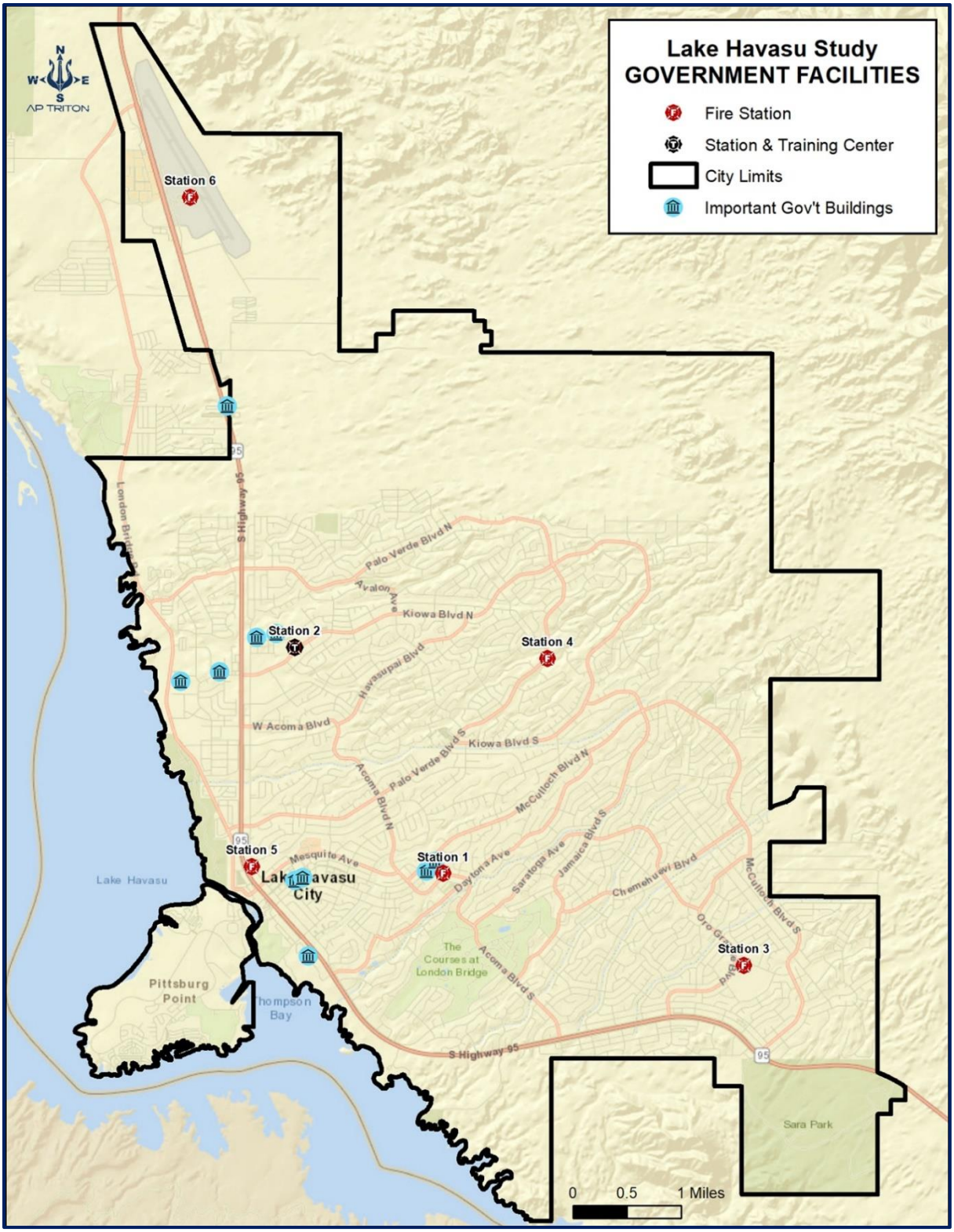
The PSAP uses One Solution CAD for dispatching. All EMS incidents are screened through EMD to determine the call's priority. LHCFD only responds to Charlie, Delta, and Echo responses, which are considered more life-threatening incidents. Other low-priority incidents only receive a response from AMR. The radio system relies on an 800 MHz trunking system for communication between fire department units and the 911 center.

As mentioned in the call processing section, the times for the 90th percentile are above the standard set by the PSAP. There should be further research into why this is occurring—specifically for structure fire responses.

Government Buildings

Governmental buildings are typically located close to their customers to manage proper public services. The buildings are considered a part of the critical infrastructure needed to operate services provided by local, state, or federal government. Without these facilities, governmental services are unable to be provided. These locations may also become a target of an act of terrorism. The following figure provides the locations of governmental occupancies in LHCFD's service area.

Figure 182: Government Facilities



Comparison of Fire Risk in Other Communities

Fire Loss

In 2020, fire departments responded to more than 1.4 million incidents in the United States that caused 3,500 civilian fire fatalities and over 15,200 civilian fire injuries. The property damage was estimated at more than $21.9 billion. The NFPA reported that 64% of fire deaths occurred in one-or two-family dwellings. In addition, the NFPA report stated that $4.2 billion of property fire losses were from wildland-urban interface incidents in California.[43]

Fire loss rates can fluctuate yearly based on the type of property damaged or destroyed during a year. A significant loss can cause the amount to increase substantially but may drop the following year. Property loss per capita for LHCFD is lower than the national average for 2018 and 2020, with the highest occurring in 2019. The following figure provides the property loss per capita in the LHCFD service area for 2018–2020.

Figure 183: Property Loss per Capita 2018–2020

Year	LHCFD Property Loss per Capita	U.S. Property Loss per Capita[44]
2018	$40.05	$78.25
2019	$85.52	$66.52
2020	$41.23	$66.07

The number of fires per 1,000 population in the LHCFD response area is lower than the national average, except for 2020, when the rate increased to 3.4, as shown next.

Figure 184: Fires per 1,000 Population

Year	LHCFD Fires per 1,000 Population	U.S. Fires per 1,000 Population[45]
2018	2.5	2.9
2019	2.6	3.0
2020	3.4	2.9

Intentionally Set Fires

Intentionally set fires, or in many cases considered arson, are defined as "any willful or malicious burning or attempt to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another.[46] The following figure shows the number of intentionally set fires between 2018–2021.

Figure 185: Intentionally Set Fires (2018–2021)

Year	Quantity
2018	6
2019	5
2020	7
2021	8

Insurance Services Office

The Insurance Services Office, Inc. (ISO©) is an independent organization that collects and analyzes data from fire departments in communities throughout the United States to determine rates for fire insurance. According to their report, the ISO's Public Protection Classification Program (PPC) "is a proven and reliable predictor of future fire losses." Therefore, commercial property insurance rates are expected to be lower in areas with a lower (better) ISO PPC Class rating.

The ISO Fire Suppression Rating Schedule (FSRS) measures four primary elements of a community's fire protection system: *Emergency Communications* (max 10 points); *Fire Department* (max 50 points); *Water Supply* (max 40 points); and *Community Risk Reduction* (max 5.5 points), for a maximum possible total of 105.5 points. ISO then assigns a grade using a scale of 1 to 10. Class 1 represents the highest degree of fire protection, and Class 10 designates a fire suppression program that does not meet ISO's minimum criteria.

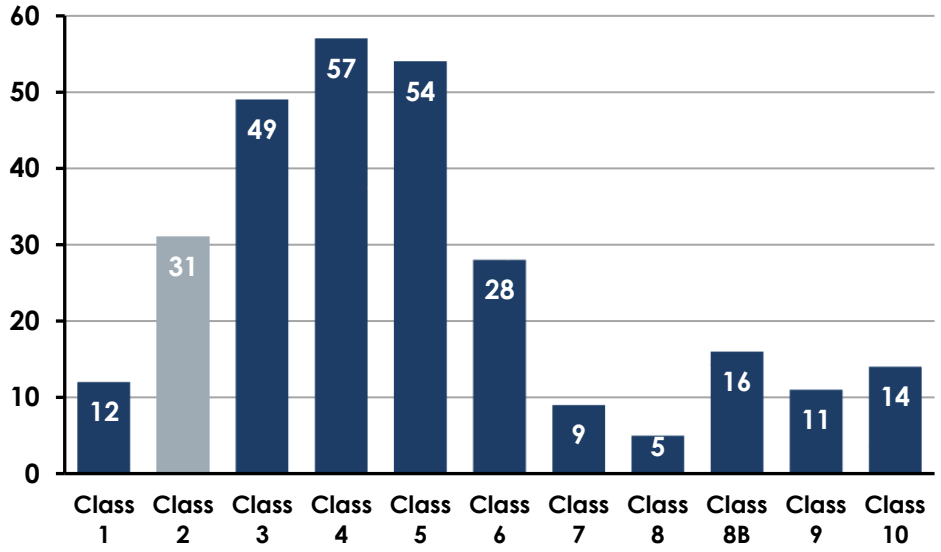
In January 2018, LHCFD received a Class 2/2X rating from ISO. The first number applies to all properties within five road miles of a recognized fire station and within 1,000 feet of a fire hydrant. The second number or class is for properties more than 1,000 feet from a fire hydrant but within five road miles of a recognized fire station.[47]

As noted in the current PPC Summary Report, there are several areas for improvement. Each area should continue to receive attention to increase the credits available to improve the current classification. For example, dispatch circuits only received 1.3 credits out of 3 under Emergency Communications. For the Fire Department, credit for engine companies was 5.25 for deployment analysis out of 10, and company personnel received 8.39 out of 15. The following figure shows the credits earned and available for LHCFD in the most recent inspection.

Figure 186: ISO Earned & Available Credits

ISO Feature	Earned Credit	Available Credit
Emergency Communications	8	10
Fire Department	35.57	50
Water Supply	37.69	40
Divergence	-4.62	0
Community Risk Reduction	4.67	5.5
Totals:	**81.31**	**105.5**

Figure 187: Comparison of ISO Classifications in Arizona



Section III:
EMERGENCY MEDICAL SERVICES & PATIENT TRANSPORT

EMS & Ambulance Operations Overview

EMS System

Although LHCFD provides Emergency Medical Services (EMS) at the ALS medical first-response level, it does not provide regular patient transport (ambulance service)—unless there is no American Medical Response (AMR) unit available to respond incidents in Lake Havasu City. The fire department does, however operate a transport-capable vehicle out of Station 1—designated as Medic 1.

Figure 188: LHCFD Medic 1

American Medical Response is the sole ambulance service provider for Lake Havasu City. Patient transport service was previously provided by River Medical, Inc., which was eventually acquired by AMR. The service continues to be referred to as "River Medical." Therefore, the terms AMR and River Medical may be used interchangeably throughout this report.

To provide ground emergency medical transport (GEMT) in Arizona, a Certificate of Necessity (CON) must be granted by the Director of the Department of Health Services, Bureau of Emergency Medical Services & Trauma System. The CON describes the service area, level of service, type of service, hours of operation, response times, other information, and any special provisions. The ambulance service must adhere to the CON's restrictions and operate according to Arizona statutes and rules.

Triton was unable to obtain complete information describing AMR's organizational structure, operations and deployment of ambulances, response time performance, staffing and scheduling of its ambulances, or current transport rates and fees as it pertains to Lake Havasu City. However, as will be shown, transport data was available, and AMR transport fees were obtained from the EMS system annual report from the State of Arizona.

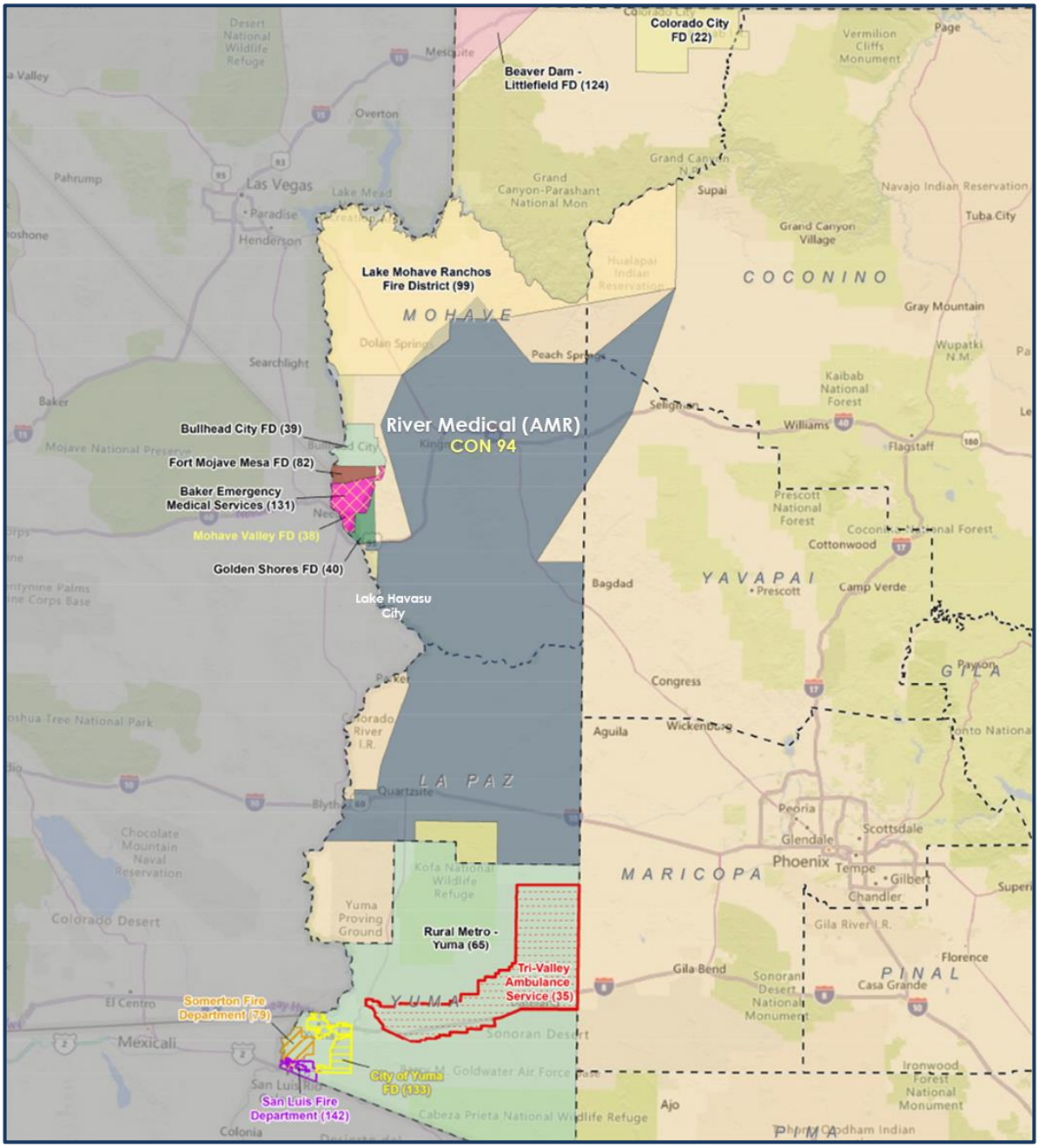
Ambulance Operations & Deployment

AMR operates in a large geographic area that includes Lake Havasu City and a significant portion of northwest Arizona. The annual report to the State of Arizona does not provide sufficient detail to determine the number of daily staffed ambulances, type of equipment, scheduling, or staffing configuration. Since, the Lake Havasu City Communications Center is the PSAP, 911 calls are received there and transferred to AMR's dispatch center.

Response Area for Certificate of Necessity 94

AMR holds the Certificate of Necessity (CON) and provides ALS transport service to a large area, including Lake Havasu City and much of Mohave County. The next figure is a map generated by the Arizona Department of Health Services that illustrates the service area boundaries (CON 94) of River Medical in Mohave County.

Figure 189: River Medical (AMR) Service Area/CON 94



EMS Administration

The Lake Havasu City Fire Department maintains a full-time EMS Battalion Chief responsible for managing the administrative elements of Emergency Medical Services. However, the EMS Battalion Chief has a variety of additional responsibilities not directly related to EMS. An EMS Liaison is assigned to each shift.

SOG 1-306.3 Emergency Medical Services Program describes the requirements for various EMS program elements. This includes the responsibilities of the EMS Battalion Chief (previously the EMS Coordinator) and EMS Liaisons, the EMS Committee, meeting and training requirements, and budget responsibilities.

Medical Control & Oversight

Havasu Regional Medical Center has earned an ALS Base Hospital Certificate from the State of Arizona and provides online medical direction and other support to the Lake Havasu City Fire Department and River Medical. Kingman Regional Medical Center provides medical control for River Medical.

The EMS Medical Director for LHCFD is a board-certified Emergency Physician who practices in the Emergency Department of HRMC. The Arizona Department of Health Services, Bureau of EMS & Trauma System defines the roles and responsibilities of the EMS Medical Director in specific detail.[48] This includes application standards, qualification requirements, continuous quality improvement, and much more.

EMS Quality Improvement & Documentation

Electronic Patient Care Reports

LHCFD utilizes ImageTrend® software for its records management system (RMS). SOG 2-307 Electronic Patient Care Report requires that an electronic patient care report (ePCR) be completed for every patient encounter. The SOG provides a comprehensive list of requirements for completing these reports.

LHCFD's SOG 2-315 EMS Quality Assurance & Quality Improvement is a comprehensive document that defines and describes the requirements for EMS quality assurance (QA) and quality improvement (QI). Specific ePCRs are reviewed through the QA/QI Program.

QA/QI Report Reviewers are selected in accordance with the SOG and are assigned ePCRs for review in accordance with questions based on the HRMC QA/QI Guidelines, LHCFD requirements, Arizona Bureau of EMS & Trauma System requirements, and Federal NEMSIS requirements. There is a detailed feedback process defined in the SOG.

Premier EMS Agency Program

LHCFD is recognized by Arizona's Bureau of EMS & Trauma System as a Premier EMS Agency. The PEAP program was established in 2009 with the goal of improving patient outcomes in Arizona by implementing evidence-based, highly coordinated, and standardized prehospital care. In order to qualify, EMS agencies must meet specific requirements. The program focuses on:

- Suspected opioid overdose
- Out-of-hospital cardiac arrest
- ST-Elevation Myocardial Infarction (STEMI)
- Acute stroke
- Major trauma
- Pediatric resuscitation

EMS Operational Performance in Lake Havasu City

Transport Data

Triton was able to obtain patient transport data for the period January 1, 2018, through May 5, 2020, from the Havasu Regional Medical Center. The next figure lists the number of transports during this period.

Figure 190: AMR Historical Transport Volume

Year	Transports
2018	3,353
2019	3,547
2020	3,805*
2021	4,169

*Extrapolated from 125 days of data at 1,302.

The information provided did not distinguish whether or not interfacility transfers from Lake Havasu Regional Medical Center were included. Over the past five years, an average of 780 interfacility transfers out of LHRMC have occurred. Based on the information provided, approximately 1–1.5% of those transports were *not* handled by AMR but by another transport agency, such as law enforcement. Each of these interfacility transfers reportedly takes a unit out of service within the response area for up to eight hours.

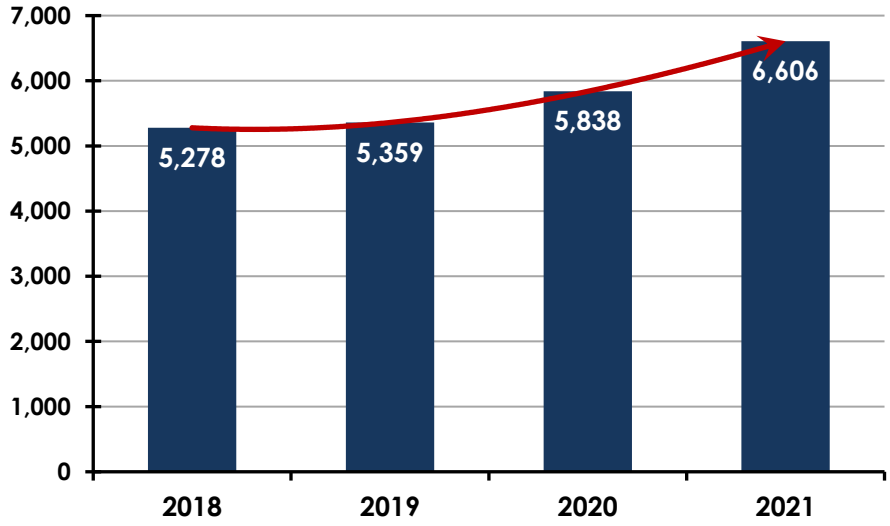
Although AMR did not provide incident data, LHCFD provided data that included patient disposition on all calls between January 1, 2018, through May 5, 2022, from the Havasu Regional Medical Center. Of the more than 9,600 medical incidents during this period, patients were transported 8,230 times (85% of the time). AMR transported nearly all patients with LHCFD transporting on 42 occasions. LHCFD personnel, however, did accompany the ambulance and assisted in patient care during transport on slightly over 39% of AMR's transports. It must be noted that during these transports, LHCFD engine company staff is reduced.

During interviews with staff, LCHFD personnel mentioned their concern about the number of times a transport ambulance was delayed to an incident scene. Data provided from LHCFD's RMS noted these delays. Based on the data provided, AMR had no delay on nearly 77% of incidents to which it was dispatched. During the study period, the Lake Havasu City Fire Department transported patients in 1% of the incidents due to AMR ambulance response delays.

Response Performance

As mentioned, EMS calls for service comprise the majority of LHCFD's overall service demand—over the four years of data representing 66%. Without incident data from AMR, this report section will focus on LHCFD's response performance to EMS incidents. The following figure illustrates how medical service demand has changed for LHCFD over the last four years.

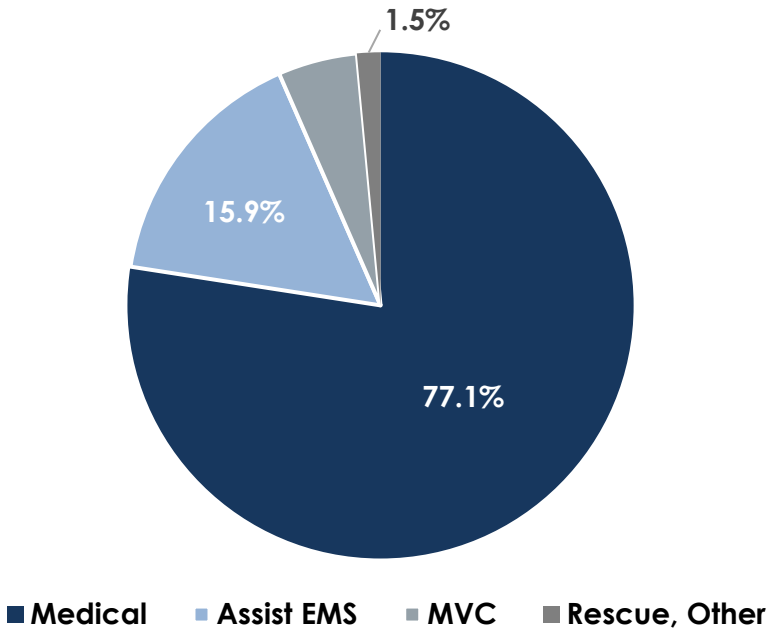
Figure 191: Historical EMS & Rescues Service Demand (2018–2021)



As illustrated in the preceding figure, medical first response service demand continues to increase for LHCFD. This trend is expected to continue as the population increases over the next two decades. The following figure illustrates the highest percentage of EMS incident types experienced by LHCFD over the last four years.

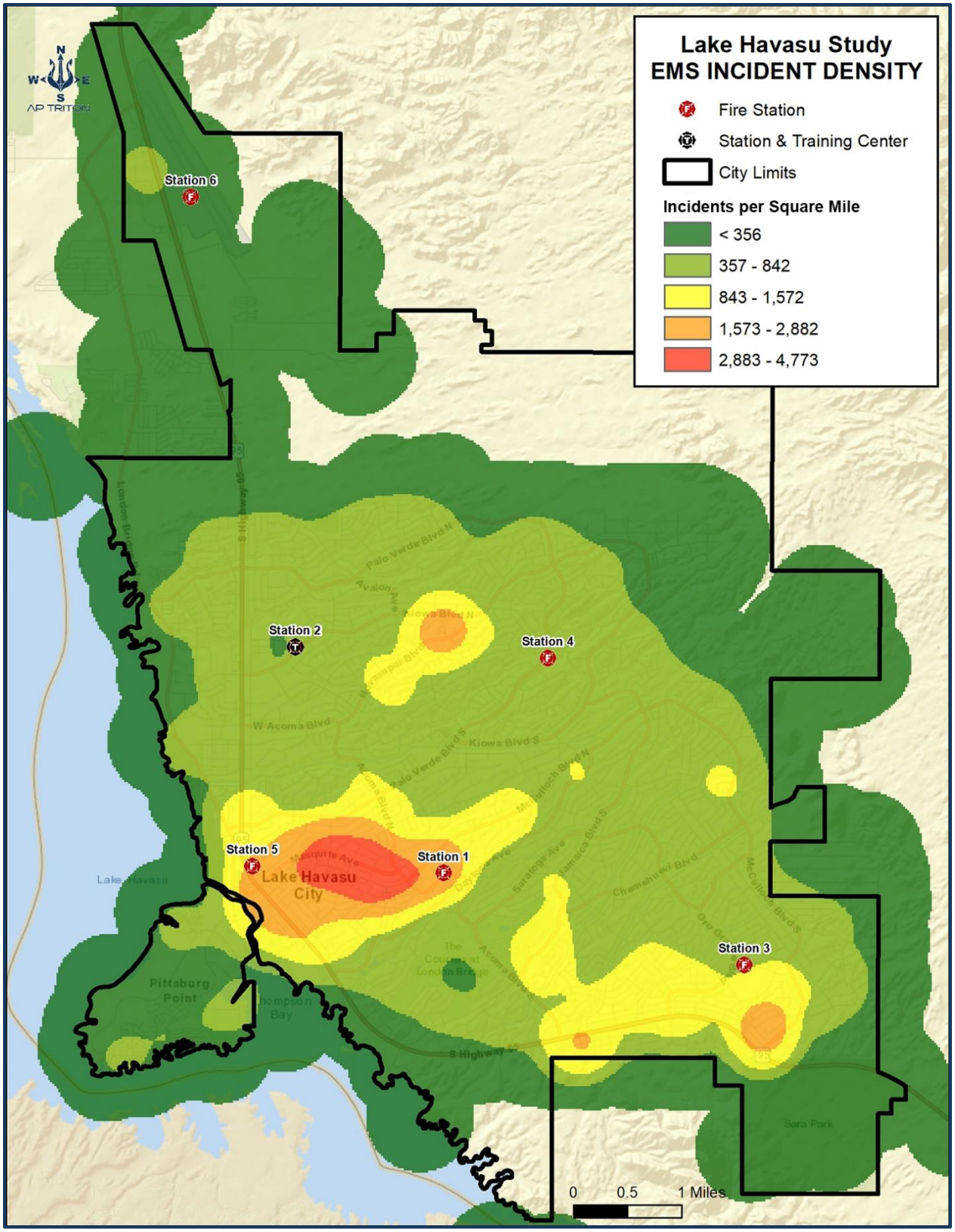
General medical incidents represent the majority of service demand. However, it is important that each EMS incident is assigned an accurate NFIRS code that most closely matches the call type.

Figure 192: Highest Percentage of EMS Incidents in Lake Havasu (2018–2021)



As shown in this report on overall service demand, it is important to identify where EMS service demand occurs. The following figure illustrates medical service demand density over the last four years.

Figure 193: EMS Incident Density in Lake Havasu City (2018–2021)



As previously discussed, response time performance is one of the most visible measures of any emergency services organization. In line with previous discussions, the following figure illustrates the call processing times by LHCCC for EMS incidents only.

Figure 194: EMS Incident Call Processing Time (2018–2021)

Year	Average	90th Percentile
2018	0:01:33	0:02:26
2019	0:01:33	0:02:25
2020	0:01:44	0:02:40
2021	0:01:43	0:02:44

The same call processing performance standards apply to EMS incidents as those previously discussed for fires and other emergency incidents. Similarly, the following figure illustrates LHCFD's response performance to emergency medical incidents only.

Figure 195 EMS Incident Response Time (2018–2021)

Year	Average	90th Percentile
2018	0:06:06	0:08:35
2019	0:06:09	0:08:43
2020	0:06:21	0:09:05
2021	0:06:01	0:08:47

Because of a lack of performance data from the ambulance service provider, response time performance comparisons between AMR and LHCFD cannot be conducted. However, LHCFD did provide internal documentation from its RMS.

Feasibility of Fire-Based ALS Transport

Certificate of Necessity

At the time of this study, LHCFD was considering the submittal of an application for a limited 911 ambulance transport CON for its service area (currently held by AMR). Although the fire department occasionally transports patients when an AMR unit is unavailable, it cannot bill for its services because it lacks a designated Certificate of Necessity from the State of Arizona.

Option 1: Joint Ambulance Operations

Since Lake Havasu City is without redundancy in the transport component of its EMS delivery system, the fire department has been in negotiations with AMR to enable alternative transport methods. According to the Fire Chief, any agreement resulting from the negotiations between the City and AMR must be focused on patient care. The reduction of response times and increased levels of service for Lake Havasu City's residents and visitors remain the City's primary focus.

Should LHCFD be awarded a limited 911 ambulance transport CON, the tentative plan is to staff two LHCFD ALS medic units 24 hours daily—with one housed at Station 1 and the other at Station 2. AMR will continue to staff two 24-hour units daily from its two stations. LHCFD and AMR medic units will be equipped with Automatic Vehicle Location (AVL) devices monitored by the communications center. This will enable the medic unit nearest the incident to be dispatched. LHCFD anticipates that the department will transport approximately 50% of those patients in whom transport is indicated.

Option 2: All Fire-Based Transport in Lake Havasu City

The following section addresses the basic elements of a *total* fire-based ALS-level ambulance transport system in which the Lake Havasu City Fire Department provides all emergency ambulance service.

To determine the number of EMS units that LHCFD would need (excluding interfacility transports for all 911 patient transports, an analysis of responses to EMS calls and working structure fires (since EMS units are part of this response) was conducted by weekday and hour. Analysis of the data indicates the average time on task for each call is approximately one hour. The average total annual call volume was divided by the total number of hours each unit is in service to produce a workload factor. While some incidents may be shorter, the converse is also true. In addition, this also accounts for incidents that require multiple EMS units.

This workload was further analyzed to determine the number of units needed at a maximum UHU of 30%—sometimes used as a benchmark for fire service-based EMS units to account for training, incident concurrency, and return-to-station travel time after leaving the hospital, among other activities. Using the 4,820 EMS calls and the one hour per call time on task, dividing by the total hours available using a four-unit deployment model results in utilization rate of approximately 13.75%. The resulting number of units by the hour of the day are listed in the following figure (fractional results are rounded to the nearest integer).

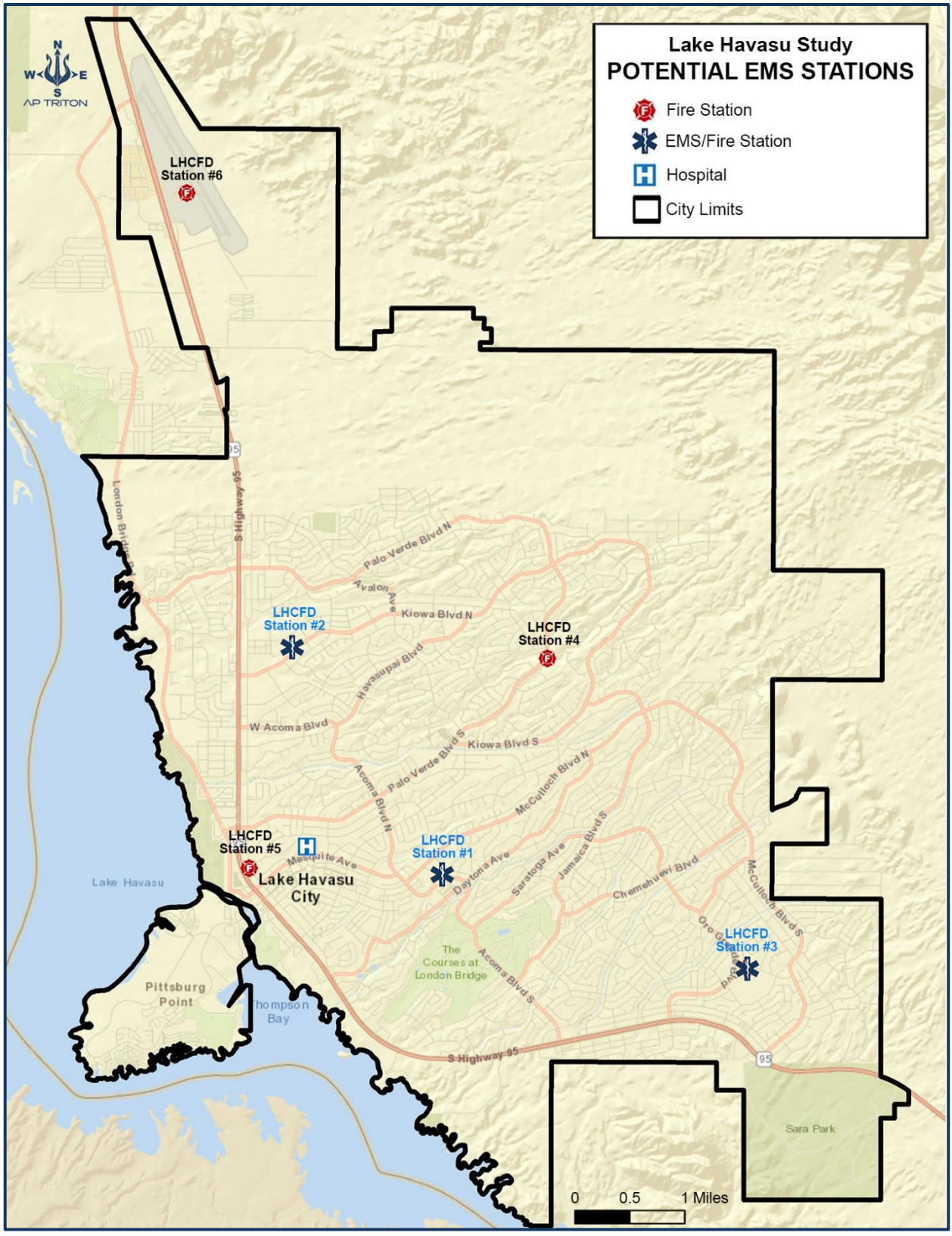
Figure 196: Transport Units Needed in Lake Havasu City by Hour of Day

Hour	SUN	MON	TUE	WED	THU	FRI	SAT
0:00	2	2	1	2	2	2	2
1:00	2	2	2	2	2	2	2
2:00	2	2	1	1	1	1	2
3:00	2	2	1	1	1	1	1
4:00	1	1	1	1	1	1	1
5:00	1	2	2	1	1	1	2
6:00	2	2	2	2	2	2	2
7:00	2	2	3	2	2	3	2
8:00	2	3	3	3	3	3	3
9:00	3	4	3	3	3	3	3
10:00	3	3	3	3	3	4	3
11:00	3	3	3	3	4	3	3
12:00	3	3	3	3	3	3	3
13:00	3	3	3	3	3	3	3
14:00	3	3	3	3	3	3	3
15:00	3	3	3	3	3	3	3
16:00	3	3	3	3	3	3	3
17:00	3	3	3	3	3	3	3
18:00	3	3	3	3	3	3	4
19:00	3	2	2	3	3	3	3
20:00	3	2	2	2	2	3	3
21:00	2	2	2	2	2	3	3
22:00	2	2	2	2	2	2	2
23:00	2	2	2	2	2	2	2

As shown in the preceding figure, historical system demand indicates that, during certain periods, as few as one ambulance would be needed—while up to four ambulances could be utilized during other periods.

The next image is an illustration of the Lake Havasu City Fire Department's service area, with medic units deployed from Stations 1, 2, and 3.

Figure 197: Potential LHCFD EMS Stations



Medic Unit Staffing

In both options, Triton has developed operations, deployment, and costs based on two personnel per medic unit. This would entail one Firefighter/EMT and one Firefighter/Paramedic. If additional assistance is needed for high-acuity cases, a Firefighter/EMT or Firefighter/Paramedic from an engine company could accompany the medic unit.

Theoretically, it would require a minimum of seven personnel in order to maintain staffing for a single two-person medic unit 24 hours daily. This could be increased to nine in order to split personnel evenly between the three shifts.

Operational Staff Scheduling Methodologies

In either option and if feasible, LHCFD should consider placing medic unit personnel on the same schedule as the engine and truck crews. Medic unit personnel should be rotated onto an engine company at regular intervals.

LHCFD Organizational Structure & Management Support

The addition of staffed ALS medic units would not necessarily require a significant change in the organizational structure of the Lake Havasu City Fire Department. With the addition of Option 1, the role and responsibilities of the on-shift EMS Liaisons should be re-evaluated.

Should LHCFD eventually assume all 911 transport service (Option 2), an EMS Captain assigned to a day shift under the supervision of the EMS Battalion Chief should be considered.

Financial Projections of Fire-Based ALS Transport

In reviewing the data collected from Havasu Regional Medical Center for 2018, 2019 and four months of 2020, based on patients received by ambulance from the service area, Triton has created a relatively accurate payer mix. To create an estimate for the potential value of the EMS transport system, a comparison must be drawn between the current charges for service and revenue collection and modifying the current rates. The report does not break out the revenue reports provided by the existing provider about the emergency 911 transports, interfacility, non-emergency, and CCT transport numbers.

Payer Mix

The following figure shows the payer mix for Havasu Regional Medical Center.

Figure 198: Percentage of Total ALS & BLS Transports (28 Months)

Cost Center	Transports	Percentage
Medicare/Managed Medicare	3,611	44%
Medicaid/Managed Medicaid	2,306	28%
Commercial Insurance	1,769	22%
Private Pay	453	6%
Other	64	1%
Totals:	**8,203**	**100%**

American Medical Response declined to provide gross revenue amounts which could be used to calculate charges per trip and other percentages. However, AMR's "Actual Financial Data" report, filed with the Arizona Department of Health Services, provided some information regarding various rates charged in 2020. Based on the report filed for 2020, the following rates were charged for that year.

Figure 199: AMR Billings (2020)[49]

Charges	Amounts	No. of Runs	Amount Billed
ALS Base Rates	$1,557.43	4,784	$7,450,745
ALS Base Rates	$1,608.05	12,260	$19,714,693
BLS Base Rates	$1,557.43	1,059	$1,649,318
BLS Base Rates	$1,608.05	2,755	$4,430,178
Mileage Rate	$22.55	161,734	$3,647,102
Mileage Rate	$23.28	376,648	$8,768,365
Other Revenues	—	—	$1,606,316
Total Billings:	**—**	**—**	**$47,266,717**

Billing & Collection

Billing and collections for EMS services may be performed by the jurisdiction's employees or by a third-party billing service that will charge a fee, usually based on the amount collected. Revenues are affected by the billing philosophy of the jurisdiction and the efforts made to collect from patients. For visitors from outside Lake Havasu City, LHCFD may want to employ a more resolute billing process in order to increase revenues to fund the transport ambulance service provided to the public. This process could entail pursuing insurance "deductibles" and employing other collection practices.

The projected transport volume for 2022, furnished by Action Ambulance Billing, is 4,820.[50] While a time study has not been provided, Triton used 60 minutes per transport to determine the number of hours needed to service the system's transport volume.

The 60-minute factor included the calculated 45-minute time-on-task (TOT) and 15 minutes to restock the unit after an incident and is consistent with typical systems seen in both urban and semi-rural systems. To determine actual TOT, it is necessary to have access to actual CAD data.

The following figure includes projected transports by payer mix in Lake Havasu City.

Figure 200: Projected 2022 Transports by Payer in Lake Havasu City

Payer	Transports	Percentage
Medicare/Managed Medicare	2,121	44%
Medicaid/Managed Medicaid	1,350	28%
Commercial Insurance	819	17%
Private Pay	289	6%
Other	241	5%
Totals:	**4,820**	**100.00%**

Revenue Calculations

The methodology in determining a fee structure is dependent on the philosophy of the governing body. This calculation is designed to recover the annual costs identified in the previous figure and is associated with a deployment model utilizing two medic units staffed 24 hours daily. The following figure calculates the revenues based on the payer mix, fee base rate, and mileage charges as provided by Action Ambulance Billing (AAB).

Figure 201: Estimated Revenues by Payer Mix for All 911 Transports

Charges	No. of Transports	Charges	Total Charges	Revenue	% Reimbursement
Medicare[1]	2,121	1,925	4,083,646	1,347,603	33%
Medicaid[2]	1,350	1,925	2,599,209	1,638,772	63%
Commercial	819	1,925	1,576,853	1,576,853	100%
Private Pay	289	1,925	556,423	523,038	94%
Other	241	1,925	464,006	363,504	78%
Totals:	**4,820**	—	**9,280,137**	**5,449,770**	**58%**

[1]Includes Managed Medicare. [2]Includes Managed Medicaid.

Medic Unit Staffing Costs

The following section describes two different options concerning the costs of staffing medic units. This was done in anticipation that LHCFD will ultimately obtain a limited CON and agreement with River Medical. The first illustrates the estimated costs to add one full-time ALS medic unit to its current operations. The second outlines the estimated costs for two ALS medic units.

Cost of One Staffed ALS Medic Unit

This option assumes that LHCFD is currently operating a transport-capable unit. The following information is the estimated cost for LHCFD to add one additional ALS medic unit staffed by one Firefighter/Paramedic and one Firefighter/EMT but it does not include the purchase of additional vehicles.

Figure 202: Estimated Costs to Add One LHCFD Medic Unit

Description	Amount
FF/Paramedic—Straight Time	$174,529
FF/Paramedic—Overtime	$24,653
FF/EMT—Straight Time	$163,932
FF/EMT—Overtime	$23,156
Benefits	$296,539
Total Salary & Benefits:	**$682,809**
Medical Supplies	$10,000
Uniforms & PPE	$25,500
Continuing Education	$3,000
Fuel	$10,000
Total Operating Costs:	**$731,309**
Medic Unit Replacement Reserves	$30,000
Other Equipment Replacement Reserves	$10,000
Total Reserves:	**$40,000**
Total Annual Costs:	**$771,309**

Utilizing data from the "Projected 2022 Transports by Payer in Lake Havasu City" figure and using an average of one hour for emergency responses resulting in a transport of the patient to a local hospital and an average of one-half hour for responses not resulting in patient transport, projected TOT is calculated as follows:

- 60 minutes x 4,820 transports = 289,200 minutes on task
- 30 minutes x 670 non-transport responses = 20,100 minutes on task
- 309,300 minutes/60 minutes in an hour = 5,155 hours on task
- 5,155/35,040 = .147 minutes TOT

This deployment suggests that based on an annual workload of 4,820 transports and 670 non-transport responses, the anticipated system of two AMR and two LHCFD 24-hour units would meet the system demand and provide significant capacity for greater transport volume, if needed.

Using the revenue projections provided by AAB, LHCFD could expect to receive an approximate total of $2,724,885 in EMS revenues in the first full year of operation. Comparing the estimated costs of $771,309 to deploy a second medic unit scheduled 24 hours daily, would produce a projected positive cash flow of $1,953,576. However, in order to get a more accurate picture of the cost of providing 911 ambulance transport, the current costs of operating Medic 1, currently included in the operating budget of LHCFD, must be included.

Addition of Two Staffed ALS Medic Units

This alternative illustrates the estimated costs to staff and deploy two medic units. As previously discussed, LHCFD may have fully equipped medic units in the existing fleet which would minimize initial capital costs. As with most service-based agencies, personnel costs are the most significant component of the operations.

In both options, capital vehicle costs were not included. LHCFD currently maintains three fully equipped medic units in its fleet. However, at least one may require a new chassis, and LHCFD believes it may be necessary to purchase additional vehicles to ensure available units during unexpected downtimes and maintenance. If this is the case, then LHCFD should expect a one-time initial expenditure of approximately $300,000 to purchase a new vehicle.

Figure 203: Estimated Costs Associated with Deploying Two Additional Medic Units

Description	Amount
FF/Paramedic—Straight Time	$349,057
FF/Paramedic—Overtime	$49,306
FF/EMT—Straight Time	$327,864
FF/EMT—Overtime	$46,313
Extra Overtime	$35,000
Benefits	$593,078
Total Salary & Benefits:	**$1,400,618**
Medical Supplies	$20,000
Uniforms & PPE	$51,000
Continuing Education	$6,000
Fuel	$20,000
Total Operating Costs:	**$1,497,618**
Medic Unit Replacement Reserves	$60,000
Other Equipment Replacement Reserves	$20,000
Total Reserves:	**$80,000**
Total Additional Annual Costs:	**$1,577,618**

Using the revenue projections, LHCFD could expect an approximate total of $5,449,770. Comparing the estimated costs of $1,577,618 to deploy a second and third medic unit scheduled 24 hours daily, would produce a projected positive cash flow of $3,969,152. However, in order to get a more accurate picture of the cost of providing 911 ambulance transport, the current costs of operating Medic 1, currently included in the operating budget of LHCFD, must be included.

Potential Enterprise Fund

As noted in the recommendations, Triton suggests that Lake Havasu City establish a separate EMS Division budget and enterprise fund that includes the relevant operational, staffing, and administrative costs to provide emergency medical services and transport.

Section IV:
FINDINGS & RECOMMENDATIONS

Introduction to the Recommendations

The following sections list each of the recommendations based on Triton's various analyses and observations, national standards, best practices, and the experience and knowledge of Triton's subject matter experts.

Triton does not expect that LHCFD will be able to implement all recommendations in the immediate future. Some may need to wait until economic conditions allow their implementation. However, all the recommendations offered are intended to chart a course to improve capability and service.

The recommendations have been organized into three sections. General recommendations are first listed by topic (e.g., Life Safety, Staffing, etc.)—but not necessarily presented in order of priority.

The next section lists these same general recommendations by proposed priority: Short-Term, Mid-Term, and Long-Term. The final section describes recommendations concerning the placement of future fire stations.

Planning & Implementation

This report includes a number of recommendations in assorted categories and priorities. As conditions change, Triton recognizes that the Lake Havasu City Fire Department may need to adjust these recommendations accordingly.

Even if conditions remain relatively the same in the near future, Triton recommends that LHCFD and representatives from Lake Havasu City create a task force consisting of key internal stakeholders to carefully review and consider these recommendations and develop a formal implementation plan.

General Recommendations by Category

The following section lists the various general recommendations by category.

Personnel & Staffing

Recommendation A-1: Evaluate the current recruitment and hiring practices to determine potential barriers and opportunities to increase employee diversity.

As noted earlier, LHCFD has no female uniformed personnel, which does not reflect the make-up of the City's population. Therefore, in partnership with the City's HCMD, LHCFD should work with local minority representation groups to identify barriers and effective recruitment pathways to increase the interest of minorities in pursuing a fire service career. This effort should also include engaging representatives from Mohave Community College.

Recommendation A-2: Add five additional personnel if an EMS CON is granted, and LHCFD implements an EMS Ambulance Transport Program.

As previously noted in the Staffing section of this study, the department is theoretically short six personnel (two per shift) to provide adequate scheduled and unscheduled leave coverage without overtime for the 21 daily minimum assigned positions. The hiring of the 11 SAFER Grant funded personnel will fill this gap, once initial recruit training has been completed. These personnel could be used to rotate across station assignments to provide relief coverage would reduce the amount of overtime, and, equally as important, reduce the fatigue of employees potentially working up to 72 straight hours without a rest period.

It is important to understand that increasing the minimum daily staffing by adding positions scheduled 24 hours daily will also increase the need for additional relief coverage on each shift.

Recommendation A-3: In collaboration with the Firefighters Association, change procedures to track and schedule PTO leave coverage.

Triton noted that the scheduling and use of PTO hours is administratively problematic, as up to four personnel can submit for PTO leave on any given shift (except restricted shifts as identified in the MOU and Staffing Policy) up to the shift before their scheduled shift. In addition, personnel can trade their scheduled PTO leave hours after a work schedule and planning have been completed.

- While PTO usage for sick leave is likely to result in a short-term notice of the need for unscheduled leave coverage, separating the scheduling procedures for vacation PTO, and requiring operations personnel to schedule their entire annual accrued vacation PTO shifts for the following year should be explored to reduce the total carry-over PTO accruals from year to year.

Recommendation A-4: Increase the utilization of Captains and Battalion Chiefs.

- If a qualified Captain and acting Captain is available on a shift with a Battalion Chief vacancy, they should be able to act as BC and Captain, respectively.
- Using off-duty Captains and Battalion Chiefs to cover at least three scheduled or unscheduled officer overtime leaves should be revisited, especially if additional personnel are hired to provide additional relief coverage across the three shifts.
- In addition, temporarily hiring qualified "acting" personnel trained to step up to a higher rank should be pursued.
    - This could reduce overtime leave coverage, reduce worker fatigue, and provide valuable experience to personnel wishing to promote to a higher rank.

Recommendation A-5: Reduce the number of payroll overtime codes and synchronize payroll and time-tracking databases.

The current method of overtime hours tracking is cumbersome and prone to errors and confusion. While Triton understands that federal accounting rule requirements related to grant/subsidy awards from the COVID-19 pandemic are in place, several other payroll codes appear to be inconsistently used by the on-duty Battalion Chiefs or not accurately translated into the payroll system.

- Triton recommends reducing the number of non-federal mandated overtime codes to make it easier for staff to accurately record overtime hours daily.

Recommendation A-6: Modify the Deputy Chief job description to require the completion of an administrative assignment.

- Triton recommends that LHCFD consider administrative experience, program management, and project planning to be important aspects of the success of personnel promoted into chief officer positions.
    - Consideration should be given to requiring this experience as a prerequisite to promoting to the Deputy Chief position.

- In addition, consideration should be given to further institutionalizing this by modifying the Deputy Chief job descriptions to require the completion of either a three-year administrative rotation or other long-term administrative assignments that provide equivalent experience.

Recommendation A-7: The current method of rotating operations chief officers should be maintained.

- The current method of rotating operations chief officers and officer-qualified Paramedics into the Training Battalion Chief and EMS Battalion Chief positions should be continued.
  - This will allow operations personnel to gain necessary administrative and planning experience and better prepare qualified personnel to step into executive officer positions.

Recommendation A-8: Provide fire department supervisors with adequate initial and periodic training in documenting employee performance.

- Lake Havasu City and LHCFD should provide initial training to current and new officers and supervisors in appropriately assessing and fairly documenting subordinate employee performance.
- This training should be conducted periodically.

Life Safety & Public Education (Prevention)

Recommendation B-1: Consider changing the Public Education Specialist's title to "Community Risk Reduction Coordinator."

- To align with national risk reduction efforts, Triton recommends that the Public Education Specialist's title change to Community Risk Reduction Coordinator. This change will better reflect the services provided in the community—reviewing all risks, not just fires.
  - They should also coordinate risk reduction efforts and develop a department-wide CRR program that includes all organization members.

Recommendation B-2: Appoint a qualified individual to serve as a Public Information Officer and improve the dissemination of timely information to the public.

- This individual should have or be provided with necessary training to obtain certification as a Public Information Officer (PIO).
- The PIO should pursue positive relationships with the media, businesses, and other local organizations.

- The PIO could manage several areas:
  - Media spokesperson.
  - Serve as the Joint Information Center (JIC) Coordinator.
  - Information management and oversight.
  - Development of internal and external communication policies.
- In addition, the PIO should identify topics and issues that public information and education programs should target (e.g., ground-level falls among the elderly, frequent kitchen fires, etc.).

- ***Alternative to Recommendation B-2:*** Working within the existing City policies and procedures, delegate key operations personnel with the ability to quickly and effectively engage the public and media during high visibility and public safety critical incidents.
- Increase the level of social media engagement for disseminating routine public safety and department activities that may be of interest to the public.
  - Ensure those who are authorized as the PIO have been properly trained to use the various social media tools.
  - This may include, but is not limited to: Facebook, Twitter, Instagram, and TikTok, just to name a few.

Recommendation B-3: Create a schedule to ensure all commercial occupancies are inspected consistently.

- Create a schedule to periodically inspect all occupancies in the community based on risks.
- Utilize the IBC group classifications of risks or the proposed Fire Prevention inspection guideline to create the schedule.

Recommendation B-4: Implement an operational permit program.

- Adopt operational permits as allowed by the fire code to ensure that the occupancy is in compliance with the adopted fire code.
- Operational permits should include a fee to help cover the inspection cost and potentially fund an additional position in the fire prevention bureau.

Recommendation B-5: Develop a Community Risk Reduction Plan.

- LHCFD should begin the process of developing a CRR plan for the community.
- A CRR plan should integrate the entire department at the fire station level in its efforts to reduce community risks.

Recommendation B-6: Have each engine conduct monthly company-level pre-incident planning.

- Engine companies should conduct at least one pre-incident "walkthrough" per engine company per month. These buildings or occupancies could be in any of the three areas of concern:
  - High hazard locations—areas that could pose a significant large-scale destructive impact if an emergency event were to occur.
  - High volume occupancies—buildings or occupancies which contain a high level of people, such as hospitals, nursing homes, schools, daycares, etc.
  - Critical Infrastructure—facilities or buildings whose purpose is to support human life and, if compromised, could lead to catastrophic cascading effects.
- The process of learning these types of networks can also serve as a guide when conducting a "windshield survey" if a catastrophic event were to occur.
  - This process can aid in the Initial Damage Assessment so that a Preliminary Damage Assessment can be provided to the Governor of the State of Arizona, if a state of emergency were to be declared in Lake Havasu.

Recommendation B-7: Consider hiring additional Fire Inspectors for the Prevention Division.

LHCFD is currently significantly limited in its ability to fulfill the need to complete commercial property and other inspections. This is primarily due to a lack of sufficient qualified staff.

- Increase current staffing levels to adequately conduct fire and life safety inspections to meet the inspection schedule policy that is currently in draft form.
- The new positions would be responsible for periodic inspections.
  - Depending upon the level of occupancy risk, LHCFD should ensure that all are inspected at least every three years.

Emergency Communications & Dispatch

Recommendation C-1: Consider establishing a Communications Center Operations Committee.

- The intent would be to increase communications between dispatch and public safety organizations.
- This committee should meet on a monthly or quarterly basis to discuss any issues or concerns, and get updates from dispatch on technology improvements and staffing.

Recommendation C-2: Establish a full Emergency Medical Dispatch quality improvement program.

- The Center does not currently have a quality improvement (QI) program that would regularly monitor the quality and effectiveness of EMD.
- The Center should consider methods and computer software applications that would enable an EMD QI program.

Recommendation C-3: Perform a compliance review of NFPA 1225.

- Without an on-site inspection of the facilities, the findings in this report are based on information from interviews. It is unknown if the building was built to NFPA 1225 standards.
- Taking as-built drawings and visual inspections, compare with NFPA 1225 standards and create a list of vulnerabilities in construction, physical security, etc.
- Develop a plan to make any feasible corrections to the facility and the mechanical systems.
- The following recommendations are a small portion of a complete NFPA 1225 evaluation.

Recommendation C-4: Determine the feasibility of removing vehicular access to the Police Department building.

- The building is surrounded on three sides by public streets.
- Limit the potential for unauthorized vehicles to be able to be used to damage exterior walls of the building.
  - Determine the feasibility of restricting any access roads/parking areas within 82 feet of the building to authorized vehicles.[51]

Recommendation C-5: Perform regular generator tests under a full load.

- The generator performs a self-test weekly, running for 20 minutes. There is no regularly scheduled test under full load.
- Work with the maintenance staff and the Center to schedule a full load test monthly.

Recommendation C-6: Develop a Continuity of Operations Plan for LHCCC.

- In case of need, LHCCC's operations can be remotely located to its mobile communications center (MCC).
  - LHCCC has full radio functionality but no telephone access besides cellular, so all 911 calls are forwarded to the Mohave County Sheriff's Office. Mobile 911 systems are available, and many are designed to be used in the MCC.
  - Create an ability to have a backup CAD system either immediately available in the MCC or have laptop computers pre-loaded with CAD that could be set up in the MCC.
  - Acquire a logging recorder system that can be wired into the MCC to log incoming telephone and radio traffic.

Recommendation C-7: Consider replacing the existing CAD system.

- The HTE/Central Square CAD system is older, and LHCCC has experienced outages and downtime.
- LHCCC would most likely have an opportunity to upgrade to a Central Square CAD system, but since this would be a complete replacement of hardware and software, LHCCC should look at all available CAD systems.
- Triton recommends that an effective method for reviewing multiple systems in one location is to attend one or more professional public safety communications association conferences.

Recommendation C-8: Consider changing the MDC Software.

- The MDC software is by HTE, so it will need to be replaced when the CAD system is replaced.
- Most CAD vendors offer an MDC solution as an option in their system, but other third-party vendors also offer solutions.

Fire Stations & Facilities

Recommendation D-1: Install a door-code security system in each fire station.

- A door code system provides security and flexibility if there are changes in personnel or the code is compromised and needs to be changed.
- A key card system may be a substitute for a coded entry process. However, the reliability of a key card is only as good as the individual who retains possession of the card when arriving at the fire station. A door code only requires memorization.

Recommendation D-2: Consider assigning a "Station Captain" at each of the fire stations.

- Currently, there is no "lead person" assigned to each station to be responsible for the regular responsibilities of maintaining a functional fire station. Current maintenance is addressed on an "as needed" basis by assorted personnel.
- Develop an SOG that describes the basic responsibilities of the position. This should include identifying future station needs to be submitted to the chief officers for budgetary purposes.
- Appoint a Captain for each station.

Recommendation D-3: Establish formal and informal fire station inspections.

- A chief officer should conduct monthly or quarterly basic station inspections.
  - There should be a basic checklist of functional areas that ensures everything is in good working order.
  - The checklist should include the status of the supplies inventory, smoke alarms check, fire extinguishers, generator checks, apparatus functions, personnel equipment, and a safety inspection.
- An annual inspection should be conducted by the Fire Chief or designee.
- Inspections should be conducted in a "positive" manner, as a means to improve the facility, and to ensure proper functionality.
  - Inspections should also be utilized as a means for operations personnel to discuss any issues and the future of the organization with chief officers and the Fire Chief.

Recommendation D-4: Obtain and review the agreement between the fixed base operator (FBO) and the Defense Logistics Agency (DLA).

- Obtain a copy of the agreement between the FBO and DLA to review and determine if there are any expectations or performance requirements related to providing timely emergency response for refueling operations involving military aircraft.
- Identify any additional needs for fire protection at the airport and take the necessary steps to implement them.

Recommendation D-5: Consider replacement or renovation of Station 6 in the future.

Triton recognizes that the City's Property Condition Assessment will include Station 6 and result in a comprehensive evaluation. At present, the Station 6 crew quarters are acceptable. However, the apparatus bay at Station 6 is inadequate.

- Station 6 is not necessarily required to be located on the airport property and could be moved to a location that would provide better service to the community.
- Triton recommends that Lake Havasu City consider moving Station 6 to a more viable location that improves emergency services.

Recommendation D-6: Consider the construction of future fire stations.

- Triton recommends that the City continue planning for the construction of a new Station 7, as determined based on community development.
- Future consideration and planning of an additional station should be undertaken if/when community growth dictates.

Recommendation D-7: Consider developing the property on the southwest side of the training tower at Station 2 for a future apparatus maintenance and logistics facility.

LHCFD does not have adequate fire apparatus maintenance and repair facilities or dedicated maintenance staff. Neither does the department have a building or staff for logistics and supplies.

- This property is potentially ideal for a future apparatus maintenance facility and logistics and supplies distribution center.
- Triton recommends that the City begin planning for this in the future.

Training & Continuing Education

Recommendation E-1: Consider providing the Training Battalion Chief with increased operational support.

- The Training Battalion Chief position should be provided with increased operational support to enable "hands-on" consistent instruction and training facilitation across the shifts, while also meeting the demands of future new-hire orientation training requirements.
  - Use the position to coordinate and deliver recruit firefighter orientation.
  - Consideration should be given to adding a rotational training administrative assignment for either a fire Captain position, or a qualified acting Captain position.
  - Increase the number of instructor-led drills and classes to ensure firefighter competency and safety.

Recommendation E-2: Develop, support, and deliver a more robust annual fire training program.

- Increase the importance and activities of the Training Committee to ensure the development and execution of realistic and meaningful annual training goals, activities, and an annual training calendar.
- The calendar should be developed in consideration and timing of developing the annual budget process to ensure funding constraints and opportunities are identified and aligned with desired training goals.
- Publish, distribute, and update the plan throughout the year. Ensure daily operational tasks align with the plan, and that the plan receives priority in accomplishing daily tasks.
- Reinstate an annual live-fire drill with a minimum of two companies per drill and one company on "Standby" at fire station two.
  - The climate of the Havasu region is only suitable for live fire burning in cooler seasonal months. This is a predictable occurrence thus allowing training and Operations Battalion Chiefs to both schedule and set objectives for what they choose to accomplish.

Recommendation E-3: Hire off-duty crew(s) to standby and cover the LHCFD service area while mandatory training is being conducted.

- Keep platoons together so that they can train together as a shift.
  - This strategy reinforces the rhythm and familiarity each platoon has with working within their assigned crews.

Operations & Deployment

Recommendation F-1: Consider dispatching and deploying engine companies initially on "Alpha" and "Bravo" (and some "Charlie") EMS calls prior to dispatching an ambulance.

- With a limited number of available ambulances from AMR and LHCFD, this could keep the ambulances available for higher-acuity calls.
- If this occurs, a policy should be developed allowing apparatus that have been dispatched to an Alpha or Bravo call to divert to another more serious incident as necessary.

Recommendation F-2: Recommend LHCFD proceed with the pursuit of a limited CON for 911 ambulance ground transport.

- If a CON is approved, the Lake Havasu City Fire Department should establish two ambulances staffed and equipped to provide Advanced Life Support and operating 24 hours daily.
- This should be done in partnership with the current CON holder.
- The agreement and deployment policies should require that the closest available ambulance be dispatched to 911 calls.
- Lake Havasu City should consider establishing an enterprise fund specifically for ambulance operations.
- LHCFD should ensure that two medic units are fully staffed and equipped 24 hours daily, without compromising or reducing existing emergency operations and deployment.

Recommendation F-3: Consider expanding future ambulance operations.

- Triton considers the agreement with current CON holder as the first step towards an eventual assumption of all emergency ambulance operations in the LHCFD.
- It is recommended that at some point in the future, to be determined by LHCFD and Lake Havasu City, that all ambulance operations should be provided by the fire department.

Recommendation F-4: Addition of potential peak-demand units.

- As shown in the "queuing analysis" earlier in this report, the wait probability at Stations 3, 4, and 5 exceeds the recommended 10% threshold.
- If LHCFD is unable to obtain a CON for ambulance service, it should consider adding 1–2 peak-demand EMS quick-response units 12 hours daily from 0900–2059 hours.
- These unit(s) should be deployed from a location(s) that would enable the best response time performance in the service areas of Stations 3 and 5.

Recommendation F-5: Discontinue assigning probationary Firefighters to Medic Units.

- The percentage of fires to overall alarms is significantly low in this community. That fact warrants a sound foundation in basic firefighting skill development. Training time on an engine is lost, given the time scheduled working a Paramedic or EMT assignment while on probation.
- Committing new Firefighters to engines during the probation period not only provides the crews the opportunity to train, but it also provides experienced Firefighters the opportunity to rate or evaluate the performance of those on probation.

Miscellaneous Recommendations

Recommendation G-1: Strategic Planning

- Given the amount of time that has transpired since the last plan was created and that this report contains important information, analyses, and recommendations, an updated strategic planning process should be considered.
  - Ideally, the process should include both internal and external stakeholders, who can help identify and prioritize the fire department's services and how it provides them.
  - Once complete, the plan would ensure that all personnel understand what is to be accomplished, by when, and by whom.
  - All non-emergency work that does not align with the plan should be evaluated for its importance and relevance to the organization and community.

Recommendation G-2: Establish an EMS quality improvement program that reviews both clinical and operational performance.

- LHCFD currently has an EMS QA/QI SOG and process that focuses on EMS clinical performance. Patient care reports are reviewed through this process.
- Triton recommends that EMS operational performance be included in the process and that it be reported on regularly.
  - Reports should be generated monthly or quarterly and distributed to all operations personnel.
  - Recommend reports show the number of incidents for the period, turnout times and response times by each shift and apparatus.

Recommendation G-3: Develop a process for reviewing call processing times.

- LHCFD should develop a process to review call processing times at the 90th percentile—not the average.
- Meet with the LHCPD to determine how to reduce the times and concentrate on higher-risk incidents such as structure fires.

Recommendation G-4: Regularly monitor and report on performance standards.

- The NFPA and the National Emergency Number Association (NENA) set a standard of answering incoming emergency calls within 15 seconds, 90% of the time and within 20 seconds, 95% of the time.
- While the Center has a policy to comply with these call-answering standards, it is not normally checked or reported out.
- The current Management Information System (MIS) for the Vesta 911 system cannot report out on a 15-second time standard.
- Reporting should not be presented from a punitive perspective, but rather as means to determine improvement.
- Meet with the LHCPD to determine how to reduce the times and concentrate on higher-risk incidents such as structure fires
- Update or replace the current MIS software to enable accurate reporting and make monthly reporting a policy.

Recommendation G-5: Consider developing methods to review the majority of electronic incident reports.

- LHCFD should have a process in place to review non-EMS incident reports that would ensure accuracy and completeness.
- Consider appointing a small group of experienced fire officers to serve as members of a quality improvement committee.
  - At a minimum, all major incidents should be reviewed.
- Evaluate any current policy (written or unwritten) on who is responsible for documenting multi-company fires or other significant incidents.
  - Triton recommends that incident commanders maintain responsibility for completing the reports of incidents in which they were in command.

Recommendation G-6: Consider replacing all frontline engines as soon as is feasible.

- Triton understands that Lake Havasu City has ordered at least one new engine to replace an existing apparatus, and will be refurbishing at least two existing engines.
- Recognizing that currently available information indicates that it may take approximately 48 months to acquire a new engine, Triton recommends that Lake Havasu City acquire the necessary funding to either refurbish (if feasible) or order and replace its remaining engines.
- Triton recommends that all of LHCFD's engines be configured and equipped identically—understanding that some vehicles may require unique additional equipment.

Recommendations by Priority

The previous section lists each of Triton's recommendations by specific category. In this section, these same recommendations will be listed in order of *recommended* priority: Short-Term, Mid-Term, and Long-Term. Note: specific recommendations concerning the Communications Center have been excluded from the priority list, as these will be best determined by that organization.

LHCFD is encouraged to modify or adjust these priorities depending on needs and changes in condition.

Short-Term Recommendations

The following lists short-term recommendations that could or should be accomplished within 1–3 years.

- **Recommendation A-1:** Evaluate the current recruitment and hiring practices to determine potential barriers and opportunities to increase employee diversity.
- **Recommendation A-2:** Add five additional personnel if an EMS CON is granted, and LHCFD implements an EMS Ambulance Transport Program.
- **Recommendation A-3:** In collaboration with the Firefighters Association, change procedures to track and schedule PTO leave coverage.
- **Recommendation A-4:** Increase the utilization of Captains and Battalion Chiefs.
- **Recommendation A-5:** Reduce the number of payroll overtime codes and synchronize payroll and time-tracking databases.
- **Recommendation A-6:** Modify the Deputy Chief job description to require the completion of an administrative assignment.
- **Recommendation A-7:** The current method of rotating operations chief officers should be maintained.
- **Recommendation B-1:** Consider changing the Public Education Specialist's title to "Community Risk Reduction Coordinator."
- **Recommendation B-7:** Have each engine conduct monthly company-level pre-incident planning.
- **Recommendation B-8:** Consider hiring additional fire inspectors for the Prevention Division.

- **Recommendation D-2:** Consider assigning a "Station Captain" at each of the fire stations.
- **Recommendation D-3:** Establish formal and informal fire station inspections.
- **Recommendation D-6:** Consider the construction of future fire stations.
- **Recommendation E-1:** Consider providing the Training Battalion Chief with increased operational support.
- **Recommendation E-2:** Develop, support, and deliver a more robust annual fire training program.
- **Recommendation F-1:** Consider dispatching and deploying engine companies initially on "Alpha" and "Bravo" (and some "Charlie") EMS calls prior to dispatching an ambulance.
- **Recommendation F-2:** Recommend LHCFD proceed with the pursuit of a limited CON for 911 ambulance ground transport.
- **Recommendation F-4:** Addition of potential peak-demand units.
- **Recommendation F-5:** Discontinue assigning probationary Firefighters to Medic Units.
- **Recommendation G-1:** Strategic Planning
- **Recommendation G-4:** Regularly monitor and report on performance standards.
- **Recommendation G-5:** Consider developing methods to review the majority of electronic incident reports.

Mid-Term Recommendations

The following lists short-term recommendations that could or should be accomplished within 3–5 years.

- **Recommendation A-8:** Provide fire department supervisors with adequate initial and periodic training in documenting employee performance.
- **Recommendation B-2:** Appoint a qualified individual to serve as a Public Information Officer and improve the dissemination of timely information to the public.
- **Recommendation B-3:** Create a schedule to ensure all commercial occupancies are inspected consistently.
- **Recommendation C-1:** Consider establishing a Communications Center Operations Committee.

- **Recommendation D-1:** Install a door-code security system in each fire station.
- **Recommendation D-4:** Obtain and review the agreement between the fixed base operator (FBO) and the Defense Logistics Agency (DLA).
- **Recommendation D-5:** Consider replacement or renovation of Station 6 in the future.
- **Recommendation E-3:** Hire off-duty crew(s) to standby and cover the LHCFD service area while mandatory training is being conducted.
- **Recommendation F-3:** Consider expanding future ambulance operations.
- **Recommendation G-2:** Establish an EMS quality improvement program that reviews both clinical and operational performance.
- **Recommendation G-3:** Develop a process for reviewing call processing times.
- **Recommendation G-6:** Consider replacing all frontline engines as soon as feasible.

Long-Term Recommendations

The short and mid-term strategies discussed should move LHCFD forward substantially. A longer-term, high-level view of future needs is also important to provide a "big picture" view of how the organization may continue with future initiatives. Primarily, long-term strategies are centered around community growth and related workload and how both impact the future deployment of fire stations and personnel. These should be implemented over a period greater than 5 years.

- **Recommendation B-5:** Implement operational permits.
- **Recommendation B-6:** Develop a Community Risk Reduction Plan.
- **Recommendation C-2:** Establish a full Emergency Medical Dispatch quality improvement program.
- **Recommendation C-3:** Perform a compliance review of NFPA 1225.
- **Recommendation D-6:** Consider developing the property on the southwest side of the training tower at Station 2 for a future apparatus maintenance and logistics facility.

Recommended Future Fire Station Locations

Future Fire Station 7

Substantial construction of single-family homes is occurring in the Foothills Estates development in the northeast portion of LHCFD's service area. Appendix B includes a map displaying the various developments in and around this area. The next figure shows the vacant lot in which a future Station 7 could be constructed.

Figure 204: Potential Station 7 Location (Sloop Dr. & McCulloch Blvd. N.)

Another development consisting of single-family homes may be constructed in the near future on the east side around Window Rock Road.

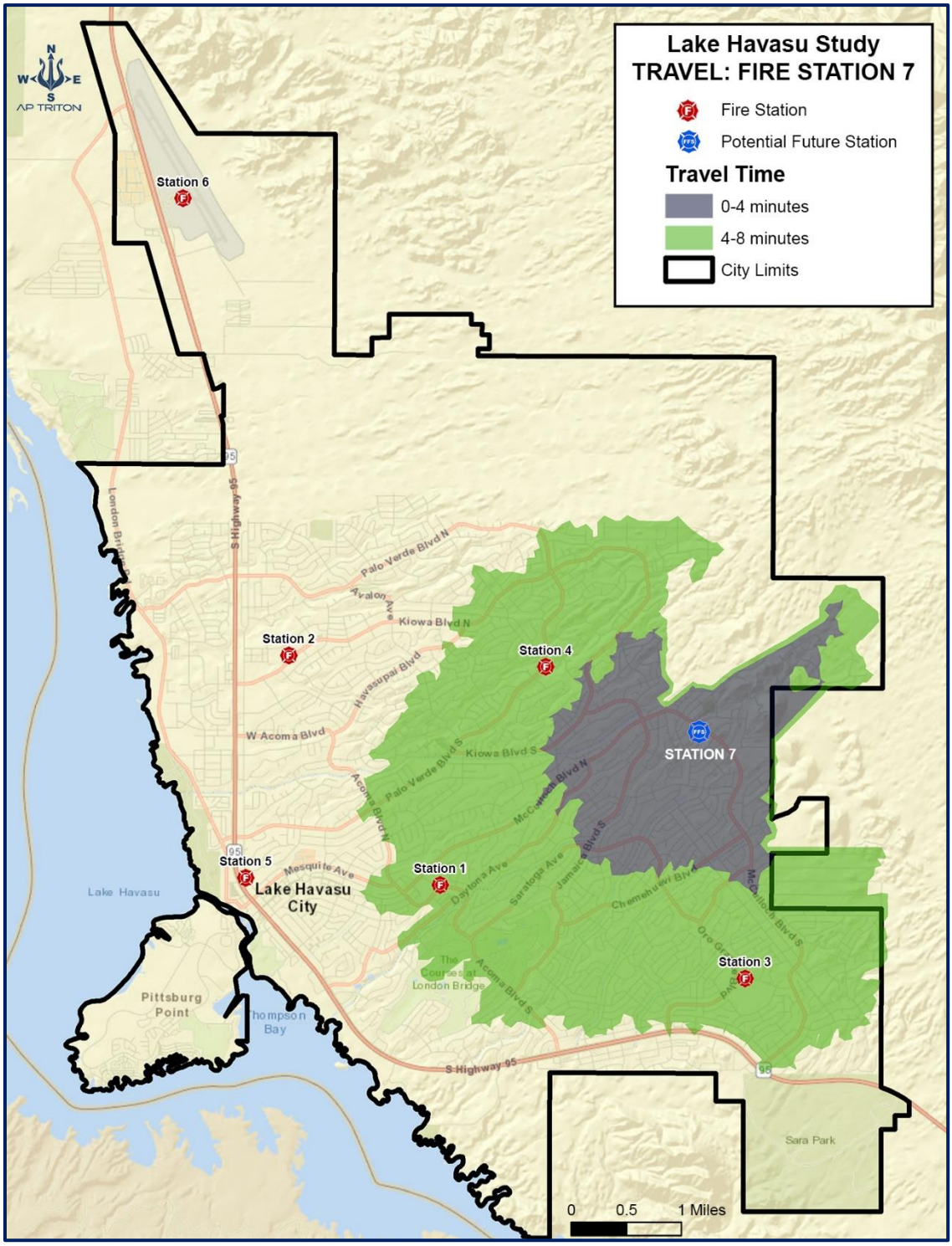
Station 7 and Foothills Development Discussion

LHCFD provided incident data on 23 calls that occurred in the Foothills Development between August 12, 2021, and June 23, 2022. Using this data, the analyses showed travel times of 10 minutes, 54 seconds or less at the 90th percentile, and total response times of 14 minutes, 34 seconds or less at the 90th percentile. AVL data also showed an average speed of nearly 26 MPH. Although this was a very small data sample, it represented actual incidents and may indicate longer potential response performance than projected in the GIS studies on the following pages.

Future Station 7 Location

The next figure shows the 4-minute and 8-minute travel distances for Station 7.

Figure 205: Projected Travel-Time Distances from Proposed Station 7



Travel Time Maps Discussion

Each of the travel time maps generated in this study was created using GIS shapefiles provided by Lake Havasu City. Travel times from each of the fire stations were projected by taking into account the posted speed limits, various curves, and other considerations.

Projected Service Area Coverage from Fire Stations

The next figure lists the estimated percentage of LHCFD's service area that can be accessed within a 4-minute and 8-minute travel time from the existing six fire stations and from the potential addition of Station 7. Access percentages are based on the road network, not the total geographic area.

Figure 206: LHCFD Projected Service Area Coverage with Additional Fire Stations

	— Percentage Covered —	
Station Options	**4-Minute Travel Time**	**8-Minute Travel Time**
Total Coverage with Current Stations 1–6	79.2%	98.9%
Total Coverage with Stations 1–7	85.6%	99.5%

As shown in the preceding figure, the current coverage of six fire stations at a 4-minute or less travel time is just over 79% of the service area, and at an 8-minute or less travel time results in nearly 99% coverage.

Fire Station Recommendations for the Future

Triton recommends that Lake Havasu City pursue constructing future Station 7 and monitor community development and the potential for an additional station in the future.

Section V:
APPENDICES

Appendix A: Risk Classifications

Fire

Low Risk

These incidents are considered low in risk and are minor in scope and intensity. It requires a single fire apparatus and crew to manage fires involving passenger vehicles, fences, trash or dumpster, downed power lines, residential or commercial alarm investigations, or an odor investigation.

Moderate Risk

These incidents are the first alarm response needed to manage a moderate fire risk incident. These incidents include smoke in a building, small outside building fires, commercial vehicle fires, a single-family residence, a lightning strike on a building, an automatic fire alarm at a high-risk occupancy, or a hazardous materials pipeline fire.

High Risk

These incidents are a second alarm response needed to manage a high fire risk incident. These incidents include smoke in a high-life hazard property (school, skilled nursing, etc.), single-family residences with injured or trapped victims, multifamily residential buildings, or a moderate-sized commercial/industrial occupancy.

Maximum Risk

A third alarm response is needed to manage a maximum fire risk incident. These incidents include a hospital, assisted living facility, fire in an apartment building, high-rise building fire, a large commercial or industrial occupancy, hazardous materials railcar, or storage occupancy. Incident assignments will include additional command staff, recalling off-duty personnel, and mutual aid assistance for other critical tasking needs.

EMS Risks

Low Risk

A single EMS unit can manage a low-risk EMS incident involving an assessment of a single patient with a critical injury or illness, no-life threatening medical call, lift assist, or standby.

Moderate Risk

A two-unit response is required to control or mitigate a moderate-risk EMS incident. It involves assessing and treating one or two patients with critical injuries or illnesses or a motor vehicle crash with 1–2 patients.

High Risk

A multiple-unit response is required to control or mitigate a high-risk EMS incident. It involves 3–8 patients with injuries ranging from minor to critical. Patient care will involve triage, BLS, ALS treatment, and the coordinated transport of patients.

Maximum Risk

A multiple unit response is required to control or mitigate a maximum risk EMS incident. It involves more than nine patients with injuries ranging from minor to critical. Patient care will involve triage, BLS, ALS treatment, and the coordinated transport of patients. If this is an active shooter incident, the response may require a casualty collection area unit to treat patients, not in the hot zone.

Technical Rescue

Low Risk

A single fire unit can manage a low-risk technical rescue incident involving minor rescues, such as a child locked in a vehicle, elevator entrapment, or minor mechanical entrapment.

Moderate Risk

A two-unit response is required to control or mitigate a moderate technical rescue risk incident. Support is not usually required from a technical rescue team. This type of incident involves a motor vehicle crash that requires patient extrication, removal of a patient entangled in machinery or other equipment, or a person trapped by downed power lines.

High Risk

A multiple-unit response is required to control or mitigate a high-risk technical rescue incident. This type of incident may involve full-scale technical rescue operations ranging from structural collapse to swiftwater rescues. It may involve multiple motor vehicles that require extrication, commercial passenger carriers, or a vehicle impacting a building. Support is usually required from a technical rescue team. In addition, this incident may require multiple alarms.

Maximum Risk

A multiple-unit response is required to control or mitigate a maximum risk technical rescue incident. Support is required from a specialized technical rescue team and may have multiple operations locations. This type of incident will involve full-scale technical rescue operations such as victims endangered or trapped by structural collapse, swiftwater, or earth cave-ins. This incident will require multiple alarms and may expand beyond the identified critical tasking. Recall of off-duty personnel or assistance from auto or mutual aid may occur during a disaster or when additional alarms and command staff are needed.

Hazardous Materials

Low Risk

A single fire unit can manage a low-risk hazardous materials incident involving carbon monoxide alarms and other unknown hazmat investigations without symptomatic victims, less than 20 gallons of fuel, natural gas meter incident, downed power lines, equipment, or electrical problems, or attempted burning. Automatic alarms that may originate from a hazardous material.

Moderate Risk

A two-unit response is required to control or mitigate a moderate risk hazardous materials incident. Direct support is not usually required from a hazardous materials team. This type of incident involves a carbon monoxide alarm with symptomatic patients, a fuel spill of 20–55 gallons, or a gas or petroleum products pipeline break not threatening any exposures.

High Risk

A multiple-unit response with a hazmat team is required to control or mitigate a high-risk hazardous materials incident. For example, support is needed for a Level 2 hazmat incident that involves establishing operational zones (hot/warm/cold) and assigning multiple support divisions and groups. This response includes a release with 3–8 victims, gas leaks in a structure, hazmat alarm releases with victims, flammable gas or liquid pipeline breaks with exposures, fuel spills greater than 55 gallons, fuel spills in underground drainage or sewer systems, transportation or industrial chemical releases, or radiological incidents. Additional assistance may be required to expand operations past the identified critical tasks.

Maximum Risk

A multiple-unit response is required to control or mitigate a maximum risk hazardous materials incident. Support is required from an on-duty hazmat team and their specialized equipment. This type of incident involves establishing operational zones (hot/warm/cold) and assigning multiple support divisions and groups. Examples include nine or more contaminated or exposed victims, a large storage tank failure, a hazmat railcar failure, or a weapon of mass destruction incident. This incident will require multiple alarms and may expand beyond the identified critical tasking. Recall of off-duty personnel or assistance from auto or mutual aid may occur during a disaster or when additional alarms and command staff are needed.

Wildland Urban Interface

Low Risk

A single fire unit can manage a low-risk wildland firefighting incident involving a fire minor in scope, structures not threatened, and Red Flag conditions that do not exist. These include low-risk wildland or grass fires, an outside smoke investigation, illegal or controlled burns, or small vegetation fires.

Moderate Risk

Multiple units are needed to manage a moderate risk wildland firefighting incident involving a significant fire in brush, brush pile at a chipping site, grass, or cultivated vegetation. Red Flag conditions do not exist, and structures may or may not be threatened.

High Risk

Multiple units or alarms are needed to manage a high-risk wildland firefighting incident. The level is associated with Red Flag warnings with structures that may or may not be threatened. This fire involves a significant wildfire in brush, grasses, cultivated vegetation, and woodland areas. Additional alarm assignments, command staff, recall of off-duty personnel, and mutual aid assistance may require the operations to extend beyond the identified critical tasks.

Aircraft Rescue & Firefighting

Low Risk

A single ARFF unit can manage a low-risk ARFF incident. These incidents, which require an Alert 1 response, involve standbys such as a medevac flight, refueling operations for aircraft with non-ambulatory passengers, or small aircraft on the ground with minor operational issues. The standby may be in the station or in the airport operational area.

Moderate Risk

A moderate ARFF risk is considered an enhanced Alert 1 that includes all the airport's frontline apparatus and staffing. These are staged standbys for in-flight with a mechanical or instrument deficiency but do not normally affect the aircraft landing safely. For example, it may include a feathered propeller on a multi-engine aircraft, an overheated engine, low oil pressure, or minor ice buildup.

High Risk

This is an Alert 2 (less than nine people) on an Alert 2A (nine or more people) and is considered a full airport response. This type of emergency involves inflight aircraft with an operational defect affecting normal flight operations that an aircraft accident could occur. Examples include the loss of an engine, interior smoke or fire in the aircraft, malfunctioning landing gear, or low hydraulic pressure. Other support agencies will be assigned to the incident, including law enforcement, EMS, and airport operations staff.

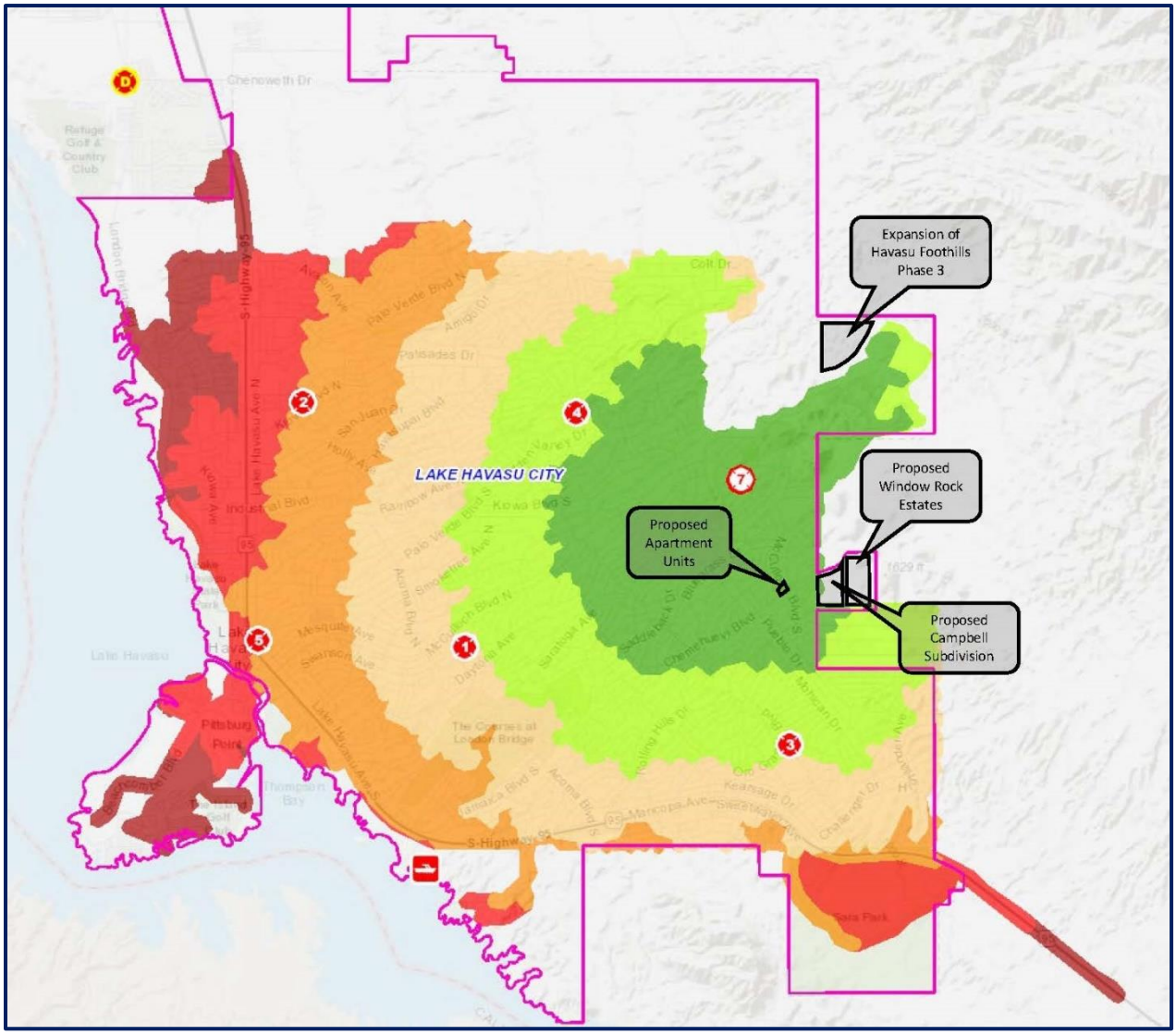
Maximum Risk

This is an Alert 3 (less than nine people) on an Alert 3A (nine or more people) and is a full airport response supported by off-site fire suppression apparatus and staffing. This type of emergency involves inflight aircraft that have been involved in an accident on or near the airport. In addition, other support agencies will be assigned to the incident, including law enforcement, emergency management, EMS, and airport operations staff.

Appendix B: Future Development Map

The following figure illustrates the service area of the Lake Havasu City Fire Department and the various locations under development in the area of the proposed Station 7 location.

Figure 207: Developments in the Area of Proposed Fire Station 7
Source: LHCFD & Lake Havasu City



Appendix C: Table of Figures

Appendix D: References

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