North Whatcom Fire & Rescue

Bellingham, WA

Fire Protection District MASTER PLAN

January 2020
Amended

ESCI Emergency Services Consulting International
Providing Expertise and Guidance that Enhances Community Safety

CONTENTS

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…and each of the firefighters, leaders, and support staff of North Whatcom Fire & Rescue, who daily serve the citizens and visitors of Fire Districts #21 and #4!

Section I:
EVALUATION OF CURRENT CONDITIONS

ORGANIZATIONAL & SYSTEM OVERVIEW

The following section consists of an overview of Whatcom County, North Whatcom Fire & Rescue (NWFR), and the various components that comprise the emergency services delivery system. Unless otherwise specified, Whatcom County Fire Protection District #21 and Whatcom County Fire Protection District #4 will be known collectively as North Whatcom Fire & Rescue throughout this report. In addition, the term "fire department" may be used in this document when regarding either fire district.

Whatcom County

Located in the northwest corner of Washington State, Whatcom County is comprised of 2,503 square miles, of which 397 square miles consists of water. As of July 2018, the estimated population of the County was 225,685 persons.[1] Whatcom County is bounded on the north by the Canadian border of British Columbia, on the south by Skagit County, and on the east by Okanagan County. On the west side lies the Strait of Georgia and Bellingham Bay.

Figure 1: Whatcom County

Demographic Composition

Females represent approximately 50.5% of the population, with 5.5% under the age of five years, and nearly 17% age 65 years and older.[2] As of 2017, the median household income was $56,419, with a mean of $72,888.[3] About 8.6% of all families had an income below the poverty level within the last 12 months.[4]

Overview of the Fire Districts

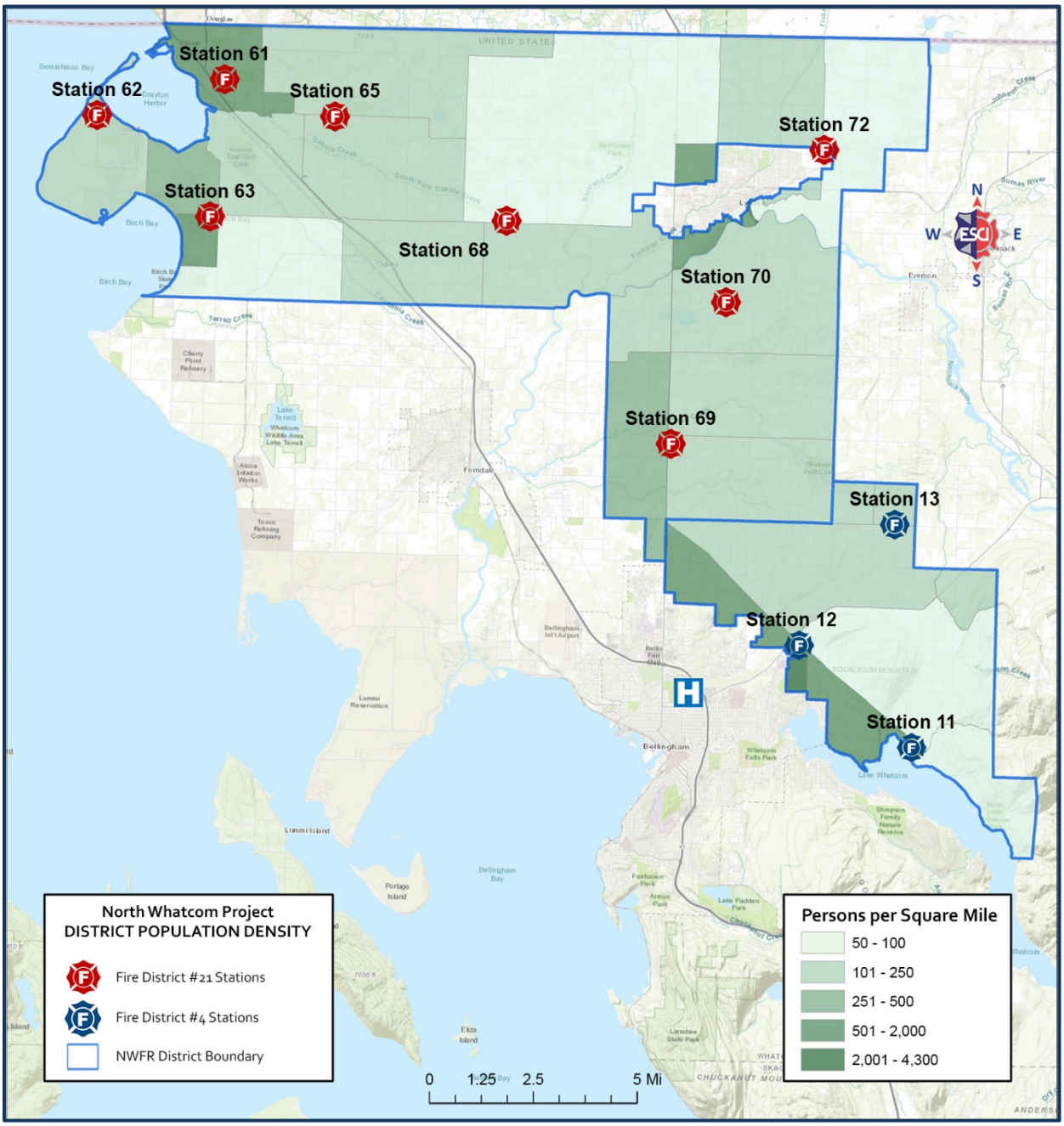
Whatcom County Fire Protection District #21 (WCFPD21) operates as North Whatcom Fire & Rescue, and was originally formed in December 2006 as a result of a voter-approved merger of Whatcom County Fire Protection District #3 and Whatcom County Fire Protection District #13. Through an Interlocal Agreement (IGA), in July 2011, NWFR formed a functional consolidation with Whatcom County FPD #4 (WCFPD4).

Study Area

Located in the northwest corner of the County, Whatcom County Fire Protection District #21 encompasses approximately 146 square miles, while Whatcom County Fire Protection District #4 consists of approximately 36 square miles. The two fire districts had a combined 2015 population of approximately 39,427 persons.[5] WCFPD4 lies southeast of WCFPD21, and is contiguous with its southern boundary. Most (88%) of the two districts are comprised of rural population densities, with 7% suburban and 5% urban populations. The City of Blaine is the largest incorporated community in the NWFR service area. NWFR defines rural as less than 500 persons per square mile; suburban as 500–1,000 persons per square mile; and urban as greater than 1,000 persons per square mile.

The following figure is a GIS illustration showing the population density of the two fire protection districts. NWFR reports that approximately 88% of the combined fire districts are comprised of a rural population.

Figure 2: Combined Population Density of NWFR & WCFPD4

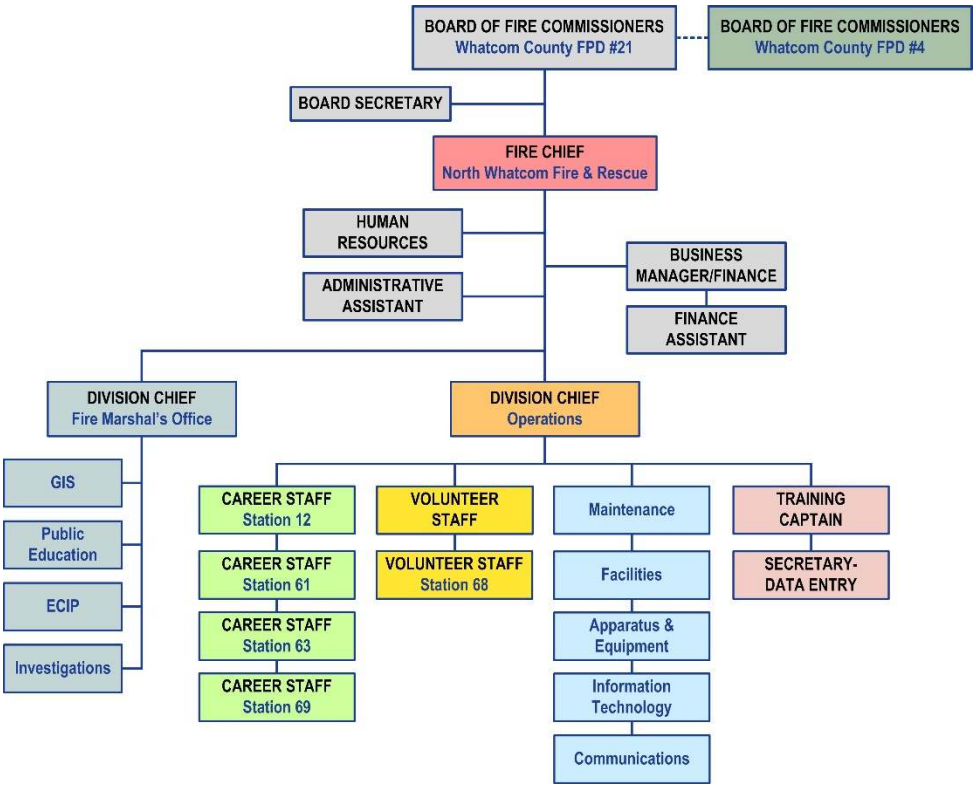


Governance & Oversight

NWFR is overseen by an elected five-member Board of Fire Commissioners (BOFC), while WCFPD4 maintains an elected three-member Board. The District is managed by a Fire Chief, who is an at-will employee hired by contract.

The Fire Chief (currently interim) oversees a Division Chief (DC) of Operations and a Division Chief/Fire Marshal. The DC of Operations is responsible for career and volunteer personnel, the Training Captain, maintenance, facilities, apparatus and equipment, Information Technology (IT), and Communications. The DC/Fire Marshal manages Geographic Information Systems (GIS), Public Education, inspections, and fire investigations. The following figure illustrates the organizational chart of NWFR as of 2019.

Figure 3: North Whatcom Fire & Rescue Organizational Chart (2019)



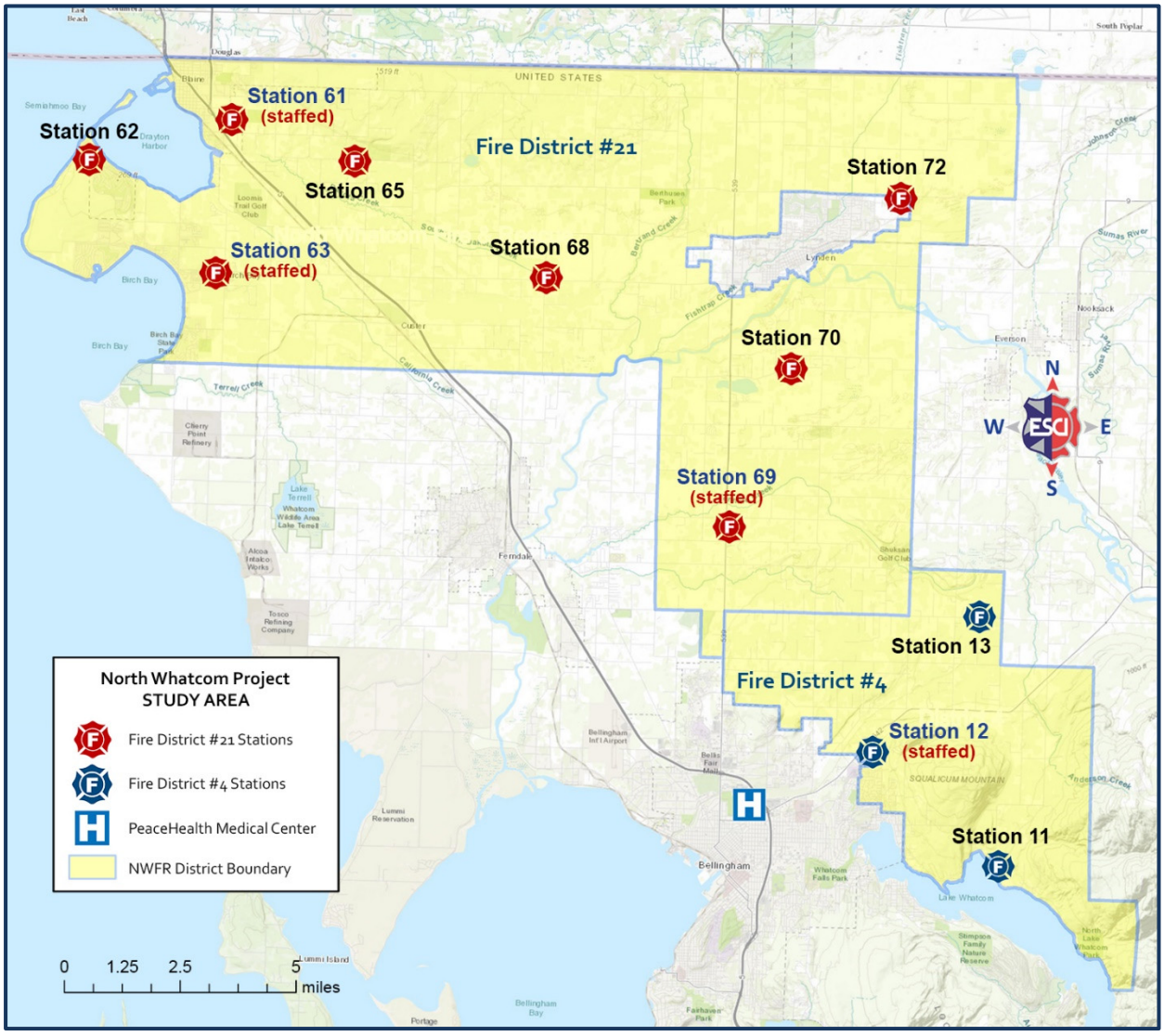
Emergency Operations & Deployment

As shown in the preceding figure, NWFR deploys apparatus and personnel from multiple fire stations located throughout both fire districts. NWFR is considered a "combination" department, utilizing both career firefighters and volunteers. As of 2018, the District employed 47 career personnel (including administrative support staff and two mechanics), approximately 12 volunteer firefighters and 11 volunteer Tender Operators, and about five Rehabilitation volunteers.

NWFR functions as a traditional fire department providing all forms of fire suppression and Basic Life Support (BLS) medical first-response (MFR) and BLS ambulance transport. Other operations include operations-level hazardous materials response, and a limited-level of technical rescue services.

The following figure is a GIS illustration showing the project study area, which includes the boundaries of the two fire protection districts.

Figure 4: North Whatcom Fire & Rescue Study Area



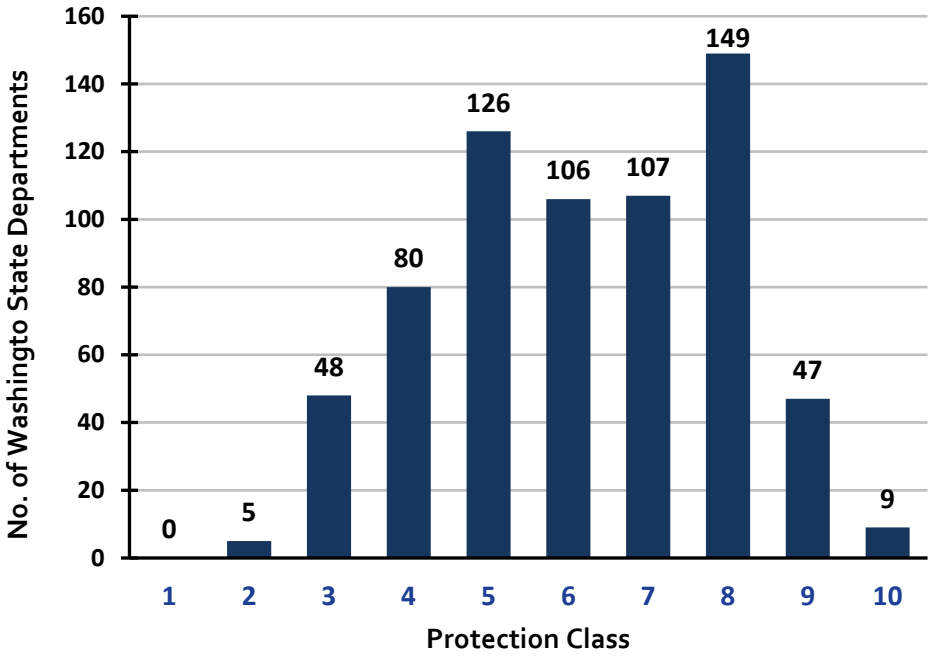
Protection Class Rating

As of 2017 and 2018, both fire districts were assigned a community *Protection Class* (PC) grade of 5 by the *Public Protection Department* of the *Washington Surveying & Rating Bureau* (WSRB). However, the City of Blaine was given a PC grade of 4.

Municipal fire departments and fire protection districts in Washington State are assigned a PC grade of 1–10, "…where 1 indicates exemplary fire protection capabilities, and 10 indicates the capabilities, if any, are insufficient for insurance credit."[6] Insurance companies utilize the ratings to assist in establishing fair premiums for fire insurance.

The following figure lists the volume of fire departments and fire districts in Washington State, and their respective Protection Class grade assigned by WSRB.

Figure 5: Protection Class Grades of Washington State Fire-Service Agencies



Other Services Provided

In addition to fire suppression and Emergency Medical Services (EMS), North Whatcom Fire & Rescue provides life-safety (i.e., fire prevention) services, which include an Engine Company Inspection Program (ECIP), Building Plan Review, Fire Investigations, and Building Pre-Plans. In addition, the Department provides some degree of public education, but no formal programs.

Components of the Emergency Services System

As in most communities throughout the United States, fire departments rely on and work with other organizations and personnel that comprise the overall emergency services delivery system. This is particularly true in EMS, which consists of more than a few elements working together to achieve the best patient outcomes.

Emergency Communications

The Primary Safety Answering Point (PSAP) in Whatcom County for 911 calls is known as *What-Comm*, which is operated by the Bellingham Police Department (BPD). What-Comm dispatches nearly all law enforcement agencies in the County (except for the Washington State Patrol and the police departments of Lynden, Sumas, and Blaine).

What-Comm immediately transfers calls for fire and EMS to the Bellingham Fire Dispatch Center (BFDC)—also known as "Prospect"—which functions as a secondary PSAP and dispatches most of the fire agencies in Whatcom County. BFDC provides pre-arrival instructions to callers of medical, fire, and rescue-type emergencies through use of the *Medical Priority Dispatch*® system and *Emergency Fire Dispatch*® programs, which enables dispatchers to uniformly interrogate callers, determine the nature of the incident or medical severity, dispatch the appropriate emergency responders, and provide medically validated and potentially life-saving pre-arrival instructions.

Mutual Aid Organizations

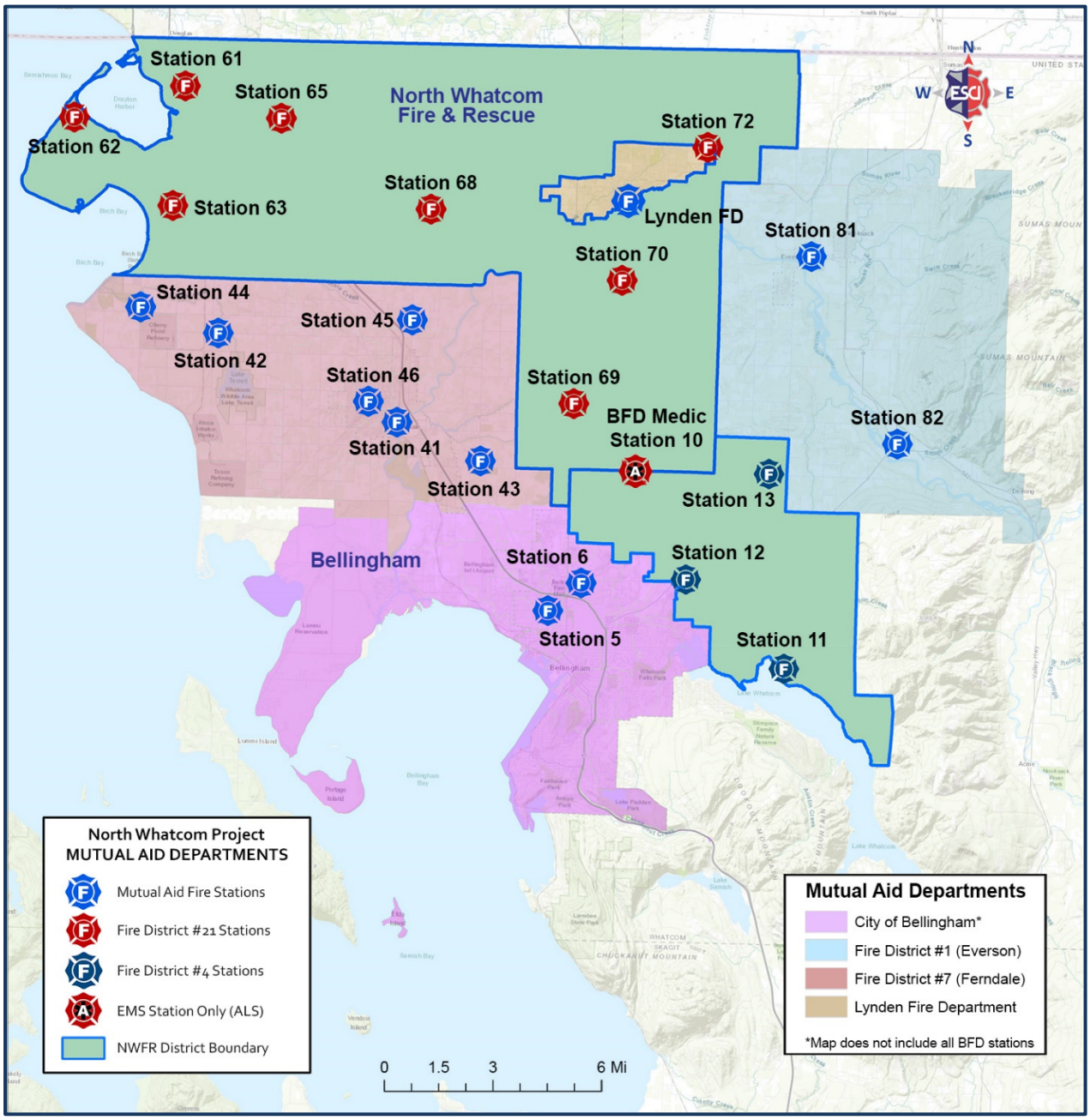
In Whatcom County, there are multiple fire districts, municipal fire departments, and Regional Fire Authorities (RFA). From a geographical perspective, Whatcom County FPD #7 (with six fire stations), Whatcom County FPD #1 (with two fire stations), and the Lynden Fire Department (with one fire station) are the closest. In addition, the Bellingham Fire Department has two fire stations near the western border of Fire District #4 and southern border of Fire District #21,as well as an EMS-only (ALS medic unit) station in the same area.

In addition to the mutual aid organizations described above, NWFR listed the following fire agencies:

- South Whatcom Fire Authority (six stations)
- Whatcom County FPD #5 (one station)
- Whatcom County FPD #8 (one station)
- Whatcom County FPD #11 (one station)
- Whatcom County FPD #14 (three stations)
- Whatcom County FPD #16 (two stations)
- Whatcom County FPD #17 (one station)
- Whatcom County FPD #18 (two stations)
- Whatcom County FPD #19 (one station)

The following figure illustrates the various fire station locations of the mutual aid fire agencies that are closest to NWFR.

Figure 6: Mutual Aid Departments in Proximity to NWFR



MANAGEMENT COMPONENTS

Effective fire department management is a complicated and expanding challenge for today's fire service leaders. Balancing community expectations, employee demands, expanding safety standards, and constrained financial resources places tremendous pressure on fire departments and fire districts across the country. Today's healthy fire departments have faced these challenges by establishing collaborative and efficient organizational structures, identifying (and working towards) a common vision, staying abreast of new technologies and methods, supporting, and evaluating a competent workforce, helping staff succeed and promote, and effectively communicating the organization's mission, performance, and future needs. This section of the report deals with the elements typically found in the management structure of an organization, as well as the processes found with North Whatcom Fire & Rescue.

Strategic Plan

NWFR has a current strategic plan in place, developed in 2016, and formally adopted by the Board of Fire Commissioners. The life-span of the plan is from 2016–2021. The plan contains the essential elements for an effective strategic plan: mission, vision, and values statements; internal stakeholder survey results; initiatives; goals and objectives; tasks, outcome statements; timelines; and persons responsible for each initiative. The key statements within the strategic plan are as follows:

Mission

"To protect the lives and property of our community through innovation and compassionate care."

Vision

"Striving to be an innovative organization, we are driven to be a leader in our community and profession, while honoring our values and accomplishing our mission through fiscal responsibility."

Values

"Trust, Integrity, and Accountability form the foundation of North Whatcom Fire & Rescue. Strong Leadership brings forward effective Teamwork, Communication, and Respect, which are the pillars of our organization. As our capstone, we serve with Humility, and value Loyalty and Compassion."

The District has condensed the foundational elements of the strategic plan using an effective visual metaphor to illustrate the interconnectedness of the values of the organization. While the strategic plan has all the essential elements, the District reports that the plan has not been reviewed frequently enough. It is possible that the timelines are too generous and the tasks too broad to be adequately instructive for those working on implementation. By setting a schedule for review at least semi-annually (quarterly is preferable), confusion surrounding any initiatives or tasks can be discovered quickly and clarified. It is important in the life of a strategic plan that momentum is maintained once the development of it is complete. It must be a meaningful part of the daily operation of the District for members to see the relevance of the plan to their daily lives.

Regulatory Documents

Organizations that operate efficiently are typically governed by clear guidance that lays the foundation for effective organizational culture. These policies set the boundaries for both expected and acceptable behavior, while not discouraging creativity and self-motivation.

An effective set of fire district rules and guidelines should, at a minimum, include two primary types:

1. *Administrative Rules*—This section contains the rules with which personnel in the organization are required to comply. Administrative Rules, by definition, require certain actions or behaviors in all situations. These administrative rules should complement District policies established by the Board of Fire Commissioners (if separate).

   These rules should be adopted and approved by the Board of Fire Commissioners since the Fire Chief is also subject to them. The Administrative Rules should govern all District personnel, whether career or volunteer. Where rules require different applications or provisions for various classifications of members, these differences should be clearly indicated and explained in writing. Specifically, the administrative rules should contain sections which, at a minimum, address:

   - Complaint filing process
   - Public records access and retention
   - Contracting and purchasing authority
   - Safety and loss prevention
   - Respiratory protection program
   - Hazard communication program
   - Harassment and discrimination
   - Personnel appointment and promotion
   - Personal conduct, disciplinary, and grievance procedures
   - Uniforms and personal appearance

2. *Standard Operating Guidelines* (SOG)—This section should contain "street-level" operational standards of practice for District personnel. SOGs are different from Administrative Rules in that variances are allowed in unique or unusual circumstances where a strict application of the SOG would be less effective. The SOGs should provide for a program of regular, systematic updating to ensure it remains current, practical, and relevant. SOGs should be developed, approved, and enforced under the direction of the Fire Chief.

Ongoing review and revision of both types of these documents are important. The first item in a manual should include the process by which NWFR rules and guidelines are to be revised. Ideally, one-third of the regulatory documents should be reviewed each year, so the entire set is reviewed over a three-year period.

According to comments from NWFR staff, there are a limited number of these and they are not routinely reviewed or regularly updated. What few documents are in place are evaluated for legal mandates and only occasionally reviewed for consistency. SOGs are used for training evolutions. New employees receive training on the policies during their initial orientation. An option the District should consider is the "Six Minutes for Policy" review philosophy. A policy, rule, or other regulation be selected and reviewed briefly (approximately six minutes) on the front-end of a training exercise, whether germane to the training topic or not. This maintains the crew's understanding of these elements over an extended period.

District Communication

Internal Communication

Of the major methods of routine communication within a fire district, according to the information provided to ESCI, some are utilized by NWFR. The typical methods of communication internally are listed below, and those which are utilized by the District are found in *italics*:

- *Regularly scheduled staff meetings (weekly),* with written staff meeting minutes.
  - *Captain meetings (monthly),* with written staff meeting minutes.
  - *Captains and Lieutenants (quarterly),* with written staff meeting minutes.
- *E-mail (volunteers use personal e-mail and belong to a group).*
- *Memoranda.*
- Member newsletters.
- Agency Intranet.
- Member forums (all-hands meetings).
- Open-door policy.
- Vertical communication path clearly identified (organization chart for Chain of Command).

External Communication

The District maintains some level of external communication with the community. Of the typical methods used by contemporary fire districts, some are used by NWFR. The typical methods of external communication utilized by the District are listed as follows:

- Community newsletter ("The Responder" monthly).
- District website.
- Advisory committee(s) (when the need arises).

Other types of external communication not currently in use by NWFR can include:

- Formal complaint process in place.
- Community survey used (customer satisfaction postcards are handed out at responses).

The District website is well-developed in many areas but in need of updating in others (District #4 site is being updated). On some pages of the website, it still lists the name of a former NWFR Fire Chief, who left at the end of 2018.

Documents & Security

The District appears to comply with the legal requirements for public records requests by managing and maintaining records—both hard copy and digital—in software programs intended for that purpose. Incident reports were maintained using *Firehouse Software*® (through 2018) but recently converted to *ImageTrend*® software. Electronic documents, including incident reports, are maintained on a secure server, and the District relies upon Tech Help to update computers weekly to address virus risks and other software glitches.

Most fire station facilities are locked when not in use, and the District pays a monthly fee to a security firm to monitor alarm systems installed at the various stations. Vehicles are expected to be secured by the user when parked outside (staff vehicles). The District stores response apparatus in the apparatus bays of the stations when not in use. Keypads and locks secure the stations; these combinations must be changed on a regular schedule to prevent unauthorized access to facilities and equipment by former members of the District.

The Fire Chief provides financial, management, and operational reports to the Board of Fire Commissioners at their monthly meetings. In addition, the District publishes an annual report on fire department activities and posts it on its website for citizen access. Within the annual report, basic response data is analyzed and provided to citizens in an easily digestible manner.

Other records or testing of critical systems are conducted by the District internally. They include incident reports, patient-care reports, exposure records, self-contained breathing apparatus records, hose testing, ladder testing, pump testing, cascade system breathing air sample gathering (tested externally), and vehicle maintenance records.

Critical Issues

The NWFR Fire Chief was asked to identify the top four critical issues facing the District from his perspective. They are:

- Interlocal Agreement with Fire District #4.
- Funding.
- Administration location.
- Too many fire stations.
- Organizational structure outdated.

These critical issues should be rolled into the current Strategic Plan at the next update to ensure organizational focus on these important concerns.

District Management Discussion

During its site visit in late October 2019, ESCI met with firefighters, officers, volunteers, administrative support staff, elected officials, command staff, and others. In all cases during these meetings, personnel expressed concern about the leadership of the District. ESCI recognizes that in many organizations, there may be some individuals dissatisfied with management and complain regularly. However, in this case, the issues were the same among each of the groups and individuals. Some of the common themes included:

- A lack of regular interaction between the top leadership and career and volunteer staff.
- Failure to follow through with the implementation of programs and other issues.
- A lack of transparency at the management level.
- Limited communication by management with career and volunteer staff.
- Failure to develop Standard Operating Guidelines for emergency operations.

At the time of the site visit, both the Fire Chief and Operations Chief were interim positions. ESCI understood that the District could not make the Operations Chief position permanent because if the Fire Chief were not appointed permanently, he would revert to his previous position as the Operations Chief (per contract).

STAFFING & PERSONNEL

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

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

Several national organizations recommend standards to address staffing issues. The *Occupational Health & Safety Administration* (OSHA) Respiratory Protection Standard, and the *National Fire Protection Association* (NFPA) Standard 1710 or 1720; (whichever is applicable), are frequently cited as authoritative documents.[7,8,9] In addition, the *Center for Public Safety Excellence* (CPSE) publishes benchmarks for the number of personnel recommended on the emergency scene for various levels of risk.

Administrative & Support Staffing

The NWFR full-time uniformed senior leadership team consists of a full-time Fire Chief, one Assistant Chief, and one Division Chief. In addition, one Captain is administratively assigned to oversee the District's training program. The following figure outlines NWFR's administrative and support staff positions.

Figure 7: NWFR Administrative & Support Staff

Administrative Staff Positions	No. of Staff
Fire Chief	1
Assistant Fire Chief	1
Division Chief	1
Captain/Training Officer	1
Finance Manager	1
Finance Assistant	1
Health & Wellness/HR Coordinator	1
Lead Mechanic	1
Mechanic	1
Administrative Assistant	1
Training Secretary (Part-Time)	0.4
Total FTEs:	**10.4**
Percent Total of the Department:	**12%**

Discussion

The level of administration and support staffing reflects approximately 12% of the total workforce, including volunteer firefighters and volunteer support personnel. This ratio of administrative to operations personnel should be viewed as not overly staffed, and is consistent with other combination fire agencies that ESCI has studied. Unlike municipal fire departments that can leverage other city services to fulfill their mission (e.g., information technology, legal, finance, fleet services, etc.), fire districts must either hire or contract for administrative services.

Emergency Response Staffing

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

Figure 8: NWFR Career Emergency Response Staffing

Operations Staff Positions	No. of Staff
Captain	4
Lieutenant	12
Firefighter	26
Probationary Firefighter	5
Total Operations Personnel:	**47**
Operational Officers to Firefighters:	**34%**

NWFR's *Standard Operating Guidelines* (SOG) and Collective Bargaining Agreement detail the rules and conditions around shift-scheduling and leave use. All District firefighters are trained and certified as Washington State Emergency Medical Technician-Basics.

Figure 9: NWFR Career Staff Schedule

Shift Parameters	NWFR
Length of normal duty period	24 hours
FLSA period	28-day cycle
Duty hours per week (average)	48.3 hours
Normal shift begins (time)	0800 hours
Call-back requirements	Yes
Residency requirements	No
Standby duty requirements	No

NWFR Operations Scheduling

NWFR full-time operations personnel are assigned to one of four shifts, and work a rotating schedule consisting of 24-hours on, 48-hours off, 24-hours on, and 96-hours off. For a 28-day period, the average results in 2,574 total hours worked annually. Minimum daily staffing throughout the District is 12 personnel, assigned across four stations.

In addition, ESCI noted that the Collective Bargaining Agreement (CBA) defined a "floater shift" beyond the four-shift schedule, which was intended to provide vacation relief coverage after all four shifts have selected vacations. However, this shift assignment has been discontinued.

Finally, the rotating work schedule results in less scheduled work hours than assigned in the CBA. As a result, each operations employee is required to schedule 13 debit days into their work schedule annually. NWFR schedules these shifts after vacation days are selected. Employees may exchange debit days for owed vacation days.

Operations Scheduling Discussion

The 24-hour shift, followed by at least 24 hours off-duty, remains the predominant schedule for fire departments in the Western United States. However, some departments have recently transitioned to a 48-hour on, 96-hour off shift-schedule, citing research that suggests longer periods of off-duty time allows for full restoration of healthy sleep patterns. One comparative analysis of the 24-hour and 48-hour schedule suggested that the work/rest ratio was the same between the two schedules.[10] The author noted the positive benefits of increased relaxation and family engagement afforded by the 96 hours of off-duty time, and suggests that this results in a more rested and healthier employee. However, the author also cautioned that the employee may be at risk for excessive fatigue in the second half of the shift if their sleep was significantly disrupted during the first 24 hours. The author noted:

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

The EMS community has also been concerned for some time about the adverse 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.[11] The review of the existing research literature and government work-hour regulations noted a profound lack of research specific to the EMS environment. It noted that much more research—specific to the EMS environment—is needed to quantify and validate the issue of fatigue among EMS providers, along with identifying strategies to address the issue within the EMS environment. However, they clearly expressed their expert opinion that poor sleep and fatigue is a threat to the safety of EMS workers and their patients.

Lastly, the federal government aggressively regulates and monitors commercial transportation workers, including commercial pilots, railroad workers, long-haul truck drivers, and ship workers. Regarding long-haul truck and passenger-carrying drivers, there are very restrictive rules in place to address potential driver fatigue. ESCI highlights these specific requirements because Firefighters, Firefighter/Paramedics, and EMS workers routinely drive emergency vehicles in all types of weather conditions—often for extended periods (long-distance interfacility transfers, for example). The following figure is a summary of the rules for truck drivers. This is presented to provide context on the level of the federal government's concern on driver fatigue.[12]

Figure 10: Commercial Driver Rules for Work Hours

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

As noted in the preceding figure, the focus is not only on the length of the work periods, but also *the length of the off-duty/rest periods.* Also, the safety and productivity implications of allowing shift trades that could extend beyond a 48-hour shift must be considered. ESCI noted that the CBA does not define a "cap" on the consecutive number of hours an employee can work. The CBA does provide flexibility to the District in approving shift exchanges that are submitted to cover for disability, consecutive exchanges beyond 30 days off, and those that go beyond 24 exchanges in 12 months. While the CBA language provides significant latitude to the District in approving and administering shift exchanges, the number of consecutive hours worked as a result of these should be defined.

Staff-Relief Analysis

In evaluating the level and availability of Operations staff, ESCI analyzed and compared the minimum number of employees required to be on-shift 24-hours daily; the total number of operations employees in the organization; and the amount of leave used by these employees to determine how many the NWFR theoretically needs to meet the minimum staffing level 365 days annually. This is commonly referred to as a "Staffing Relief Factor (SRF)." In the following figure, ESCI used employee data provided by NWFR to identify the theoretical minimum number of employees required to staff NWFR operations 24-hours daily.

Figure 11: Elements Used to Calculate NWFR Staffing Relief Factor (2018)

Shift Schedule	Annual Hours[1]	Average Workweek	Average Sick Leave[1,2]	Average Vacation	Average Other Leave[2]
24 hours	2,504 hours	48.1 hours	98 hours	199 hours	0 hours

[1]Per employee

[2]Includes: FMLA, Military, Short/Long term disability, etc.

Operations employees are paid for their holidays in lieu of scheduling time off. Therefore, holidays are not factored into the following *Staffing Relief Factor* (SRF) calculation. ESCI calculated the theoretical number of employees required to meet the various average leave hours used by employees in 2018, and compared the results to the current number of Operations employees assigned to the 24-hour shift schedule. This calculation compared the average available scheduled weekly work hours per employee, subtracted the average various leave types—based on 2018 historical leave-use data—and calculated the sick and vacation SRF. ESCI then multiplied the number of personnel needed to cover a single position at 24-hours per day with the relief factor to determine the total number of employees required to meet daily minimum staffing, based on historical leave use. The next figure summarizes the results of these calculations:

Figure 12: Theoretical Staffing Comparison (2018)

Leave Type	Relief Factor
Sick Leave	1.08
Vacation Leave	1.18
Total Leave:[1]	**1.18**

[1]Includes: FMLA, Military, Short/Long term disability, etc.

The total leave factors were multiplied by the number of personnel needed to cover one position 24-hours daily. The following figure compares the theoretical number of positions necessary to meet minimum daily staffing (12 positions) with the current number of employees assigned to the operations work schedule.

Figure 13: Calculated Operational Staff Shortage/Overage

Shift Coverage Required	Calculated Total Personnel Required	Current No. Employees[1]	Staff Shortage/Overage
Sick Leave Use only	45	47	**+2**
All Leaves	49	47	**-3**

[1]Includes five probationary firefighters.

NWFR Staffing Discussion

The staffing analysis theoretically indicates a shortage of three personnel needed to cover all the various types of leaves used by employees in 2018. In the absence of available unassigned personnel per shift, coverage of these leaves requires the use of overtime pay. However, administrative management of discretionary leave usage is commonly used to reduce overtime expenditures.

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

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

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

Figure 14: NWFR Volunteers versus National & Regional Medians
(per 1,000 population)

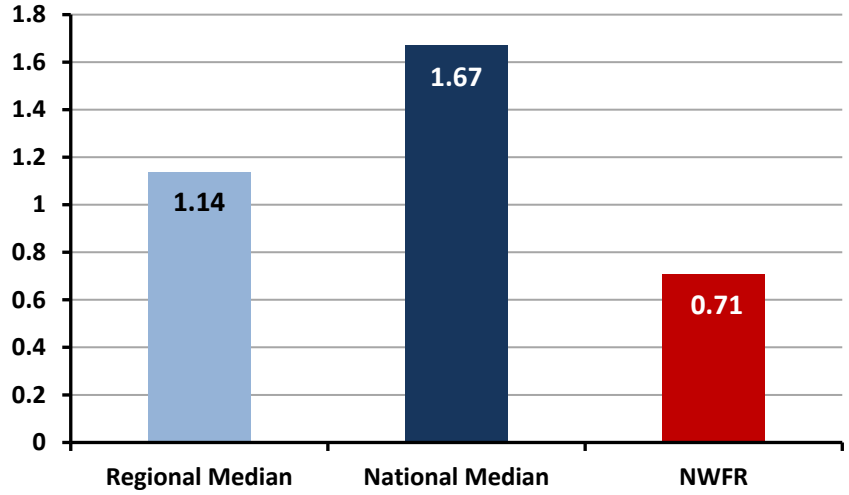
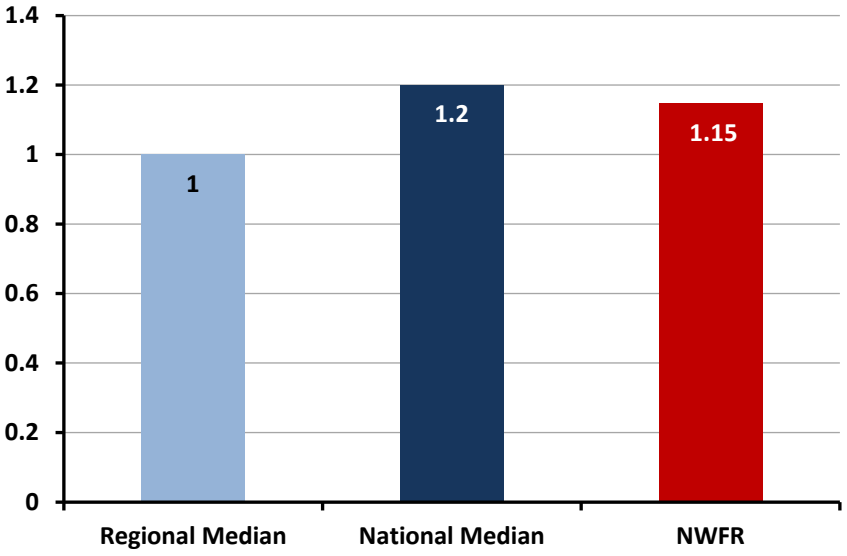


Figure 15: NWFR Career Firefighters versus National & Regional Medians
(per 1,000 population)



The preceding figures represent a comparison of western communities with populations similar in size to NWFR's service area. ESCI used a population size of 41,000 in calculating this comparison, which is the approximate combined population for NWFR and Fire District #4. This figure does not consider any transient population increases due to recreational or business activities, or the City of Bellingham population that is inside the NWFR automatic-aid service area. Also, this analysis does not consider the number of hours worked per week by firefighters (which vary among jurisdictions), or if the fire departments provide emergency medical transport. Using this comparison, NWFR appears to be significantly below the regional and national medians for volunteer firefighter staffing, and slightly above the regional median and somewhat below the national median for career firefighter staffing.

ESCI noted that the minimum staffing level for the first-due fire apparatus is three personnel. The NFPA recommends that career fire departments maintain minimum engine-company staffing of four personnel. This standard was developed from a consensus of experts, but is also supported by scientific research. In 2010, the *National Institute of Standards & Technology* (NIST) published a study that found four-person firefighting crews were able to accomplish essential firefighting and rescue tasks 25% faster than three-person crews.[13] Another study analyzed the effectiveness of firefighting crews in high-rise operations.[14] The study found that firefighting crews of five or six members, instead of three or four, were significantly faster in completing search-and-rescue operations and extinguishing fires.[15] ESCI mentions this only as another example of evidence-based research supporting the use of sufficient personnel.

Considerable ongoing local, regional, and national discussion and debate draws a strong focus and attention to the matter of firefighter staffing. Frequently, this discussion is set in the context of firefighter safety. While there are published national standards (NFPA 1710 and 1720) regarding firefighter staffing, they generally speak in terms of the number of firefighters assigned to a particular response apparatus, and are often characterized as a "minimum of four personnel per each engine company." ESCI notes that the more critical issue is the *number* of firefighters that are assembled at the scene of an incident in conjunction with the scope and magnitude of the job tasks expected of them—regardless of the type or number of vehicles upon which they arrive.

Although older, a 2001 study by the Houston Fire Department determined that fire apparatus staffing is a greater citizen safety issue than firefighter safety.[16] The report termed the understaffing situation a "crisis situation that demands immediate intervention." Decreasing the number of firefighters without eliminating any of the tasks fire departments are expected to accomplish causes the it to delay some of the required tasks or to try to perform all tasks unsafely with inadequate staff. The study also noted that "Firefighters working in understaffed environments are too often expected to perform beyond their capabilities." And, that inadequate staffing creates "a cumulative effect" caused by combined delays and lost functions of crews, resulting "in an even greater loss of overall effectiveness."

When looking at the minimum requirements for accomplishing the tasks necessary in containing and extinguishing a residential house fire, it should be noted that NWFR's minimum on-duty career daily operations staffing does not appear to provide adequate personnel resources, unless administratively assigned personnel are in the District and available to respond. Nor does it account for concurrent calls, which can deplete available staffing and increase the reliance on volunteer responders and mutual or automatic aid.

FINANCIAL ANALYSIS

This section provides information on the financial condition of NWFR and the local and regional economic context affecting its future operations. It begins with a brief review of selected local economic data to provide some context for the District's forecast outlook. Historical revenues and expenses are examined, highlighting key aspects and factors affecting the District's revenue and expense trends. Finally, using the information provided by District staff and regional economic contextual information, a forecast of revenues and expenses through 2024 is provided.

Economic Setting

Among the positive local indicators are:

- **Assessed Values and Levy Revenue**. NWFR's assessed value increased by 17% from 2013 to 2018, while its levies increased by 13.8%.
- **Per Capita Income.** The median family income for the Bellingham MSA grew 8.6% from 2013 to 2017. While not extraordinary, this matches the US growth rate of 8.7%.
- **Unemployment** has (aside from just the last few months) continued to fall, hitting a low of 4.6% in September 2018, and still at only 5.2% in July 2019.
- **Population growth** has been steadily growing at around 1% for rural Whatcom County, and ESCI projects it to grow at about 1.6% in NWFR's territory over the next five years. Of course, while strong population growth can be a good sign for the economy, it can also strain the District's resources.

The national economy, which sets the stage for the local economy, continues its ten-year trend of modest growth. The current economic expansion is now the longest on record, breaking the record in July 2019 (the previous record was 120 months from 1991–2001). That said, there are concerns regarding the stock market, consumer confidence, and the implications of certain national and international policies. Some economists are predicting a mild recession within the next year.

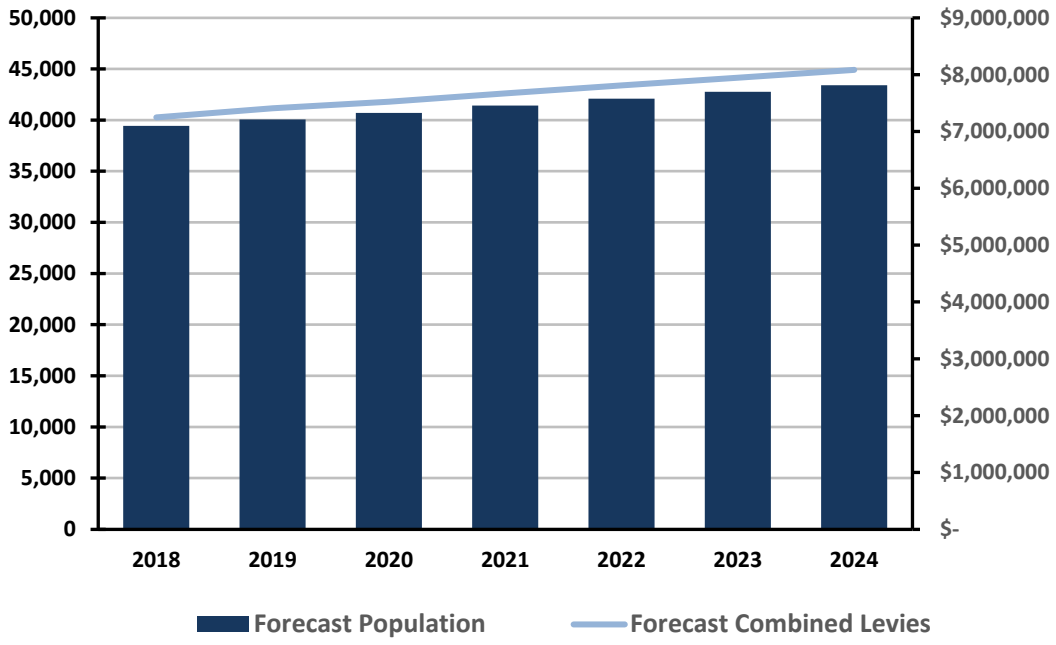
Washington's economy has been growing at a faster pace than the nation since 2012, in terms of Gross Domestic Product (GDP). Washington State's unemployment rate of 4.5% (July 2019) is at a historic low, and the Bellingham Metropolitan Service Area's (MSA) rate is 5.1% (up from a low of 4.1% last September, but still strong). Whatcom County's labor force participation rate was 63% at the end of 2017—like that of both the state and the nation. The state's retail sales tax collections are up 33% between 2014 and 2018.

Compared to other MSAs, Bellingham has an unusually high amount of forestry, agriculture, fishing & hunting activities (2.41 times higher than expected). Washington State's general trade dependence, may make the area more susceptible to international trade tensions, including fluctuations in the Canadian dollar exchange rate, which can significantly impact Canadian tourism and spending in Whatcom County. NWFR is perhaps even more vulnerable because of its rural nature. The anticipated recession is likely to be mild, and because property taxes are somewhat resilient, minimal impacts to the two fire districts would be expected.

Agriculture is an important economic activity in the County. Farming is prevalent in the northwestern lowlands of the County, in and around Lynden, Ferndale, Everson, Nooksack and Sumas, as well as in the unincorporated areas. In 2012, the total market value of Whatcom County agricultural products sold was $357.3-million—ranking eighth among all 39 counties in the state, and first in western Washington. That amount also represented 3.92 percent of the market value of all agricultural products sold in the state. The *Washington Agricultural Statistics Service* estimates the overall economic impact of sales of agricultural products multiplies three to seven times in the regional economy.

The combined assessed value of NWFR and WCFPD4 is $6.287 billion in 2019—up 31% from 2013. This fits with the economic growth and the County's comprehensive growth-plan estimates, with Blaine expecting 85% growth, Birch Bay anticipating 70% growth and areas outside the UGAs planning for 17% by 2036. The next figure provides population and assessed value projections.

Figure 16: Comparison of Population & Levy Growth



While the strong economy provides confidence for the NWFR's budget, this confidence is largely offset by strong population growth (and with it, growing expenses). The District's property tax revenue is forecast to mildly outpace population with 11.5% growth in general levies versus 10.1% growth in population from 2018 to 2024.

To help pay for the costs of development and population growth, NWFR has turned to mitigation fees for large projects in rural areas (where the County has not approved impact fees) and recently began receiving impact fees within the City of Blaine. These fees may only be expended to fund capital improvements and equipment listed in the Capital Facilities Plan. Also, these fees must be spent within 5 years or be returned to the property owners. Thus, maintaining a current capital facilities plan is of paramount importance. NWFR's plan was last updated in 2016—at minimum it should be updated along with the County's comprehensive plan. ESCI recommends that NWFR request Whatcom County to institute countywide fire-impact fees, which would replace the mitigation fees and be applied to all new construction projects.

Historic & Current Revenues & Expenses

ESCI completed an analysis of historic revenues and expenses for NWFR to help identify relevant financial trends, strengths, and weaknesses, and to lay the groundwork for the financial forecast presented in the *Strategic Recommendations* section of the report.

For the following discussion, ESCI assumes NWFR will follow its Capital Facilities Plan for seeking capital bonds in 2019 and 2024.

Revenues

Major operational revenue sources included:

- Property Taxes—Regular Levies (Districts #4 and #21)
- Property Taxes—EMS Levies (District #4 only)
- Ambulance transportation fees
- Miscellaneous (especially reimbursements and capital asset sales)

Figure 17: NWFR Historic Operating Revenues

Description	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Estimated
Regular Levy–Dist. #21	5,231,737	5,250,269	5,452,129	5,571,898	5,805,071	5,837,445
Regular Levy–Dist. #4	1,371,648	1,417,594	1,432,498	1,466,084	1,492,687	1,507,983
EMS Levy–Dist. #4[A]	373,574	380,621	387,715	393,586	401,087	408,044
Grants & Contracts[B]	120,260	115,223	123,471	91,966	98,587	19,852
Ambulance Receipts[C]	344,050	385,031	421,289	463,376	426,573	1,568,841
Miscellaneous/Other	1,042,486	338,525	278,186	696,091	199,346	425,377
Total Revenue:	**$8,483,755**	**$7,887,263**	**$8,095,287**	**$8,683,002**	**$8,423,351**	**$9,767,541**

[A]Beginning with 2017, a countywide EMS Levy supplants a portion of the voted District #4 Levy

[B]Beginning 2019, Ambulance Receipts will include GEMT Revenue

[C]Excludes District #4

Districts #4 and #21 both receive impact and mitigation fees, which must be used for capital purposes. This revenue has recently been used to help make payments on a ladder truck, which will be completely paid off in 2019. The mitigation fund balance currently sits at $170,954.

Both districts impose levies for bonded debt. District #4's bond levy will expire in 2020, unless it is renewed. The associated debt for the District #4 levy will be retired at the end of 2019, leaving a fund balance of about $300,000. District #21's bond levy does not expire within the forecast period of this study, but the associated debt should be retired in 2019. This leaves the capacity to issue additional debt, but not the full $7,500,000 called for in the Capital Facilities Plan.

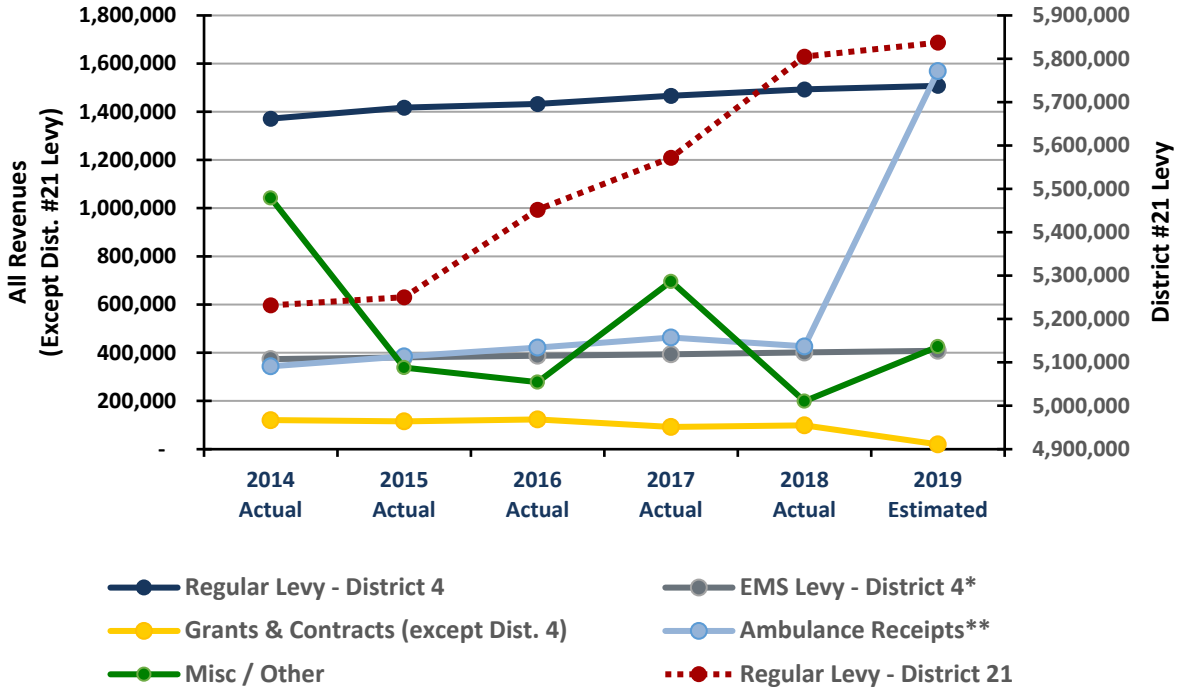
Assuming the District issues additional debt in 2020 (the capital plan calls for $7,500,000 in 2019, but time is running short this year), they will need to either seek voter approval for additional bond levies, or cover the debt with existing general fund revenue. For purposes of this study, ESCI makes the most conservative assumptions, which is that the debt will be issued and covered with existing general fund revenues.

Figure 18: NWFR Historic Levy Rates

Levy Rates	2014	2015	2016	2017	2018	2019
District #4	1.1311	1.1213	1.1210	1.1049	1.0283	0.9313
District #4 Bond	0.1812	0.1761	0.1725	0.1631	0.1483	0.1308
District #4 EMS	0.3000	0.2975	0.2984	0.2050	0.1914	0.1733
Total District #4:	**$1.6123**	**$1.5949**	**$1.5919**	**$1.4730**	**$1.3680**	**$1.2354**
District #21	1.4463	1.4328	1.4364	1.4150	1.3877	1.2650
District #21 Bond	0.0537	0.0672	0.0636	0.0612	0.0582	0.0515
Total District #21:	**$1.5000**	**$1.5000**	**$1.5000**	**$1.4761**	**$1.4459**	**$1.3165**
Whatcom EMS	N/A	N/A	N/A	0.2950	0.2785	0.2536

With the additional expense load from the debt payments, the GEMT payments are particularly timely. The *Ground Emergency Medical Transportation* (GEMT) program is a federal Medicaid program that became available in Washington State in 2016 and through which NWFR began receiving funds in 2019. The goal of the program is to ensure that an agency is fully reimbursed for its Medicaid-eligible ambulance transports. In August, 2019, NWFR received $771,805 in GEMT payments for 2017 billings. In 2019 to date, NWFR has also received $306,606 in GEMT payments for 2018 billings, and it is anticipated that the total should be about $650,000. It is important to note that there is no guarantee of this funding increase—the program could be canceled, and the amount will vary each year according to several factors. The next figure presents the same data in a graphical format.

Figure 19: NWFR (Fire Districts #4 & #21) Revenues (2014–2019 Estimated)



Revenues have increased by 15.1% over 2014–2019 (projected)—thanks in large part to the GEMT payments (they would have climbed 2.4% without the GEMT program). Since NWFR received both 2017 and 2018 GEMT payments in 2019, it can be expected that revenues will dip somewhat in 2020. Combined property taxes, which make up the largest and most stable portion of revenues, have increased 11.2% from 2014–2019, or an average of 2.2% per year. District #21 has seen significantly more new construction (and hence property tax growth) than District #4. The Miscellaneous/Other category varies widely from year to year because it includes occasional large asset sales.

Figure 20: Percentage of Changes in Revenues (2014–2019)

Description	Average Annual Increase (2014–2019)	Increase (2014–2019)	Average Increase w/o GEMT	Increase w/o GEMT (2014–2019)
Regular Levy–District #21	2.2%	11.6%	2.2%	11.6%
Regular Levy–District #4	1.9%	9.9%	1.9%	9.9%
EMS Levy– District #4	1.8%	9.2%	1.8%	9.2%
Grants/Contracts (except Dist. #4)	(16.7%)	(83.5%)	(16.7%)	(83.5%)
Ambulance Receipts	71.2%	356.0%	8.5%	42.5%
Miscellaneous/Other	(11.8%)	(59.2%)	(11.8%)	(59.2%)
Total Revenue—Operations:	**3.0%**	**15.1%**	**0.5%**	**2.4%**

Both districts have worked to increase their fund balances. District #21 has increased $3.6 million (107.6%) from $3,309,932 to $6,872,446, District #4 has increased $401,000 (85.3%) from $469,889 to 870,551. For District #21 this represents 108.6% of operating expenses (excluding the portion attributable to District #4); for District #4 this represents 45.6% of operating expenses. In both cases, the fund balance is very healthy. Note that in 2018 District #21 transferred about $2 million to create reserve funds for apparatus replacement and facilities. With these funds excluded, the remaining reserve is about $4.8 million and accounts for 76.5% of operating expenditures (minus costs associated with District #4).

Expenses

Both District #4 and District #21 are budgeted under three funds: a general fund, a capital fund, and a bond fund. District #4 has relatively little activity, so discussion will focus on NWFR, with District #4 expenses included. In addition to its main funds, NWFR maintains several reserve funds. The projected 2019 fund balances are as follows:

Figure 21: 2019 NWFR Funds

Fund	2019
General	3,942,775
Capital Projects	662,534
GO Bond	290,505
Reserve Fund	1,097,502
Healthcare Reserve Fund	633,990
Apparatus Fund	970,710
Facilities Fund	1,057,416
Volunteer Fund	46,193
Mitigation Fund	172,365
Total:	**$8,873,989**

The NWFR General Fund is subdivided into the following departments:

- Legislative/Administration
- Operations (Fire and EMS)
- Fire Prevention/Public Education
- Training
- Vehicle Maintenance
- Facilities

As expected, the bulk of the budget (77.0% of the general fund in 2018) resides in Operations. As is also standard for the fire service, personnel (wages and benefits) costs also accounted for most of the overall budget (88.8% of the general fund in 2018). Similarly, operations and personnel costs account for the bulk of the growth over the last five years, with personnel costs rising $1,350,003 or 22.8% (salaries increased 18.2% and benefits increased 36.2%) with the Operations Division increasing $1,022,989 or 19.5%. The total expenditure increase for NWFR was $1,336,759 or 19.5%. There were 49 career staff reported in 2014 and 50 reported in 2018 (volunteer staffing decreased from 70 to 31), so it can be concluded that while one firefighter was added, the bulk of the District's increase resulted from increasing pay and benefit rates for existing staff.

ESCI notes that the highest percentage of growth occurred in Fire Prevention/Public Education, because a staff person was added in 2019 where there was none previously. Conversely, Facilities lost its only staff person that same year.

Figure 22: NWFR Historic & Current Expenses by Type

Description	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Estimated
Salaries	4,423,662	4,644,578	4,773,253	4,799,971	5,185,659	5,226,934
Benefits	1,509,820	1,544,811	1,837,535	2,020,765	1,857,801	2,056,551
Services & Supplies	911,639	804,175	881,557	900,933	886,993	898,396
Totals:	**$6,845,122**	**$6,993,565**	**$7,492,345**	**$7,721,669**	**$7,930,452**	**$8,181,881**

Figure 23: NWFR Percent Growth by Type of Expense

Description	Average Annual Growth	Total Growth 2014–2019
Salaries	3.4%	18.2%
Benefits	6.8%	36.2%
Operations (Services & Supplies)	(0.0%)	(1.5%)
Totals:	**3.6%**	**19.5%**

Figure 24: NWFR Expenditure Trends by Type

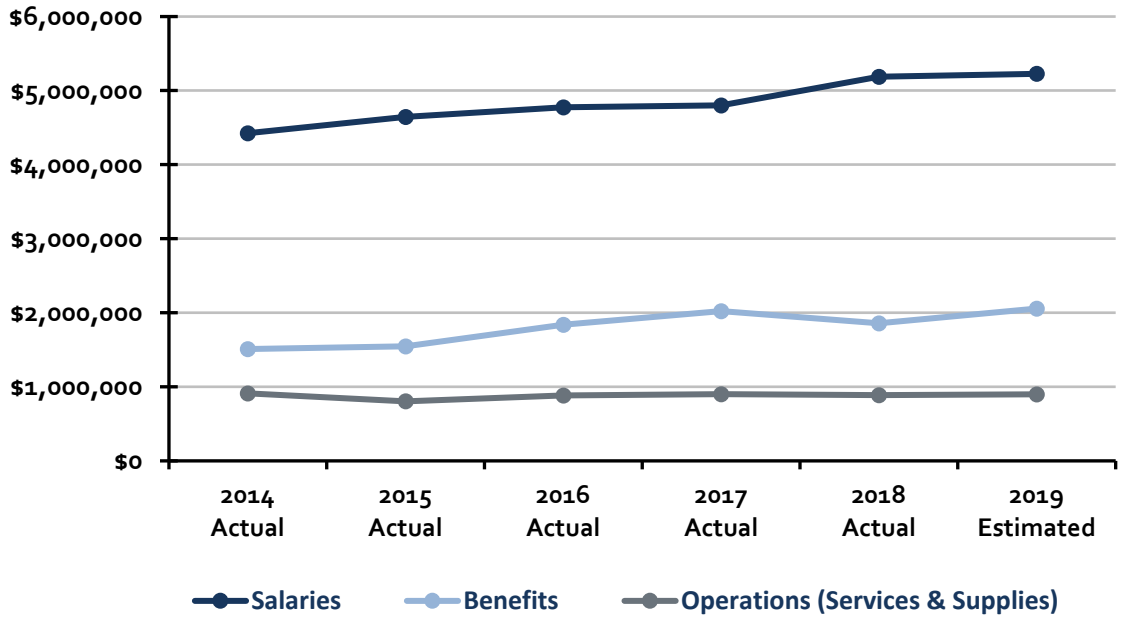


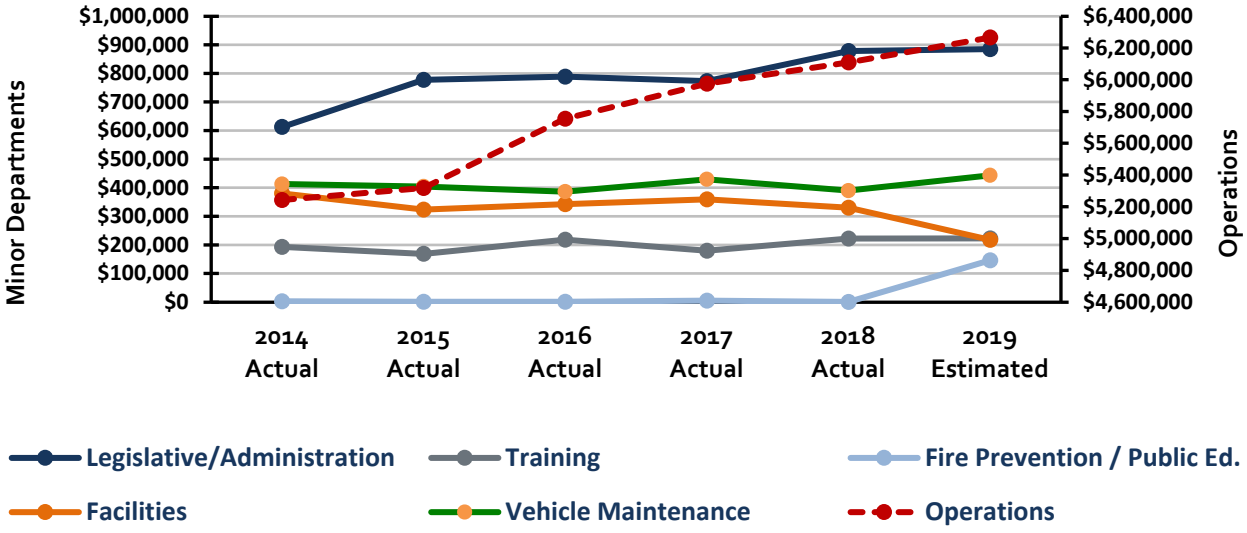
Figure 25: Historic & Current Expenses by NWFR

Description	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Actual	2019 Estimated
Legislative/Administration	612,718	777,146	788,840	773,129	877,864	884,985
Operations	5,243,134	5,318,711	5,754,121	5,974,986	6,109,523	6,266,123
Training	193,025	169,044	218,551	179,725	222,094	223,007
Prevention/Pub. Education	2,689	1,024	1,340	5,092	748	146,118
Facilities	380,542	323,386	342,820	359,428	330,108	218,036
Vehicle Maintenance	413,014	404,253	386,674	429,309	390,116	443,613
Total Expenses:	**$6,845,122**	**$6,993,565**	**$7,492,345**	**$7,721,669**	**$7,930,452**	**$8,181,881**

Figure 26: Percentage of Growth by NWFR

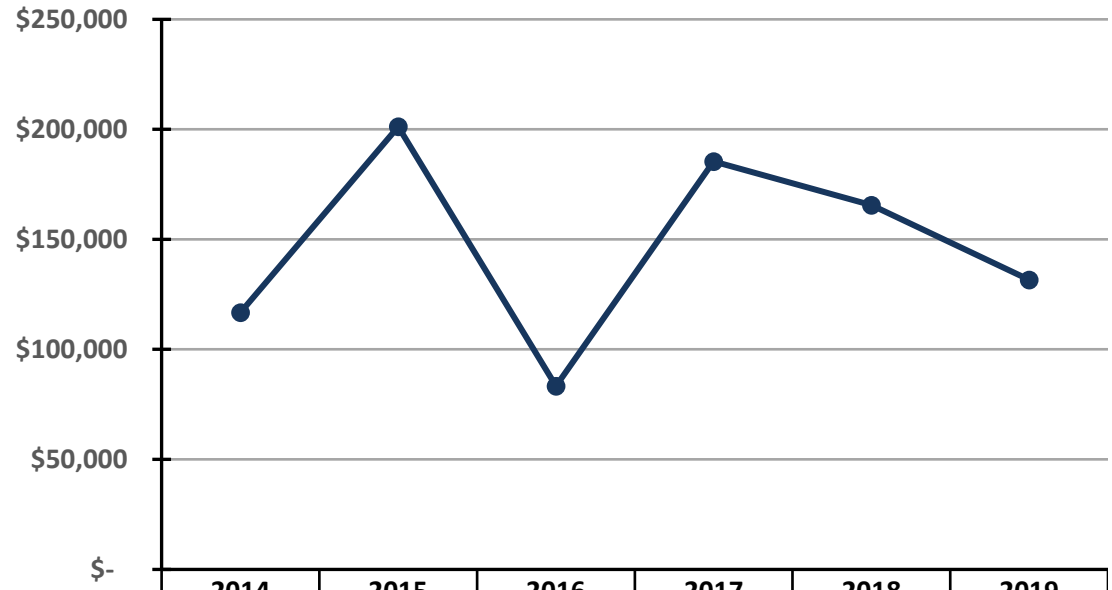
Description	Average Annual Growth	Total Growth 2014–2019
Legislative/Administration	8.1%	44.4%
Operations	3.7%	19.5%
Training	4.6%	15.5%
Fire Prevention/Public Education	3,922.0%	5,333.0%
Facilities	(9.3%)	(42.7%)
Vehicle Maintenance	1.8%	7.4%
Total Expenses:	**3.6%**	**19.5%**

Figure 27: Expenditure Trends by NWFR Department



Capital Expenditures have held relatively steady, averaging about $150,000, with minor spikes in 2015 and 2017—both of which years included the purchase of vehicles. A new ambulance chassis was purchased in 2018, but this did not result in a spike in expenditures since less equipment was purchased in that year than other years.

Figure 28: NWFR Capital Expenditures



	2014	2015	2016	2017	2018	2019
Capital	$116,726	$201,224	$83,316	$185,391	$165,571	$131,600

There are several ways to benchmark data to estimate whether expenditure growth is in-line with environmental factors. The next figure presents some common benchmarks. While the District may not measure well against certain benchmarks, this does not necessarily indicate poor management. For example, costs may increase faster than benchmark data due to changes in the Board of Fire Commissioner's priorities, inflationary pressures beyond the staff's control, or a variety of other factors.

- *Personnel:* While the total number of personnel only grew by one person (2%), the total cost per personnel has grown $23,941 (17.1%). As mentioned previously, benefits have increased 36.2%—an environmental factor over which the District has only limited control.
- *Population:* Population is the most common driver of government service-oriented costs, such as fire districts. Unfortunately, ESCI was unable to obtain annual population counts for the District. Thus, the numbers used here are only estimates, projecting backward from the 2018 figure which was obtained from NWFR by applying growth percentages for rural Whatcom County. The District's expenditure growth per capita has grown from about $182 to $204—about 12% over five years. This indicates that factors other than population are driving expenditure growth (otherwise the cost per capita would remain mostly unchanged).
- *Responses:* Along with the population, another major driver of cost can be the number of responses. The number of responses has increased 30.3%, while expenses have increased only 19.5%—resulting in a cost per response that has dropped from $2,037 to $1,868. This indicates that the District is either becoming more efficient in responding to incidents, or its level of service is decreasing.

Figure 29: NWFR Benchmark Data

Description	2014	2015	2016	2017	2018	2019	Change
No. Personnel	49	49	50	50	50	50	100.0%
Cost/Personnel	$139,696	$142,726	$149,847	$154,433	$158,609	$163,638	$23,941
% Growth		**2.2%**	**5.0%**	**3.1%**	**2.7%**	**3.2%**	**17.1%**
Total Population	37,690	38,100	38,418	38,922	39,427	40,062	6.3%
Cost/Population	$182	$184	$195	$198	$201	$204	12.5%
% Growth		**1.1%**	**6.2%**	**1.7%**	**1.4%**	**1.5%**	
Responses	$3,361	$3,807	$4,223	$4,199	$4,226	$4,381	30.3%
Cost/Response	$2,037	$1,837	$1,774	$1,839	$1,877	$1,868	(8.3%)
% Growth		**(9.8%)**	**(3.4%)**	**3.6%**	**2.0%**	**(0.5%)**	

Comparison of the Revenue & Expenses of the Districts

The following figure is a comparison of District #4's and District #21's revenue and expenses averaged over 2014–2018, including average assessed value. ESCI notes that District #21's average revenues are 220.2% larger than District #4's revenues, but that its expenditures are slightly more on a percentage basis—229.3%. Similarly, District #21 has a larger percentage of service-demand, response area, and population. For these greater expenses and demographics, the difference in assessed value between Districts #21 and #4 is somewhat smaller.

Figure 30: Comparison of Districts #4 & #21 Revenue & Expenses

— 2014 through 2018 Average —

Description	District #4	District #21	Percent Difference	2018 Difference
Total Revenues—Operations				
Regular Levy	1,417,026	5,443,034	284%	435%
EMS Levy	393,354	—	-100%	N/A
Grants & Contracts	39,562	70,340	78%	8%
Ambulance Receipts	56,179	363,120	546%	598%
Miscellaneous & Other	67,527	443,400	557%	1037%
Total Revenues:	**$1,973,648**	**$6,319,894**	**220%**	**230%**
Average Assessed Value	$1,301,049,068	$3,967,548,546	205%	188%
Expenses—Operations				
Total Expenditures:[A]	**$1,723,039**	**$5,673,592**	**229%**	**240%**

[A]Contract payments from District #4 were utilized in lieu of specific expenditures, which were not available.

When comparing the two fire districts, it must be noted that District #21 has a population, service-area, and historic service-demand substantially greater than District #4.

CAPITAL FACILITIES & EQUIPMENT

Three basic resources are required to successfully carry out the mission of a fire district—trained personnel, firefighting equipment, and fire stations. No matter how competent or numerous the firefighters, if appropriate capital equipment is not available for use by responders, it would be impossible for North Whatcom Fire & Rescue to deliver services effectively. The most essential capital assets for use in emergency operations are facilities and apparatus (response vehicles). Of course, the fire district's financing ability will determine the level of capital equipment it can acquire and make available for use by emergency personnel. This section of the report is an assessment of the respective capital facilities, vehicles, and apparatus of NWFR.

Fire Stations & Other Facilities

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

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

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

In gathering information from the three fire departments, ESCI asked the departments to rate the condition of each of their fire stations using the criteria in the following figure.

Figure 31: Criteria Utilized to Determine Fire Station Condition

Excellent	Like new condition. No visible structural defects. The facility is clean and well maintained. 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 10 years.
Good	The exterior has a good appearance with minor or no defects. Clean lines, good work flow design, and only minor wear of the building interior. Roof and apparatus apron are in good working order, absent any significant full-thickness cracks or crumbling of apron surface or visible roof patches or leaks. Building design and construction match the building's purposes. Age is typically less than 20 years.
Fair	The building appears to be structurally sound with 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 apron may exist. The roof has evidence of leaking and/or multiple repairs. The interior is poorly maintained or showing signs of advanced deterioration with moderate to significant non-structural defects. Problematic age-related maintenance and/or major defects are evident. May not be well suited to its intended purpose. Age is typically greater than 40 years.

ESCI toured each of the fire stations owned and operated by the two fire districts involved in this study and, combined with the information provided, produced the observations listed in the following figures.

Figure 32: Station 11 (Bellingham)

Address/Physical Location:	3131 Y Rd, Bellingham, WA 98226

General Description:
Station 11 is owned by District #4 and is unstaffed without volunteers assigned to it. The station is more than 60 years old and in very poor condition without regular maintenance. It is located on an easement. Currently, it has no value in terms of serving as a facility from which to deploy apparatus and personnel. ESCI was unable to gain access to the interior, but it was evident the station was in poor condition.

Structure						
Construction Type	Wood frame					
Date of Construction	1955					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Poor (mold)					
Number of Apparatus Bays	0	Drive-through bays	4	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	2,820					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	None					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	No					
Training/Meeting Rooms	No					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Key pad					
Apparatus Exhaust System	No					

East Side of Station 11

Front Door Keypad at Station 11

Figure 33: Station 12 (Bellingham)–Administration

Address/Physical Location:	4142 Britton Loop, Bellingham, WA 98226

General Description:
Fire Station 12 is owned by District #4 and located adjacent to the Training Center and administration building. It is the only District #4 station that is fully staffed. A three-person crew cross-staffs an engine and an ambulance. Volunteers staff a tender when needed.

Structure						
Construction Type	Wood Frame/Metal Roof					
Date of Construction	2001					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	4	Drive-through bays	0	Back-in bays		
Special Considerations (ADA, etc.)	ADA					
Square Footage	15,777					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	4					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Camera, key pad					
Apparatus Exhaust System	Yes					

Figure 34: Station 13 (Bellingham)

Address/Physical Location:	2308 Smith Road, Bellingham, WA 98226

General Description:
Station 13 is the last of the three District #4 fire stations, is unstaffed with no volunteers assigned to it. It is situated on a large piece of property with much room for expansion. The station is a converted single-family residence and is poorly maintained and unkempt inside. There is a large unfinished basement. There are two bathrooms with showers on the first floor.

Structure						
Construction Type	Wood Frame/Comp Roof					
Date of Construction	1931					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays	2	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	1,485					
Facilities Available						
Separate Rooms/Dormitory/Other	3	Bedrooms	3	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	3					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	No					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Camera, key pad					
Apparatus Exhaust System	No					

Figure 35: Station 61 (Blaine)

Address/Physical Location:	9408 Odell Rd, Blaine, WA 98230

General Description:
Station 61 appears to be in excellent condition housing a career 24-hour crew and multiple apparatus. Additionally, the station houses the Fire Marshal and staff. This facility appears to have the capacity for increased service-demand.

Structure						
Construction Type	Wood frame, metal roof					
Date of Construction	2003					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	0	Drive-through bays	5	Back-in bays		
Special Considerations (ADA, etc.)	ADA					
Square Footage	11,068					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Camera, key pad					
Apparatus Exhaust System	Yes					

Figure 36: Station 62 (Semiahmoo)

Address/Physical Location:	9001 Semiahmoo Parkway, Blaine, WA 98230

General Description:
Located on a large piece of property, Station 62 is owned by District #21, and located in the far northwest corner of the District. The first floor is configured with a reception area, ample office space, and a large classroom/conference room. If used for an administration facility, it would require some remodeling. The second floor has ample facilities for personnel. The station's location would make it impractical as the District's headquarters.

Structure						
Construction Type	Wood frame, composition roof					
Date of Construction	1995					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Good					
Number of Apparatus Bays	1	Drive-through bay	0	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	6,617					
Facilities Available						
Separate Rooms/Dormitory/Other	7	Bedrooms	7	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	7					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Camera, key pad					
Apparatus Exhaust System	No					

Figure 37: Station 63 (Birch Bay)

Address/Physical Location:	4581 Birch Bay Lynden Rd., Blaine, WA 98230

General Description:
Fire Station 63 is about 38 years old and represents NWFR's busiest station. The Operations Chief's office and maintenance shop are both located in this facility. The station has a very small kitchen and day room, and has had several minor modifications. It should be considered for a major upgrade/remodel, and evaluated by professional engineer and architect to determine future options.

Structure						
Construction Type	Brick, flat roof					
Date of Construction	1981					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	4	Drive-through bays	2	Back-in bays (Shop)		
Special Considerations (ADA, etc.)	None					
Square Footage	7,772					
Facilities Available						
Separate Rooms/Dormitory/Other	1	Bedrooms	1	Beds	4	Beds in dormitory
Maximum Station Staffing Capability	4					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Camera, key pad					
Apparatus Exhaust System	Yes					

Figure 38: Station 65 (Haynie)

Address/Physical Location:	3401 Haynie Rd, Blaine, WA 98230

General Description:
Station 65 was described as in poor condition during the survey process, but appears to be in fair to good condition. Consistent with the majority of NWFR stations a vehicle exhaust system should be considered if the station is placed into full service.

Structure					
Construction Type	Brick, veneer, Marblecrete, metal roof				
Date of Construction	1967				
Seismic Protection	No				
Auxiliary Power	No				
General Condition	Poor				
Number of Apparatus Bays	0	Drive-through bays	3	Back-in bays	
Special Considerations (ADA, etc.)	None				
Square Footage	5,200				
Facilities Available					
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	0				
Exercise/Workout Facilities	No				
Kitchen Facilities	Yes				
Individual Lockers/Storage Assigned	No				
Shower Facilities	No				
Training/Meeting Rooms	Yes				
Washer/Dryer	No				
Safety & Security					
Sprinklers	None				
Smoke Detection	Yes				
Decontamination/Biohazard Disposal	No				
Security	Camera, key pad, alarm				
Apparatus Exhaust System	No				

Figure 39: Station 68 (Delta)

Address/Physical Location:	8188 N. Enterprise Rd, Ferndale, WA 98248

General Description:
Station 68 is in fair condition requiring numerous repairs, including issues with a leaking roof. The bay does have an apparatus exhaust system but would require a major re-model to accommodate 24-hour staffing. Most of the volunteer tender-drivers are deployed from this station.

Structure						
Construction Type	Metal & cultured stone, metal roof					
Date of Construction	1975					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays	3	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	5,117					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	No					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	No					
Safety & Security						
Sprinklers	No					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Camera, key pad, alarm					
Apparatus Exhaust System	Yes					

Figure 40: Station 69 (Laurel)

Address/Physical Location:	6028 Guide Meridian Rd, Bellingham, WA 98226

General Description:
Station 69 was constructed in 1980 and remolded in 2001. It is considered a poor location due to limitations of responses from the north end of the District during flooding. The facility requires numerous repairs, including updates to the septic system.

Structure						
Construction Type	Metal & brick veneer, metal roof					
Date of Construction	1980					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays	4	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	6,399					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Camera, key pad					
Apparatus Exhaust System	Yes					

Figure 41: Station 70 (Wiser Lake)

Address/Physical Location:	633 E. Wiser Lake Rd, Lynden, WA 98264

General Description:
Station 70 was found to be in fair to good condition. It does not have facilities for 24-hour staffing, including sleeping quarters, laundry or bunker gear extraction. The facility does not have an exhaust system for apparatus. Currently this facility provides limited service to the District.

Structure						
Construction Type	Metal & brick veneer/metal roof					
Date of Construction	1994					
Seismic Protection	No					
Auxiliary Power	No					
General Condition	Fair					
Number of Apparatus Bays	4	Drive-through bays	0	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	5,170					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	No					
Individual Lockers/Storage Assigned	No					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	No					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Key pad					
Apparatus Exhaust System	No					

Figure 42: Station 72 (Northwood)

Address/Physical Location:	1507 E. Badger Rd, Lynden, WA 98264

General Description:
Station 72 currently provides limited services. Due to its location, the property may provide future utilization. The structure is in fair to good condition. It does not have sleeping quarters or facilities for 24-hour staffing. Additionally, an apparatus exhaust system should be installed if the station becomes fully functioning.

Structure						
Construction Type	Metal & brick veneer, metal roof					
Date of Construction	1985					
Seismic Protection	No					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Apparatus Bays	0	Drive-through bays	5	Back-in bays		
Special Considerations (ADA, etc.)	None					
Square Footage	4,780					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	0					
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	No					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Camera, key pad					
Apparatus Exhaust System	No					

District Administration Headquarters

NWFR's Administrative Headquarters (Fire Station 12) is currently located on Britton Loop Road, just outside the Bellingham city limits and within District #4. The City of Bellingham is in the process of annexing the area in and around Fire Station 12, although no formal decisions have been made regarding the long-term future of this station and how it will be staffed. Regardless, Station 12 may not be in the best location for the District's headquarters, and consideration should be given to moving it to an alternative fire station.

Training Facility

NWFR maintains a large drill grounds and training facilities behind Fire Station 12. This facility is utilized by many of the fire departments and fire districts throughout Whatcom County. The features of the Training Center are described in this report under *Support Programs, Training*.

Fire Stations Discussion

As shown in the preceding figures, North Whatcom Fire & Rescue maintains a total of 11 fire stations distributed throughout the combined fire districts (three owned by District #4 and eight by District #21). Full-time career staff and apparatus are deployed from four stations, volunteers from other stations, and no volunteers or career personnel at some of the other stations. Currently, there are few remaining "respond-from-home" traditional volunteers. Most of these do not serve in a "combat" role, but instead, serve as Tender drivers or provide rehabilitation services during major fires or incidents. The following figure shows the current minimum staffing.

Figure 43: NWFR Current Minimum Fire Station Staffing

NWFR Station	Minimum Staffing
Station 11	No personnel
Station 12	**Career personnel (3 minimum)**
Station 13	No personnel
Station 61	**Career personnel (3 minimum)**
Station 62	No personnel
Station 63	**Career personnel (3 minimum)**
Station 65	Few, if any volunteers
Station 68	Primarily Tender Driver volunteers
Station 69	**Career personnel (3 minimum)**
Station 70	Primarily Rehabilitation volunteers
Station 72	Few, if any volunteers

ESCI understands that the primary utilization of Stations 11, 13, 62, 65 and 72 is to provide storage of older reserve apparatus. Considering the service-demand and travel distances (shown in the *Service-Delivery & Performance* section of this report), several of these stations provide no strategic advantage, nor do they have any value to NWFR. While each of these fire stations house at least one or more apparatus, in several of them, apparatus and personnel are rarely, if ever, deployed to emergency incidents.

ESCI was provided with records from January through October 2019, showing the facility maintenance costs of each of the unstaffed stations within the North Whatcom Fire & Rescue boundaries. The following figure shows these costs, plus to projected costs (November and December) through the end of 2019.

Figure 44: Actual & Projected Annual Maintenance Costs of Unstaffed Stations (2019)

Source: NWFR records

Station	Utilities	Repairs & Maintenance[1]	Phone, Cable, & Internet	Misc. Expenses	Grand Total
District #4 Station 11	1,935.02	3,144.80	700.77	893.06	**$6,673.65**
District #4 Station 13	1,243.04	4,378.03	0.00	645.03	**$6,266.10**
District #21 Station 62	8,074.80	3,796.01	1,674.97	284.36	**$13,830.14**
District #21 Station 65	1,120.26	3,721.31	0.00	944.56	**$5,786.13**
District #21 Station 68	2,357.41	320.10	0.00	662.58	**$3,340.09**
District #21 Station 70	2,075.07	1,835.99	0.00	780.03	**$4,691.09**
District #21 Station 72	5,673.19	6,277.07	1,483.08	824.03	**$14,257.37**
Subtotals (Jan–Oct):	**$22,478.79**	**$23,473.31**	**$3,858.82**	**$5,033.65**	**$54,844.57**
Projected Costs (2019):	***$26,974.55***	***$28,167.97***	***$4,630.58***	***$6,040.38***	***$65,813.48***
Grand Totals:	**$49,453.34**	**$51,641.28**	**$8,489.40**	**$11,074.03**	**$120,658.03**

[1]Includes maintenance of equipment & apparatus in each station, including labor costs.

In addition to the amounts in the preceding figure, NWFR expended an additional $10,624 in one-time capital improvements at Station 62. The figure shows that NWFR will have expended nearly $121,000 in 2019 to maintain primarily unused fire stations and their associated equipment and apparatus. Along with the capital improvements at Station 62, this will total $131,282 for 2019.

Since several of these fire stations have no impact on the provision of emergency services, there may be value and cost-savings by considering the sale of some of the stations. The District may be better served by using funds currently utilized for maintenance of some of these stations to more important priorities.

The potential sale of any fire stations should be *carefully* considered by evaluating population-growth projections in the vicinity of the stations. In addition, the Washington Surveying & Rating Bureau should be consulted to determine the impact on the District's rating. Finally, NWFR should consider a cost/benefit analysis on its efficacy.

Call Volumes on the Service-Areas of Unstaffed Stations

The following figure shows the volume of calls in service-areas of the unstaffed stations. As shown, incidents occurring in these areas represented a small number of NWFR's total service-demand. Combined, these seven stations averaged 26 incidents annually during 2016–2018

Figure 45: Service-Demand in the Response Areas of Unstaffed Stations (2016–2018)

Unstaffed Station	2016	2017	2018	Station Totals
Station 11	1	1	0	**2**
Station 13	1	0	2	**3**
Station 62	6	4	2	**12**
Station 65	3	2	0	**5**
Station 68	19	3	6	**28**
Station 70	1	9	15	**25**
Station 72	1	2	1	**4**
Annual Totals:	**32**	**21**	**26**	**79**

Volunteer Station Staffing

NWFR has two fire stations assigned to support special functions. Station 70 is staffed by a volunteer crew that has been given special training and apparatus to conduct rehabilitation services at incident scenes and respond to major incidents. The station is centrally located within the NWFR boundaries and provides excellent response to large events throughout the service area. Additionally, Station 68 is staffed by a volunteer crew with the specific role of operating Water Tenders to provide water supply when necessary. The volunteer group is called the *North Whatcom Tender Group*. Station 68 is also centrally located, and although data shows minimal responses each year, it may be a valuable resource.

City of Bellingham Annexations

The City of Bellingham has annexed property directly across from Station 12. The City has recently received a petition from residents to annex the property that includes Fire Station 12, the Training Center, and a small section of a residential area south of Station 12. However, this had not yet been approved as of early November 2019.

According to a representative of Bellingham Planning & Community Development (BPCD), it will be unlikely that the City will annex significant portions of Fire District #4 in the short-term. Based on its discussions with BPCD and the interim Bellingham Fire Chief, it was ESCI's impression that annexations of Fire District #4 by the City of Bellingham will not have an immediate impact on NWFR.

Apparatus & Vehicles

This section of the report describes the frontline fleet inventories of the District, which includes emergency response apparatus, support units, and staff/command vehicles. The following figure lists the inventory of the frontline fleet.

Figure 46: NWFR Frontline Suppression & Other Apparatus Inventory (2019)

Designation	Type	Year	Manufacturer	Condition	Features
Engine/Pumpers					
Engine 12	Pumper	2007	Pierce	Fair	1500 gpm/750 gal.
Engine 61	Pumper	2010	Spartan/Crimson	Fair	1500 gpm/710 gal.
Engine 63	Pumper	2008	Spartan/Crimson	Fair	1500 gpm/710 gal.
Engine 69	Pumper	2010	Spartan/Crimson	Fair	1500 gpm/710 gal.
Aerials/Ladders					
Ladder 61	Aerial	1976	Oshkosh	Poor	1500 gpm/85-ft. p-form
Ladder 63	Aerial Ladder	2006	Spartan/Crimson	Fair	1500 gpm/103-ft. ladder
Tenders & Pumper/Tenders					
Tender 12	Tender	1999	S & S	Fair	1250 gpm/3000 gal.
Tender 61	Tender	1986	Van Pelt	Poor	1000 gpm/3000 gal.
Tender 63	Pumper/Tender	1994	Pierce	Good	1500 gpm/3000 gal.
Tender 68	Tender	1998	H & W	Fair	1250 gpm/2800 gal.
Tender 6802	Tender	1999	S & S	Fair	1250 gpm/3000 gal.
Tender 69	Tender	1998	H & W	Fair	1250 gpm/2800 gal.
Tender 72	Pumper/Tender	1992	Pierce	Poor	1500 gpm/1400 gal.
Tender 6803	Pumper/Tender	1990	Pierce	Poor	1500 gpm/1400 gal.
Wildland/Brush Units					
Brush 12	Wildland	2002	NWFR	Good	250 gpm/300 gal.
Brush 63	Wildland	2002	NWFR	Good	250 gpm/300 gal.
Brush 68	Wildland	2001	NWFR	Good	250 gpm/300 gal.
Brush 69	Wildland	2002	NWFR	Good	250 gpm/300 gal.

Figure 47: NWFR Support & Staff Vehicles (2019)

Designation	Type	Year	Manufacturer	Condition	Assigned To
C71	Staff Car	2016	Chevrolet Tahoe	Good	Fire Chief
C7103	Staff Car	2009	Chevrolet Tahoe	Fair	Fire Marshal
C7102	Staff Car	2016	Ford Interceptor	Good	Ops Chief
Training 63	Staff Car	2006	Ford Expedition	Fair	Training

The four frontline engines had a combined average age of 10.25 years. The two aerial apparatus ranged in age from 13–43 years (average of 28 years). NWFR lists eight frontline tenders, with the newest being 21 years old, and the combined average age of 24.5 years. Three of the four wildland vehicles (brush trucks) are 17 years old, with the fourth 18 years of age (average of 17.25 years).

Of the four engines, mileage was reported to ESCI in three apparatus. The combined average mileage of those engines was 85,091. Each of the four engines was rated as in "Fair" condition. The average mileage of the two aerial apparatus was 43,350 miles, with one rated as "Fair" and the other as "Poor." The combined average mileage of the tenders was 22,700 miles, with three of the eight rated as "Poor," four rated as "Fair," and one as "Good." The wildland apparatus averaged 25,987 miles, with each rated as "Good."

North Whatcom Fire & Rescue lists four frontline ambulance units in its fleet inventory, and nine reserve ambulances. The following figure provides specific details about the four ambulances.

Figure 48: NWFR Frontline Ambulance Inventory (2019)

Designation	Type	Year	Manufacturer	Chassis	Condition	Mileage
Ambulance 12	Type III	2000	Braun NW	Ford	Poor	100,289
Ambulance 69	Type III	2008	Braun NW	Ford	Fair	165,181
Ambulance 63	Type III	2009	Braun NW	Ford	Fair	187,079
Ambulance 61	Type III	2012	Braun	Ford	Good	124,988
Averages:		**12 years**				**144,384**

As shown in the preceding figure, as of 2019, the average age of the frontline ambulances is 12 years, with an average of 144,384 miles. One unit was rated as "Good," two as "Fair," and a fourth as "Poor." Ambulances on the reserve list ranged in age from 13–27 years, with an average of nearly 21 years. Mileage among these ambulances averaged 70,940.

Support Vehicles

NWFR also maintains a fleet of 12 additional vehicles that include utility vehicles, other staff cars, utility trailers, shop trucks, an engine assigned to Training, and 1992 Ford Rehabilitation Unit described as in "Poor" condition. Of all of these, only two were considered in "Good" condition.

Apparatus Maintenance & Replacement Planning

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

Because of the expense of fire apparatus, most communities develop replacement plans. To enable such planning, fire districts 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.

Those within the District responsible for managing and maintaining the fleet should be concerned about aging apparatus and vehicles, and ensure that a funded replacement schedule is in place. As frontline units age, fleet costs will naturally be higher and more downtime will be associated with necessary repairs and routine maintenance.

NWFR Replacement Planning

North Whatcom Fire & Rescue does not currently maintain a capital vehicle replacement plan, nor a capital equipment replacement plan.

Future Apparatus Serviceability

Fleet Maintenance

The majority of NWFR's apparatus and vehicle maintenance is done using its staff, consisting of two Mechanics. Maintenance and repairs requiring expertise or tools beyond NWFR's capability, or vehicles under warranty, are outsourced as necessary. Apparatus service-lives can be readily predicted based on factors including vehicle type, call volume, age, and maintenance considerations.

National Fire Protection Association *1901: Standard for Automotive Fire Apparatus* recommends that fire apparatus 15 years of age or older be placed into reserve status, and apparatus 25 years or older should be replaced.[17] This is a general guideline, and the standard recommends using the following objective criteria in evaluating fire apparatus lifespan:

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

The following figure is one example of criteria that can be utilized for determining apparatus replacement based on a points system. The method examines age, apparatus mileage or hours, service, condition, and general reliability.

Figure 49: Criteria & Method for Determining Apparatus Replacement

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

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

Economic Theory of Apparatus Replacement

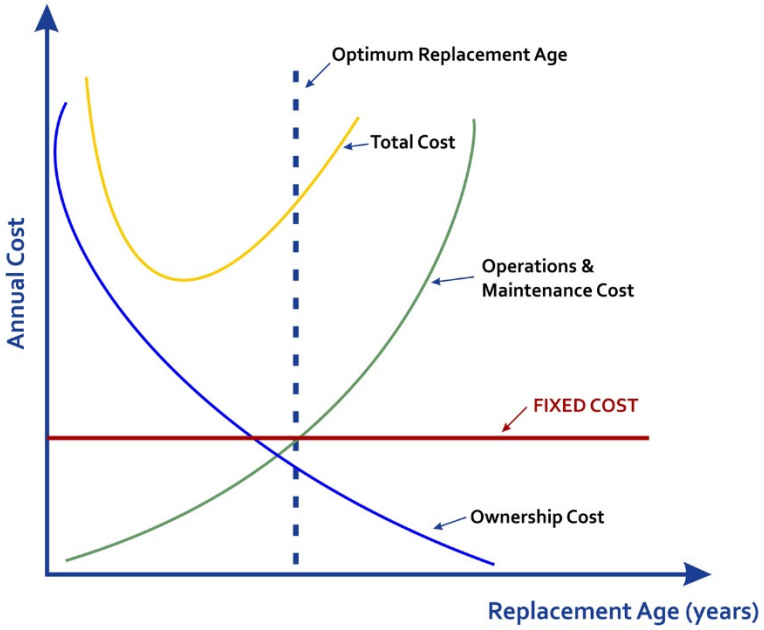
A conceptual model utilized by some fire departments is the *Economic Theory of Vehicle Replacement*. The theory states that, as a vehicle ages, the cost of capital diminishes and its operating cost increases. The combination of these two costs produces a total cost curve. The model suggests the optimal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

Shortening the replacement cycle to this window allows an apparatus to be replaced at optimal savings to the District. If an agency does not routinely replace equipment in a timely manner, the overall reduction in replacement spending can result in a quick increase of 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:

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

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

Figure 50: Economic Theory of Vehicle Replacement



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

Apparatus & Vehicles Discussion

The following figure lists the combined average age, mileage, and conditions of the NWFR frontline apparatus, ambulances, and staff vehicles. Excluding the staff vehicles, the combined average age of all other apparatus is about 19 years, with an average of 64,302 miles. If the staff vehicles are included, the combined average age of the frontline vehicles is 16.5 years, with an average of 65,308 miles.

The apparatus maintenance department continues to utilize the Firehouse Software® application to document its apparatus and ambulance records. The software application does not integrate with the District's current ImageTrend® software.

Figure 51: Age, Mileage, & Condition of NWFR Frontline Apparatus (2019)

	— Combined Averages —		— Rated Conditions[A] —			
Apparatus	Vehicle Age[A]	Mileage	% Poor	% Fair	% Good	% Excellent
Engines	10 years	85,091	0%	100%	0%	0%
Aerials	28 years	43,350	50%	50%	0%	0%
Tenders	25 years	22,700	38%	50%	13%	0%
Wildland	17 years	25,987	0%	0%	100%	0%
Ambulances	12 years	144,384	25%	50%	25%	0%
Staff Vehicles	7 years	70,338	0%	50%	50%	0%

[A]Rounded to the nearest integer

Of all frontline apparatus, ambulances, and staff vehicles combined, 20% were rated as "Poor," 52% "Fair;" 28% "Good," with *no* single unit rated as "Excellent."

Estimated Capital Vehicle Replacement Costs

The following figure utilizes typical industry standards for the life expectancies of various apparatus types and the costs to replace them plus 4% inflation to estimate potential costs to replace frontline apparatus.

Figure 52: NWFR Estimated Costs & Year to Replace Frontline Apparatus (2019)

Apparatus	Replacement Cost	Current Cash Requirements	Annual Cash Requirements	Current Age	Replacement Year[B]
Engines					
Engine 12	$766,399	$459,839	$38,320	12	**2027**
Engine 61	$862,094	$387,942	$43,105	9	**2030**
Engine 63	$797,055	$438,380	$39,853	11	**2028**
Engine 69	$862,094	$387,942	$43,105	9	**2030**
Aerials					
Ladder 61	$1,200,000	$1,200,000	N/A	43	**Overdue**
Ladder 63	$1,921,239	$999,044	$76,850	13	**2031**
Tenders					
Tender 12	$375,000	$375,000	N/A	20	**2019**
Tender 61	$375,000	$375,000	N/A	33	**Overdue**
Tender 63	$630,000	$630,000	N/A	25	**Overdue**
Tender 68	$375,000	$375,000	N/A	21	**Overdue**
Tender 6802	$375,000	$375,000	N/A	20	**2019**
Tender 69	$375,000	$375,000	N/A	21	**Overdue**
Tender 72	$630,000	$630,000	N/A	27	**Overdue**
Tender 6803	$630,000	$630,000	N/A	29	**Overdue**
Wildland					
Brush 12	$179,978	$152,982	$8,999	17	**2022**
Brush 63	$179,978	$152,982	$8,999	17	**2022**
Brush 68	$173,056	$155,750	$8,653	18	**2021**
Brush 69	$179,978	$152,982	$8,999	17	**2022**
Ambulances					
Ambulance 12	$225,000	$225,000	N/A	19	**Overdue**
Ambulance 69	$225,000	$225,000	N/A	11	**Overdue**
Ambulance 63	$225,000	$225,000	N/A	10	**Overdue**
Ambulance 61	$266,412	$93,244	$13,321	7	**2032**
Totals:	**$11,061,884**	**$9,021,087**	**$290,204**		

[A]Includes cost plus 4% for inflation

[B]Based on typical estimated life expectancy

In calculating the numbers in the preceding figure, ESCI utilized the following life expectancies of the different types of apparatus:

- Engine—20 years
- Aerial (Ladder)—25 years
- Tender/Pumper Tender—20 years
- Wildland (Brush)—20 years
- Type III Ambulances—7 years

Considering the methodologies used in the preceding figure, at least 10 apparatus are overdue for replacement—which would require an approximate cost of nearly $4.9 million. The combined remaining apparatus (excluding one new tender) are due, on average, to be replaced within 5.6 years. The latter group of apparatus would require capital replacement funds of $285,880 annually in order to acquire adequate capital by their respective replacement years.

The current conditions of North Whatcom Fire & Rescue's apparatus and vehicles, in addition to the lack of a capital vehicle replacement plan, should be cause for concern by the two fire districts—as well as the costs to replace them. Except for one new tender, the current cash requirements to replace all apparatus would be more than $8.7 million.

ESCI has presented the amounts in the preceding figure to illustrate the significant potential costs to update NWFR's current fleet. It must be emphasized that these are estimated costs. Clearly, not all apparatus would require immediate replacement (including those identified as overdue) and there are likely reasonable options that could be considered to minimize the expense of replacing apparatus.

Capital Medical Equipment Inventory

Since calls for EMS represent the highest demand for service in both fire districts, in this report, ESCI elected to list the inventories of capital medical equipment. It must be noted that acquiring and equipping apparatus and ambulances with cardiac monitor/defibrillators and Automated External Defibrillators (AED) are substantial capital expenses.

Figure 53: NWFR Capital Medical Equipment Inventory

Manufacturer	Model	Type/Description	Year	Qty.
Physio-Control	Lifepak® 500	Automated External Defibrillator	1999	11
Physio-Control	Lifepak® 1000	Automated External Defibrillator	2015	7
Ferno	EZGlide (58T)	Stair Chair	2017	4
Ferno	Squadmate (93-ES)	Stretcher	—	11[A]

[A]Stretchers are in NWFR inventory, but swapped with ALS & other BLS units, but not considered an asset.

SERVICE-DELIVERY & PERFORMANCE

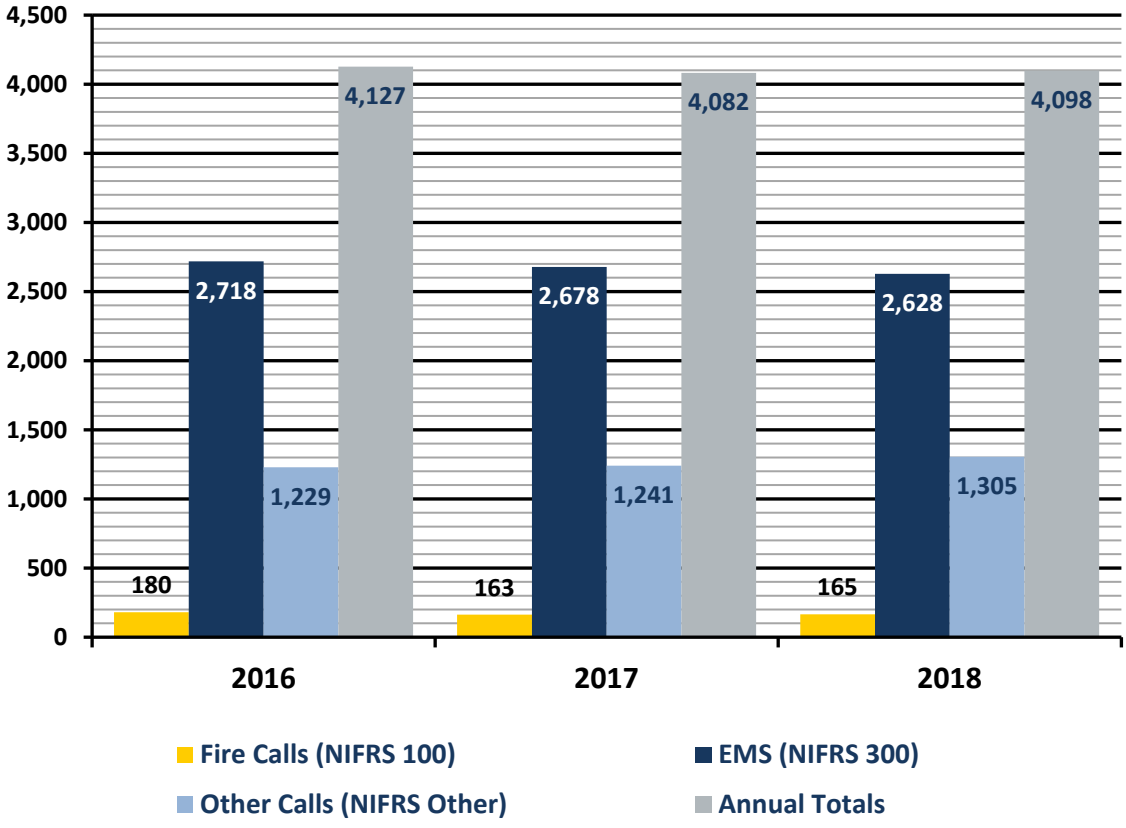
Fire-service organizations must look at the past, in order to conduct future planning. An indicator of success is the balance of resources to the utilization of services. If the need for emergency service response exceeds the District's resources, then the response-time performance may be negatively impacted.

The following two figures show the District's service-demand over the past three years. Like most fire departments, emergency medical response constitutes the greatest number of calls for service. The second figure shows trending for fire, EMS, and other responses. Over the past three years, fire responses have decreased by about 8%. During the same period, EMS has remained steady with an approximate drop in volume of 3%. Other responses have gone up about 6%. NWFR's overall demand for service has seen a less than 1% change over the past three years.

Service-Demand Study

NWFR had a total of 6,846 requests for service in 2018. As previously mentioned, EMS, including motor vehicle accidents (MVA) constituted most of the calls at 58%. The national average for EMS response by fire departments is 64%, leaving 36% for fire and other types of service-demand.[18] NWFR is slightly lower than the national average, in part, due to the use of medical priority dispatching and limiting unnecessary fire department responses.

Figure 54: NWFR Service-Demand (2016–2018)



The next figure lists the 2018 North Whatcom Fire & Rescue service-demand by specific National Fire Incident Reporting System (NFIRS) type.

Figure 55: NWFR Service-Demand by NFIRS Type (2018)

Type Description	% of Total
Emergency Medical Services	61%
Public Assist	11%
Other	11%
False Call	6%
Motor Vehicle Accident	5%
Fire, Other	2%
Hazardous Materials	2%
Structure Fire	1%
Wildland	1%
Rescue	< 1%

Service-Demand by Fire Stations

The following section addresses historical service-demand among each of the NWFR fire stations. This is important, as it can indicate which stations may require the necessary staffing of operations personnel. The next figure shows the call volumes and percent of the total of each station during the 36-month study period of 2016–2018.

Figure 56: NWFR Service-Demand by Fire Station (2016–2018)

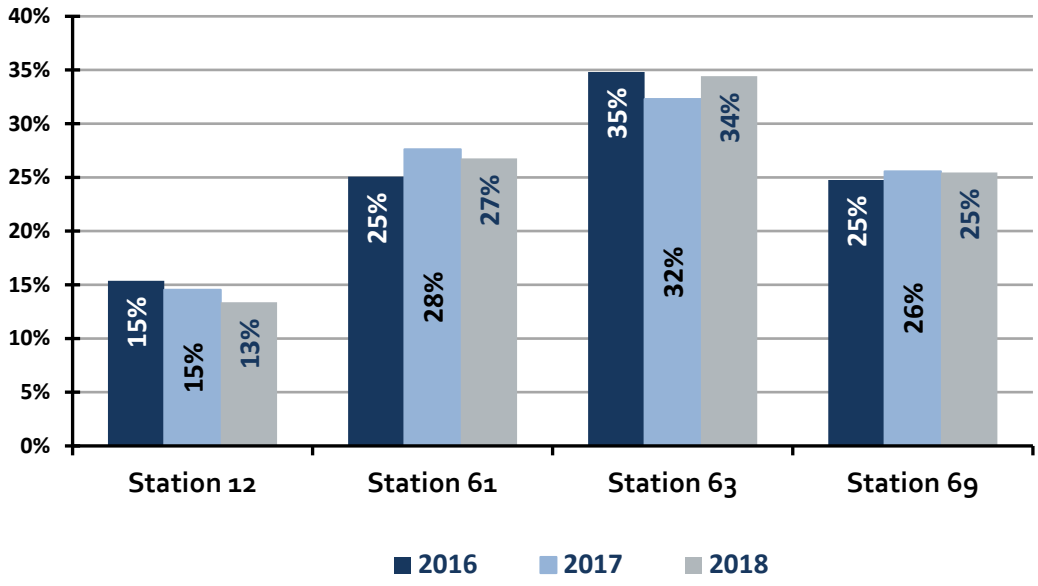
Fire Station	2016	2017	2018	% of Total
Station 11	1	1	0	**< 0%**
Station 12	627	584	538	**14%**
Station 13	1		2	**< 0%**
Station 61	1,023	1,109	1,077	**26%**
Station 62	6	4	2	**< 0%**
Station 63	1,420	1,297	1,385	**< 34%**
Station 65	3	2		**< 0%**
Station 68	19	3	6	**< 0%**
Station 69	1,010	1,027	1,024	**25%**
Station 70	1	9	15	**< 0%**
Station 72	1	2	1	**< 0%**

Note: Shaded rows indicate career-staffed fire stations.

The results of the analysis in the preceding figure shows that most incidents are in proximity of the career-staffed stations. This supports that NWFR is deploying its personnel effectively. Specific data relating to travel time will be provided later in this section.

The remaining analysis focuses on the historical service-demand of the career-staffed stations. The following figure indicates the distribution of emergency incidents among the four stations. As shown, the highest demand for service occurred within Station 63's response zone.

Figure 57: Distribution of Service-Demand among the Career-Staffed Stations (2016–2018)

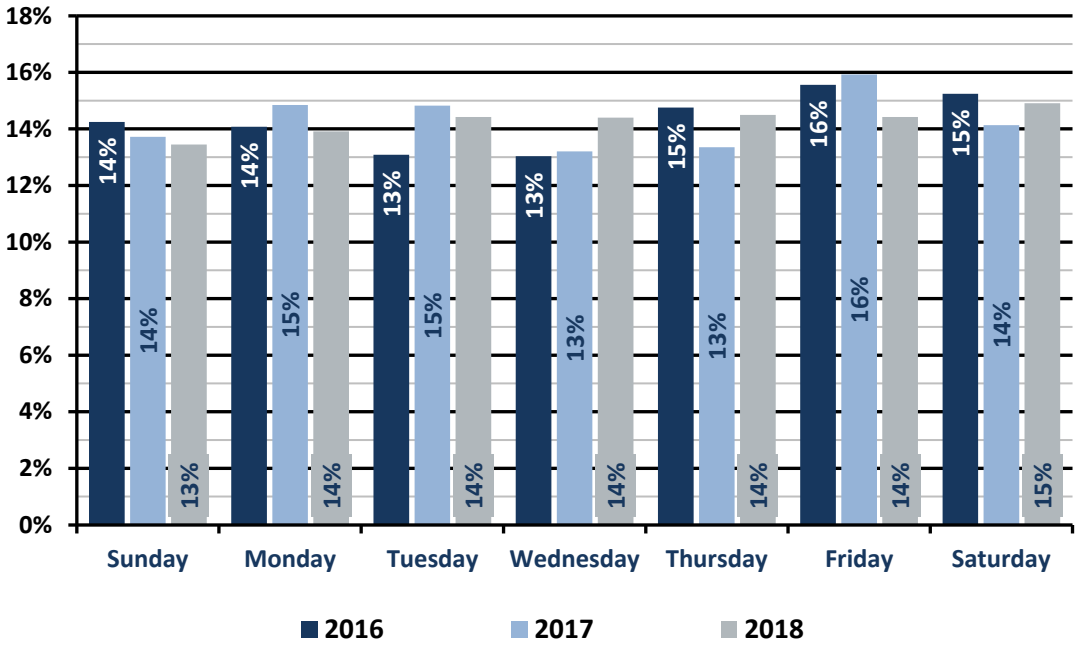


Station 12 is staffed with career firefighters and, prior to 2019, demonstrated the lowest percentage (14%) of the total call-volume the NWFR response-area. Based on an auto-aid agreement established at the beginning of 2019, there is an indication that the service-demand for Station 12 may increase to a volume equivalent to the other career-staffed stations.

Temporal Variations

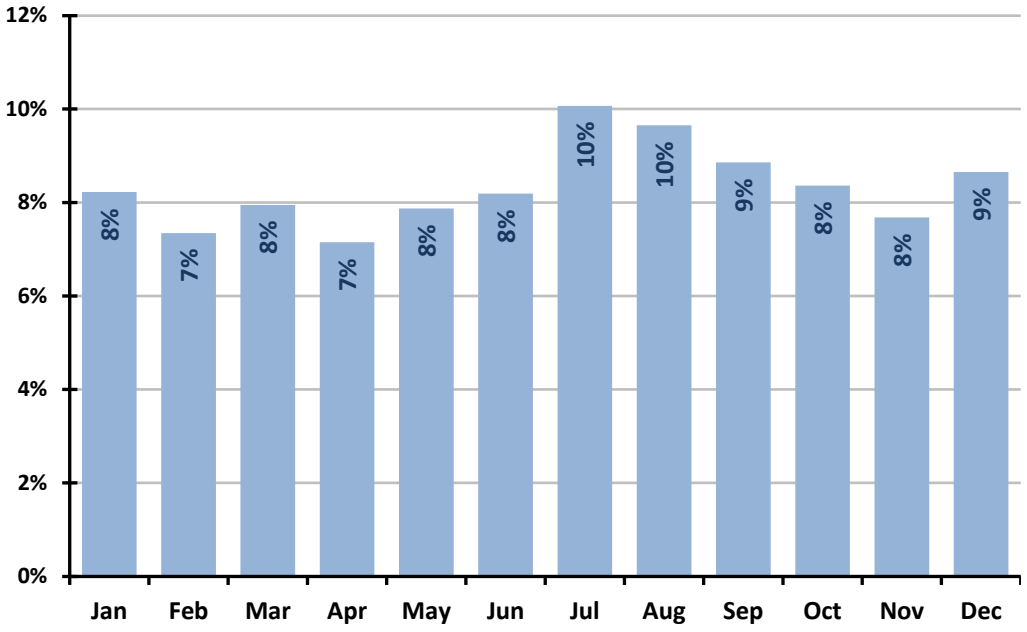
The next set of figures break the demand for service into day-of-week, time-of-day, and calls by month. The following figure shows trendlines that support that there is a minimal change in service demand throughout the week. There is a minimal increase on Friday and Saturday but does not indicate the need for staffing changes.

Figure 58: NWFR Service-Demand by Day-of-Week (2016-2018)



The next figure showed a consistent demand for services throughout the year, with slight increases in the Summer months of July and August, and the lowest call volumes during February and April. The trend found among the months does not indicate a need for seasonal staffing changes.

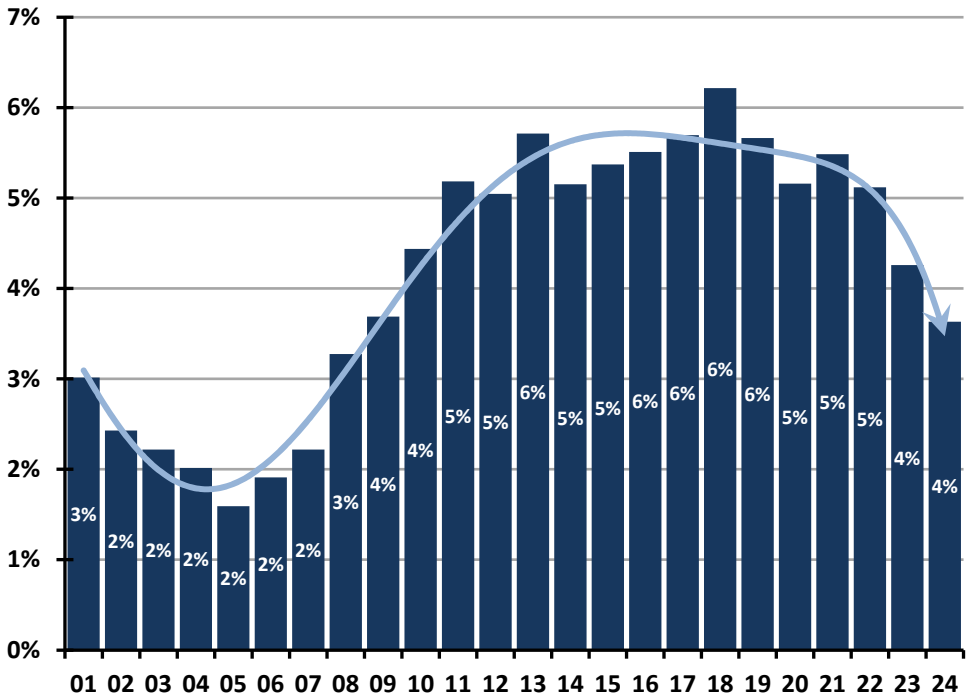
Figure 59: NWFR Service-Demand by Month (2016-2018)



The next figure illustrates the 2018 service-demand of NWFR by the hour of the day. This is one of the most important of the temporal analyses, as it can drive the need for daily fire department staffing and the availability of operations personnel to respond. The results showed a pattern typical of most communities, in which greater service-demand occurs during those times when human activity is most prevalent.

During 2018, service-demand began to increase during 0800, with the highest demand in the late afternoon and early evening hours. The busiest two-hour period for service-demand of all incident types occurred between 1600 and 1800 hours (4:00 pm–6:00 pm).

Figure 60: NWFR Service-Demand by Hour-of-Day (2018)



The next figure lists the busiest consecutive time-intervals. This information can be used to identify periods for potential staffing changes or increases, as well as placing additional apparatus in service.

Figure 61: Busiest Consecutive Service-Delivery Periods (2016–2018)

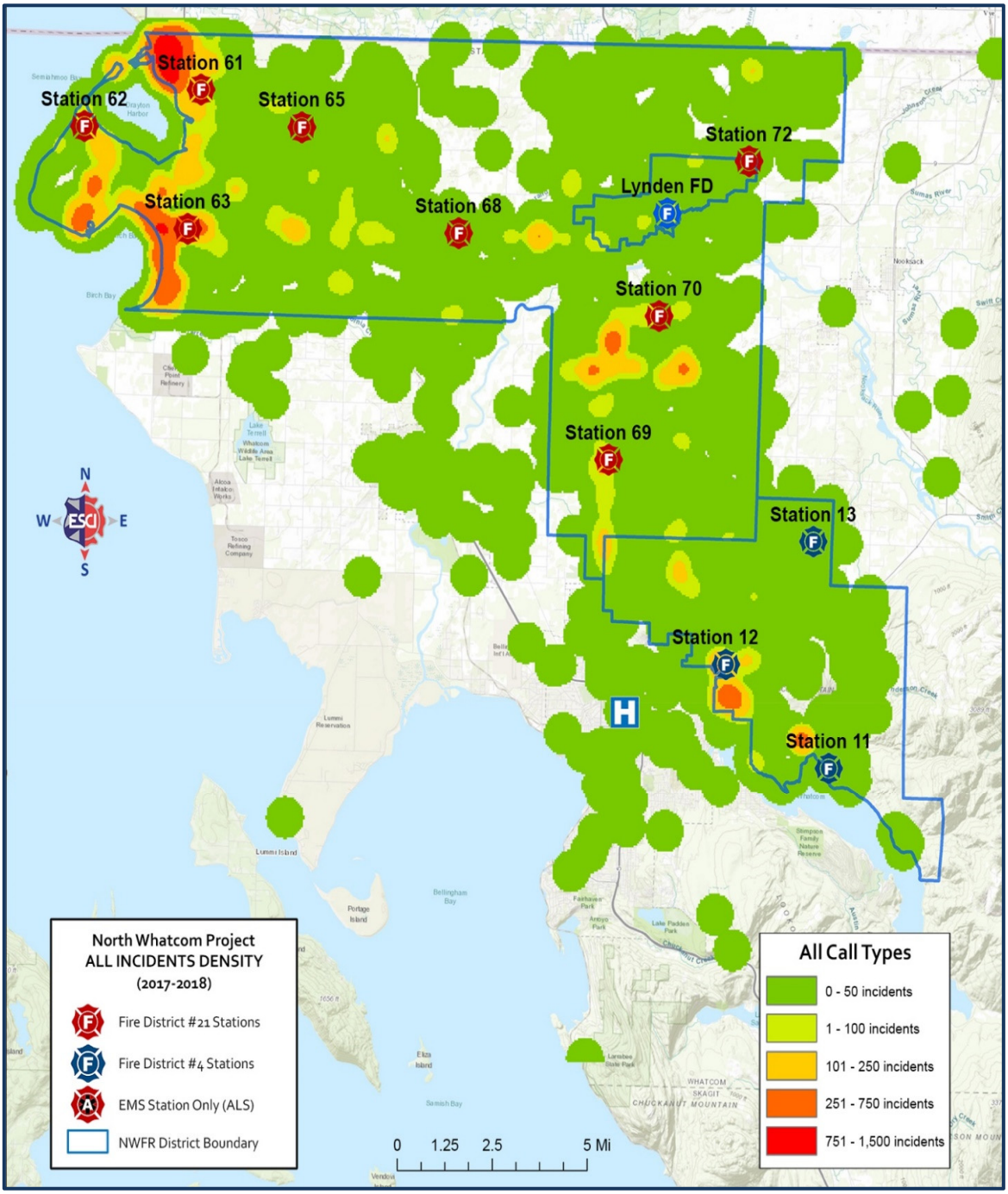
Time Periods	8-Hour	10-Hour	12-Hour
Time Intervals	0900–1600	0900–1800	0900–2000
Percent of Total	40%	52%	63%

As shown in the preceding figure, the busiest consecutive 12-hour periods in 2018 were 0900–2000 hours, which represented 63% of the total daily service-demand. Therefore, should it be necessary to add any type of 12-hour peak demand unit, these times would likely prove to be the most effective.

Geographic Distribution of Service-Demand

ESCI depicts the density of incidents by location in the following figures. The relationship between fire station locations and the higher density of service-demand is illustrated.

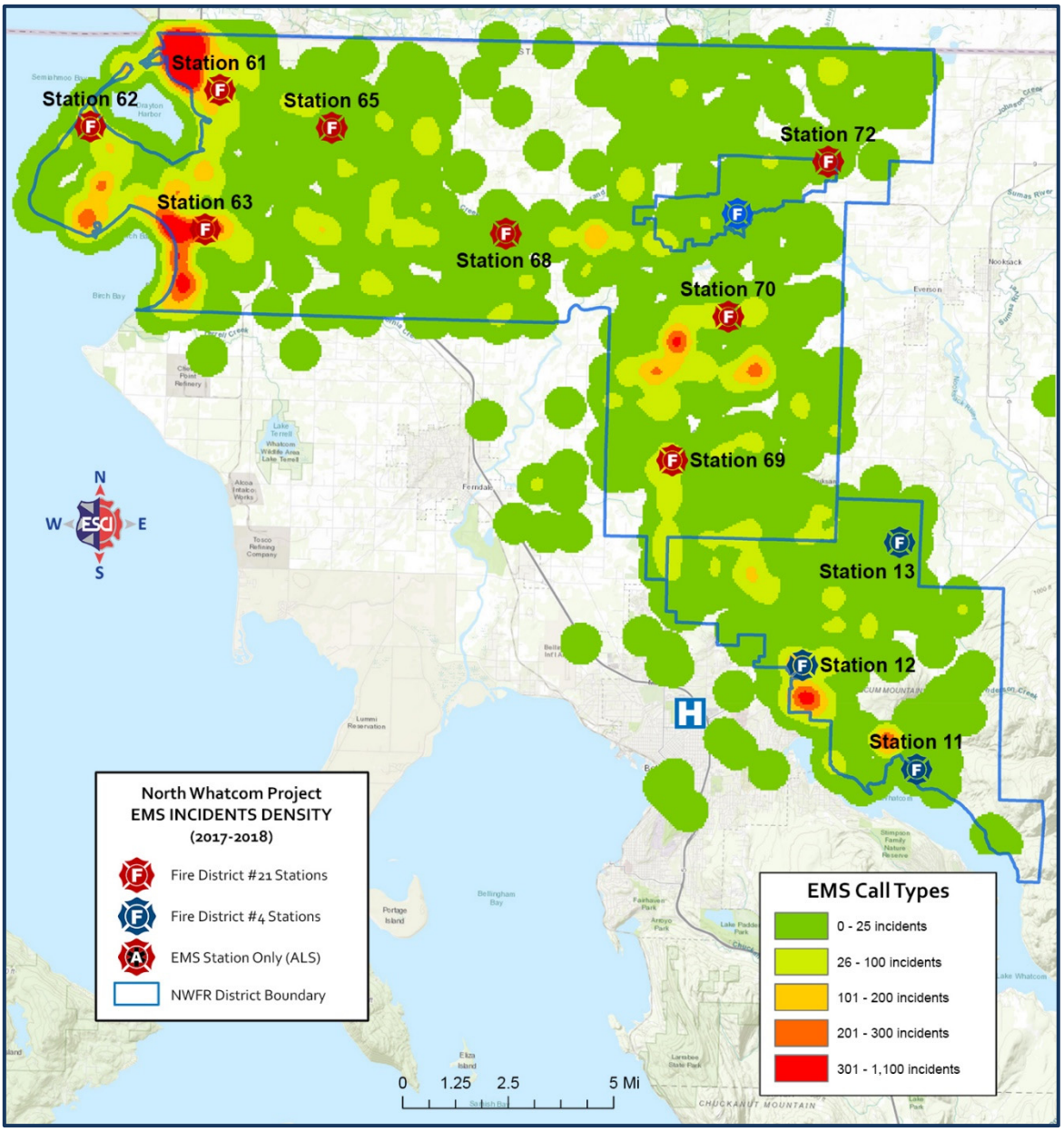
Figure 62: NWFR Incident Density—All Call-Types (2017–2018)



As expected, the preceding figure shows that during the 24-month period of 2017–2018 the highest service demand for all types of incidents occurred around Stations 12, 61, 62, 63, and between Stations 69 and 70. Higher incident densities occurred around the area of Station 11, which does not have any assigned staff and is typically served by the company from Station 12.

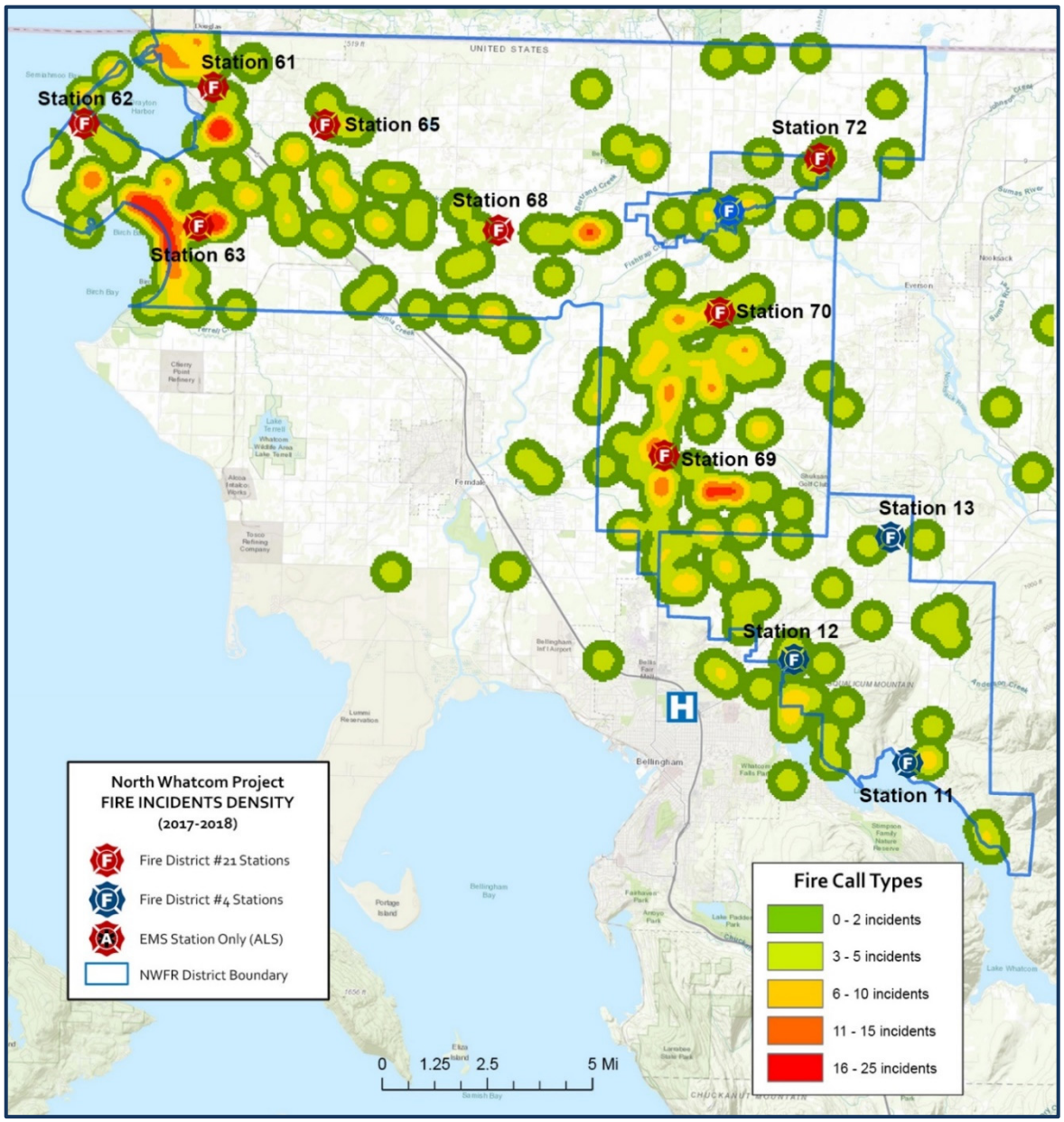
The next figure represents EMS incident-density during the 24-month study period. This follows the same pattern as found with the results found with all call-types, although the highest EMS incidents appeared to be in the area of Station 61.

Figure 63: NWFR Incident Density—EMS Calls (2017–2018)



The next figure illustrates the density of all fire-related calls (NFIRS 100) during the 24-month study period. Fire-related calls occurred most frequently around Stations 61, 63, and 69.

Figure 64: NWFR Incident Density—Fire-Related Calls (2017–2018)



Distribution Analysis

There are several are several organizations that publish recommended standards used in analyzing the distribution of fire department resources within a jurisdiction. These include the *Washington Surveying & Rating Bureau* (WSRB), the National Fire Protection Association, the *Center for Public Safety Excellence* (CPSE), and the *Insurance Services Office* (ISO). ISO uses the *Fire Suppression Rating Schedule* (FSRS). CPSE is an accrediting organization whose standards are published in its *Fire & Emergency Services Self-Assessment Manual* (FESSAM). The manual defines response-time performance criteria. In order to determine the effectiveness of station locations for the travel-time component of the response-time standard, a GIS analysis has been utilized.

Washington Surveying & Rating Bureau Criteria

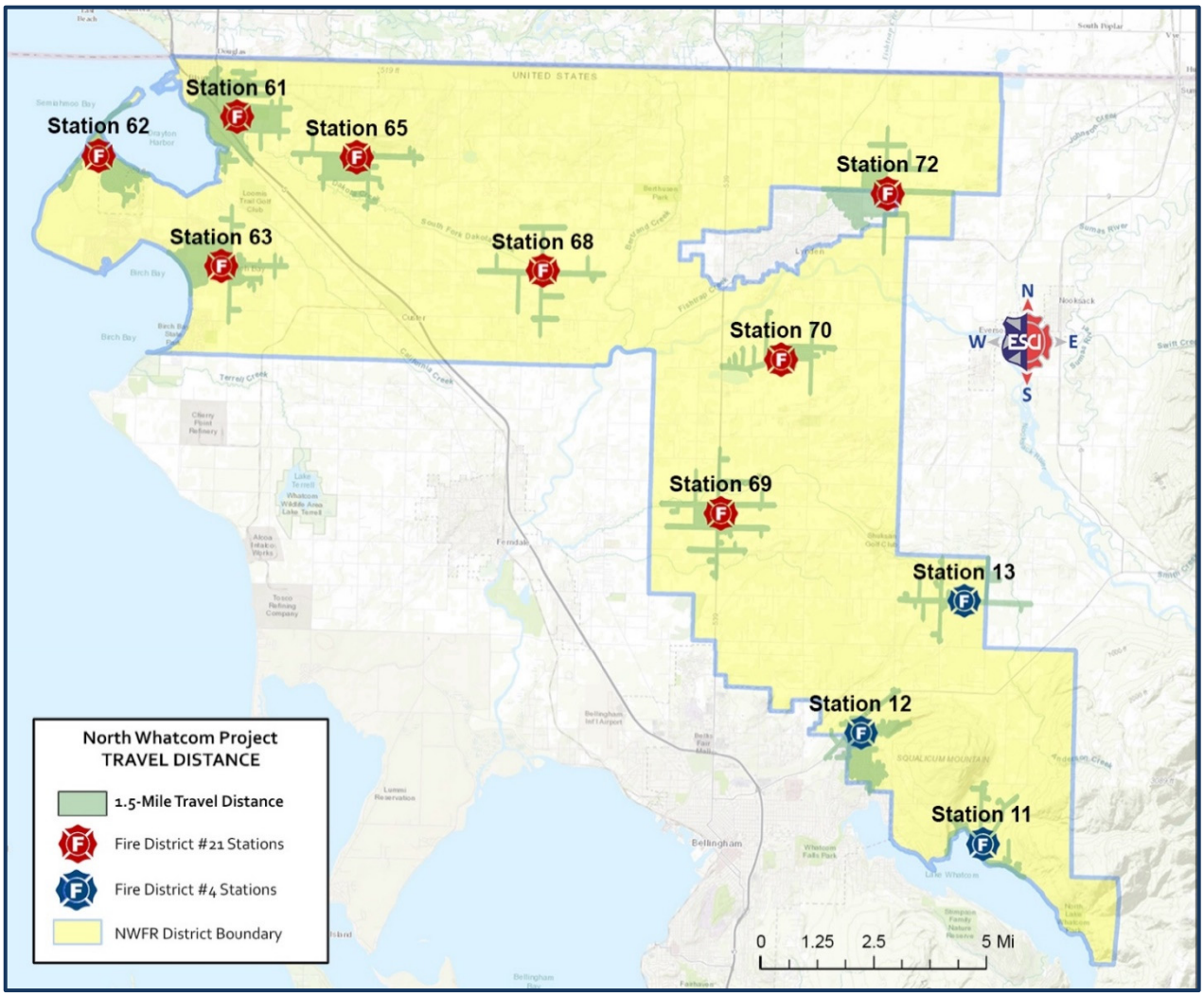
The Insurance Services Office is a national insurance industry organization that evaluates fire protection for communities across the country. ISO assesses all areas of fire protection as broken down into four major categories including emergency communications, fire department, water supply, and community risk reduction. Washington State communities typically do not use ISO, but instead rely on the *Washington Surveying & Rating Bureau*. Following a *Protection Class* evaluation, a rating is assigned to the community, ranging from 1 (best protection) to 10 (no protection). This provides insurance companies assistance in establishing fair premiums for fire insurance—typically offering lower premiums in communities with better protection.

A community's Protection Class Rating is an important factor when considering fire station and apparatus distribution and deployment due to its effect on the cost of fire insurance for the residents and business owners. The ability of a fire department to arrive on the scene of an incident equipped with personnel, equipment, and water adequate to effectively mitigate a fire is a critical component of the rating. For a structure to be eligible to receive a PCR better than 10, the structure must be within five road miles from a fire station. Typically, areas outside of five road miles receive a PCR of 10, unless the fire department can demonstrate adequate fire-flow is available, which then allows some credit for the water supply. In addition, to receive maximum credit for station and apparatus distribution, WSRB evaluates the percentage of the community (contiguously built upon area) that is within specific distances of both engine (pumper) companies (1.5 miles) and aerial (ladder truck) apparatus (2.5 miles).

In addition, WSRB also evaluates a community's availability of adequate water supply. One of the areas evaluated regarding the water supply is the geographical locations and distribution of fire hydrants. Structures that sit outside of a 1,000-foot radius of a fire hydrant are subject to a separate rating. That rating is dependent on the fire department demonstrating alternate water sources and the ability to use them. This may be accomplished in several ways such as a dry hydrant, a storage tank, tanker/tender shuttle operations, capability for large-diameter hose lays, or drafting operations.

The next three figures illustrate the WSRB projected 1.5, 2.5, and 5-mile travel distances from each of the NWFR fire stations. This begins with the 1.5-mile travel distances.

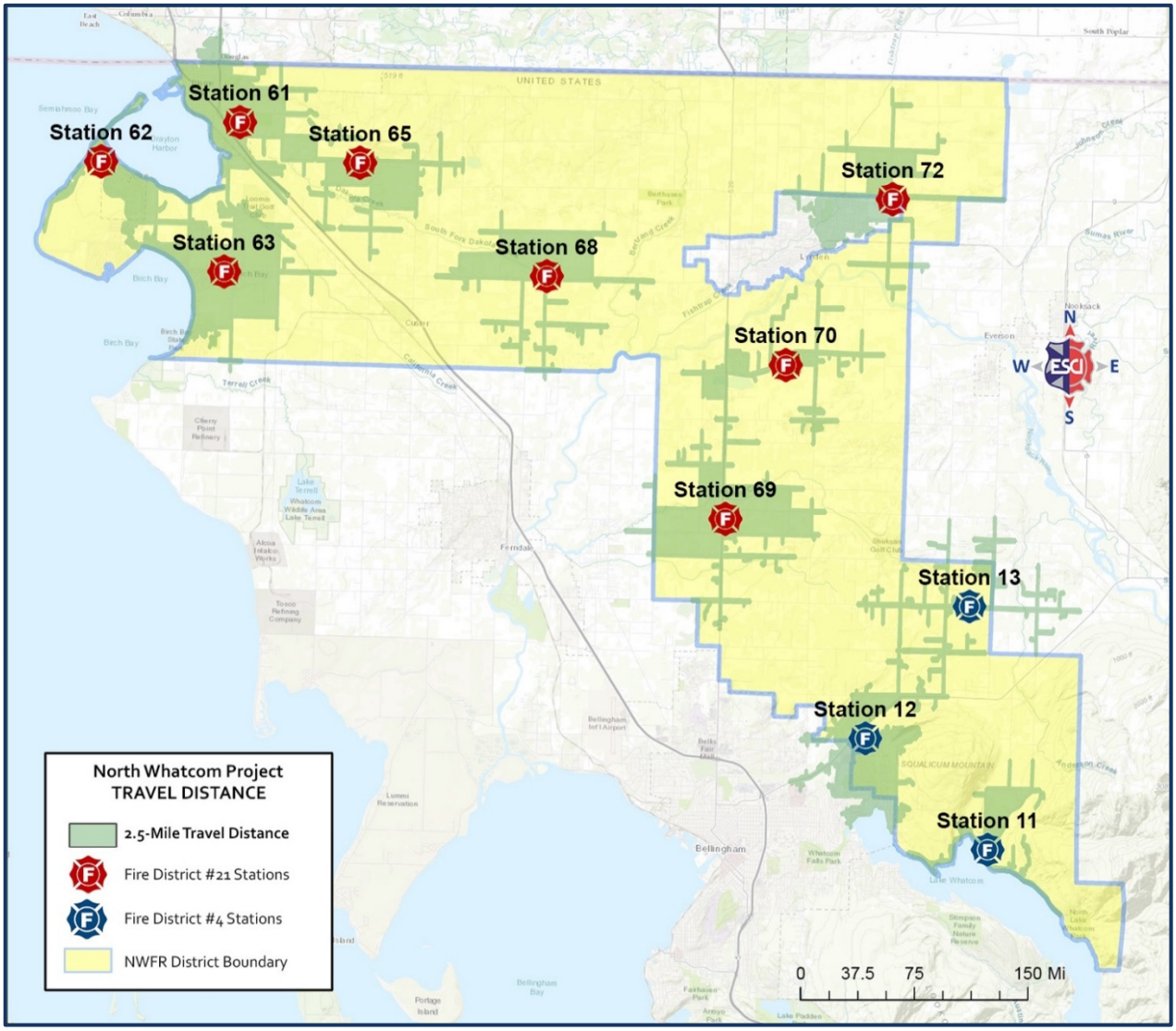
Figure 65: NWFR Projected 1.5-Mile Travel Distances



As shown in the preceding figure, there is a considerable portion of the NWFR service-area well outside the 1.5-mile travel distance radius recommended for engine companies. There is a total of 545 road miles within the NWFR boundaries. Of these, just over 91 miles are within 1.5-miles of the four career-staffed stations, which represent 16.5% of the District's total road miles.

The next figure illustrates the 2.5-mile projected travel distances from each NWFR fire station. The 2.5-mile criteria is applicable to aerial apparatus. The figure shows the travel distances from each station within the NWFR service area. However, the District maintains only one aerial apparatus deployed from Station 63 in the northwest corner of the service area.

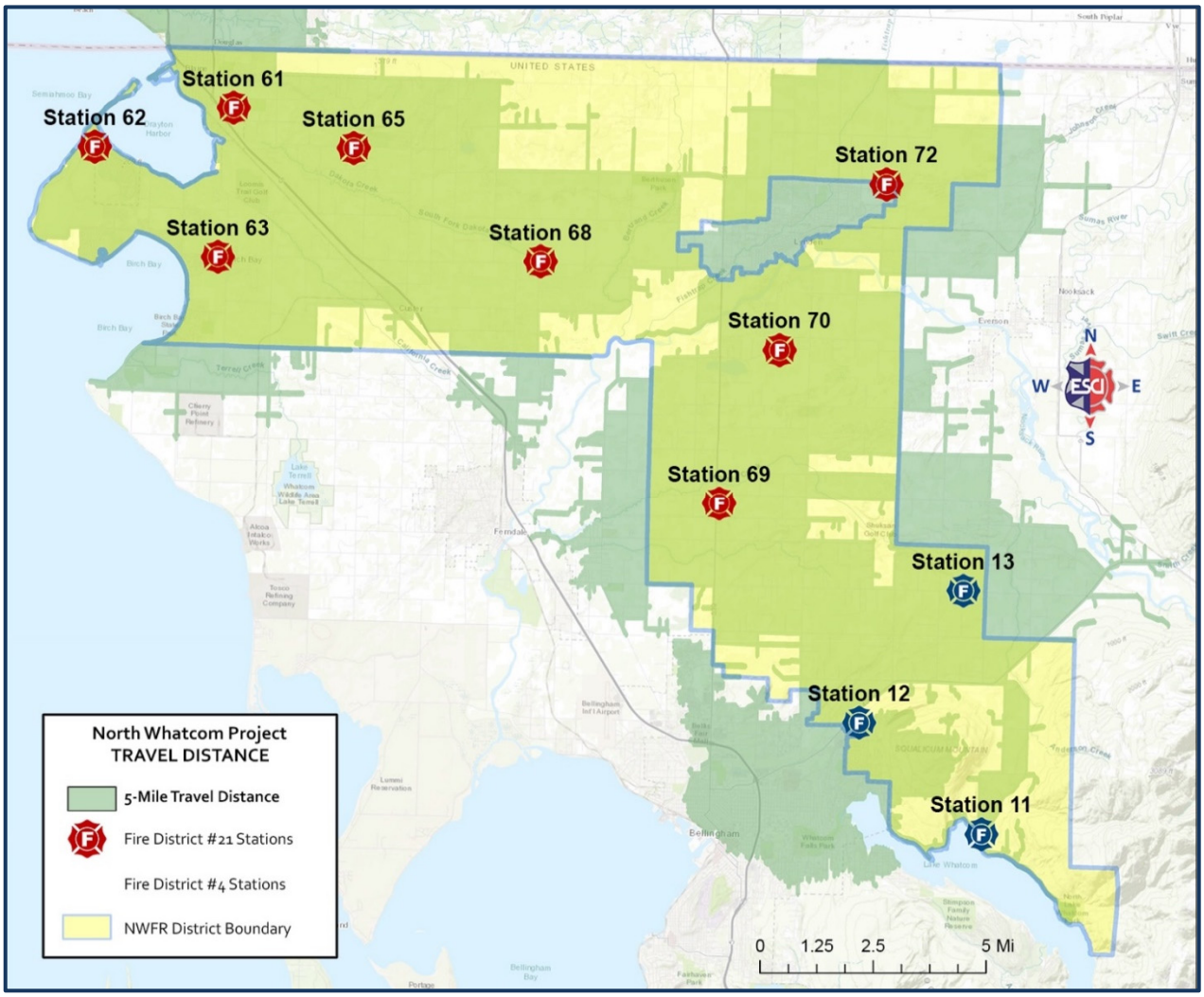
Figure 66: NWFR Projected 2.5-Mile Travel Distances



Of the total 545 road miles within the NWFR boundaries, about 149 miles are within 2.5-miles of Station 63, representing just over 27% of the District's total road miles.

The next figure shows the projected 5-mile travel distances from each NWFR fire station. Assuming all stations are sufficiently staffed with either career or volunteer personnel, much of the District can be accessed within five miles. However, this is misleading since only four stations are staffed 24-hours daily, and many stations have either few or no volunteers serving in a "combat" role.

Figure 67: NWFR Projected 5-Mile Travel Distances



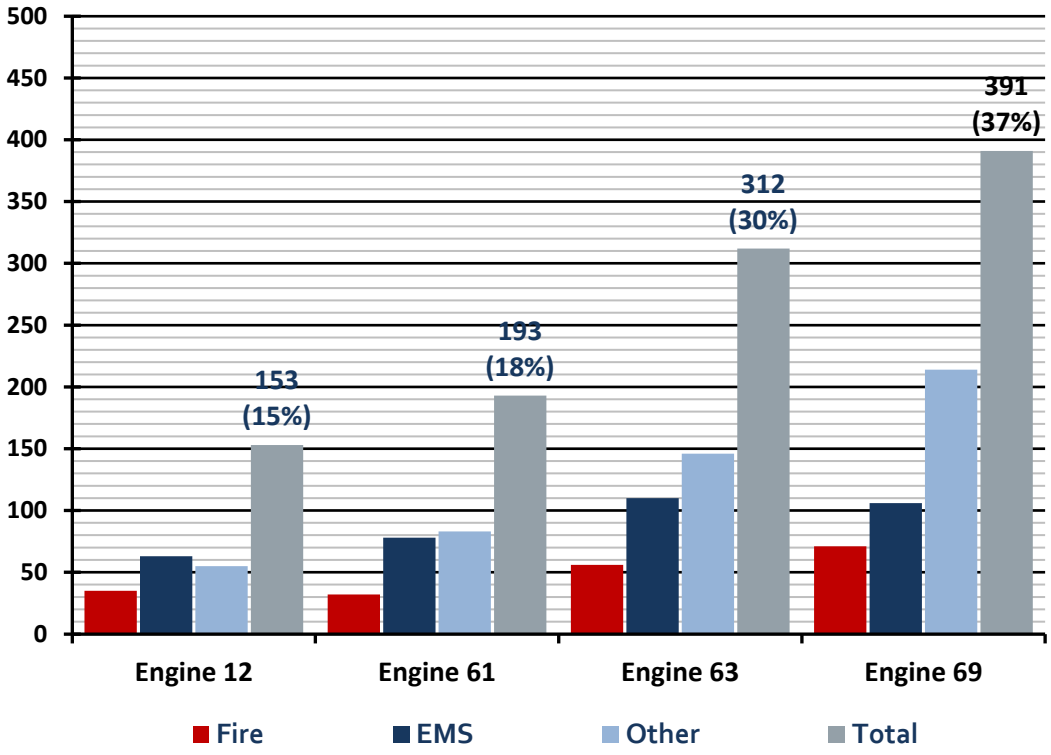
Reliability Study

The following section provides an overview of unit workload and response-time performance. For an organization to meet response goals, an evaluation is required to determine the utilization of each apparatus. Based on a unit-workload analysis, the District can determine concurrent requests for services, which can result in increased response-times from distant units.

NWFR provides primary response through the utilization of multiple apparatus. For the purpose of this study, the focus was placed on ambulances, ladder trucks, engines, and water tenders from staffed Stations 12, 61, 63, and 69. Using 2018 incident data, call-volumes were categorized as either Fire-related (NFIRS 100), EMS (NFIRS 300), or Other (all other NFIRS codes).

The following figure illustrates the 2018 service-demand of engine companies assigned to stations staffed 24 hours daily with career personnel.

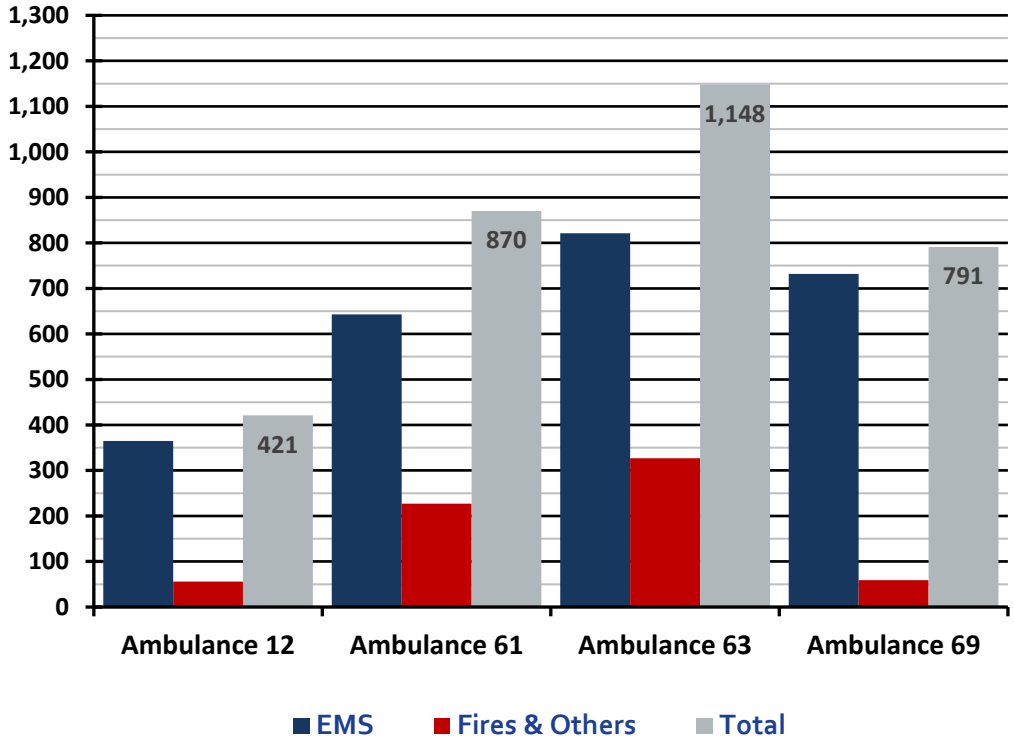
Figure 68: NWFR Service-Demand by Career-Staffed Engine Companies (2018)



The historical incident data indicated that Engines 69 and 63 had the highest demands for service in 2018. Combined, this represented 67% of the total engine company responses. Engines 12 and 61 had the lowest service demand and, when combined, accounted for 33% of the total engine company responses. During 2018, Ladder 63 had a total of 31 responses.

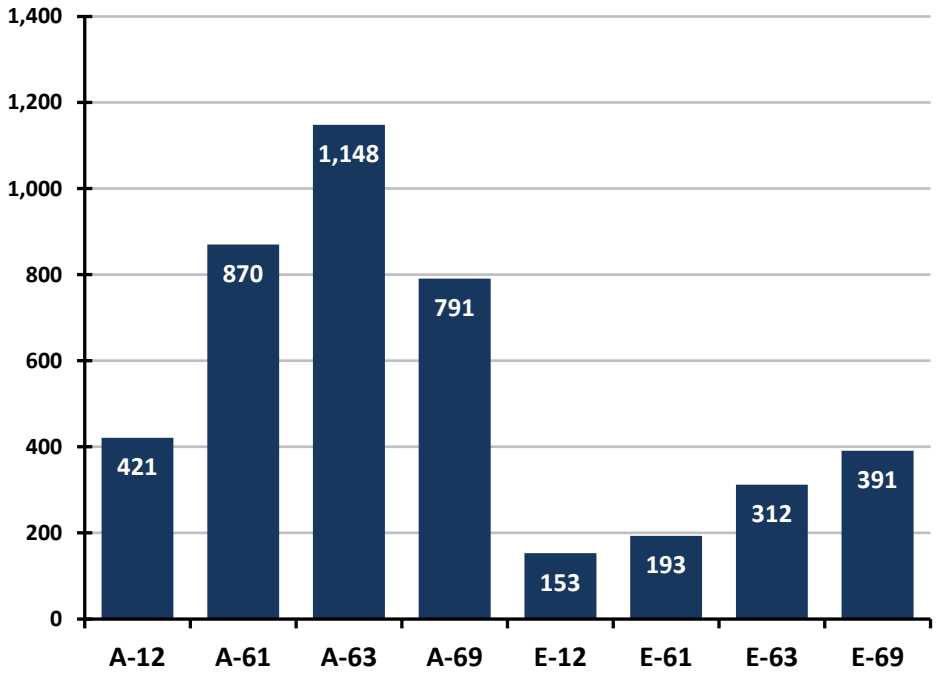
The next figure illustrates the historical 2018 incident-responses by the each of the four ambulances. Although obviously most calls were EMS-related, ambulances were dispatched to a small number of fires and other incident-types. As shown, Ambulances 63 and 61 had the highest total demands for service respectively during 2018. However, Ambulance 69 had a higher number of EMS-related calls than Ambulance 61.

Figure 69: NWFR Service-Demand by Ambulance Companies (2018)



The next figure represents a comparison of the ambulance and engine companies' historical service-demand during 2018.

Figure 70: Ambulance & Engine Companies Service-Demand (2018)



The next figure lists the total service-demand for 2018, in addition to the average daily call-volume for each apparatus. Due to the limited utilization of the ladder trucks, the focus of this analysis was on the engine and ambulance companies.

Figure 71: Average Calls per Day by Engine & Ambulance Companies (2018)

NWFR Unit	Average Per Day
Engine 12	0.4 calls/day
Engine 61	0.5 calls/day
Engine 63	0.9 calls/day
Engine 69	1.1 calls/day
Ambulance 12	1.2 calls/day
Ambulance 61	2.4 calls/day
Ambulance 63	3.1 calls/day
Ambulance 69	2.2 calls/day

Unit Hour Utilization

The next process for evaluating apparatus response, is to determine the overall amount of time that an apparatus is assigned to a specific incident. This is a measurement from the initial dispatch time until the unit is available for another incident.

Unit hour utilization (UHU) is but one measure indicating workload. It is calculated by dividing the total time a unit is committed to all incidents during a year divided by the total time in a year. Expressed as a percentage, it describes the amount of time a unit is not available for response since it is already committed to an incident. The larger the percentage, the greater a unit's utilization and the less available it is for assignment to an incident.

Figure 72: Unit Hour Utilization by Ambulance & Engine Companies (2018)

NWFR Unit	Average Time on Call	Unit Hours Per Day	Total Minutes Per Day	Unit Hour Utilization
Ambulance 12	0:39:20	0:45	45.00	**3.1%**
Ambulance 61	0:43:29	1:43	103.00	**7.2%**
Ambulance 63	0:42:38	2:13	133.00	**9.2%**
Ambulance 69	0:40:48	1:28	88.00	**6.1%**
Engine 12	0:41:36	0:17	17.00	**1.2%**
Engine 61	0:41:52	0:21	21.00	**1.5%**
Engine 63	0:34:57	0:29	29.00	**2.0%**
Engine 69	0:42:15	0:45	45.00	**3.1%**

Although there is no national consensus standard in regards to UHU, many departments operating fire-based transport, such as NWFR, consider higher UHU rates as having a negative impact on personnel—which may contribute to "burnout." Although many private and public EMS-only organizations consider a UHU target of 35%–50% as the most efficient, fire-based transport agencies often choose a target of 15%–25%. This variance is based on several factors, including fire departments operating with cross-trained firefighters responsible for other non-EMS emergency services and attendance at training exercises and continuing medical education sessions. In addition, firefighters typically work 24-hour shifts as opposed to the 10- or 12-hour shifts worked in many private and public EMS-only organizations.

An analysis of incident-response data for each apparatus and the corresponding unit-hour utilization rates, the frontline apparatus have enough capacity for increased service-demand. While Ambulance 63 had the highest UHU rate in 2018, it was nowhere near the accepted standard maximum of 25% (0.25). However, not that UHU rates may be slightly higher than shown, as the engines and ambulances are cross-staffed. Regardless, the combined UHU rates are relatively low compared to industry standards.

Incident Concurrency

Another way to look at fire department workload is to examine the number of times multiple incidents occur within the same period. The following figure shows the number of times that one or more units were assigned to incidents. The data indicated that, on average over 2016–2018, apparatus responded to two separate incidents concurrently 38% of the time, while 24% of the time three incidents occurred concurrently. The frequency of multiple concurrent responses can have an impact on a fire department's ability to assemble and effective response force.

Figure 73: NWFR Concurrent Incidents (2016–2018)

Concurrent Incidents	2016	2017	2018	Three-Year Average
One Incident	24%	22%	22%	**23%**
Two Incidents	37%	39%	38%	**38%**
Three Incidents	23%	24%	25%	**24%**
Four Incidents	11%	10%	12%	**11%**
Five or More Incidents	5%	5%	3%	**4%**

Performance Study

In addition to unit hour utilization, an organization needs to evaluate various measurements of performance to determine overall response-effectiveness. The following section looks at the various time stamps for each phase of an emergency response, and then includes an analysis of response-time performance. In this study, ESCI will focus on the four career-staffed stations and the standards established by NFPA 1710 that apply to response-time performance. NWFR will need to determine the overall expectations and benchmarks for each criterion. Following is a summary of NFPA 1710 response performance criteria. Appendices C and D lists the NFPA 1710 and NFPA 1720 (which applies to primarily volunteer fire departments) in more specific detail.

Figure 74: NFPA 1710 Response Performance Criteria

Response Element	NFPA Recommendation
Call Processing	• 60 seconds or less at 90% (also see NFPA 1221)
Turnout Time	• 60 seconds or less at 90% for EMS • 80 seconds or less at 90% for Fire & Special
Travel Time (First unit on-scene)	• 240 seconds or less at 90% (4 minutes)
Travel Time (First arriving ALS unit)	• 480 seconds or less at 90% (8 minutes)
Travel Time—Full First Alarm	• 480 seconds or less at 90% (8 minutes)

Call Processing

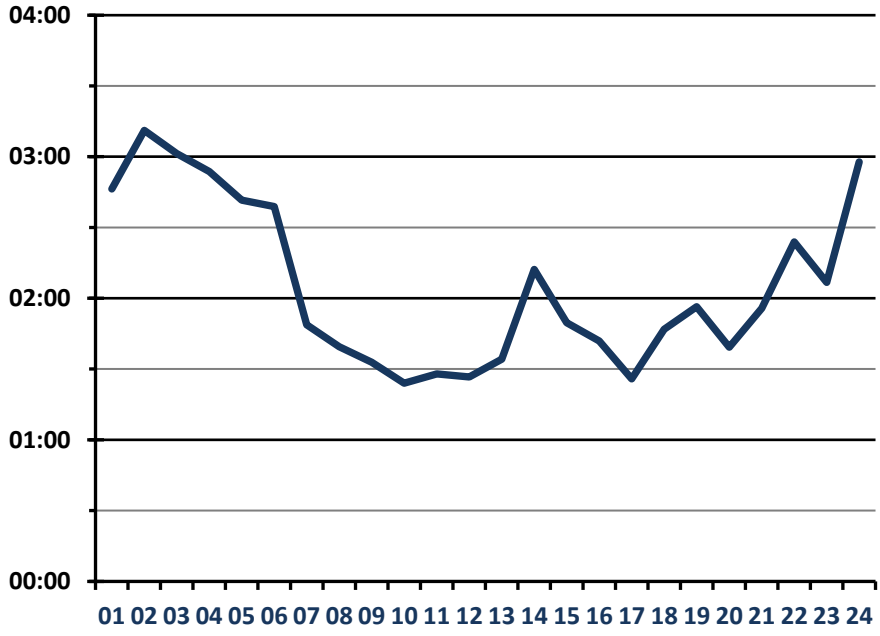
The City of Bellingham serves as the 911 primary public safety answer point, along with providing emergency dispatch services. In this study, data was unavailable to determine the dispatch center's call-processing performance. In the absence of PSAP times, *total* response times cannot be analyzed. Therefore, ESCI calculated response times excluding that time interval.

Turnout Time

Turnout-time is one of the components of total response time. The measurement begins when the first unit is dispatched until the unit goes en route. The overall 90th percentile for turnout time in 2018 was 3 minutes, 1 second. The data included outliers that appeared to be from mutual aid response. Regardless, the calculated turnout time exceeds NFPA 1710 recommended standards.

Turnout-time is one of the elements that can be controlled by the fire department. Numerous factors contribute to the amount of time it takes to get apparatus en route to an emergency. Fire station design, including the proximity of sleeping quarters to apparatus bays, should be considered when designing new stations. Standard operating guidelines should define specific and *reasonable* standards.

Figure 75: NWFR Turnout-Times During 24-Hour Periods (2018)



NWFR tended to have the shortest turnout times during the late morning and early afternoon. The longest times occurred between midnight and 0600 hours (6 am). While NWFR did not consistently meet national consensus standards, ESCI does not believe the results are necessarily excessive. However, there may be an opportunity for improvement during the late night and early morning periods. Focused training can produce improvements in a firefighter's ability to don appropriate equipment and be safely secured in the apparatus prior to movement of the vehicle.

Apparatus Travel Times

The next standard for resource distribution entails travel-time criteria. NFPA Standards 1710 and 1720 recommend the travel times for different response zones based on population density.

Some fire departments, including career-staffed or combination departments serving rural areas, find it unreasonable to adopt the 1710 travel-time standard throughout their jurisdiction. Instead, many will adopt a 4-minute travel-time standard in response zones with urban and suburban population densities, and the 1720 response-time criteria for rural areas. The following figure describes the NFPA 1720 response-time performance recommendations.

Figure 76: NFPA 1720 Response-Time Performance Recommendations

Zone[A]	Demographics	Minimum Staff[B]	Response Time (minutes)[C]	Meets Objective (%)
Urban	> 1,000 people/sq. mile	15	9	90%
Suburban	500–1,000 people/sq. mile	10	10	80%
Rural	< 500 people/sq. mile	6	14	80%
Remote	Travel distance ≥ 8 miles	4	Directly dependent of travel distance	90%
Special Risks	Determined by AHJ	Based on risk	Determined by AHJ	90%

[A]A jurisdiction can have more than one demand zone.

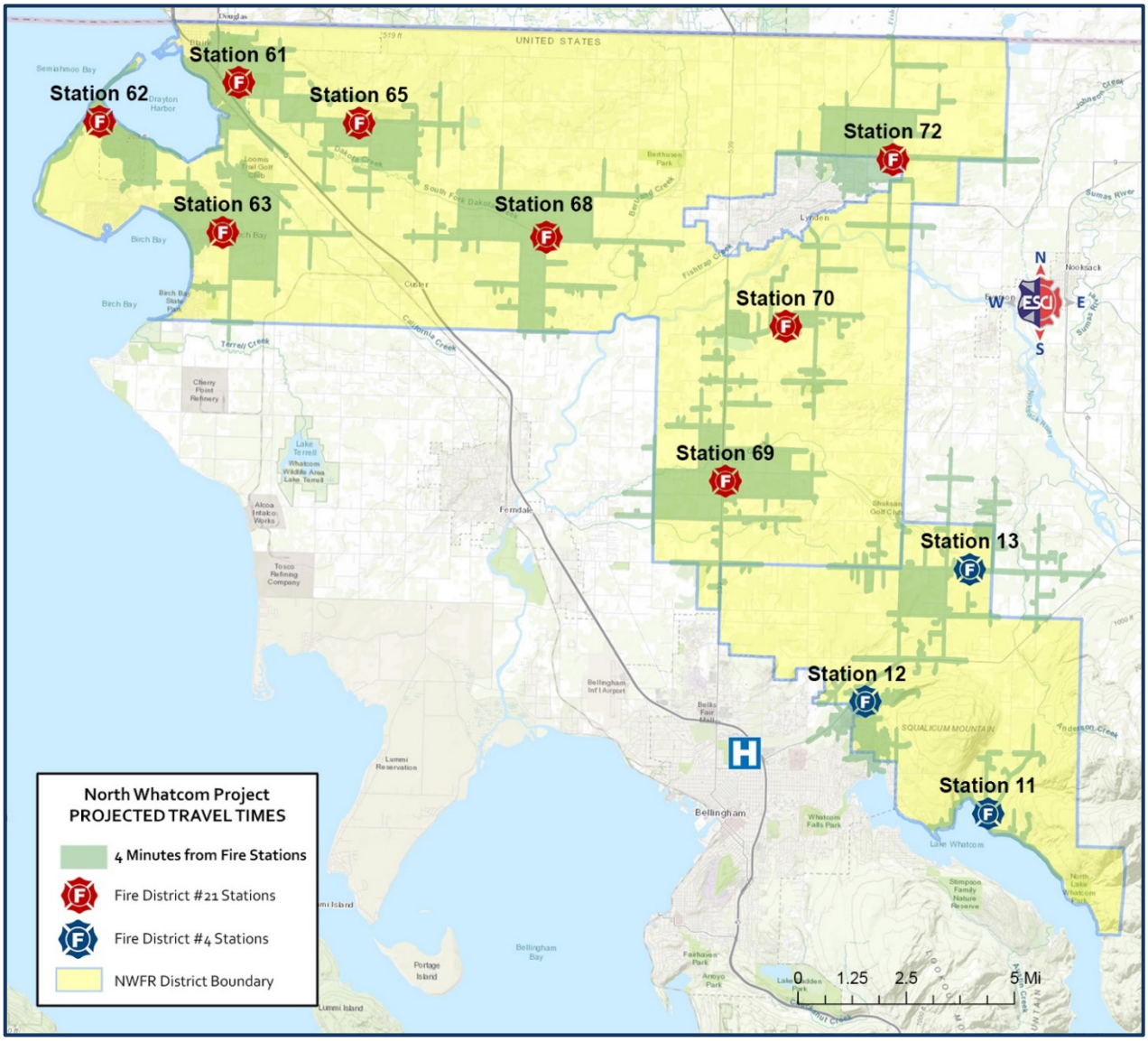
[B]Minimum staffing includes members responding from AHJ's department and automatic aid.

[C]Response time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

Both standards recommend a call-processing time of 60 seconds, and a turnout-time for staffed stations as 60 seconds for EMS calls and 80 seconds for fire or special operations calls. Call-processing time is not reflected in the 1720 standard, so deducting only the turnout time (1:20) from a 14-minute response time is 12 minutes, 40 seconds (12:40).

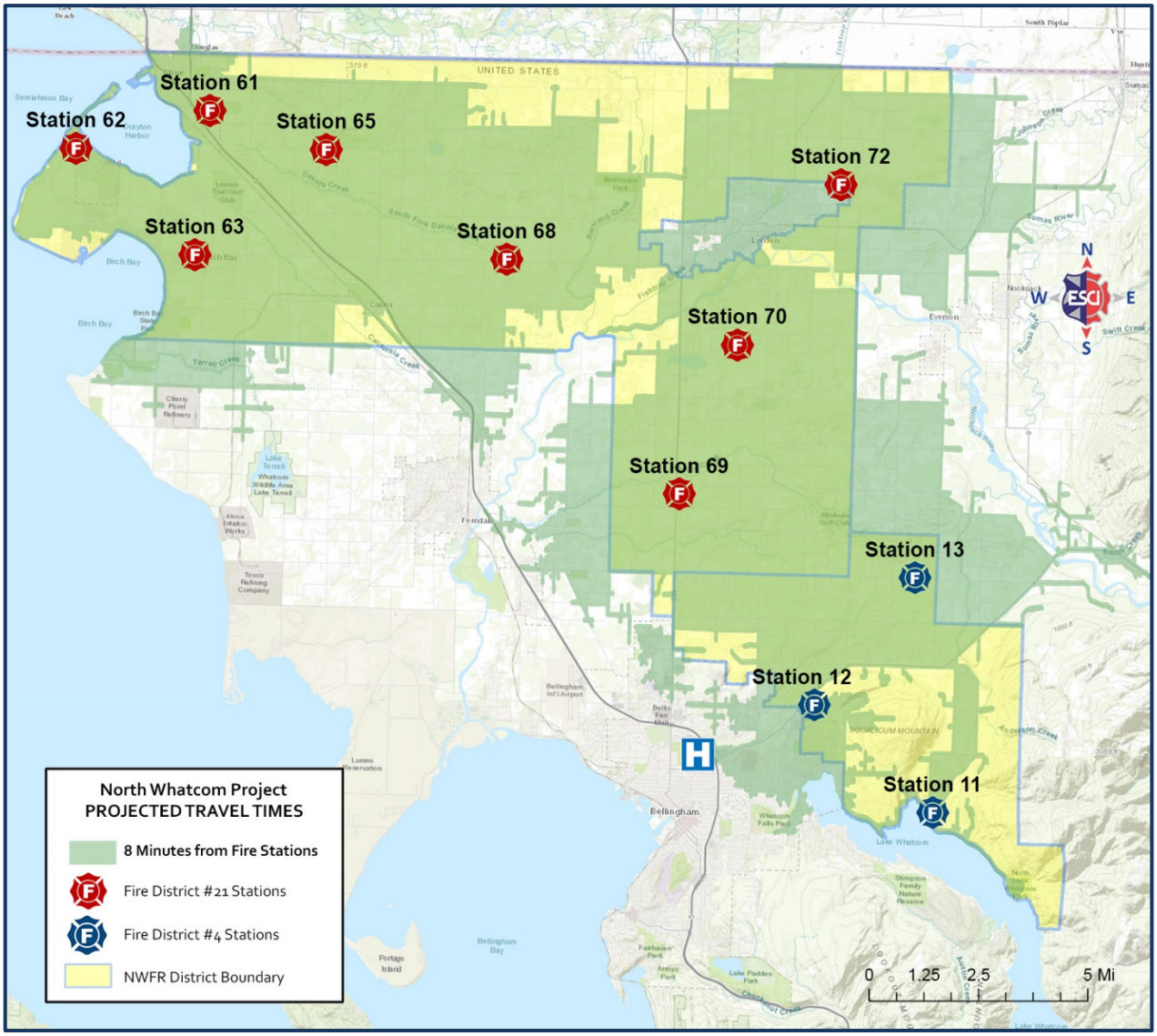
The following three figures reflect projected NWFR 4-,8-, and 10-minute travel times through a GIS analysis. The next figure presents a four-minute travel time model from the current station locations over the existing road network. Travel time is calculated using the posted speed limit and adjusted for negotiating turns, intersections, and one-way streets.

Figure 77: NWFR Predicted Travel-Times—4 Minutes



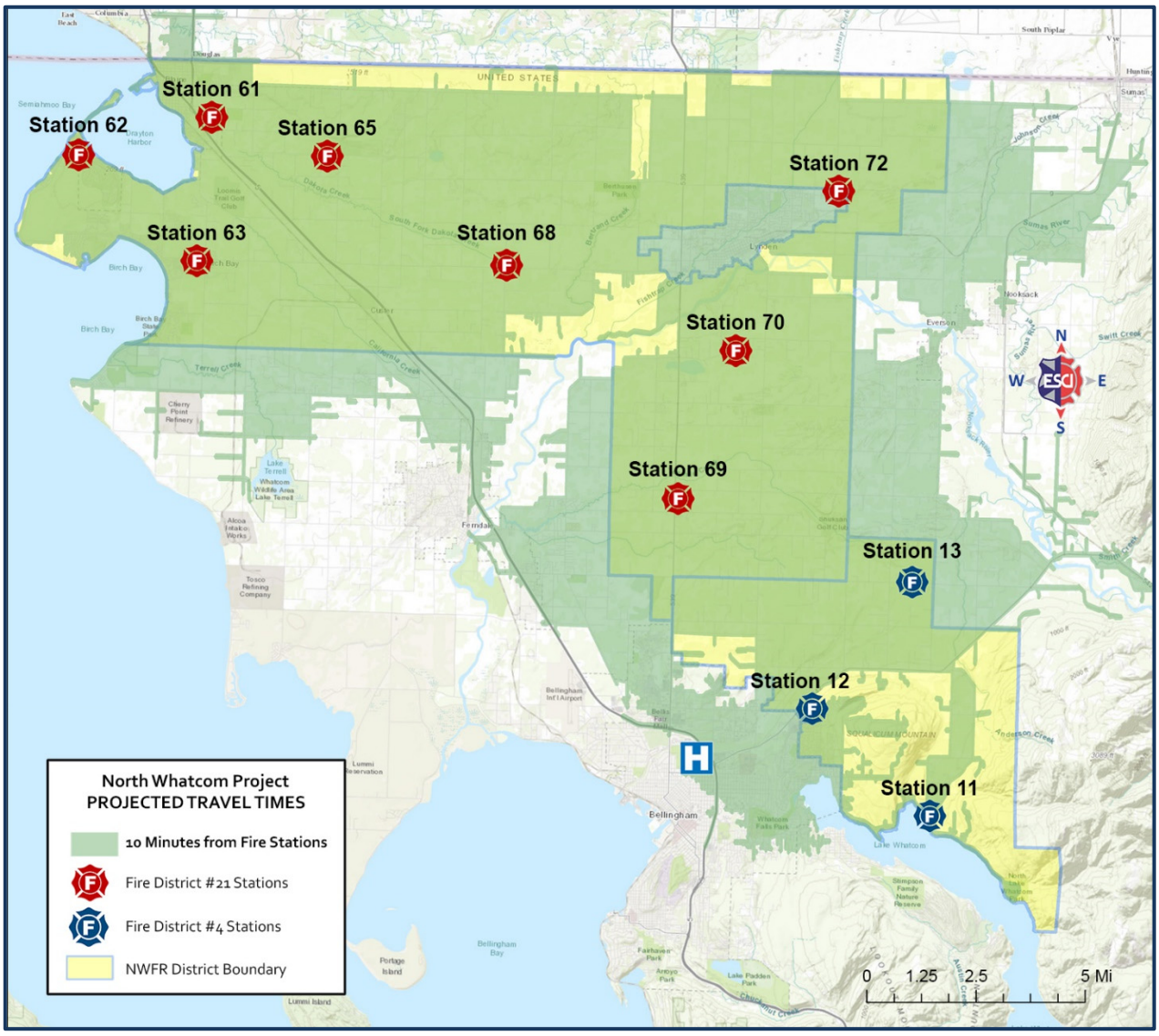
Analyzing the four-minute travel time coverage area determined that 22% of each year's incidents that occurred within the North Whatcom Fire & Rescue boundaries were within a four-minute travel-time response.

Figure 78: NWFR Predicted Travel-Times—8 Minutes



Analyzing the eight-minute travel time coverage area determined that 65% of each year's incidents that occurred within the North Whatcom Fire & Rescue boundaries were within an eight-minute travel-time response.

Figure 79: NWFR Predicted Travel-Times—10 Minutes



Analyzing the ten-minute travel time coverage area determined that 80% of each year's incidents that occurred within the North Whatcom Fire & Rescue boundaries were within a ten-minute travel-time response.

NWFR demonstrated a travel time at the 90th percentile of 16 minutes, 24 seconds. The next figure presents the average response times for the NWFR primary apparatus during 2018 only. While average times do not reflect true performance, these figures are presented here to show the contrast with the fractile response-time performance at the 90th percentile.

Figure 80: Comparison of NWFR Actual Response Times (2018)

Apparatus	Average Response Time	Response Time at 90%
Ambulance 12	08:48	13:44
Ambulance 61	08:05	12:42
Ambulance 63	08:51	13:40
Ambulance 69	09:11	15:07
Engine 12	10:33	16:07
Engine 61	09:16	14:34
Engine 63	09:21	13:40
Engine 69	10:12	15:07

As shown in the preceding figure, the calculations demonstrate a substantial disparity when comparing average times to those at the 90th percentile.

The following figure lists each of the components of the overall cumulative response-time performance of the North Whatcom Fire& Rescue during the 12-month study period in 2018.

Figure 81: NWFR Response-Time Components Performance at 90% (2018)

Response Time Component	90th Percentile
Call-Processing Time	Unavailable
Turnout Time	2 minutes, 45 seconds
Travel Time	16 minutes, 24 seconds
Total Response Time:	**15 minutes, 9 seconds**

Response-Performance Targets

Based on documentation gathered during the site visit evaluation, NWFR does not currently have specific response-performance targets. The District has informal response-time objectives for EMS and fire responses. For EMS-related calls, the goal is 7 minutes, 80% of the time, with 8 minutes 80% of the time for fire-related calls. Response-time is defined as the interval between the time of dispatch until the arrival of the first unit on the scene.

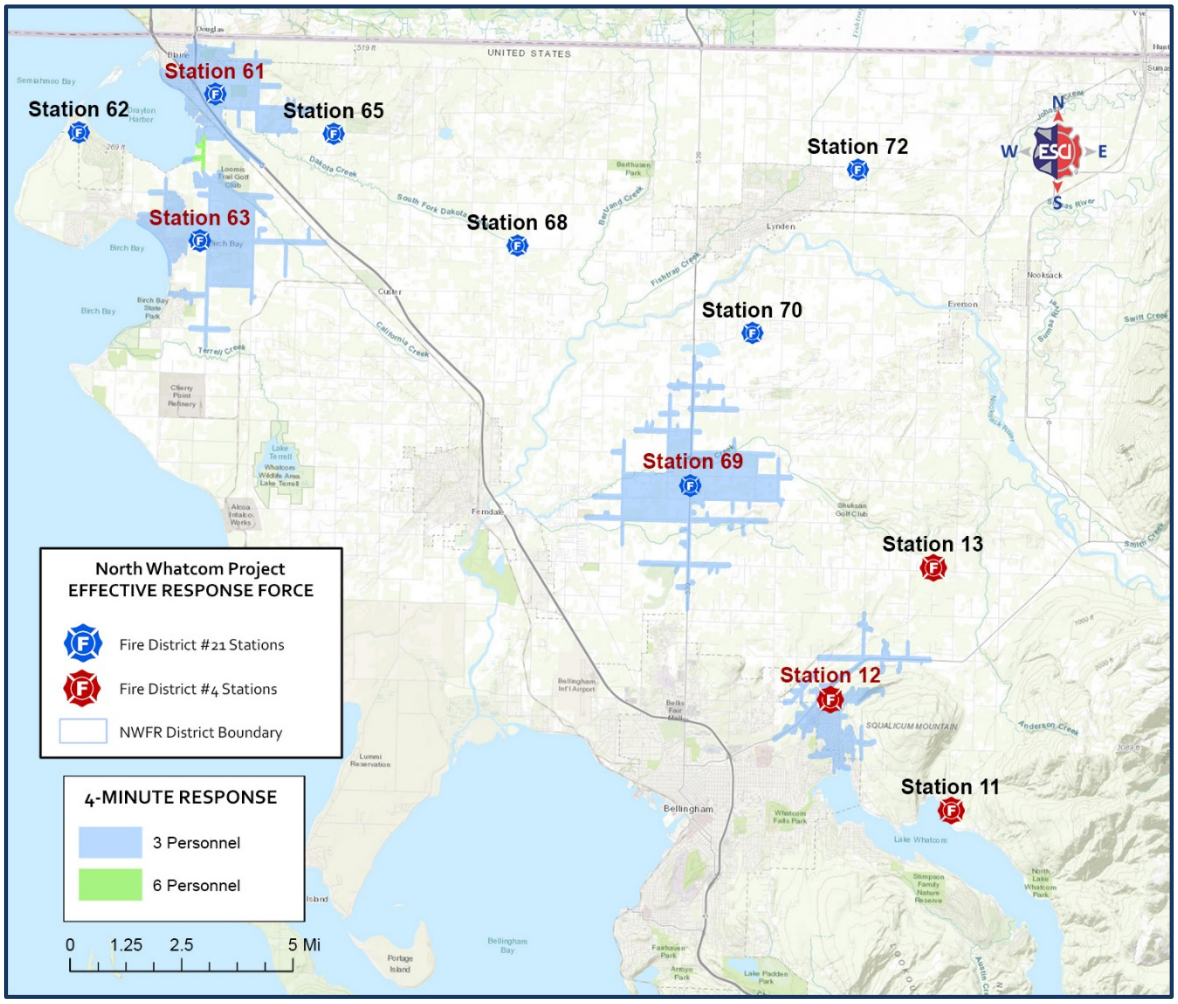
Effective Response Force

Accepted firefighting procedures call for the arrival of the entire initial assignment (sufficient apparatus and personnel to effectively deal with an emergency based on its level of risk) within a reasonable amount of time.[19] This is to ensure that adequate numbers of personnel and equipment arrive quickly enough to safely control a fire or mitigate any emergency before there is substantial damage or injury.

NFPA 1710 allows up to eight minutes to assemble the necessary resources at the scene to initiate effective firefighting. In the urban environment, it is recommended that 15 firefighters on-scene are necessary to mitigate a moderate-hazard fire. This scenario has been described as a 2,000 square foot, two-story single-family residential dwelling without a basement and no exposures. Larger structures or commercial occupancy may well require additional personnel.

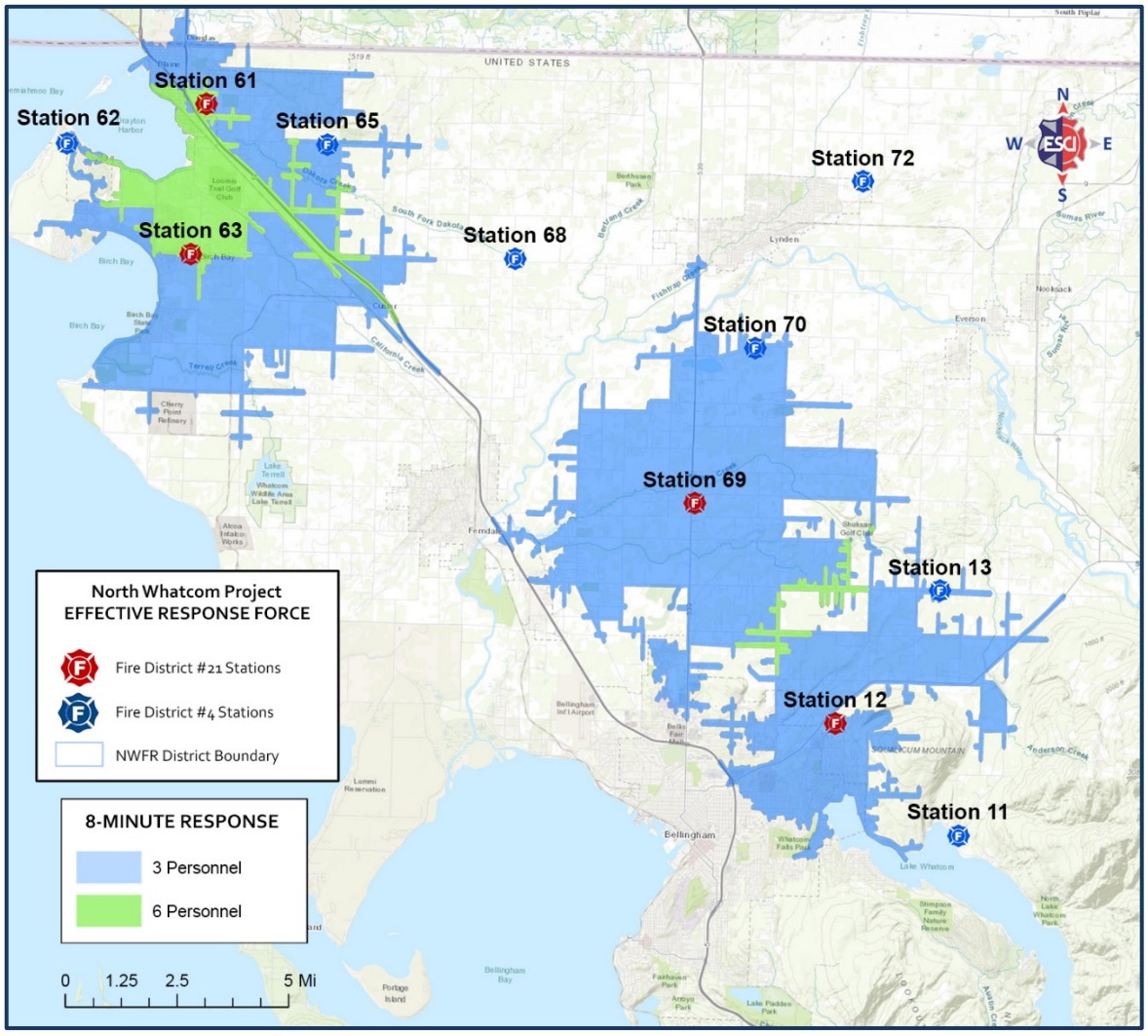
The following two figures are GIS illustrations showing the *Effective Response Force* (ERF) capability of NWFR in 4-minute and 8-minute responses from each of the four career-staffed fire stations.

Figure 82: NWFR 4-Minute Effective Response Force Assembly (Staffed Stations)



The preceding figure shows the minimum number of firefighters that can be assembled within a 4-minute travel time from each career-staffed fire station. The next figure represents the same, but with an 8-minute response from the stations.

Figure 83: NWFR 8-Minute Effective Response Force Assembly (Staffed Stations)



The preceding figure shows a portion of the District where a minimum of 3–6 firefighters can be assembled within an 8-minute travel time. As expected, up to six firefighters and two or more apparatus can be assembled in the service-areas around the staffed Stations 61 and 63, as well as the unstaffed Stations 62 and 65. Up to six personnel can be assembled within an 8-minute travel time in a small area between Stations 12 and 69., including the unstaffed Stations 13 and 70.

It must be noted that the preceding maps represent the minimum staff that could be assembled. In a significant incident, it is likely that the Fire Chief and other support staff would respond and supplement the on-duty personnel. However, this can vary depending upon the time of day, day of the week, and availability of those individuals.

Service-Delivery & Performance Discussion

ESCI conducted an assortment of analyses, along with information gathered during the site visit, which are described previously in this section. The following are observations and issues for consideration by the leadership of NWFR.

Overall Service-Demand

EMS accounts for approximately 61% of overall service-demand. Based on the projected population growth of 1.7% annually, and the current EMS model where NWFR provides BLS medical transport, there are limited opportunities for growth. Ambulance-transport reimbursement, particularly Medicare and Medicaid, has proven challenging over the past few years. The District should consider alternate means of funding and additional opportunities to address service-demand.

Fire District #4 Service-Demand

It was apparent that the impact of the new auto-aid agreement with the Bellingham Fire Department and potential annexation by the City of Bellingham, warrants additional evaluation relating to service-delivery. Data from 2016–2018 indicated that Station 12 had the lowest call-volumes among all the fire stations. Preliminary data from 2019 indicates an increase in service-demand for Station 12—specifically in EMS responses. The potential changes discussed above may have an impact on the District's service-demand and call-concurrency. NWFR should consider a focused study in early 2020 to evaluate the initial impact of these changes.

Call Concurrency

There are factors within NWFR's operations that affect call-concurrency. Historical incident data demonstrated that two units are committed to calls 38% of the time, and three units are committed 25% of the time. This results in a limited capacity for increased service-demand and impacts the NWFR's effective response force (EFR) for structure fires. Analysis suggests that much of this is due to long transport times by NWFR's ambulances to definitive care.

EMERGENCY MEDICAL SERVICES

Whatcom County EMS System

The Whatcom County Emergency Medical Services system is comprised of a tiered-response system of first responders from each of the fire districts, the cities of Lynden and Bellingham, and Airlift Northwest (ALNW). PeaceHealth St. Joseph Medical Center (PSMC) is the only hospital in Whatcom County, and is designated as a Level III Trauma Center.

Most, if not all, of the first responders in Whatcom County are certified to at least the EMT-Basic level. The City of Bellingham and Whatcom County Fire Protection District #7 (WCFD7) provide most of the ALS patient transports throughout Whatcom County, except the remote eastern section of Whatcom County (Newhalem-Diablo), which can only be accessed by State Highway 20. Aero-Skagit Medic One and local Skagit County first responders provide BLS and ALS care and transport to this area. Whatcom County Fire District 5-Point Roberts is another isolated Whatcom County area that can only be accessed by boat or vehicle by driving through Canada. Patients requiring transport to PSMC are either transported by medic unit from WCFD7, Bellingham Fire Department (BFD), or ALNW (for serious/critically ill patients). In some cases, WCFD5 will rendezvous with a responding Whatcom County ALS ambulance at a pre-established rendezvous location and transfer the patient. ALNW, which has a helicopter stationed at PSMC, is used occasionally to transport seriously ill/injured patients in other isolated rural county areas, and transport patients to Seattle.

Medical Direction & Oversight

Emergency Department physicians at PSMC provide online medical control as necessary for Advanced Life Support (ALS) providers. Prehospital patient-care protocols and clinical care oversight are the responsibility of the designated Whatcom County Medical Program Director (MPD). However, the MPD rarely interacts directly with NWFR, unless there is a significant patient-care issue that requires follow up. The ALS providers—Bellingham Fire Department and Whatcom County Fire District #7—have designated Physician Advisors who oversee ALS training, continuing medical education, and delivery of care.

While the Medical Program Director has ultimate oversight authority over the delivery of prehospital care in Whatcom County, other components of the EMS system are delegated to the *Whatcom County EMS & Trauma Care Council* (WCEMSTCC). This is a non-profit entity comprised of representatives from EMS provider organizations, PSMC, citizens, law enforcement, and other governmental agencies. The Medical Program Director has an advisory position on the Council. Some of the activities of the WCEMSTCC include, but are not limited to, approval and maintenance of Whatcom County's Basic Life Support (BLS) protocols (which requires final approval by the MPD), approval and monitoring initial Emergency Medical Technician (EMT) training courses, and monitoring overall EMS system performance.

Whatcom County EMS and Whatcom Medic One have long been recognized as one of the most progressive EMS systems in the country. Examples of their progressive patient-care protocols include early use of mainstream end-tidal CO_2 airway monitoring to predict cardiac arrest survival, use of semi-automatic defibrillators, and the utilization of 12-lead ECG. EMTs in Whatcom County are equipped and authorized in the use of the following protocols and equipment:[20]

- "Code Red" transport of stroke patients without respiratory compromise.
- Use of CPR adjunct devices— ResQPOD® Impedance Threshold Device (ITD) and pump.
- Supraglottic airway device.
- LUCAS® mechanical chest compression device.

NWFR Emergency Medical Services

As noted previously, all NWFR career and volunteer firefighters and uniformed administrative staff are certified as Washington State EMT-Basics, and provide BLS and transport. NWFR ambulances located in the four career-staffed stations are "cross-staffed" by an engine company crew, and respond to all EMS incidents with either an ambulance or, depending on the type of incident or location of the crew, with both an engine and an ambulance. Because of this response configuration, the crew will typically travel with the engine and the ambulance whenever they are traveling within their first-response territory for purposes such as conducting normal business, inspections, and/or training. If the crew is out of quarters when an incident is dispatched, they may elect to take the engine and the ambulance to the scene. BFD suppression crews also use this response configuration. Unmanned stations rely on volunteer Firefighter/EMTs who respond to the station to staff the ambulance as necessary.

NWFR EMS Support

NWFR does not have a separate EMS Division. Instead, EMS support, training, and operational deployment are under the shared purview of the Operations Division Chief and the Training Captain. Patient-care reports are electronically generated and retained using *ImageTrend*® computer software and handheld computers, which integrate with PSMC's *Health Information Network* database. NWFR charges a fee for ambulance transports. Electronic patient-care records (ePCR) are electronically submitted to an outside medical billing agency, *Systems Design West*® for billing and collection.

SUPPORT PROGRAMS

Training

Delivering safe and effective fire and emergency services requires a well-trained work force. Initial, ongoing, and high-quality training and education are critical for agency effectiveness and the safety of its personnel. Without it, the community may experience poor outcomes and injury or death of the District's citizens or emergency responders.

The initial training of newly hired firefighters is essential. It requires a structured recruit training program and testing process, after which regular ongoing verifiable training must be conducted to ensure skill and knowledge retention and competency. Delivering high-quality training requires dedicating significant internal training resources, and contracting with outside agencies and providers for these services. Effective training requires specific written objectives, lesson plans, and methods to verify learning knowledge comprehension and retention.

On a national basis, most of the fire department consist of volunteer personnel. Today's fire service is finding it more difficult to recruit, hire, and retain volunteer firefighters. A volunteer firefighter fact sheet authored by the *National Volunteer Fire Council* in 2017 noted:

> *The number of volunteer firefighters in the U.S. reached a low in 2011. While there has been a slow increase since then, the growth isn't enough to meet the steady increase in call volume, which has tripled in the last 30 years due in large part to the increase in emergency medical calls. Major factors contributing to recruitment challenges include increased time demands, more rigorous training requirements, and the proliferation of two-income families whose members do not have time to volunteer. Fire departments today are also expected to provide a wide range of services and multi-hazard response, creating further challenges for resource-constrained departments.*

NWFR's experience in recruiting and retaining firefighters is consistent with this national problem. The District's leaders expect this problem to continue into the foreseeable future, with continued significant population growth, along with other demographic and generational changes.

Given the size of the NWFR and District #4 response area, delivering District training that involves multiple stations and response crews can be a challenge, especially when attempting to coordinate and conduct multi-company drills. The District notes that these drills are frequently interrupted by emergency incidents.

In the following section, ESCI reviewed NWFR's training program, resource allocation, schedule, training documents, and practices. ESCI then compared them to national standards and best practices and made recommendations where appropriate.

Training Resources & Methodology

Delivering high-quality training to fire and EMS personnel requires providing instructors with specific resources and adequate facilities. NWFR has a small drill ground with some props; survival/SCBA obstacle course, and training/meeting room at Station 63, and a large drill ground, roof prop, garage door prop, forcible entry prop classrooms, and drill tower (with a permitted Class A burn room) at Station 12. BFD also uses this facility for routine drills, including multi-company drill evolutions. *Whatcom County Fire Recruit Academies*, likewise, use the training grounds.

Figure 84: Training Center Tower

Figure 85: Training Center Props

General Training Competencies

Along with required tools, props and facilities, standardized training is another critical component in providing the necessary emergency response training throughout the organization. Training should be based on established standards, best practices, and a validated curriculum. The District refers to a variety of sources for training standards, including the NFPA, the National Institute for Occupational Safety and Health (NIOSH), and the *International Fire Service Training Association* (IFSTA), just to name a few. EMS training is consistent with Washington State Health Department-EMS and Trauma System regulations and standards.

Training Manual, Methodologies, & Scheduling

NWFR's Training Captain coordinates the District's training. The District uses Fire Instructor I certified instructors whenever possible, or other certified instructors depending on the training topic (ICS and Hazardous Materials subjects for example). Company officers also routinely perform company drills and didactic classes with individual crews. In-house created and commercially available lesson plans are used where applicable.

The Training Captain coordinates most department training, and tracks individual employee training hours. NWFR reports that manipulative skills training and task evaluations are performed quarterly, along with multi-agency and multi-company drills. The Captain also oversees weekly drills/meetings of the Water Tender volunteer group. Safety is stressed during initial training; during complex drills and exercises; and during live fire burn evolutions, and includes assigning a certified *Incident Safety Officer* for the duration of the drills.

Training New Personnel

Comprehensive and robust training of new fire and EMS personnel is critical to ensuring their safety and effectiveness before being authorized to respond to emergency incidents. Specific knowledge and skills for basic fireground, EMS, incident command, and other basic emergency operations must be effectively taught and retained by new employees. The District requires the following prerequisites to become a volunteer firefighter:

- Current Washington State EMT certification.
- Current CPAT card.
- Completion of the IFSAC Firefighter I curriculum.
- Completion of the HazMat Operations level course.
- Current Commercial Driver license or completion of the Emergency Vehicle Accident Prevention (EVAP) course.

Full-time firefighter applicants must meet the same pre-requisites as listed above, except for the HazMat Operations and EVAP course completion. Upon hire, new full-time employees are sent to the Washington State Fire Training Academy, and must successfully complete their recruit training curriculum.

EMS Training & Continuing Medical Education

Bellingham Technical College (BTC) is the primary provider of initial EMT training in Whatcom County. The course, offered in one college quarter, consists of three parts: EMT fundamentals, medical disorders and emergencies, and traumatic emergencies and special circumstances. At the completion of the course, students must pass a written and practical skills examination, and have a sponsoring EMS organization to obtain Washington State EMT-B certification.

Occasionally, a fire district or other emergency response agency may conduct a stand-alone EMT class. However, ESCI understands that NWFR relies on BTC for initial training, or onboards personnel who are already EMT certified.

Washington State requires each EMT-B complete 30 hours of Ongoing Training and Evaluation (OTEP) training every three years. Within the three years, the following subjects must be reviewed annually:[21]

- Cardiovascular emergencies
- Spinal immobilization
- Patient assessment

The following subjects must be covered at least once in the three-year period:

- Infectious disease
- Trauma
- Pharmacology
- Pediatric care
- Defibrillation

NWFR EMT continuing education is facilitated through the web-based portal *EMS Online*, which *King County Emergency Medical Services* sponsors. EMTs enroll and complete online training modules that meet Washington State and local requirements. Additional training and skill assessments specific to Whatcom County protocols are administered by department and other outside agency approved BLS instructor/evaluators.

Training Program & Administration

To function effectively, a training program must be closely monitored, supported, and funded. Administrative program support is important, along with program guidance in the form of training plans, goals, and defined objectives. The next figure reviews the NWFR training program administration and management practices.

The training provided to each firefighter is recorded electronically by a part-time data entry employee, with relevant certification records archived in individual employee training folders.

Figure 86: Training Program Administration & Management

Description	North Whatcom Fire & EMS
Goals & objectives identified	Only for mandatory skills annually assessed
Certified instructors used	When required
Annual training report produced	Yes
Priority by management toward training	Yes
Budget allocated to training	$73,000
Condition of capital facilities for training admin.	Good
Adequate office space, equipment, supplies	Yes
Clerical staff support assigned to training admin	Part-time data-entry person

Training Program Administration Discussion

During ESCI's site visit, career and volunteer firefighters were interviewed to gain further insight into the NWFR training program. It was apparent from ESCI's discussions with both career and volunteer personnel that nearly all felt that the amount and type of training and continuing medical education (CME) they have been receiving was inadequate. Anecdotal information suggested that some training records *may* have been "pencil-whipped," in lieu of actually conducting and participating in drills or classes. ESCI *could not verify this* and mentions it only because the information came from more than one source in the organization.

Furthermore, volunteers do not feel supported, as they are not assigned to specific training classes. The result has been the necessity to develop self-guided training and drill sessions among the volunteers themselves, who meet regularly once a week. According to ESCI's meeting with the volunteers, they have received little to no support from the Training Division.

Life-Safety Services

The jurisdictions responsible for the application of fire and life safety codes are the City of Blaine, for all buildings within the city limits, and the Whatcom County Fire Marshal's office and Building Department for the remaining unincorporated land within the NWFR service area. Until recently, very little fire code compliance oversight was performed by NWFR. However, the recent appointment of a District Fire Marshal has resulted in an increased emphasis on fire code issues within the District, resulting in initiation of various code compliance efforts.

Code Compliance

The City of Blaine adopted and applies the 2012 edition of the International Fire Code (IFC). However, they reference the 2015 edition of the Code in reviewing plans and fire code issues. Whatcom County has adopted the 2015 edition of the IFC. Neither jurisdiction has adopted a residential sprinkler ordinance.

New construction/developments and the design and installation of fire protection systems within the Blaine city limits are the joint responsibility of the Blaine Building Official and the NWFR Fire Marshal. The City and NWFR do not outsource fire protection systems or new construction plan reviews. A fee schedule for plan reviews and fire protection system acceptance testing has been proposed to the Blaine City Council for review and adoption.

Occupancy Inspections

Currently, only the Station 61 crews conduct inspections of commercial occupancies in the City of Blaine. Approximately 200 occupancies within the city limits are slated for inspection every three years. No inspections are conducted by NWFR in unincorporated areas, as they are under the jurisdiction of the County Fire Marshal. It is important to note that the crews performing these inspections have received no formal fire code inspection or enforcement training. Instead, they rely on the prompts and items listed on the inspection form to guide them through a review. Efforts are underway to; create formal policies and procedures related to the NWFR code compliance and inspection program, update the inspection form, and train all personnel on fire inspection techniques and code compliance issues.

Public Education

The District does not have a formal fire/life safety education program. Training and education of the public are provided only on an "as requested" basis. However, in 2018 this ad hoc approach resulted in contacting approximately 1400 students and senior citizens, educating them on life safety topics such as; CPR, blood pressure screenings, station tours, community presentations, annual block parties, and football game standbys.

Other Support Services

Fire agencies, especially combination or volunteer organizations, often rely on non-combat volunteers to enhance service delivery, through direct and indirect support of those actively engaged in mitigating emergency events.

Water Tender & Rehabilitation Services

The District has two main support programs to enhance and support fire operations and safety. Eleven volunteers are designated Tender Operators, responsible for the safe transport and reliable transfer of water at fire scenes that do not have a hydrant water supply. These positions are designated as non-fire combat positions. In addition, the District supports five Rehabilitation Support personnel, who respond to significant emergency events to monitor and address the basic physiological needs of the firefighters.

Hazardous Materials & Technical Rescue Response

All Operations personnel are trained to at least the *Hazardous Materials Operations* level. No District personnel are trained as Hazardous Materials Technicians. Instead, the District relies on the countywide Special Emergency Response Program (SERP) Team to provide technician and specialist level response and mitigation of hazardous materials releases. This team, comprised of fire department and private industry representatives, has access to a large cache of equipment and resources to mitigate a wide range of chemical release situations. Currently, NWFR does not have anyone assigned to the SERP Team.

NWFR has a very limited capability in performing technical rescues within its service area. Surface water rescue awareness-level training is the only technical rescue training provided. The District relies on the Bellingham Mountain Rescue Team for low angle/high angle rescues, *South Whatcom Fire Authority* and *U.S. Coast Guard* for water rescue on Lake Whatcom and Birch Bay, and local industrial teams for confined space rescue. However, it is not known if this resource has even been requested or utilized by the District in training or an actual rescue.

Technical Rescue Discussion

Technical rescue and large-scale hazardous materials releases are, fortunately, low frequency events. However, they are also high-risk events for responders, especially as it pertains to surface water rescue, high angle/low angle rescue, and confined space rescue.

To illustrate this point, a confined space rescue situation involving three overcome workers occurred in Key Largo, Florida in January 2017 resulting in a Key Largo firefighter's near death when he entered the space without respiratory protection to attempt a rescue. Once inside the space, he was quickly overcome by toxic fumes and lack of oxygen in the space. Another firefighter was able to enter the space wearing a self-contained breathing apparatus and tie a rope around the firefighter, who was then extricated without a pulse or respirations. He was placed in an induced coma, and returned to work only after months of medical treatment and rehabilitation.[22]

Given the unique and extreme hazards associated with entering and working in confined spaces, OSHA and the Washington State Department of Labor and Industries established very specific rules related to these operations, and the requirements for ensuring timely, safe, and effective rescue. ESCI understands some local industrial businesses contract with a private company to provide confined space rescue standby services to meet state law. However, it is suspected many others are incorrectly relying on their local fire departments to provide confined space rescue in a manner that is contrary to state law.

Appendix H in the Washington Administrative Code (WAC) Chapter 296-809 provides specific guidance and evaluation criteria for confined space rescue teams. To comply with the law, companies that are planning work inside a permit-required confined space must ensure:

1. A standby rescue team is identified, equipped, and ready to respond in a timely manner.
2. The company must evaluate and approve the team's capability to effectively and safely perform a rescue.
3. The team must be available for the duration of the entry(s). If the team is not available, confined space operations must be suspended until the team is available.
4. Ensuring the team is aware of the entry operation, and is prepared to conduct a rescue if necessary.

Establishing and maintaining multi-discipline technical rescue capabilities is very labor-intensive and expensive. Initial training in each discipline takes significant time, requires specialized equipment, and must be unencumbered by daily emergency response requirements. Given the low frequency and high hazards of these types of emergencies, constant ongoing training must be supported to maintain safe operational readiness. As a result of these requirements, some smaller emergency response agencies have combined their resources and personnel, building regional teams comprised of specially trained responders from various emergency response organizations, and in some cases, private industry. This configuration helps ensure no single agency is overburdened by the cost and administration in the provision of technical rescue.

The SERP Hazardous Materials Team is an excellent local example of this approach. This team is comprised of fire, law enforcement, and private company representatives who operate under inter-local agreements and contracts to provide hazardous materials response throughout the County. The construct of the organization, bylaws, and inter-local agreements were initially designed to include technical rescue services. However, the services of the team have yet to expand into this arena.

The technical and geographical hazards and lack of available local technical rescue resources within NWFR and other Whatcom County fire agencies should be of great concern. In the absence of timely expert rescue capability, response crews may be tempted to perform rescues they are not trained or equipped for, resulting in significant injury or death of responders and victims. Consideration and effort should be given to creating a multi-agency technical rescue capability that would include qualified and willing personnel from other emergency services organizations in Whatcom County. Further, integration and partnerships with private companies that have specialized rescue and emergency response capabilities should be explored as well.

BASIC COMMUNITY RISK ANALYSIS

This section of the report provides information about community characteristics, hazards, and risks as determined from the research conducted by ESCI. Demographics and community descriptions are included to provide statistics which highlight the categorical risks and their potential to threaten persons and/or businesses within the community. This information is then reviewed with an emphasis on the direct correlation to the safety of North Whatcom Fire & Rescue personnel and the corresponding workload that is entailed. It is recommended that the fire department review the categorical risks and revise, as needed, the response plan(s). The assessment was developed from a broad base of information, including:

- Current hazard classification, planning, and mitigation measures from various sources.
- Specific information provided by Whatcom County about target hazards and land use.
- Planning zones established by Whatcom County.

Risk management is the assessment of the chance of an event occurring and the loss that will occur as a result of the event. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished and certain numbers and types of apparatus should be dispatched.

Risk management should also consider the fiscal and political environment of the community being served. Ultimately, policy makers must decide what services will be provided and to what level they will be funded to provide appropriate coverage throughout the jurisdiction.

Whatcom County Economy

Whatcom County's job market has increased by 1.7% over the last year. Future job growth over the next ten years is predicted to be 39.9%, which is higher than the U.S. average of 33.5%. The following are the current tax rates for Whatcom County:

- Sales Tax Rate for Whatcom County is 8.7%. The U.S. average is 7.3%.
- Income Tax Rate for Whatcom County is 0.0%. The U.S. average is 4.6%.[23]

The proximity to the Canadian border is a strong influence on the economy. When the Canadian dollar is strong, it creates demand for Canadian shoppers seeking retail bargains and real estate in Whatcom County. The past couple years have been characterized by a weak Canadian dollar; in large part because of low oil prices.[24]

Agriculture is a steadying influence in the northern parts of the County. Today, Whatcom County produces the most raspberries of any county in the United States, and is the second-largest producer of milk statewide. Cannabis sales will be a consideration for the future economy offered in Whatcom County.

The largest contributors to Gross Domestic Product (GDP) in Whatcom County include manufacturing (especially non-durable goods), real estate, and government.

Like the national economy, Whatcom County's largest job-providing sector is in the private sector, making up a 61.2% share of non-farming jobs. Following national trends, and due to the recent recession, goods-producing jobs fell to a greater extent than private services, but has been gaining strength in the post-recession years. Private goods-producers supplied nearly 20% of all non-farming jobs in Whatcom County during 2017.

Detailed Population & Community Demographics

The following section provides a general overview of the community and population served by the *Whatcom County Emergency Management District*. Included is information about community characteristics, hazards, and risks as determined by many sources. Demographics and community descriptions are included to review the categorical risks with the potential to threaten persons and/or businesses within the community. Recommendations follow, as well as response plans.

Population estimates from July 1,2018 show 225,6854 people, 97,855 households, and 83,475 families resided in Whatcom County. The percentage of households with a computer is 91.1% and broadband internet is 84.8%. The median income for a household in the County was $56,419. The per capita income for the County was $29,186. About 13.0% of the population was below the poverty line.[25]

State Route 546 (SR 546) is a major state highway in Whatcom County. It runs east-west for eight miles near the Canadian border, connecting SR 539 near Lynden to SR 9 near Nooksack and Sumas. The highway is a major freight corridor and serves as an alternate route between Bellingham and the Sumas border crossing. State Route 539 (named the Guide Meridian) is a north-south state highway in Washington State. The highway travels through northwestern Whatcom County and connects Interstate 5 in Bellingham with Lynden and the Canadian border near Langley, British Columbia.

There are four major border crossings in Whatcom County, referred to collectively as the Cascade Gateway. These include Peace Arch and Pacific Highway, both located in Blaine, and one in Lynden and Sumas, located further east. Of all these crossings, Peace Arch is the largest, and ranks as the third-busiest United States-Canadian border crossing for passenger vehicles in the nation. Wait times at crossings in the Cascade Gateway ports vary but tend to peak on weekends and during the summer months.

General Population Characteristics

The population of Whatcom County has averaged an annual growth rate of about 1% during the past 10 years. This was significantly lower than the State of Washington's growth rate of 11.1% over the same amount of time.[26]

As of 2010, the population was: 50.5% female, 5.3% children under five years, 19.5% persons under 18 years, and 17.4% persons over the age of 65. Most of the population is white. Hispanics are the next race at 9.5%, while Asians, African Americans, and American Indians are of the minority.

At-Risk Populations

The *Journal of General Internal Medicine* defines *Populations at Risk* broadly, and includes the poor, frail, disabled, economically disadvantaged, homeless, racial, and ethnic minorities, and persons with low literacy. The National Fire Protection Association's *Urban Fire Safety Report* further reinforces the "at risk" groups as:

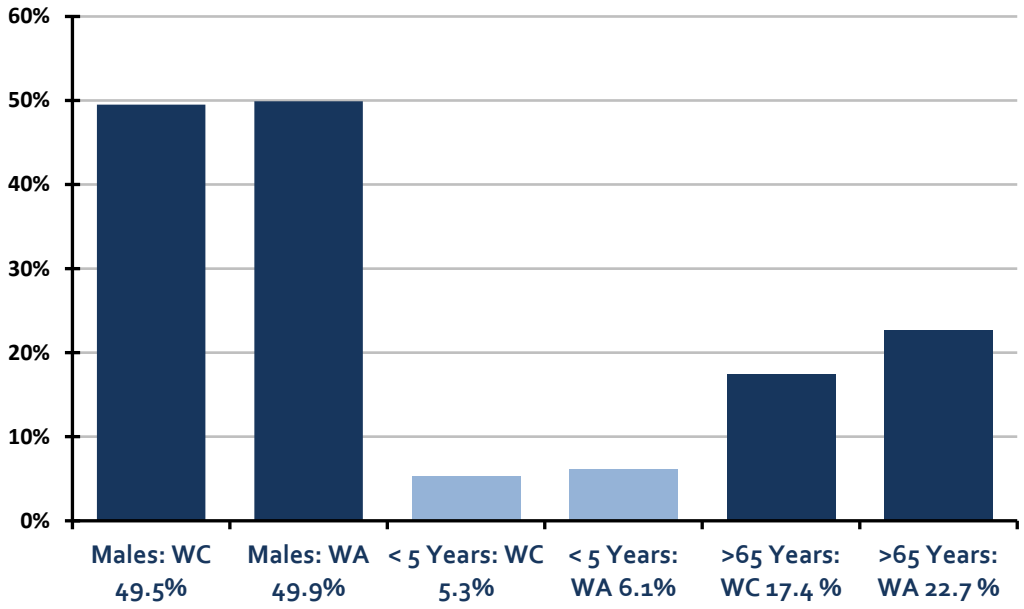
- Males
- Children under 5 years of age
- Adults over the age of 65 years
- Persons with disabilities
- Persons with language barriers
- Persons in low-income communities

The U.S. Census Bureau's, 2017 *American Community Survey* (ACS) identified ley benchmark data for the at-risk population groups in Whatcom County. The findings are illustrated in the following sections.

Benchmark Risk

The following figure provides a comparative analysis of the risk groups between Whatcom County and the State of Washington. One can quickly see that Whatcom County has a larger percentage of professionals, and a smaller percentage of the population with disabilities. ESCI will discuss this finding in further detail in a subsequent section.

Figure 87: Comparison of Whatcom County to Washington State Population Ages

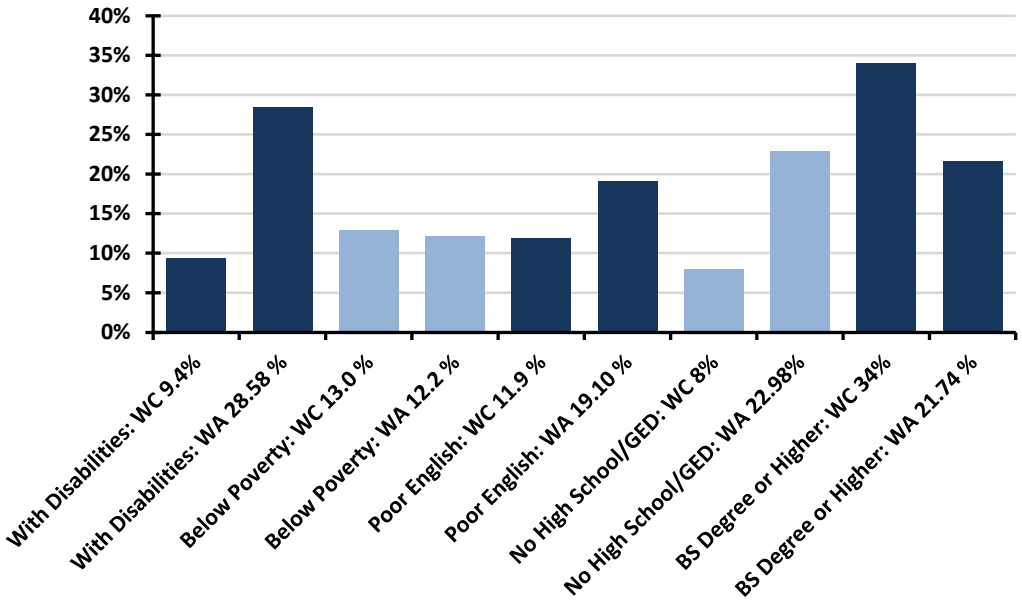


As is common in many communities, males make up slightly less than half of the population. Males, especially those under 25-years of age, are more prone to engage in risky activities and may require higher levels of emergency response. Additionally, males are 1.7 times more likely to die in fires than females. There is not a significant difference between the percentage of males in Whatcom County when compared to the State of Washington.

When compared to the State of Washington and similar-sized counties, Whatcom County has a lower percentage of the population less than five years and/or over the age of 65 years. This is reinforced through a median age of 23.2 years, when compared to a statewide median age of 34.3 years.

There is an increase in demand for service as a community ages and a corresponding increase in community risk. Quality-of-life issues and increased reliance on assisted living may affect service-delivery and the number of resources required, due to an increase in service-demand for emergency medical services. The very young also represent a vulnerable population, both regarding their ability to escape a structure fire as well as their susceptibility to serious medical ailments such as asthma, traumatic events, choking, or injury from vehicular accidents. The following figure is adapted from the U.S. Census Bureau's 2017 ACS.

Figure 88: Assorted Population Demographics in Whatcom County



Persons with Disabilities

People living with a disability under 65 years of age may have difficulty or be incapable of self-preservation during an emergency. Likewise, people under 65 with no health insurance are more prone to chronic illness or exhibit poor physical condition simply because they do not seek treatment promptly. Thus, they may require a higher level of fire-rescue and EMS response.

Persons without Health Insurance

Although access to health insurance is not included in the NFPA at-risk categories, it is well documented and known that persons without health insurance are more susceptible to developing chronic health conditions and dependence on emergency services. The percentage of persons without health insurance is slightly higher than the state. This is of concern when considered in conjunction with the high poverty rate. According to the U.S. Census Bureau's 2017 ACS, persons without health insurance are as follows:

- Whatcom County: 7.6%
- Washington State: 7.1%

Persons Living in Poverty

Persons living in poverty experience an increased risk from fire or medical condition due to age or condition of housing level, inability to pay for routine medical care, lack of medical insurance, and general health conditions. Sometimes, lack of access to transportation leads to increased use of care and transport. Those living below the poverty line are the most at-risk. The low-income category is often combined with other factors such as education, disability, and work status. In rural communities, low-income residents may live far from treatment centers and require extended response times. According to the U.S. Census Bureau, persons living in poverty include:

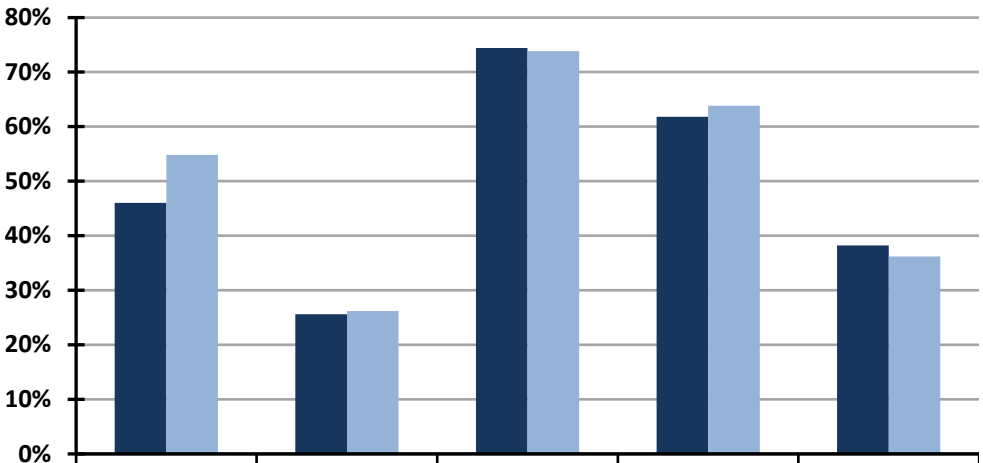
- Whatcom County: 13%
- Washington State: 11%

Major Occupancies

Housing

Although housing type is not included in the NFPA at-risk categories, certain housing types, such as older multi-family units and mobile homes pose a higher risk due to potential loss of life or lack of fire protection features.[27] The following figure shows some of the risk factors associated with housing occupancy and correlation to national statistics.

Figure 89: Risk Factors Associated with Residential Structures (Whatcom County)



	% Residential >40 years	% Multi-Family Residential	% Single-Family Residential	% Owner-Occupied Residential	%Rental-Occupied Residential
Whatcom County	46%	26%	74%	62%	38%
National Statistics	55%	26%	74%	64%	36%

The residential construction in Whatcom County in newer overall. This generally correlates to improved construction standards and integrated fire protection. The percentage of single-family and multifamily residential is consistent with national statistics. There is a national trend to the increased development of multifamily residential and NWFR will need to continue the development of specific response plans.

Other Community Risks

Natural Disasters

Surprisingly, avalanches have killed more than 190 people in the past century, exceeding deaths from any other natural cause in Whatcom County. Other notable natural disasters occurring in the County are earthquakes, flooding, and landslides. Hazardous materials can create incidents which are either intentional or unintentional, yet still may pose a risk to the County. Storms, tsunamis, volcanos, wildfires, and windstorms are other natural disasters that may affect the Whatcom County and NWFR.[28]

The *Lake Whatcom Water & Sewer District* activated a pilot scale earthquake early warning system (known as ShakeAlert®) at one of its water reservoirs. With its activation, the District is among the first utilities in Washington State to implement the system developed by the *U.S. Geological Survey* along with a coalition of state and university partners throughout the West Coast.[29]

The Federal Emergency Management Agency (FEMA) aids states, counties, and localities that experience significant hardship during and after a natural disaster. Accordingly, FEMA maintains a database that documents federally supported and declared disasters.

Technological Hazards

Technological or human-caused hazards result from accidents or failures of systems and structures; or from the actions of people, either accidental or intentional. Intentional actions are always deliberate; however, the intent may differ (e.g., a deliberate action may be planned, careless, reckless, or with the intent to cause harm). In careless or reckless acts, or those that are poorly planned and or executed, the outcome may have unintended consequences.

Transportation Hazards

The major highways that run through the County include SR 546, which begins at an intersection with SR 539 and Badger Road northwest of Lynden, located about 2.7 miles south of the Canadian border. The highway travels east on Badger Road across the northern outskirts of Lynden and its residential neighborhoods, traversing a pair of roundabouts at Depot Road and Bender Road. After passing more residential areas, a small industrial park, and a third roundabout at Northwood Road, SR 546 leaves Lynden city limits and descends into the lower Nooksack Valley, a flat and rural area with views of Mount Baker. The highway passes several farms and forested plots before it crosses over a branch railroad belonging to the BNSF Railway® and reaches a junction with SR 9. SR 546 terminates at the junction located adjacent to the Nooksack Valley High School campus and approximately four miles southwest of Sumas, and SR 9 continues east onto Badger Road on its way towards Sumas.

SR 546 runs through Lynden and the outlying rural areas as a two-lane highway with a posted speed limit of 50 miles per hour. The highway is designated as a major freight corridor and serves as an alternative route to the 24-hour Sumas border crossing from Interstate 5, which intersects SR 539 in Bellingham. SR 546 is designated as a *Highway of Statewide Significance* by the state legislature and is listed as part of the National Highway System, a network of roads identified as important to the national economy, defense, and mobility. The Washington State Department of Transportation (WSDOT) estimates that approximately 5,500 to 9,700 vehicles use the highway daily, based on annual average daily traffic data. The busiest section is located between SR 539 and Depot Road in Lynden, carrying 9,000 to 9,700 vehicles per day in 2016. The entire route of SR 539 from Bellingham to the Canadian border runs due north–south. It serves as an alternate route between Bellingham and British Columbia, bypassing the Blaine border crossings.

SR 539 is maintained by the *Washington State Department of Transportation* (WSDOT), which conducts an annual survey on state highways to measure traffic volume in terms of average annual daily traffic. Average traffic volumes on the highway in 2016 ranged from a minimum of 1,400 vehicles at the Canadian border to a maximum of 37,000 vehicles near Bellis Fair Mall. The Guide Meridian corridor is also served by several Whatcom Transportation Authority bus routes connecting Bellingham to Lynden, Everson, Nooksack, and Sumas.

PLANNING FOR FIRE PROTECTION & EMS

The fire service nationally creates and gathers large volumes of data in the performance of its duties, both from emergency response activities and in preparation for and anticipation of large-scale disasters. However, many of these same organizations do not analyze the data sufficiently to evaluate the effectiveness and adjust as necessary to become more effective or efficient. Accurately analyzed data provides fire service leaders with information from which to make key decisions and develop effective plans. The fire service has many different plans and planning functions that should be included in any fire department, but are often set aside for higher priority issues. This can lead to disastrous consequences.

There are many categories of planning that fire departments should employ. Key planning efforts include:

- Response Performance Planning (Standards of Cover; RCW 52.33).
- Community Risk Assessment (CRA) Planning (Standards of Cover; stand-alone CRA).
- Community Risk Reduction (CRR) Planning (stand-alone CRR plan).
- Community Growth Planning (Master Plan; County and City Growth Management Plans).
- Target Hazard Response Planning (Tactical Planning).
- Resource Planning:
  - Staffing (Master Plan; County and City Growth Management Plans; trigger points & projections for retirements, hiring, promotions).
  - Equipment (Master Plan; trigger points & projections for retirement, replacement, acquisition).
  - Facilities (Master Plan; County and City Growth Management Plans; trigger points for land acquisition, construction, expansion).
  - Finances (Master Plan; revenue and expense projections).
- Succession Planning (Key leadership trait identification & development).
- Organizational Work Planning (Strategic Plan; goal & objective setting with timelines & assignments).

Response-Performance Planning

This type of planning develops a community profile, evaluates the resources available to the fire department and the transportation network used to respond to emergencies, and establishes a set of response performance objectives. The intent is to help the community understand what they can reasonably expect from their fire department during emergencies and what its limitations are. This information also allows policymakers to balance risk and cost for the community. While this can be done internally by many fire departments, it is usually a labor-intensive endeavor. RCW 52.33 also identifies the key performance metrics a community should use but is not a substitute for local policymakers to make informed cost-benefit decisions.

A *Standards of Cover* (SOC) is an industry best-practice for the fire service nationally. It combines a community risk assessment with the elements of response performance planning, ensuring that components such as a critical task analysis, distribution and concentration of resources, and agency-specific service level objectives are combined to establish an effective response to emergencies. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations.

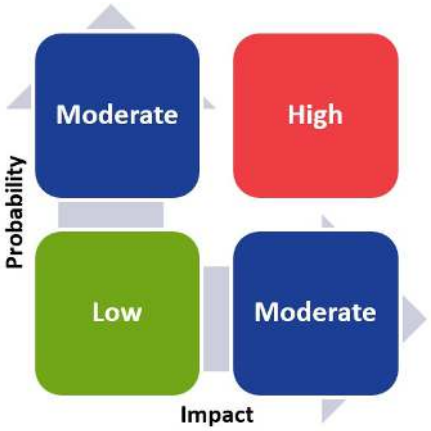
NWFR does not have a Standards of Cover, nor does it comply with RCW 52.33: *Fire Departments—Performance Measures.* ESCI recommends programming into the planning horizon the establishment of a Center for Fire Public Safety Excellence (CPSE) 6th Edition compliant *Community Risk Assessment: Standards of Cover.*

Community Risk Reduction

Community Risk Assessment Planning

As emergency response agencies, fire departments must thoroughly understand their community risks. These risks must be quantified. There are numerous risk/consequence- or risk/probability matrices available; but regardless of the labels on the axes, they usually fall into one of the quadrants in the adjacent figure.

Figure 90: Risk/Probability Matrix



As the risk is quantified generally into one of the four quadrants, a decision is made based on the level of risk. Communities cannot create a zero chance of a risk, which would indicate there is no risk. Likewise, there cannot be a 100% chance of a risk, since that would make it a certainty, not a risk. Every community must come to grips with an acceptable level of risk, recognizing that it is improbable, impractical, and unaffordable to eliminate risk in a community.

Using a matrix helps fire department officials determine approximately where the line is between an acceptable and unacceptable risk. It is important to note that for the individuals directly involved in an incident, it is never considered an acceptable risk. The quadrants in the preceding figure may be defined as follows.

- *Low impact/low probability:* Risks in the bottom left corner are low level, with acceptable consequences if the incident occurs. These can often be considered acceptable risks and require no further action.
- *Low impact/high probability:* Risks in the top left corner are moderate level—if the incident happens, the fire department can usually handle it with existing resources. However, effort should be given to reduce the likelihood that these incidents occur. This is where community risk reduction strategies pay significant dividends to a community.

- *High impact/low probability:* Risks in the bottom right corner are high level if they do occur, but they are very unlikely to happen. Risks in this quadrant are prime candidates for training and contingency planning. A fire department may spend time and energy preparing for such an incident and may even acquire specialized equipment and other non-staff resources to prepare for this risk. These risks also lend themselves well to community risk reduction strategies, such as public education, community engagement, and code enforcement.
- *High impact/high probability:* Risks toward the top right corner are critical. These should be the highest priorities for the fire department and for the community. Aggressive action is required, such as staffing and equipping for these risks, and engaging the community in risk reduction and preparedness.

Once the community risks are identified and appropriately categorized, plans of action are developed consistent with their category. These risks can be building-specific, neighborhood-specific, agency-wide, or even regional. The Whatcom County Comprehensive Emergency Management Plan should be incorporated into the risk assessment for NWFR, and can be a significant resource for the District in developing a risk assessment.

Community Risk Reduction Planning

CRR is defined by *Vision 20/20* as a process to identify and prioritize local risks, followed by the integrated and strategic investment of resources (emergency response and prevention) to reduce their occurrence and impact. Much of the current literature and training materials suggest that Community Risk Reduction programs use a six-step approach towards development. The accompanying figure depicts the six steps.

Figure 91: Six Steps of Community Risk Reduction

Community risk reduction is not a new concept for the fire service. Fire departments have been actively involved in fire prevention for many years through public education, building inspections, and other activities. Although there is no specific blueprint for developing CRR plans in U.S. fire departments, there are some common and essential steps. Ultimately, the CRR plan will be unique to each fire department, based on the types of risks for that community. A common misunderstanding is that CRR is the purview of the Fire Marshal's Office. It should be viewed as a holistic approach to community risk reduction, thus demand reduction for a fire department.

Not only will a CRR plan be different for each fire department, but depending on the size of the agency it will vary from station to station. The risks in one station's area may be vastly different than an adjoining station based on various factors, including demographics, type of residences (multi- or single-family homes), or commercial areas. Essentially, the fire service exists not only to respond to emergency incidents, but also to proactively prevent or mitigate the impact of such incidents within their communities.

CRR provides a more focused approach to reducing specific risks. In addition, a comprehensive CRR program involving community partners, firefighters, and other staff, can result in an organizational culture that recognizes the importance of reducing risks within a community. Fire-service leaders, firefighters, and other staff must begin to shift their thinking towards reducing and mitigating risks, as this will ultimately be expected by their communities and elected officials.

In its simplest form, a CRR plan combines the results of a community risk assessment with local historical response data analysis and trends and identifies strategies to reduce the risk or reduce the consequences of a risk manifesting itself within the community. NWFR has no such plan in place.

Community Growth Planning

Community growth planning for a fire department focuses on three things: land use planning/zoning; population density and projections; and current fire department resource capability. Washington State has enacted the Growth Management Act (or GMA, a series of state statutes, first adopted in 1990, that requires fast-growing cities and counties to develop a comprehensive plan to manage their population growth). NWFR provides fire protection and emergency medical services for the City of Blaine and its associated Urban Growth Area (UGA), the Birch Bay UGA, the Lynden UGA (outside the city limits), a portion of the Bellingham UGA, and rural and agricultural areas within NWFR's boundaries. Thus, it must pay close attention to these growth management documents to determine what effect that growth will have on the District's ability to serve the community into the future.

Since a roadmap for growth within the region has been created, the Fire District has the information necessary to grow its resources wisely and incrementally to absorb the impact of community growth or request mitigation of the impacts to the Fire District. The District's capacity is not unlimited (see *Service Delivery & Performance* section of this report), so growth will only exacerbate any limitations without adding resources.

- *Bellingham Comp Plan:* Bellingham is anticipated to grow by 34% over the estimated 2013 population of 92,660 to 124,157 by 2036—calculated from the Whatcom County Comprehensive Plan & Bellingham Comp Plan
- *Blaine Comp Plan:* "Over the next twenty years, Blaine expects to see an 85% increase in the number of residents within its City limits. This equates to about an additional 4,414 moving to Blaine, and a total population of about 9,500 by 2036."—Excerpt from Blaine 2016 Comprehensive Plan
- *Whatcom County/Birch Bay Comp Plan:* Birch Bay is anticipated to grow by 70% over the estimated 2013 population of 7,540 to 12,822 by 2036—calculated from the County's Comprehensive Plan.
- *Whatcom County/Lynden Comp Plan:* Lynden is anticipated to grow by slightly less than 50% over the estimated 2013 population of 12,872 to 19,275 by 2036—calculated from the Whatcom County Comprehensive Plan.
- *Areas Outside of UGAs:* For areas in Whatcom County outside of existing UGAs (areas not within a city comprehensive plan), the population is expected to grow by 17% over the estimated 2013 population of 66,104 to 77,321 by 2036.

The District must delve deeper into each comprehensive plan to determine the most likely impacts to the District from these municipalities and unincorporated areas. NWFR has been actively involved in the comprehensive plan development in the County and in cities that directly or indirectly affect the Fire District, as well as their updates. It is critical that the District continue to do this to ensure that District resource growth keeps pace with community growth.

Target-Hazard Response Planning

In many instances, high-risk facilities within a jurisdiction are preplanned in the event of an incident occurring there. By focusing on these specific risks—or target hazards—fire personnel become very familiar with these facilities, understanding what risks each of these facilities pose and what features the building has that can be used to gain a tactical advantage, such as area separation walls or built-in fire deluge systems.

For those buildings that have been identified as target hazards, NWFR should develop a short-form, one-page pre-incident "site plan" that is accessible by the crews on the scene (a tactical worksheet specific to that building). Further, those worksheets should be used in drills to get all personnel familiar with the target hazards and what considerations should be in play during an incident. Crews should spend any discretionary time conducting walk-throughs of these facilities and discussing hypothetical scenarios to avoid surprises during an actual incident there.

In addition to the short-form tactical worksheets, more complex, detailed site-specific information can be compiled in advance of an incident and kept electronically, accessible by incident commanders during a sustained emergency incident or accessible to training personnel for tabletop exercises.

Resource Planning

Resource planning is a heading under which numerous subject areas fall. Those resources include staffing, apparatus and equipment, facilities, and finances.

Apparatus & Equipment

Fire department apparatus must be reliably operated when a response is called for 100% of the time without fail. This requires a high level of maintenance and assurance that each unit will operate as intended every time. As can be appreciated, this is an expensive endeavor. NFPA 1911: *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles* recommends that for an effective lifespan, that apparatus maintain front line service for no more than 15 years, and they should not be kept in reserve status for more than an additional ten years. According to Annex D of this standard, "Apparatus that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced." ESCI supports Annex D of these standards as they relate to replacement schedules (or refurbishment) for heavy fire apparatus (engines, tenders, and ladder trucks). Lighter duty response vehicles, such as brush units, medic units, or support vehicles, are not required to meet the replacement criteria in Annex D.

The intent behind Annex D is to maintain firefighter safety. Apparatus manufacturers comply with the NFPA standard each year. With changes to the standard every few years, improvements such as lighting, visibility, crew compartment safety, rollover protection, harnessing of passengers, and other safety systems are added. Annex D recognizes that an older fleet that has not been upgraded to meet current NFPA standards poses a greater risk than newer apparatus. A retrofitted apparatus that has been upgraded may meet the intent of NFPA 1911 and Annex D. Annex D is only guidance, not a mandate. It is included in this report as an appendix.

ESCI recognizes that a more formulaic approach to apparatus replacement is more helpful to jurisdictions seeking to develop a schedule. The approach recommended includes age, miles/hours, service, condition, and reliability as major factors to be used in determining a unit's continued viability. These factors are weighted according to a scale, which is provided in the *Capital Facilities and Apparatus* section of this report.

In developing an apparatus and equipment replacement plan, the District must establish the criteria for replacement. The agency must also include expensive equipment in the plan, with a life expectancy determined. Equipment manufacturers can help with this criterion. The price point for the apparatus and equipment must be determined, along with a price escalator to project how much money will be required to purchase replacement vehicles and equipment once they have reached their useful lives. Each year, the District should evaluate the inflation rate against the actual price increases, and the replacement schedule trued up. When the apparatus is retired, there is usually a nominal return for the salvage value of the sale. Proceeds from this should also be reinvested into the apparatus and equipment fund.

Funding the replacement schedule is also key to an effective plan. It provides little value to know when a unit must be replaced when there are no funds available for the replacement. Therefore, a policy decision must be made. Are funds set aside each year to adequately implement the replacement schedule as apparatus and equipment reach the end of their useful life? Does NWFR intend to bond/finance the replacement of a large portion of the fleet? If so, can it or should it coincide with facility needs?

Anticipating the need for new types of apparatus is also key to effective apparatus and equipment planning. For example, a ladder truck may be required to serve an area slated for construction of taller buildings or that poses access issues. Knowing when such apparatus should be added to the fleet and how it will be staffed is critical. In this case, looking to the Washington Surveying & Rating Bureau for grading criteria is an excellent source. Within the grading schedule of the WSRB, deficiency points are assigned for gaps in capability. The greater the need for aerial apparatus (higher buildings), the more deficiency points are assigned. This can contribute to a decline in rating and, ultimately, an increase in commercial insurance premiums for businesses in the community. The criteria for requiring or adding a ladder company is as follows: *"A ladder truck is required when a community has at least five buildings with a required fire-flow of 4,000 gpm or greater and/or three stories (35 feet) in height."*[30]

Apparatus needs are anticipated within the Capital Facilities Plan for the District. No funding mechanism is dedicated, but annual revenues, an EMS levy, bond measures, fire mitigation fees, and grants have been identified as possible funding mechanisms for the entire capital facilities plan (including apparatus and major equipment).

Finances

Obviously critical is the funding to respond to any planned needs, whether staffing (ongoing cost), apparatus and equipment (episodic), or facilities (infrequent). A Fire Chief who invests in detailed planning and partnering with allied agencies makes the need easy to identify. Developing the expense side of the financial plan is straightforward but can be tedious. Staging the expenses so the spikes and dips are limited can be an art form.

Developing strategies to generate the revenue necessary to fund these new or added expenses normally consists of choices of which the elected officials must grapple. If the financial plan for the District is thorough and well thought out, complete with details, contingencies, and predictable consequences for failure to act, the Fire Chief has significantly increased the likelihood that the elected officials will seek ways to fund the plan.

NWFR has, as part of its Capital Facilities Plan, developed financial projections (revenue and expense) through the life of the plan (2036). This helps the District prepare for foreseeable growth challenges, and identifies contingencies in the event funding mechanisms fail. Establishing a healthy emergency reserve fund also hedges against the unforeseen fiscal calamities, such as a deep recession.

Every eight years, Washington State's Growth Management Act requires that cities and counties update their Comprehensive Plans. Less extensive revisions are allowed through the docketing process and County-initiated amendment proposals in the years between the major update cycle. The District should be at the table for each of these major and minor plan amendments.

Succession Planning

The fire service nationally has been slow to address or implement succession planning in its fire departments. In the private sector, succession planning is expected where the knowledge, skills, and abilities of the Chief Executive Officer are critical to the success of the organization. It is equally true in the public sector. The following are key steps to developing a succession plan:

- Identify the agency's critical positions, functions, skills, processes, and systems.
- Develop a list of critical success factors.
- Identify past, current, and expected levels of performance.
- Identify and categorize gaps (urgency, gravity, short-, medium-, or long-term).
- Develop an ideal candidate profile (given the results listed above).
- Determine if an internal candidate has the potential to meet the criteria.
- Develop a mentoring plan.

It is critically important that the incumbent CEO (or other position) buys into the plan, unless the organization intends to diverge from the current path. If a new path is desired, a member of the Board may be required to act as a coach/mentor for an internal successor. It is also critical that the potential successor is informed whether ascension to the CEO position is a *fait accompli* or if there will be competition.

Organizational Work Planning

An organizational work plan is essentially a strategic plan. The strategic planning process results in a three to five-year work plan, intended to guide the work effort of the entire organization toward a common set of goals and objectives. The process includes representation from every major interest group in the organization. Each person in the department should feel that their interests are represented by someone in attendance on the planning team.

Typically, all members of the department are invited to submit responses to an electronic survey, which includes their individual, anonymous feedback on a SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis well in advance of a planning workshop. Each member identifies issues for each category they believe are the strengths and weaknesses of the agency, and what are believed to be opportunities or threats facing the department. The results of the survey and specifically the SWOT Analysis are shared with the planning team prior to beginning work on the plan.

If external stakeholders are invited to contribute, the citizens are provided with an opportunity to provide feedback in a facilitated session. This is an ideal occasion to provide education to these stakeholders before asking for their responses to questions deemed important to the strategic planning team. The facilitated citizen forum should solicit responses to gain insights into their expectations of the fire department. The results of this forum are shared with the internal planning team to ground the participants in meeting the customers' needs.

A planning meeting should then develop and review the agency's mission, vision, and values. The planning team then reviews the results of the internal SWOT analysis and collectively identifies broad themes. These themes form the strategic initiatives of the strategic plan.

After creating the strategic initiatives, the planning team is broken into small groups to develop goals that, if successfully completed, accomplish the strategic initiatives. The smaller groups facilitate deeper conversation, brainstorming and discussion than larger groups allow. However, each small group reports out to the full planning team to "cross-pollinate" ideas and concepts. This also creates buy-in from the larger team.

Once the goals have been identified, the small groups begin developing measurable objectives for each goal. Again, these are reported out to the full planning team for refinement. The small groups must also create an "outcome statement," which describes the intended outcome for each objective. The outcome statement may be a performance metric (e.g., unit turn-out times improved by 20% over 2019 times) or a simple outcome (e.g., a guide exists which assists members in preparing for promotional exams).

Once the initiatives, goals, objectives, critical tasks, and outcomes have been identified, the planning team establishes timelines. The timelines should maintain a relatively balanced workload over the life of the plan. Once adopted, the plan must be briefed to all personnel, and regularly reviewed for progress. Momentum must be maintained during the life of the plan, and should be updated annually to keep it contemporary. NWFR has a current strategic plan, but the Chief reports that it is not reviewed frequently enough. This may reflect timelines that are too generous or tasks and outcomes that are too vague.

POPULATION & SERVICE-DEMAND PROJECTIONS

The following section describes population projections and forecasted NWFR service-demand for the 10-year period beginning in 2020 through 2029. Population projections are based on the latest U.S. Census Bureau data as well as the 2015 population estimates from Fire District #21 and Fire District #4. Service-Demand projections were based on ESCI's various analyses of historical call-volumes.

Population Projections

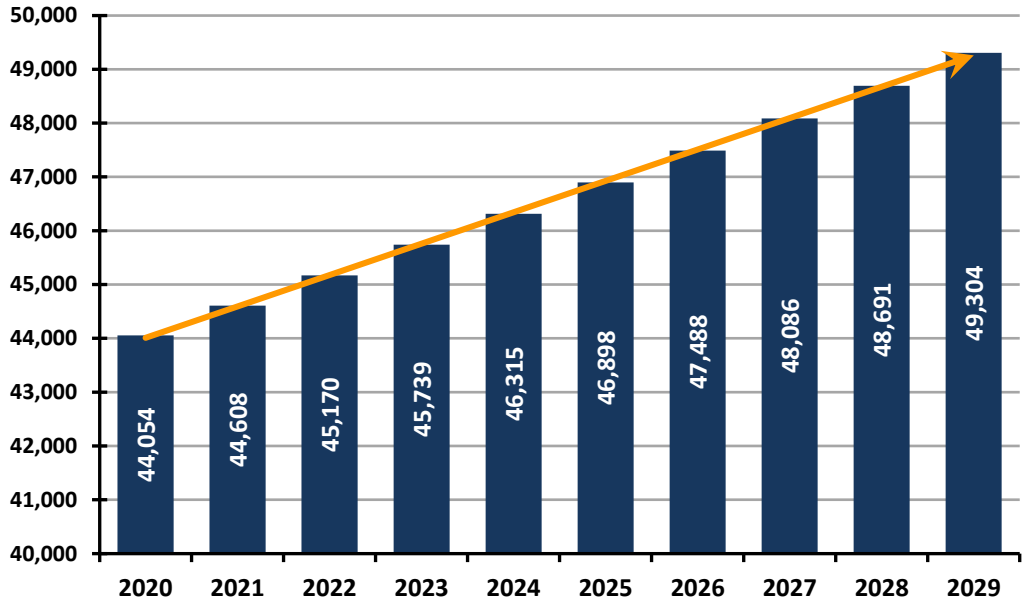
The following figure lists the forecasted population growth within the NWFR (District #21 and District #4) boundaries for 2020–2029. Note, that the following figures represent residents of the District and do not include transient persons or temporary visitors.

Figure 92: Population Projections within the NWFR Boundaries (2020–2029)

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
44,054	44,608	45,170	45,739	46,315	46,898	47,488	48,086	48,691	49,304

As shown in the preceding figure, the population of the District is expected to increase by nearly 12% by the end of 2029. This represents an annual growth rate of 1.26%, which is nearly consistent with projected population growth for Whatcom County. The next figure is a graphic representation of population growth.

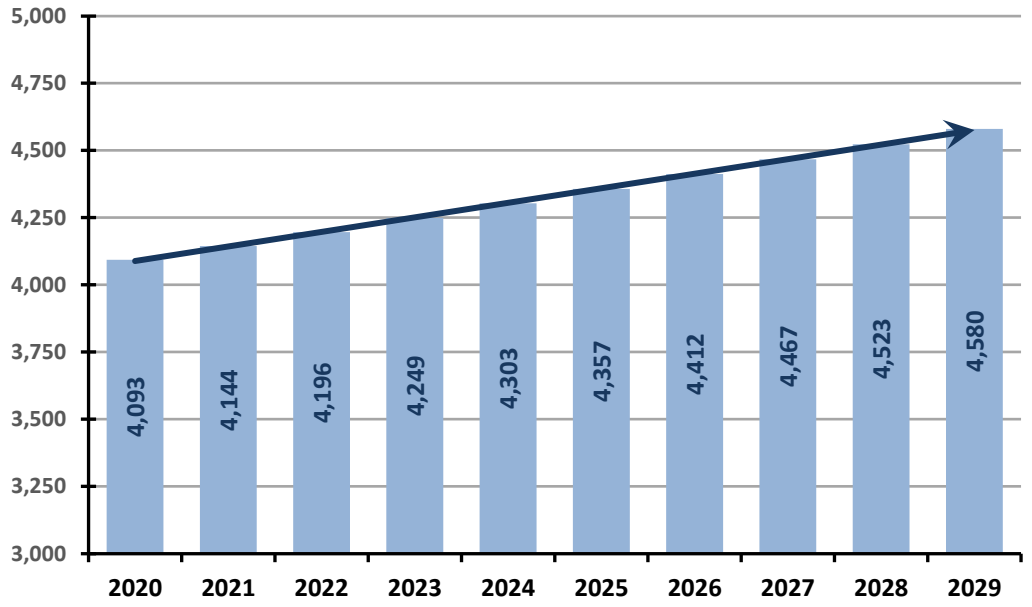
Figure 93: Graphic Representation of Population Projections (2020–2029)



Service-Demand Projections

ESCI used two approaches in projecting future service-demand. The first used the last three calendar years of NWFR's historical service-demand numbers. The following figure lists forecasted increases in total call volumes over the next 10-year period using this method. During 2016–2018, there was an average of 0.093 calls per resident population, or 10.8 incidents (all types) per 1,000 resident population.

Figure 94: Graphic Representation of Total NWFR Service-Demand (2020–2029)

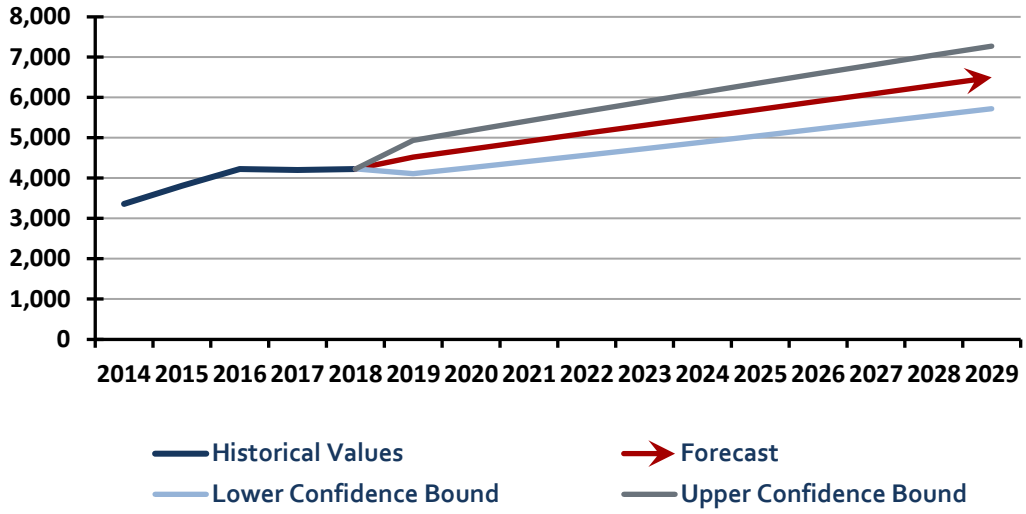


As shown in the preceding figure, like the population-growth projections, the data indicated a nearly 12% potential increase in service-demand by the end of 2029. This is not unexpected, as call volumes are driven primarily by human activity.

As an alternative, ESCI also used the last five calendar years (2014–2018) of *raw* incident-response data to forecast potential future service-demand. A review of this data revealed that structure fire incidents during this period fluctuated annually, but did not trend up significantly during this time. However, during this period, EMS incidents increased slightly over 11%, "Service Calls" by 190%, and "Good Intent" calls by approximately 58%. The overall annual incident rate increased by 25% during 2014–2018, or approximately 5% per year.

The following figure shows a linear regression forecast model based on 2014–2018 total incident data, and projects the total number of incidents through 2030—with upper and lower bounds of potential variance (95%) in the projection.

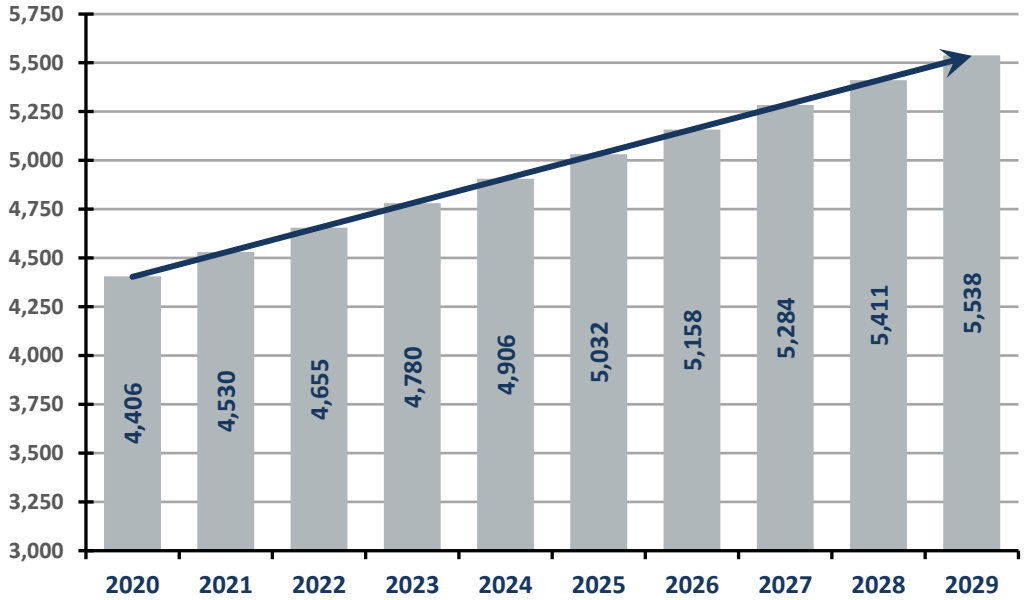
Figure 95: Alternative NWFR Service-Demand Projections (2019–2029)



The model in the preceding figure predicts 6,694 incidents by 2030, with a lower variance of 5,890 incidents, and an upper bound of 7,498 incidents. In this model, there would be an approximate 5.8% annual growth rate in service-demand.

The next figure represents a graphic illustration of projected service-demand using the results of the two preceding methods of analysis. Averaging between the two forecasts *may* represent the most accurate projections of future service-demand over the next 10 years.

Figure 96: Projected Service-Demand based on the Averages of the Two Methods (2019–2029)



Discussion of the Projections

Considering the analyses of the projected population growth, and the two service-delivery forecast models indicates that NWFR will continue to see incremental increases in service demand over the next ten years. This will likely be influenced to some degree by seasonal visitors to the northwest corner of the service-area, which brings in approximately 100,000 tourists annually.[31] Consideration also must be given to the current auto-aid agreement with the City of Bellingham, which has produced an increase in call-volume for Station 12. Lastly, the further out the forecast, the greater the chance for error and unforeseen environmental conditions that could impact future service-demand. Annual monitoring of incident responses, call types, and workload can assist NWFR to react to changing conditions and modify response-resources as necessary.

Section II:
STRATEGIES FOR ORGANIZATIONAL IMPROVEMENT

RECOMMENDED STRATEGIES

The following section describes recommended strategies for North Whatcom Fire & Rescue to consider. When evaluating these, NWFR should determine priorities and categorize each into short-term, mid-term, or long-term strategies. Since NWFR staff and the two Boards of Fire Commissioners have an intimate knowledge of its capacity to address these, they are in the best position to determine the time necessary to accomplish each.

Legal Consolidation of the Fire Districts

As described previously, Whatcom County FPD #21 and Whatcom County FPD #4 currently remain as two separate legal entities functioning as one organization—North Whatcom Fire & Rescue. Given the success of the current collaborative relationship, ESCI believes that the two districts should consider a legal consolidation through a *Merger*, especially given the likely eventuality of future annexations of portions of Fire Protection District #4 by the City of Bellingham.

Merger

A merger is a complete combining of participating fire protection districts into one agency. Washington State regulations (RCW 52.06.010) authorizes the merger of fire protection districts under certain conditions. One or more fire districts can be absorbed into and become part of the surviving district. Fire districts merging into a surviving district are referred to as the *merging agency,* and the surviving district is referred to as the *merger agency*.

The employees of the merging agency(s) are transferred to the merger agency, and the elected officials are brought into the merger district and are reduced over the next three regular elections until the board of fire commissioners is down to three or five; depending on the structure of the merger district board. If a fire district has a $10 million budget or more, a seven-member board can be created.[32] The merging fire district boundaries must be within reasonable proximity to each other. Reasonable proximity is defined at an operational level, so if it makes sense operationally for the fire districts to merge, the reasonable proximity criteria would be met.

Once the merging district board decides to merge, the merging district must submit a petition to merge to the merger district. If the merger district accepts the petition and terms of the proposed merger, it adopts a resolution accordingly and sends the resolution, along with the original petition, back to the merging district board. The merging district board then adopts a resolution requesting the county auditor to call a special election in the merging district. A simple majority determines the outcome of the election. If the majority votes in the affirmative, the respective district boards adopt concurrent resolutions declaring the districts merged under the name of the merger district.

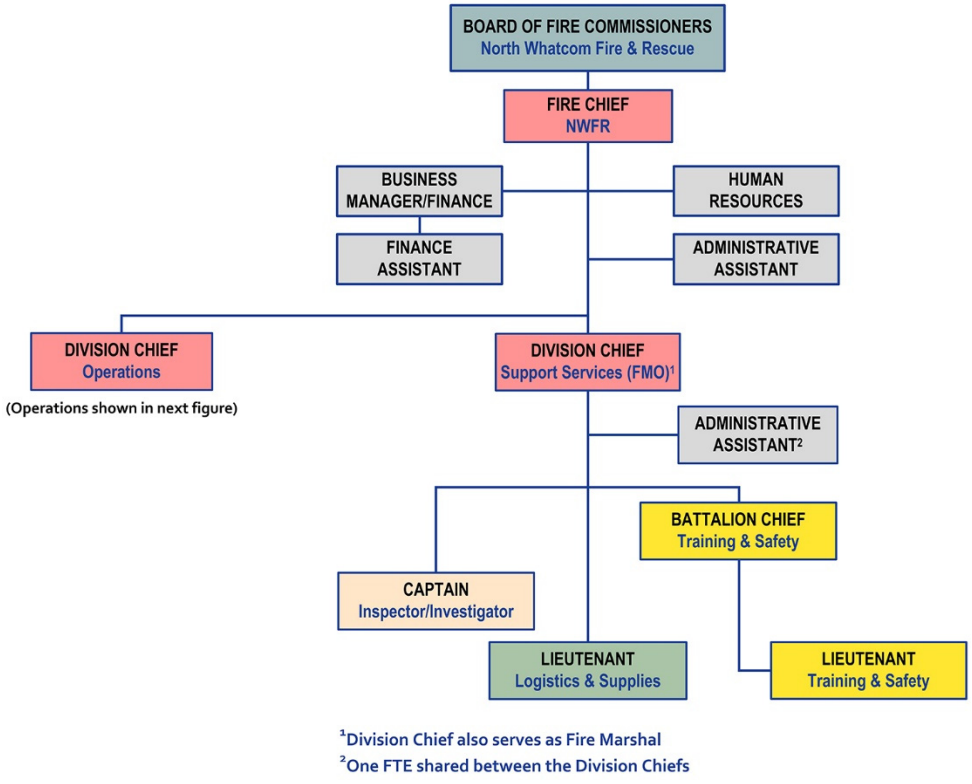
The election for a merger may also establish commissioner districts if unanimously approved by the boards prior to the merger vote, and must be included in the ballot language for the merger. In this case, the same process of board-member reductions occurs as if no commissioner districts were formed until the merged board is reduced to the three or five members.[33] At that point, the commissioner districts shall be drawn and used for the election of the successor fire commissioners (also review "Emergency Medical Services Levy" under the *Financial Impact of the Strategies* section later in this report).

Fire District Organizational Structure

The following figures illustrate a proposed new organizational structure for North Whatcom Fire & Rescue. In this configuration, administrative support staff would report directly to the Fire Chief, and the District would be comprised of two divisions: Operations and Support Services—each overseen by a Division Chief. The Division Chief of Support Services would also serve as the Fire Marshal and include a Captain functioning as an Inspector/Investigator, a Battalion Chief and Lieutenant assigned to Training & Safety, and a Lieutenant responsible for logistics, supplies, and capital equipment. One Administrative Assistant would be shared between the two Division Chiefs.

The next figure shows the various positions associated with administrative support positions (overseen by the Fire Chief, and the positions and programs managed by the Division Chief of Support Services. This structure should be implemented regardless of whether a merger is completed between Fire District #4 and Fire District #21.

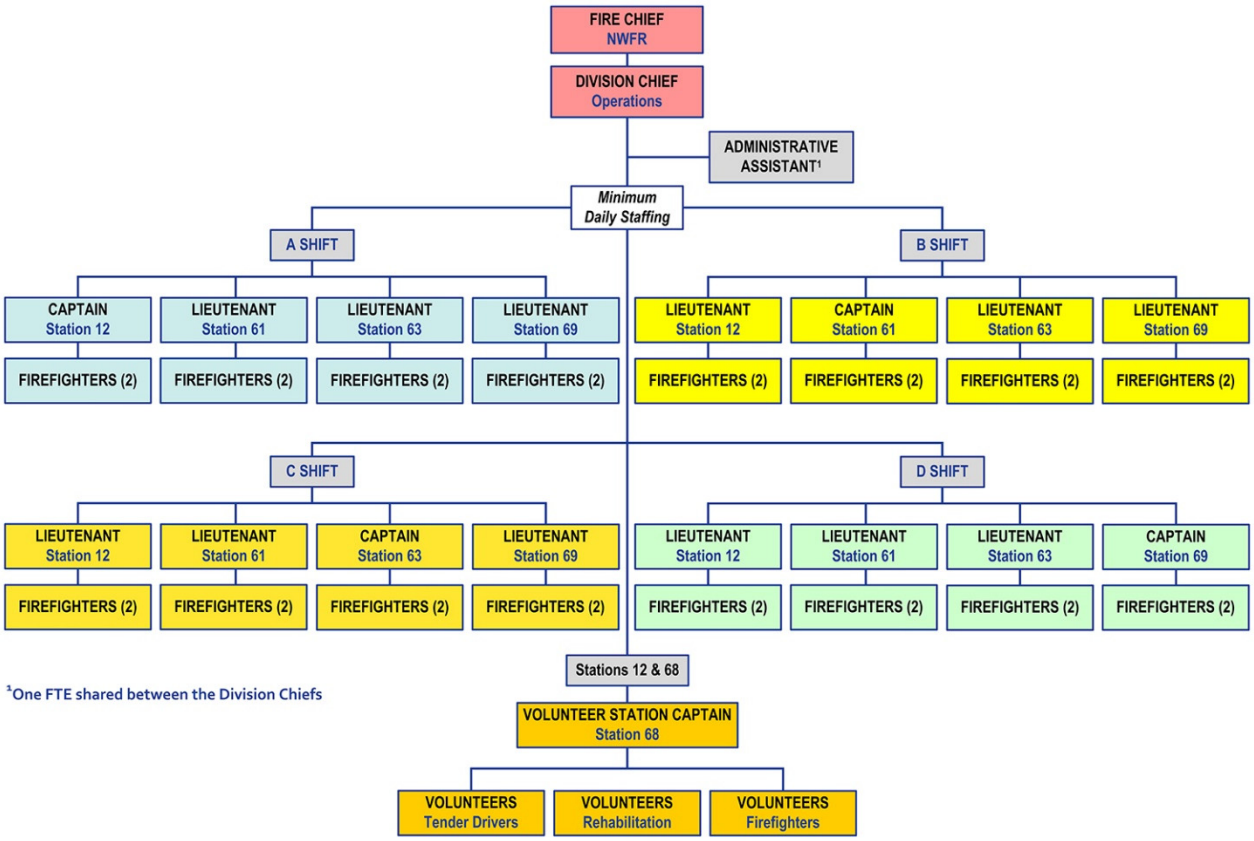
Figure 97: Proposed NWFR Organizational Structure—Administration & Support Services



The Division Chief of Support Services would be a new position, and ESCI recommends that the leadership of NWFR consider promoting the current Division Chief/Fire Marshal to that position.

The next figure represents the Operations Division and the proposed minimum daily staffing at Stations 12, 61, 63, and 69. In this configuration, career staff are assigned to a four-platoon schedule.

Figure 98: Proposed NWFR Organizational Structure—Operations Division



The Fire Chief, Division Chiefs, and Battalion Chief should rotate the position of Duty Officer. All chief officers and Captains should have the necessary training and certifications to assume the role of Incident Commander on major fires and other significant incidents. Captains assigned to Operations should have the following primary responsibilities:

- One Captain assigned to each of the staffed fire stations on each shift.
- Serve as a company officer on the apparatus to which they are assigned.
- Manage the fire station to which they are assigned (ensure their station is properly supplied, maintained, and functioning properly).
- Fulfill the role of Incident Commander on major incidents until the arrival of a chief officer.

- Serve as the on-duty shift supervisor for all on-duty personnel and volunteers.
- Eventually, be capable of occasionally fulfilling the role of Duty Officer during vacation or sick leaves (would require overtime pay).

Lieutenants and firefighters would continue to function in their current traditional roles. Most of the volunteers would be assigned to Fire Station 68, with some Tender Drivers assigned to Station 12. A volunteer station Captain should be appointed to oversee the management of Station 68.

ESCI recognizes that the proposed new NWFR organizational structure would likely require hiring or promoting additional FTEs—which would obviously require higher costs (shown later in the report). The rationale for these proposed changes is to produce a more effective and efficient fire department capable of providing the best possible emergency services to the community. ESCI notes, however, that not all new positions would need to be hired in the immediate future.

Operations & Deployment

ESCI's historical analysis showed a high percentage of concurrent calls, sometimes leaving the District with one or no apparatus and personnel available for another call. What seems to contribute to this is the substantial time necessary to transport patients to the hospital in Bellingham. ESCI recommends that the District consider:

- Data shows that 54% of EMS demand for services occurs during 0900–2000 hours with highest demand during the months of June through September. This could be an opportunity to use seasonal staffing that could be funded through the transport fees. One option to consider is:
  - Conduct a three-month pilot project by staffing a 12-hour peak-demand ambulance during 0900–2000 hours using unassigned firefighters beyond what is needed to meet minimum daily staffing, and/or on overtime hire-back.
  - This ambulance should be assigned to Station 63, but have a broader service-area beyond that of Station 63.
  - Patient transports and call-concurrency data should be monitored during the pilot project to determine the impact of scheduling the peak-demand ambulance.
- An alternative to this is to consider minimum staffing of five personnel at Station 63. Two firefighters to staff the ambulance, with the other three to cross-staff the engine and ladder truck.
- ESCI does not recommend specific response-time performance criteria, as that must ultimately be determined by the organization and community expectations.
  - ESCI does, however, recommend developing response-performance targets based on NFPA standards and specific to population densities. Performance criteria should include turnout times for EMS incidents, fire-related calls, and special operations.
  - NWFR should consider using a combination of NFPA 1710 and NFPA 1720 standards. NFPA 1710 should be applied to the service areas of the four staffed fire stations (Appendices C and D list the specific recommendations contained in NFPA 1710 and 1720).

Fleet Management & Apparatus

Capital Vehicle Replacement Plan

The analysis of North Whatcom Fire & Rescue's fleet indicates that many of its apparatus either need immediate replacement or are near the end of their lifespan. ESCI recommends the District develop a comprehensive vehicle replacement plan that prioritizes replacement of the most critical apparatus—particularly frontline engines and ambulances. It will be important to recognize that capital financing will require a significant investment over the next five to ten years.

Ambulances

NWFR's frontline ambulances average 12 years of age, with an average of 144,384 miles. ESCI believes these vehicles should have been replaced or remounted several years ago. ESCI understands that NWFR has recently ordered the purchase of three new ambulances. If not, the District should consider:

- Replacing its frontline ambulances with more cost-effective Type II ambulances. The purchase price of Type II ambulances would be substantially less than Type I or Type III vehicles, and more cost-effective to operate and maintain. This would not necessarily need to be done all at once, but incrementally based on available funding.
- An alternative would be to do a remount program by mounting the ambulance body on a new cab and chassis. This is a cost-effective option, and typically requires 6–9 months to complete—which is much less time than developing specifications and building a new ambulance.

Water Tenders

NWFR maintains a large fleet of older Water Tenders. ESCI recommends:

- Surplus out all Tenders but whichever one is in the best condition and use that as a reserve unit.
- Purchase two new Tenders. Consider the purchase of Support Type 1 or Support Type 2 Water Tenders, rather than Pumper/Tenders.
- House one Tender at Station 12 and another at Station 68, along with the reserve Tender.

Utilization of the Fire Stations

An assessment and on-site evaluation of each of Fire District #21's and Fire District #4's respective fire stations indicated that changes need to be made. Note that ESCI conducted a cursory evaluation of the fire stations, and did not do a comprehensive engineering and architectural study of the buildings.

Administration & Station 62 (Semiahmoo)

During this study, ESCI was told that the Fire Chief was considering moving the District's administration (headquarters) from the building adjacent to Fire Station 12 to Fire Station 62. Station 62 is situated in the northwest corner of the District in a relatively remote and inconvenient location. At present, the station is unstaffed with career personnel and does not have any assigned volunteers.

Although the facility itself is well-configured to house both administration and operations personnel, ESCI believes an alternative location would better serve the District and community. ESCI recommends the following:

- Currently, Station 62 provides no value to the District, as no apparatus or personnel are deployed to emergency incidents from that location.
- Historical incident-data indicated that the Semiahmoo area represents a small volume of calls and is adequately served by the other staffed stations.
- The District should consider selling the property and utilizing the funds to either build a new administration building or upgrade/remodel another unstaffed/unused fire station to house its headquarters.
- ESCI recognizes that the sale and removal of Station 62 would probably produce dissonance among and between the residents and businesses in the Semiahmoo community. Prior to proceeding with the sale of Station 62, ESCI suggests that District schedule several public meetings to explain the benefits of a potential sale and its impact (or lack thereof) to the Semiahmoo area.

Fire Station 11 (Bellingham)

This station has no career or volunteer personnel assigned to it, and from an operational perspective provides no value to NWFR—yet the District is paying monthly costs for maintenance and security. The building is in obvious disrepair and poorly maintained. It is awkwardly situated on an easement would have questionable value if it could be sold. ESCI recommends District #4 determine options for its removal from its inventory.

Fire Station 13 (Bellingham)

This is another unstaffed station with no assigned volunteers, which currently does not provide any value to NWFR. It is not situated in a location for the effective deployment of apparatus and personnel. ESCI recommends the following:

- District #4 should consider the sale of the property and utilize the funds for higher priorities needed in North Whatcom Fire & Rescue.
- An alternative to the preceding would be if NWFR were to elect to develop a Firefighter Reserve program, the station could be used as housing for the reserves. This would require minimal upgrades, cleaning, and painting.

Fire Station 65 (Haynie)

Station 65 is yet another unstaffed and unused facility. It is situated in a relatively central location within NWFR. Proceeds from the sale of the other stations could be used to remodel this facility to house administrative support staff and serve as NWFR's headquarters.

Fire Station 68 (Delta)

The majority of Tender Drivers and some volunteers are deployed from this station. ESCI recommends:

- Utilize funds from the sale of other stations to make all necessary repairs to the facility.
  - Consider any other upgrades necessary to make this station more useful and comfortable for personnel.
- House two tenders at this station and utilize the facility as the primary deployment and training location for the Tender Drivers, volunteers, and Rehabilitation personnel.
- Move the Rehabilitation vehicle to this station.

Fire Station 70 (Wiser Lake)

Station 70 has no room for full-time staff, has no volunteers assigned to it, and does not currently provide any value to NWFR. ESCI recommends that the District sell the property and use the funds for more important priorities.

Fire Station 72 (Northwood)

Station 72 is located at the north end of the City of Lynden. Currently, it is not staffed and provides no value to NWFR. Nor does it have facilities to house full-time staff. However, ESCI does *not* recommend the District divest itself of this property in the immediate future, but should consider the following:

- The station may, at some point in the future, be useful to the Lynden Fire Department (LFD) as a second fire station. In this case, NWFR could either sell the property to the City of Lynden or lease it to the Lynden Fire Department.
- Alternatively, should NWFR eventually annex or merge with Lynden, this station may be necessary as a location for future deployment of personnel and apparatus.

Other Assets & Equipment

During its site visit, ESCI noted that many of the unstaffed/unused fire stations contained substantial quantities of exercise equipment, furniture, appliances, and a variety of other tools and equipment—apparently none of which is being utilized by NWFR. ESCI recommends:

- NWFR conduct a comprehensive inventory of all non-apparatus items in all fire stations in the District.
- Determine which items are in the best condition and ensure the staffed stations and volunteer station (Station 68) have the best equipment, furniture, and other items.
  - Liquidate the remaining items of value through some method of sales.
  - This may be best accomplished by outsourcing this to a professional estate sales company.

Management & Internal/External Communications

- Internal communication and transparency at the management level appear to be insufficient. NWFR's leadership should provide regular reports to all employees to inform them of significant developments, plans, and other issues.
  - The Fire Chief should regularly visit the career-staffed stations and informally talk with staff to provide them with information and obtain their feedback. The Chief should also meet regularly with the District's volunteers for the same purpose.
- The District needs to develop and expand both its Administrative Rules and Standard Operating Guidelines. It should consider utilizing a service such as Lexipol® to assist in the development of these documents.
  - Establish a review and revision process for Administrative Rules and Standard Operating Guidelines, preferably reviewing one-third of the documents annually to achieve a three-year review cycle.
- Insert the four critical issues from the perspective of the Fire Chief into the strategic plan as new or modified initiatives.
- ESCI was unable to review staff meeting minutes and could not confirm the various communication methods listed in the survey tables.
  - All employees and volunteers should regularly review their e-mail account for information disseminated by the District's management.
  - An added level of accountability should include company officers reviewing these memoranda with crew members in their crew meetings regularly.
  - NWFR should maintain minutes of staff meetings and distribute them to all personnel for added transparency and accountability.
- ESCI recommends that NWFR improve its external communication processes to include:
  - Development of a customer survey to be sent to individuals or family members experiencing a medical emergency and treated and transported by NWFR.
  - Create a formal complaint process for citizens and users of NWFR's services.

Planning

Response Performance & Community Risk

- Plan for the development of a Center for Fire Public Safety Excellence (CPSE) 6th Edition-compliant *Community Risk Assessment: Standards of Cover*.
- If a CPSE 6th Edition-compliant *Community Risk Assessment: Standards of Cover* is not created, develop a stand-alone Community Risk Assessment.
- Develop and adopt a Community Risk Reduction (CRR) plan.

Community Growth

- NWFR administration must continue to be actively involved in any Comprehensive Plan amendment discussions in the City of Blaine, as well as unincorporated UGA areas.
  - Beyond population growth, the District must be engaged in discussions regarding reduced property line setbacks (access problems and fire-spread potential) and increased building height (access problems and ladder truck needs).
  - Maintain the 2016 Capital Facilities Plan and update it as the Comprehensive Plans for the County and cities are updated.

Staffing & Succession Planning

- Develop a staffing plan that factors in:
  - The minimum number of personnel by rank, by certification, and by location/unit for each shift.
  - Leave-usage (discretionary and unscheduled) staffing levels on each shift.
  - Define the maximum number of hours an employee in Operations can work without at least 12 hours off.
  - Retirement-eligible members on shift to anticipate large turnover.
- Develop a succession plan for key management and administrative positions.

Other Planning Recommendations

- Develop response plans and tactical worksheets for target hazards, and training on them regularly.
- Review the District's strategic plan:
  - For validity.
  - For a clear understanding of intent by those assigned to specific initiatives.
  - To adjust deadlines to stagger work, allowing greater focus on fewer initiatives.
  - To add new initiatives if District faces new issues there were not present at the time of development.
  - And delete initiatives that are no longer relevant.
  - And establish a review schedule for the strategic plan at least semi-annually (preferably quarterly) by the Board during a regular meeting.
  - Annually assess and publish incident call-load and response-time performance by station, shift, and apparatus.
  - Consider including external stakeholders in the next iteration of the strategic plan.

Training & Continuing Medical Education

Based on multiple interviews with staff, as well as an evaluation of the current training program, ESCI recommends the following:

- The District should consider hiring an experienced and qualified Training Officer from outside the organization to build and manage an effective training and CME program for both career and volunteer staff.

  - Internal personnel assisting with operations training should be required to have completed at least an Instructor Level 1 course. Officers overseeing the training program should have completed Instructor Level 2.
  - Internal (or external) staff conducting CME should have minimum qualifications to teach the Whatcom County Basic Life Support Ongoing Training & Evaluation Program (OTEP).
- Create a comprehensive training plan for operations personnel, consisting of mandatory annual training topics, lesson plans, and class-delivery tools.
- Conduct routine training "audits" to ensure company officers and instructors are delivering high-quality and consistent training.
- Ensure mandatory training is completed annually, and is consistent with federal and state requirements and NFPA standards.
- Regularly publish training activity and performance every quarter.
- Pursue ongoing firefighter and officer development opportunities and programs.
- Create and deliver a volunteer Tender Operator/Driver training program.
- Ensure all operations personnel complete the required EMT CME topics and online training.
  - Career firefighters should receive additional training and CME related to ambulance operations.
  - Probationary firefighters should participate in an orientation program on ambulance operations.
- Add a firefighter survival and safety training program into the training curriculum.
- Consider developing a Field Training & Evaluation Program (FTEP) for fire suppression, EMS, and other emergency operations topics.
  - Appoint qualified Field Training Officers (FTO) to deliver the program.

Life-Safety (Prevention) Program

- Continue performing life safety code inspections in the City of Blaine.
- Train all career firefighters in basic fire inspection techniques and basic fire codes.
- Contact the Whatcom County Fire Marshal's office and obtain a list of completed commercial fire-code inspections and findings for commercial buildings located in the District's unincorporated service-area.

Special Operations

- Evaluate technical rescue hazards within the NWFR service-area and determine the risks.
- Explore the necessity and feasibility of forming a multi-agency technical rescue team, using the Whatcom County Specialized Emergency Response Program (SERP) concept.
- Ensure all operations personnel are effectively trained in recognizing special hazards, isolating and denying entry, and operating within their capabilities until special technical rescue resources arrive.

Volunteers & Reserves

The Tender Drivers, Rehabilitation Volunteers, and traditional volunteers participating in "combat" roles provide a valuable resource to NWFR. ESCI recommends:

- The District should improve its support of these individuals, and that the Fire Chief and command staff meet with them regularly.
- Fire Station 68 should be assigned as the "headquarters" station for all volunteers.
  - As shown in the proposed Operations Division organizational chart, appoint a volunteer Captain to be responsible for the maintenance and function of Station 68.
  - This individual should be paid a monthly stipend in exchange for this added responsibility.
- All volunteers should occasionally participate in multi-company, single-company, night drills, and other training, along with the career-staffed companies.
- Evaluate Station 68 and its assets to determine any necessary improvements to the building, as well as any necessary equipment, furniture, and other supplies.
- Consider developing a volunteer recruitment program.

Future Reserve Program

There are many excellent examples of Firefighter Reserve Programs. ESCI believes that NWFR could eventually benefit from such a program. These would not be the traditional come-from-home volunteers, but rather required to commit to so many hours monthly to serve as a fourth person on a career engine, or third person on an ambulance.

A properly developed Reserve Program would target individuals who desire a career in the fire service and looking for training and experience. A quality program can serve as a method for acquiring future career staff for NWFR.

Currently, NWFR is probably not able to develop such a program. Other issues and priorities must first be addressed. However, such a program should be considered and developed in the future. At that point, ESCI recommends NWFR research successful programs in other fire departments.

Fleet Maintenance

- The Fleet Maintenance (FM) department currently utilizes Firehouse Software® to maintain apparatus records. The software does not interface with NWFR's existing records management system.
  - ESCI recommends NWFR consider upgrading the FM department's fleet maintenance software to enable additional management based on firefighter inspections, repair requests, and scheduled preventative maintenance (e.g., Operative IQ™).
- ESCI also recommends that NWFR consider the purchase of professional vehicle diagnostic software and associated hardware, along with upgrading any necessary shop tools.
- NWFR may be better served by moving the maintenance facility to one of the other unused fire stations (would enable more room for expansion at Station 63).

Potential Cooperative Service with the Lynden Fire Department

The North Whatcom Fire & Rescue service-area surrounds the boundaries of the City of Lynden. NWFR maintains one of its unstaffed stations (Station 72) at the north end of the City. By all accounts, NWFR and Lynden Fire Department (LFD) have a positive working relationship and provide reciprocal mutual aid.

Looking at the two organizations from a broad perspective, ESCI speculates that a potential annexation of the City of Lynden into the District would likely be mutually beneficial to the City, NWFR, and especially the citizens and taxpayers of both jurisdictions. However, this is only conjecture, as it would require a comprehensive study to determine the feasibility of annexing the City into the District.

ESCI understands that some form of consolidation was attempted without success in the past. However, changes in leadership and other issues may now enable a more receptive position among the key stakeholders, and could lead to consideration of a different configuration.

ESCI recommends that the District #21 Board of Fire Commissioners and NWFR Fire Chief approach Lynden City officials and the LFD Fire Chief to determine interest in a potential annexation/consolidation of the two fire departments.

FINANCIAL CONSIDERATIONS

General Financial Considerations

ESCI has developed recommendations that are intended to have the greatest possible revenue receipts to support the continued growth of NWFR in support of the two district's growing populations and increasing service demand:

- Review the GEMT program and evaluate the best use for future revenues. As discussed previously, given uncertainties around forecasting this revenue stream, and the current state of fire apparatus and facilities, a good use may be capital projects and purchases.
- Maintain the 2016 Capital Facilities Plan and at least update it as the Comprehensive Plans for the County and cities are updated. Preferably, the financial portion of the plan should be updated as part of the annual budgeting process.
- Continue to update Mitigation Fees as appropriate. At a minimum, an updated fee schedule should be included in each update to the County's Comprehensive Plan.

Financial Impact of the Strategies

The following section addresses the financial impact of ESCI's recommendations and proposed strategies.

Projected Costs of the Organizational Changes

The following figure describes the *estimated* salaries and benefits for new and upgraded positions in accordance with ESCI's proposed organizational chart. Benefits were estimated at 23% of salary (per NWFR staff). Note that these are estimates and do not represent the actual total salary and benefits costs. Existing personnel (e.g., current Fire Marshal appointed Division Chief of Support Services, etc.) may be moved into these positions and backfilled with recruit firefighters hired at an entry-level salary, or outside qualified employees hired at the appropriate officer wage. When identifying the wage spread between ranks, 4.5% was used between the shift Lieutenant through Division Chief.

Figure 99: Estimated Officer Salary Costs for New Positions at NWFR

Positions	FTE	Salary	Benefits	TOTAL
Division Chiefs (Operations & Support Services)	2	$214,398	$47,189	$261,587
Battalion Chief (Training)	1	$102,943	$23,677	$126,620
Captain (Inspector/Investigator)	1	$98,510	$22,657	$121,167
Lieutenants (Training & Logistics)	2	$188,729	$41,538	$230,267
Administrative Assistant[A]	0.5	$27,179	$6,251	$33,430
Totals:	**6.5**	**$631,759**	**$141,312**	**$773,071**

[A]Current part-time Administrative Assistant assigned to Training would be increased to full time.

ESCI estimated the Division Chief salary at the current Division Chief salary plus 4.5%. The Training Battalion Chief salary range was set at the tentative new Training Captain pay rate plus 4.5%. The administrative Captain pay was set based on the tentative new collective bargaining unit pay. The new administrative Lieutenant salary was based on the tentative new shift Lieutenant pay, plus premium pay at the amount of 4.5%.

As noted previously, if NWFR elects to increase minimum daily staffing by two personnel to staff a dedicated BLS unit in the northwest area of the District, ESCI estimates it will take up to nine additional employees based on current staffing levels as of November 1, 2019. The estimated salary and benefits cost of these additional personnel would be approximately $646,000 in the first year, and approximately $718,000 in the second year. These estimates *do not* include the costs of onboarding, outfitting, and equipping new employees.

Emergency Medical Services Levy

Fire District #4 currently receives annual funding from an *Emergency Medical Services Levy* in accordance with WAC 458-19-060. Prior to considering a merger between the two fire districts, it will be important to determine the impact on this funding source in the event of a merger. RCW 52.06.070 describes the obligation of merged districts as follows:

> *None of the obligations of the merged districts or of a local improvement district located in the merged districts may be affected by the merger and dissolution, and all land liable to be assessed to pay any of the indebtedness shall remain liable to the same extent as if the districts had not been merged and any assessments previously levied against the land shall remain unimpaired and shall be collected in the same manner as if the districts had not merged. The commissioners of the merged district shall have all the powers of the two districts to levy, assess, and cause to be collected all assessments against any land in both districts that may be necessary to pay for the indebtedness thereof, and until the assessments are collected and all indebtedness of the districts paid, separate funds shall be maintained for each district as were maintained before the merger: PROVIDED, That the board of the merged district may, with the consent of the creditors of the districts merged, cancel any or all assessments previously levied, in accordance with the terms and conditions of the merger, so that the lands in the respective districts bear their fair and proportionate share of the indebtedness.*

Depending on what would occur with the current District #4 EMS Levy, prior to merging, District #21 may want to consider placing an EMS Levy on the ballot in the November 2020 general election. ESCI does not provide legal advice, and recommends the District obtain legal counsel to evaluate the EMS Levy tax implications of a merger.

Financial Forecasts

In this section, ESCI provides a high-level overview of the likely financial future of the NWFR, treating it as a merged district (including all of District #4's revenues and expenses).

Property tax revenues are projected at 1% plus new construction at recent rates of development (as mentioned previously, it is expected that a recession would only have a limited impact locally). It is assumed that there would be no new property tax levies or levy lid-lifts—while it is assumed that a new bond will be issued in 2020, it is not assumed a new or expanded bond levy will pay for it. Ambulance fees are projected using a linear forecast model, though an annual $650,000 GEMT payment was added to the ambulance fee forecasts (increasing by 3% per year).

The District should be able to fund the new bond because of the increased revenue from the GEMT payments. Given the uncertainty in forecasting the GEMT revenue stream, a wiser course of action may be to forgo the bond and simply use the GEMT payments to fund capital improvement on a "pay-as-you-go" basis. While larger expenses may need to be delayed while building a fund balance with GEMT revenue, this system would avoid the potential of having to make bond payments despite an unforeseen loss of GEMT revenues. Of course, the District may also choose to seek voter-approval for a bond, and use the GEMT revenues for other purposes, such as augmenting staff.

ESCI matched historical growth patterns for wages and benefits, using a 3.5% wage growth, 7% benefits growth, and 2% inflation on supplies and professional services. For a few isolated lines such as Facilities Repair and Maintenance, ESCI used a linear forecast model in place of the standard 2% growth. The existing debt figures were maintained, and the project list was used in the 2016 Capital Facilities Plan for capital expenses. However, per ESCI's recommendations, it was assumed the replacement of two additional ambulances beyond the three listed in the CFP for the years 2021 and 2024. ESCI assumed no additional staffing within the forecast horizon.

Figure 100: Projected Finances in the Event the Fire Districts Merge (2019–2024)

Revenues	2019 Estimated	2020	2021	2022	2023	2024
Regular Levy–District 21	5,921,638	6,017,753	6,139,161	6,257,504	6,369,848	6,487,017
Regular Levy–District 4	1,507,983	1,527,389	1,970,902	2,000,371	2,029,784	2,059,177
EMS Levy–District 4	408,044	413,942	420,531	427,140	433,777	440,448
Grants & Contracts[A]	22,187	21,976	21,976	21,976	21,976	21,976
Ambulance Receipts	1,861,772	1,122,628	1,151,581	1,181,307	1,211,829	1,243,169
Miscellaneous & Other	566,461	185,089	186,774	188,492	190,244	192,030
Total Revenue:	**$10,288,084**	**$9,288,777**	**$9,890,924**	**$10,076,791**	**$10,257,458**	**$10,443,817**
Expenses						
Salaries	5,226,934	5,409,927	5,599,326	5,795,357	5,998,250	6,208,248
Benefits	2,056,551	2,180,062	2,316,052	2,459,685	2,616,551	2,789,089
Services & Supplies	898,396	880,970	893,565	936,469	949,892	995,024
Total Operations:	***$8,181,881***	***$8,470,958***	***$8,808,943***	***$9,191,511***	***$9,564,693***	***$9,992,360***
Transfers to Bond Fund	-	294,359	289,078	283,912	278,982	273,839
Transfers to Capital Fund	-	50,000	50,000	50,000	50,000	50,000
Total Expenditures:	**$8,181,881**	**$8,815,317**	**$9,148,021**	**$9,525,423**	**$9,893,675**	**$10,316,199**
Net						
Net Surplus (Deficit):	**$2,106,203**	**$473,460**	**$742,903**	**$551,369**	**$363,783**	**$127,618**
Ending Fund Balance:	**$5,627,971**	**$6,101,431**	**$6,844,334**	**$7,395,703**	**$7,759,487**	**$7,887,105**

[A]Excludes District #4

Overall, ESCI is forecasting an average annual expenditure increase of 4.8% (the average operating expenditure increase would be about 4.1%). From 2019 to 2024, the total increase is expected to be 26.1% (operating expenditure increase would be about 22.1%). Meanwhile, revenues increase an average of 0.5%, and 1.5% over the forecast period (ignoring the 2017 GEMT payments received in 2019, the average increase would be 1.9%, with an overall increase of 9.7% over the forecast period).

As a merged district, ESCI projects adequate funding and subsequently increasing fund balance during the forecast period. Importantly, this forecast is dependent on GEMT payments—the forecasts of which are uncertain. Further, the advantage obtained from the GEMT payments is slowly eroded over the forecast period, and would be lost by the end of 2025 (one year past the forecast period). After that point, ESCI forecasts increasing deficits. Also, while the General Fund is designed in this forecast to support and ensure the viability of both the Bond Funds and Capital Fund, there are likely to be further capital pressures that are not included.

Among the greatest financial pressures would be the loss of District #4's Fire Station 12 upon its annexation into the City of Bellingham. While NWFR may be able to absorb the loss of administrative offices and training facilities currently located at this station, it *may* be that a new facility will be required—although there likely would be better alternatives. A similarly sized four-bay, 16,000 square foot station would cost approximately $10 million—give or take about $500,000. Amortized over 20 years at 3.5% interest, that would be a cost of about $700,000 per year.

A merged district would result in new levies being spread across the combined assessed values of the previous districts. Keeping the levy revenues at the current forecast combined level, the total levy rate for District #4 taxpayers would increase slightly, while it would decrease for those in District #21. Overall, the merged district should see a net benefit.

Figure 101: Comparisons of Districts #4 & #21 to a Merged District (2020)

2020 Merger Comparison	District #4	District #21	Merged District
Assessed Value	$1,701,299,251	$4,849,314,116	$6,555,352,321
Regular Levy Rate	$0.8971	$1.2369	$1.1332
Levy Amount	$1,526,189	$5,902,169	$7,428,358
District EMS Levy Rate	$0	N/A	$0
District EMS Levy Amount	$287,807	N/A	$287,807
County EMS Levy Rate	$0.3326	$0.5000	$0.4561
Total EMS Levy Amount	$850,650	$2,424,657	$3,277,676
Total Levy Rates	$1.3971	$1.7369	$1.6332
Total Levy Amounts	$2,664,646	$8,326,826	$10,993,841
Taxpayer Savings (Costs):	**$(113,873)**	**$407,050**	**$287,807**

Section III:
APPENDICES

APPENDIX A: EXAMPLE POLICY FOR VEHICLE REPLACEMENT CRITERIA

Purpose

- To minimize or eliminate the possibility of competition for capital funds between capital projects and fleet unit replacements.
- To accumulate adequate reserves for future fleet unit replacements.
- To ensure the fleet vehicles and equipment maintain the highest practical state of suitability, reliability, safety, and efficiency.
- To establish uniform criteria for the replacement of fleet units.
- To insure sound, equitable financial management of fleet assets.

Applicability

In general, all fleet units are included in the Replacement Program. Some equipment with very minimal replacement value is not enrolled in the program based on the overall life cycle cost of the unit and at the request of the user Divisions.

Roles & Responsibilities

- **Fleet Services Chief:** Responsible for managing the Fleet Replacement Program & Vehicle Replacement Fund. Provides input and recommendation regarding program policies, procedures, and Authority financial affairs.
  - Chairs and facilitates the SMFRA Apparatus Committee meetings.
  - Provides input and recommendations relative to program policies, procedures, and guidelines.
  - Compiles and provides information and data necessary for the operation of the Replacement Program.
  - Provides input and recommendations regarding additions, replacements, disposition and downsizing of fleet vehicles and equipment.
  - Assists user departments and special teams in developing specifications and requirements for fleet units.
  - Manages the Fleet Replacement Program in a manner consistent with Authority polices.
  - Provides all necessary input and information to the Fire Chief, Assistant Chiefs, Board of Directors, and Chief Finance Officer.
  - Enforces Vehicle Replacement Program policies.
  - Provides input and recommendations relative to program policies, procedures, and guidelines.
  - Reviews and makes recommendations for replacement of fleet items based on established criteria, user Department needs, and financial resources.
  - Identifies, prioritize, and submit fleet replacement and addition requests.

- **Apparatus Committee:** The apparatus committee is committed to assess critically all specifications, inspection, testing, and documentation for all emergency apparatus. The committee is dynamic in nature and designed to integrate a dedicated group while analyzing changes in the agency, NFPA requirements, manufacturing processes, technological innovations, apparatus, and equipment safety, with fiduciary responsibilities.
  - Provides input and recommendation regarding replacement specifications, program policies and procedures to authorize end-product users, including engineers, paramedics, chief officers, special teams, fleet technicians, administrative and support staff, etc.
  - Relays fleet information to staff and line personal
  - Provides input and recommendation regarding replacement specifications, program policies and procedures.

- Finance Department
  - Assists in budget development.
  - Works with Fleet Services Chief to monitor the status and availability of program funds.
  - Provides information and makes recommendations based on financial status.
  - Provides authorizations as required by District Purchasing Policies.
  - Provides an ex-officio member of the Apparatus Committee.
  - Purchasing Agent assists with bids, awards, and purchases, and confirms compliance with purchasing policies and procedures.

Replacement Guidelines

- **Purpose:** The Replacement Class System and Replacement Guidelines are used to define practical criteria and guidelines for the replacement of fleet units, to be applied in the projection of the life cycles of fleet units. The replacement guidelines outlined in this policy generally reflect the operational, technological, downtime, and financial criteria.
  - **Life Cycles:** The life cycle of fleet units is based on the "Best Practice" method recommended by industry standards. This method involves an internal customer survey and using replacement guidelines set forth in the vehicle replacement guide on our Faster Fleet Software analysis. The results are compiled and adjustments are made in order to consider factors unique to our fleet such as utilization and type of use.
  - **Replacement Class System:** The Replacement Classes and Replacement Guidelines are used to categorize the various types of fleet units and their target replacement miles, hours, and age in addition to each unit's operational feasibility while analyzing the most current technology.

Replacement Procedures

- Consideration for Replacement
  - Units that have met replacement criteria.
  - Units with replacement deferred from prior years.
  - Units that have reached 12 points or higher on the Fleet Management software.
  - Units that have excessive operating costs.
- Staff Vehicles: 7–10 years or 85,000–100,000 miles*
- Engines Aerials: 10 years frontline and 3–5 years Reserve*
- Medic Units: 7 years frontline and 3 years Reserve*
- Type III and Type VI Wildland: 20–25 years or as needed*
- Tenders, HazMat, other Specialty Units: As needed*

**As needed is based on the replacement criteria outlined above.*

APPENDIX B: NFPA 1911 ANNEX D GUIDELINES

Annex D: Guidelines for First Line and Reserve Fire Apparatus
This annex is not a part of the requirements of the NFPA document but is included for informational purposes only.

D.1 General. To maximize fire fighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities.

In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901 have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus more than 15 years old in first-line service.

It is recommended that apparatus more than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status; be upgraded in accordance with NFPA 1912; and incorporate as many features as possible of the current fire apparatus standard *(see Section D.3)*. This will ensure that, while the apparatus might not totally comply with the current editions of the automotive fire apparatus standards, many of the improvements and upgrades required by the current editions of the standards are available to the fire fighters who use the apparatus.

Apparatus that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced.

D.2 Evaluating Fire Apparatus. It is a generally accepted fact that fire apparatus, like all types of mechanical devices, have a finite life. The length of that life depends on many factors, including vehicle mileage and engine hours, quality of the preventative maintenance program, quality of the driver training program, whether the fire apparatus was used within the design parameters, whether the apparatus was manufactured on a custom or commercial chassis, quality of workmanship by the original manufacturer, quality of the components used, and availability of replacement parts, to name a few.

In the fire service, there are fire apparatus with 8 to 10 years of service that are simply worn out. There are also fire apparatus that were manufactured with quality components, that have had excellent maintenance, and that have responded to a minimum number of incidents that are still in serviceable condition after 20 years. Most would agree that the care of fire apparatus while being used and the quality and timeliness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages.

Critical enhancements in design, safety, and technology should also play a key role in the evaluation of an apparatus life cycle. Previous editions of the fire department apparatus standards featured many requirements advancing the level of automotive fire apparatus safety and user friendliness.

Contained within the 2009 edition were requirements for rollover stability; tire pressure indicators; seat belt warning systems requiring all occupants be properly seated and belted; extended seat belt length requirements resulting from an in-depth anthropometric study evaluating the average size of today's fully dressed firefighter; "roadability," including minimum accelerations and top speed limitations; enhanced step and work surface lighting; cab integrity testing; increased use of retroreflective striping in the rear of apparatus, providing a consistent identifiable set of markings for all automotive fire apparatus; and enhanced aerial control technologies, enabling short jacking and envelope controls.

D.3 Upgrading Fire Apparatus. Any apparatus, whether in first-line or reserve service, should be upgraded in accordance with NFPA 1912, as necessary, to ensure that the following features are included as a minimum:

(1) Seat belts with seat belt warning systems are available for every seat and are new or in serviceable condition.

(2) Warning lights meet or exceed the current standard.

(3) Reflective striping meets or exceeds the current standard.

(4) Slip resistance of walking surfaces and handrails meets the current standard.

(5) A low-voltage electrical system load manager is installed if the total connected load exceeds the alternator output.

(6) The alternator output can meet the total continuous load on the low voltage electrical system.

(7) Where the gross vehicle weight rating (GVWR) is 36,000 lb (16,000 kg) or more, an auxiliary braking system is installed and operating correctly.

(8) Ground and step lighting meets or exceeds the current standard.

(9) Noise levels in the driving and crew compartment(s) meet the current standard, or appropriate hearing protection is provided.

(10) All horns and sirens are relocated to a position as low and as far forward as possible.

(11) Signs are present stating that no riding is allowed on open areas.

(12) A pump shift indicator system is present and working properly for vehicles equipped with an automatic chassis transmission.

(13) For vehicles equipped with electronic or electric engine throttle controls, an interlock system is present and working properly to prevent engine speed advancement at the operator's panel, unless either the chassis transmission is in neutral with the parking brake engaged, or the parking brake is engaged, the fire pump is engaged, and the chassis transmission is in pumping gear.

(14) All loose equipment in the driving and crew areas is securely mounted in accordance with the current standard.

D.4 Proper Maintenance of Fire Apparatus. In addition to needed upgrades to older fire apparatus, it is imperative that all fire apparatus be checked and maintained regularly to ensure that they will be reliable and safe to use. The manufacturer's instructions should always be followed when maintaining the fire apparatus. Special attention should be paid to ensure that the following conditions, which are particularly critical to maintaining a reliable unit, exist:

(1) Engine belts, fuel lines, and filters have been replaced in accordance with the manufacturers' maintenance schedule(s).

(2) Brakes, brake lines, and wheel seals have been replaced or serviced in accordance with the manufacturers' maintenance schedule.

(3) Tires and suspension are in serviceable condition, and tires are not more than 7 years old.

(4) The radiator has been serviced in accordance with the manufacturer's maintenance schedule, and all cooling system hoses are new or in serviceable condition.

(5) The alternator output meets its rating.

(6) A complete weight analysis shows the fire apparatus is not over individual axle rating or total GVWR.

(7) The fire pump meets or exceeds its original pump rating.

(8) The water tank and baffles are not corroded or distorted.

(9) If the apparatus is equipped with an aerial device, a complete test to original specifications has been conducted and certified by a certified testing laboratory.

(10) If so equipped, the generator and line voltage accessories have been tested and meet the current standard.

D.5 Refurbishing or Replacing Fire Apparatus. Fire department administrators and fire chiefs should exercise special care when evaluating the cost of refurbishing or updating an apparatus versus the cost of a new fire apparatus. Apparatus that are refurbished should comply with the requirements of NFPA 1912. A thorough cost–benefit analysis of the value of upgrading or refurbishing a fire apparatus should be conducted. In many instances, it will be found that refurbishing costs will greatly exceed the current value of similar apparatus.

Some factors to consider and evaluate when determining whether to refurbish or replace a fire apparatus include the following:

(1) What is the true condition of the existing apparatus? Has it been in a major accident, or has something else happened to it that would make spending significant money on it ill advised?

(2) What advancements in design, safety, and technology have improved the efficiency and safety of personnel?

(3) Does the current apparatus meet the program needs of the area it is serving? Is it designed for the way the fire department operates today and is expected to operate in the foreseeable future, or is the apparatus functionally obsolete? Can it carry everything that is needed to do the job without being overloaded?

(4) If the apparatus is refurbished, will it provide the level of safety and operational capability of a new fire apparatus? It should be kept in mind that in many cases, refurbishing does not mean increasing the GVWR, so it is not possible to add a larger water tank or additional foam agent tanks or to carry massive amounts of additional equipment. Enclosing personnel riding areas might add enough weight to the chassis that existing equipment loads need to be reduced to avoid overloading the chassis.

(5) What is the anticipated cost per year to operate the apparatus if it were refurbished? What would the cost per year be for a new apparatus? Insurance costs, downtime costs, maintenance costs, depreciation, reliability, and the safety of the users and the public all must be considered. At what rate are those costs rising each year? Are parts still readily available for all the components on the apparatus? A refurbished 15-year-old apparatus still has 15-year-old parts in it. How long could the fire department operate without the apparatus if it suddenly needed major repairs?

(6) Is there a current trade-in value that will be gone tomorrow?

D.6 Conclusion. A fire apparatus is an emergency vehicle that must be relied on to transport fire fighters safely to and from an incident and to operate reliably and properly to support the mission of the fire department. A piece of fire apparatus that breaks down at any time during an emergency operation not only compromises the success of the operation but might jeopardize the safety of the fire fighters relying on that apparatus to support their role in the operation. An old, worn-out, or poorly maintained fire apparatus has no role in providing emergency services to a community.

APPENDIX C: NFPA 1710 RESPONSE PERFORMANCE ELEMENTS

Term	Reference Number	Definition	Performance Standard	Minimum Staff
Alarm Answering Time	4.1.2.3.1	911 call-time from first ring to answer	Within 15 seconds, 95% of the time; within 40 seconds, 99% of time	N/A
Alarm Transfer Time	4.1.2.3.2	Time from receipt of alarm at PSAP until alarm receipt at dispatch	Within 30 seconds, 95% of time	N/A
Alarm Processing Time	4.1.2.3.3	Call process-time from acknowledged at dispatch until unit notification	Within 64 seconds, 90% of the alarms & within 106 seconds, 95% of alarms	N/A
Alarm Processing Time–Exceptions	4.1.2.3.3.1	1. Calls requiring EMD & pre-arrival medical instructions 2. Calls requiring language translation 3. Calls requiring use of TTY/TDD device or audio/video relay services 4. Calls of criminal activity requiring information vital to responder safety prior to dispatching units 5. Hazardous material incidents 6. Technical rescues 7. Calls requiring determining location of alarm due to lack of information 8. Calls received by text	Within 90 seconds, 90% of time; within 120 seconds 99% of time	N/A
Turnout Time	4.1.2.1(2) 4.1.2.4	Time from notification of response personnel until initiation of movement towards incident	Within 80 seconds for fire & special operations response, 90% of time; within 60 seconds for EMS response, 90% of time	N/A
Travel Time–Fire	4.1.2.1(3) 4.1.2.4	Time begins when engine is en route to incident & ends when unit arrives at scene	Within 4 minutes travel time for arrival of first arriving engine, 90% of time	N/A
Travel Time–EMS	4.1.2.1(6) 4.1.2.4	Time begins when an unit with AED or higher-level capability is en route to incident & ends at arrival at scene	Within 4 minutes travel time for arrival of unit with 1st responder with AED or higher-level capability at an EMS Incident, 90% of time	N/A

Term	Reference Number	Definition	Performance Standard	Minimum Staff
Travel Time–ALS (when FD based)	4.1.2.1(7) 4.1.2.4	Time begins when unit with ALS capability is en route to incident & ends at arrival at scene	Within 8 min. travel time for arrival of ALS unit at EMS incident, provided a first responder with AED or BLS arrived in 4 minutes or less travel time, 90% of time	N/A
Travel Time–Full Alarm Assignment (residential fire)	4.1.2.1(4) 4.1.2.4 5.2.4.1	Initial full-alarm assignment to structure fire in typical 2,000 ft² two-story single-family dwelling without basement or exposures	Within 8 min. travel time for deployment of initial full alarm at fire suppression incident, 90% of the time	14 FFs, or 15 w/aerial (5.2.4.1.1)
Travel Time–Full Alarm Assignment (open-air strip mall fire)	4.1.2.1(4) 4.1.2.4 5.2.4.2	Initial full-alarm assignment to structure fire in open-air strip shopping center from 13,000 ft² to 196,000 ft²	Within 8 min., travel time for deployment of an initial full alarm at fire suppression incident, 90% of time	27 FFs, or 28 w/aerial (5.2.4.2.1)
Travel Time–Full Alarm Assignment (apartment fire)	4.1.2.1(4) 4.1.2.4 5.2.4.3	Initial full-alarm assignment to structure fire in typical 1,200 ft² apartment within three-story, garden-style apartment building	Within 8 min. travel time for deployment of an initial full alarm at fire suppression incident, 90% of time	27 FFs, or 28 w/aerial (5.2.4.3.1)
Travel Time–Full Alarm Assignment (high-rise fire)	4.1.2.1(4) 4.1.2.4 5.2.4.4	Initial full-alarm assignment to fire in building with highest floor greater than 75 ft above lowest level of FD vehicle access	Within 8 min. travel time for deployment of an initial full alarm at fire suppression incident, 90% of time	46 FFs (5.2.4.4.1)
Total Response Time	3.3.53.6	Time from receipt of alarm at the primary PSAP to first emergency response unit is initiating action or intervening to control incident.	Too many variables, depends on call type—no standard for initiation action or intervening to control incident	Depends on call type
Response Time–Fire & Special Operations (ERF)	Accumulation of Turnout & Travel Times	The initial full alarm assignment arrives	Within 9 min., 20 sec., 90% of time	Depends on call type
1st Unit Response Time–Fire & Special Operations	Accumulation of Turnout & Travel Times	Fire and special operations incidents	Within 5 min., 20 sec., 90% of time	4 FFs (5.2.3.1.1)
1st Unit Response Time–BLS EMS	Accumulation of Turnout & Travel Times	Emergency medical incidents	Within 5 min., 90% of the time	Typically 2 BLS certified personnel 5.3.3.2.1
ALS Unit Response Time–ALS EMS	Accumulation of Turnout & Travel Times	ALS EMS incidents where FD provides BLS 1st response	Within 9 min., 90% of time (if FR w/AED or BLS unit arrived in 4 min. or less travel time)	Typically 2 5.3.3.2.1

APPENDIX D: NFPA 1720 RESPONSE PERFORMANCE ELEMENTS

Term	Reference Number	Definition	Performance Standard
Alarm Answering Time	4.1.2.3.1	911 call from first ring to answer	Not defined or measured
Alarm Transfer Time	4.1.2.3.2	Time from receipt of alarm at PSAP until alarm receipt at communication center	Not defined or measured
Alarm Processing Time	4.1.2.3.3	Call-process time from acknowledged at the dispatch center until notification of units	Not defined or measured
Alarm Processing Time–Exceptions	4.1.2.3.3.1	1. Calls requiring EMD questioning & pre-arrival medical instructions 2. Calls requiring language translation 3. Calls requiring use of a TTY/TDD device or audio/video relay services 4. Calls of criminal activity that require information vital to responder safety prior to dispatching units 5. Hazardous material incidents 6. Technical rescue 7. Calls requiring determining location of alarm due to insufficient information 8. Calls received by text	Not defined or measured
Turnout Time	4.1.2.1(2) 4.1.2.4	Time from notification of response personnel until initiation of movement towards the incident	Where staffed stations provided as defined by AHJ: Within 90 seconds for fire & special operations, 90% of time Within 60 seconds for EMS, 90% of the time
Travel Time–Fire	4.1.2.1(3) 4.1.2.4	Time begins when an engine company is en route to incident & ends when unit arrives at scene	Not defined or measured
Travel Time–EMS	4.1.2.1(6) 4.1.2.4	Time begins when unit with 1st responder AED or higher-level capability at EMS Incident & ends when unit arrives at scene	Not defined or measured
Travel Time–ALS (when FD based)	4.1.2.1(7) 4.1.2.4	Time begins when unit with ALS capability at EMS Incident & ends when the unit arrives scene	Not defined or measured
Travel Time–Full Alarm Assignment (residential fire)	4.1.2.1(4) 4.1.2.4 5.2.4.1	Initial full-alarm assignment to structure fire in typical 2,000 ft² two-story single-family dwelling without basement & no exposures	Not defined or measured

Term	Reference Number	Definition	Performance Standard
Travel Time–Full Alarm Assignment (open-air strip mall fire)	4.1.2.1(4) 4.1.2.4 5.2.4.2	Initial full-alarm assignment to structure fire in open-air strip shopping center ranging from 13,000 ft² to 196,000 ft²	Not defined or measured
Travel Time–Full Alarm Assignment (apartment fire)	4.1.2.1(4) 4.1.2.4 5.2.4.3	Initial full-alarm assignment to a structure fire in typical 1,200 ft² apartment within three-story, garden-style apartment building	Not defined or measured
Travel Time–Full Alarm Assignment (high-rise fire)	4.1.2.1(4) 4.1.2.4 5.2.4.4	Initial full-alarm assignment to fire in building with highest floor greater than 75 ft above lowest level of FD vehicle access	Not defined or measured
Response Time–Fire & Special Operations (ERF)	Table 4.3.2	Fire and special operations incidents	• Urban area > 1,000 people/mi²—15 FFs delivered within 9 min., 90% of time • Suburban area 500–1,000 people/mi²—10 FFs delivered within 10 min., 80% of time • Rural area < 500 people/mi2—6 FFs within 14 min., 80% of time • Remote area Travel distance ≥ • 8 miles—4 FFs within timeframe dependent on travel distance, 90% of time • Special risks determined by AHJ; minimum FFs, response time, risk determined by AHJ 90% of time
Response Time–EMS	Accumulation of Turnout & Travel Times	Emergency medical incidents	EMS operations shall be organized to ensure FD's EMS capability includes personnel, equipment, & resources to deploy initial arriving company & additional alarm assignments. (no specific standard)
Initiation of Fire Attack	4.3.4	Upon assembling necessary resources at emergency scene, FD shall have capability to safely commence initial attack (determined by population density, or AHJ for special risks)	Within 2 minutes, 90% of time.

APPENDIX E: TABLE OF FIGURES

APPENDIX F: REFERENCES

[1] QuickFacts, United States Census Bureau.

[2] Ibid.

[3] American FactFinder, United States Census Bureau.

[4] Ibid.

[5] Completed survey table by NWFR, based on 2015 U.S. Census.

[6] Washington Survey & Rating Bureau website.

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

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

[9] NFPA 1720: Standard for the Organization & Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments; National Fire Protection Association.

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

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

[12] 349 Code of Federal Register 395.1-5.

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

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

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

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

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

[19] Ibid

[20] Whatcom County BLS Protocols, 2018.

[21] Washington State Administrative Code: 246-976-163.

[22] Training Gaps Nearly Kill Key Largo Firefighter, FL Keys News, 2017

[23] BestPlaces, Whatcom County.

[24] Washington State Employment Security Department.

[25] U.S. Census Bureau (2013–2017)

[26] Ibid.

[27] American FactFinder, U.S. Census Bureau.

[28] Whatcom County Sheriff's Office.

[29] Whatcom County Sheriff's Office, Emergency Management.

[30] Washington Survey Rating Bureau.

[31] Birch Bay Chamber of Commerce.

[32] Number of Commissioners in District—Terms of First Appointees, RCW 52.14.020.

[33] Decrease in the Number of Commissioners—Election—Disposition of Commissioner Districts, RCW 52.14.017.