VALLEY REGIONAL FIRE AUTHORITY

2021 STANDARDS OF COVER

The VRFA proudly serves the Washington State Communities of Algona, Auburn, and Pacific

VRFA Headquarters Station #31
1101 D Street NE, Auburn WA 98002

INTRODUCTION

This document serves as the Valley Regional Fire Authority's (the Agency) Standard of Cover (SOC). The purpose of this SOC is to identify and assess local needs regarding community risk and response capabilities, allowing the Agency to make strategic decisions based on factual information. This SOC contains evidence-based research to identify and evaluate current performance levels (baseline) and to help determine the Agency's target performance levels (benchmarks) that will contribute to a process of continual improvement.

During the development phase of this document, the Agency engaged community stakeholders throughout the service area to develop outcome expectations for the accreditation process. Also, the internal SOC team analyzed many factors, including but not limited to: population density, demographics, socio-economic factors, community profiles, hazards, community risks, job task analysis, and emergency response data. This evaluation process identified the need to formally document the types and magnitude of area hazards to make informed decisions concerning performance level requirements.

Finally, an emphasis was placed on documenting a logical and systematic process for identifying, assessing, analyzing, categorizing, and classifying risks within the Agency's response area. Ultimately, the analysis of these factors will lead to the justification for fire department resources, response planning, the adoption of response time standards, and the prioritization of strategies for community risk reduction.

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

The Valley Regional Fire Authority (VRFA) exists to provide fire suppression, emergency medical, technical rescue, and hazardous materials response. Additionally, the VRFA provides public information, education, investigation, and risk reduction inspections services to preserve and protect lives and property within the communities of Algona, Auburn, and Pacific.

As the first fire authority in Washington State, the members of the VRFA proudly serve the three communities with pride, integrity, courage, and respect. The VRFA SOC defines expectations and creates an avenue to measure, evaluate, and improve performance while maintaining the necessary levels of accountability to stakeholders, taxpayers, and supporters. At the VRFA, periodical self-evaluation helps to set, evaluate, and improve performance standards and related goals for achieving measurable outcomes.

This document contains a detailed risk analysis based on historical information and data to quantify and categorize risk levels, to effectively prioritize response methodology. Although this process of rating risks is relatively subjective, the methodology used is founded upon sound mathematical fundamentals and service level standards.

This document provides information and detail regarding VRFA resources, services, staffing, and deployment.

- Section I includes historical information and an overview of the legal basis and funding mechanism
- Section II identifies the specific characteristics of the VRFA and the services provided
- Section III contains the Community Risk Assessment (CRA), detailing and ranking the potential hazard events based on probability and severity for the community and the Agency
- Section IV identifies current levels of performance based on the last three years of data
- Section V evaluates those factors of performance
- Section VI discusses the overall plan for improvement and maintenance
- Section VII provides a correlation to the overall accreditation process

Currently, the VRFA is reliably providing services that meet the needs of the community and address the hazards present in the CRA. Ultimately, the primary purpose of the SOC is to establish the necessary performance standards to help the Agency reduce performance gaps ensuring that we continue to meet the expectations of those we serve.

VALLEY REGIONAL FIRE AUTHORITY MISSION, VISION, & VALUES

Mission Statement

We serve the whole community. The VRFA saves lives and protects property through reliable emergency services, preparedness and prevention.

Vision Statement

Creating the safest community to live, work and visit.

Guiding Values

Selfless Service, Integrity, Grit

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Legal Basis for Agency

In 2004 the Washington State Association of Fire Chiefs (WSAFC) led legislative efforts to provide fire districts, municipalities and tribal nations with the ability to "formally" join together under the provision of fire and emergency services. This ability had formally been available through mergers (between fire districts), and annexations (cities into fire districts or other unincorporated territory protected by a fire district) using inter-local agreements or contractual consolidations. This new formation, adopted by the State Legislature in 2004, allowed municipalities and fire districts to create a "Regional Fire Authority" (RFA). An RFA is a municipal corporation that is not bound by strict guidelines for which entities can join together. An RFA, organized under Title 52 of the Revised Code of Washington (RCW), is similar to a fire district in many ways, but also has a few distinct differences, mainly a planning committee for the formation and a funding model related to taxation and a benefit charge. The approval of an RFA required a public vote with a super majority (60% + 1). Voters in the cities of Algona, Auburn, and Pacific approved Proposition 1 in November of 2006, and the Valley Regional Fire Authority (VRFA) was officially established on January 1, 2007, effectively becoming the first Regional Fire Authority in Washington State.

Historic Perspective

The Formation of the VRFA combined the resources of the Pacific and Auburn Fire Departments. Fire and emergency medical services (EMS) for the City of Algona were provided via contract by the Legacy Auburn Fire Department previous to the formation of the VRFA.

The legacy Auburn Fire Department was established in 1890, in response to a devastating fire that destroyed an entire city block. The original department, consisting of all-volunteer firefighters, had a horse-drawn hose cart and was first named "The Auburn Bucket Brigade." In 1908, the name changed to "The Auburn Volunteer Fire Department." In 1922 the City purchased its first fire truck, a Ford Model T, for $2,292 and hired its first paid firefighter in 1926.

Old No. 1 - This 1922 Model "T" Ford was the first motorized apparatus for the Auburn Fire Department. The heroes in the photo (L to R) are: Ray Starwich, Dewey Ballard, Ben C. Gosney, William Packard, Chief Ralph Brooks, Hugh Lewis, Ernest Fisher and Asst. Chief Hugh Leslie. *Courtesy Auburn Fire Department- Steve Shropshire*

Photo 1: 1922 Auburn Fire Department

As the organization transitioned to a more modern fire Agency, the single station operation relocated from the core of downtown Auburn to 700 Auburn Way North, known today as: “Fire House Square.” Firefighters responded from 700 Auburn Way north for 25 years (1959 to 1985) before changing to a two-station operation (one station north and one south). At the time of the formation of the VRFA, the Auburn Fire Department was comprised of an all career staff of approximately 70 personnel and operated out of three fire stations.

The Legacy Pacific Fire Department was formed in 1932 and was a volunteer organization, operating a 1922 Packard Touring Vehicle, stationed in a feed store next to City Hall. In 1979, the City of Pacific opened its "Public Safety Building" that housed the city police and fire departments. In 1994, the Legacy Pacific Fire Department hired its first full-time Fire Chief, followed in 1997 by its first full-time firefighter. At the time of the formation of the VRFA in 2007, the Legacy Pacific Fire Department had a paid full-time Fire Chief, two paid captains, two paid firefighters, and 22 volunteers.

Photo 2: Legacy Pacific Fire Department

In 2007, VRFA firefighters responded from three stations strategically located throughout the service area. In 2008, the annexation of the Lea Hill Area, formally served by King County Fire District 44, was annexed by the City of Auburn. The VRFA added an existing fire station and ten new firefighters, transfer employees from the Fire District, in the annexation agreement. In 2009, the VRFA opened a new fire station, station 33, on the southeast border of the service area.

Presently, the VRFA responds from five fire stations to over 13,000 requests for service annually with 108 uniformed first responders. Finally, the VRFA serves the cities of Algona, Auburn, and Pacific as well as a small portion of unincorporated areas of King County, known as "Fire District 31".

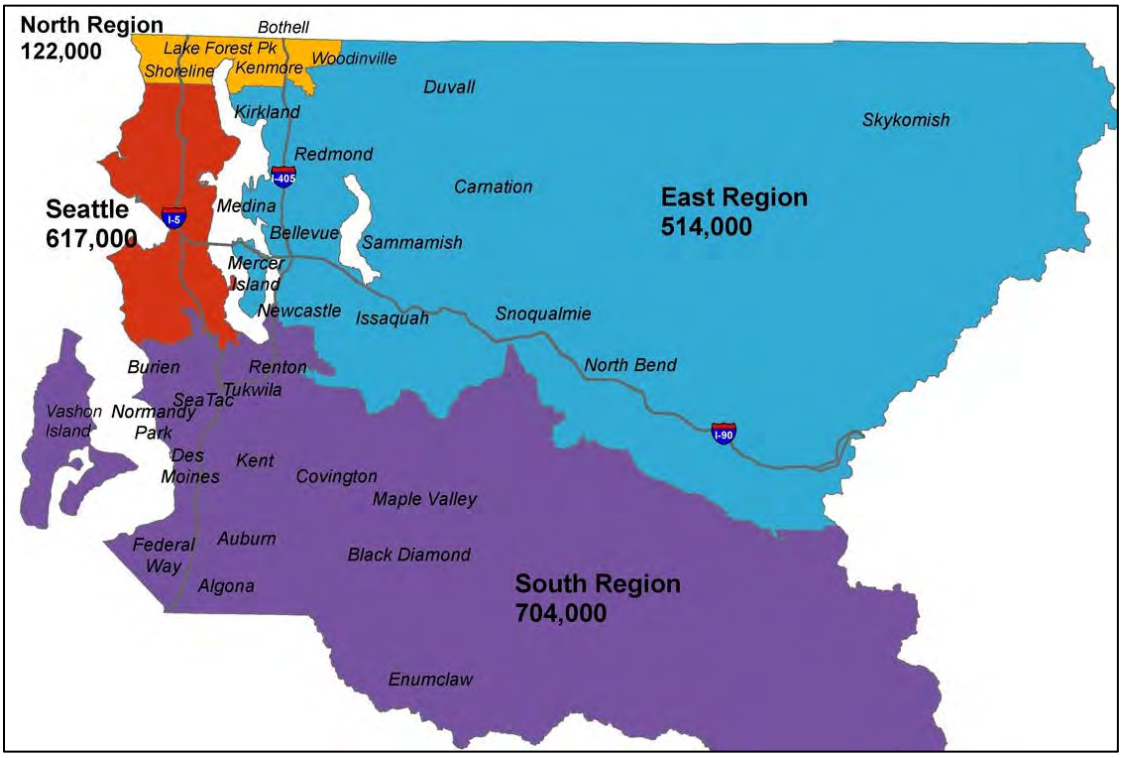
Governing Authority

The VRFA is a regional fire authority operating under the RCW Title 52.26 Regional Fire Protection Service Authority. Under section 52.26.060, The VRFA applies taxing authority and a benefit charge to provide the necessary revenue to fund operations. Additionally, under section 52.26.080, the VRFA organized a nine-person governing board comprised of the Mayors from the three member cities and a total of six council members, two from each city, to govern the VRFA. This "Board of Governance" appoints the VRFA "Fire Chief / Administrator" to guide the organization under the applicable legal requirements to execute all resolutions, contracts, and agreements.

Area Description

The VRFA service area is located in the western part of Washington State and is approximately twenty miles south of Seattle in urban / suburban King County. The VRFA lies within King County's Zone 3, one of several emergency coordination zones established by King County. A critical facet of the VRFA's operations is responding via mutual or automatic aid to the numerous partners within Zone 3, which collectively serves 16 cities and a population of over 725,000. The VRFA also supports regional emergency services by contributing assets to strike team / task force requests by the other major population centers within King County (see figure one below). Such services may be rendered during major fires or incidents involving hazardous materials, technical rescue, mass casualties or acts of terrorism and are coordinated through the King County Fire Resource Plan, the Washington State All-Hazards Mobilization Plan, and other inter-local agreements.

Figure 1: Community Count Regions, King County 2012



Service Area Critical Infrastructure

The VRFA service area hosts critical infrastructure that is of crucial importance to the western United States, including essential transportation, manufacturing and distribution components, as well as crucial government, energy, and retail assets.

In 2001, a new commuter rail and bus station opened in the downtown area of the City of Auburn, which carries hundreds of commuters from Auburn to Seattle (northbound) and from Auburn to Tacoma (southbound) each day. An adjacent six-story commuter-station parking-garage can house nearly 550 vehicles (park and ride commuters).

Two major freight carriers, Burlington Northern Santa Fe (BNSF) and Union Pacific, also serve the area from a large rail yard located just south of downtown Auburn. The Federal Aviation Administration's "Seattle Center" (southeast Auburn) manages the airspace of Washington, Oregon, northern California and parts of Idaho and Montana, effectively handling over 1.5M airspace operations annually. Auburn is 15 miles from the Seattle-Tacoma International Airport and the Port of Tacoma, and just 20 miles from the Port of Seattle, the closest deep-water port to Alaska and the Far East. State Highways 18 and 167 bisect Auburn along two axes. These major arterials connect to Interstate 5, the west coast's primary north-south freeway system. In addition to rail and vehicle transportation Auburn operates one of the busiest Municipal Airports in the state of Washington; this 110-acre facility, which is just eight nautical miles south of Seattle-Tacoma International Airport, houses over 320 aircraft and runs over 450 operations per day.

In addition to transportation, significant manufacturing and distribution functions occur within the VRFA's service area. The Boeing Corporation operates a large fabrication facility within the city of Auburn that employs several thousand workers. In south Auburn, Safeway Incorporated operates a 116-acre distribution facility that includes a 538,000 square foot dry goods warehouse as well as a 515,000 square foot refrigerated warehouse that serves the northwestern portion of the United States. The federal government's General Service Administration's northwest / Arctic Regional Headquarters resides in Auburn on a 134-acre complex that is shared by the VRFA's Station 35. Two major pipelines also run through the service boundaries: the Olympic gasoline pipeline and the Williams natural gas pipeline.

The Outlet Collection Seattle (super mall), the Emerald Downs Race Track, the Muckleshoot Casino, the Auburn Performing Arts Center, the White River Valley Museum, and the Washington National Golf Course all reside within the VRFA's service area and provide tremendous economic benefit to the entire region. The Muckleshoot Indian Tribe is south King County's second largest employer with over 1,400 employees working within the city of Auburn. The White River Amphitheater, which is just outside the VRFA's southeastern boundary, also provides seating for 17,000 people for concerts, graduation ceremonies or other functions that require a large seating capacity.

In addition to critical infrastructure growth over the last several decades, the VRFA three member cities have also seen dramatic growth in residential and commercial housing. Recently the area has seen a significant increase in large assisted living facilities and senior housing. These types

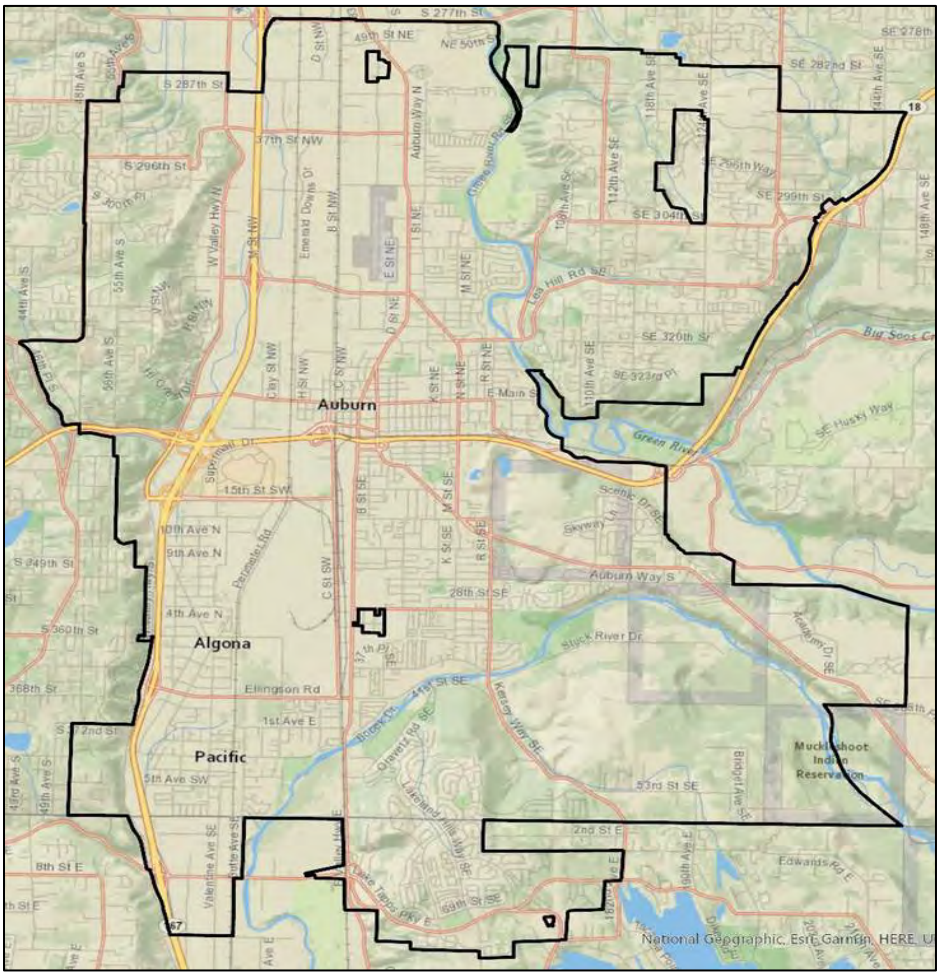
of facilities have stressed resources due to an increase in requests for service with the aging population.

Communities Served

The VRFA serves the cities of Algona, Auburn, and Pacific in addition to all small portion of unincorporated King County known as Fire District 31. The service area is 37 square miles of urban area with a balanced mix of small businesses, manufacturing, and residential structures. The response district borders are as follows:

- North – South 277th Street
- East – 148th Avenue South
- South – 73rd Street East
- West – 51ST Avenue South

Figure 2: VRFA Service Area Map



City of Algona

The City of Algona is located 28 miles south of Seattle, situated between the City of Auburn to the north and the City of Pacific to the south. Algona is known for its wetlands, herons, and other wildlife. The community was developed by homestead settlers in the 1870s and 1880s, and the completion of the Seattle-Tacoma Interurban Railway in 1902 brought growth to the area. The area was platted in 1906, and a post office was established in 1909. Soon after, businesses began to open to serve the community, while crops -- vegetables, fruits, and dairy products -- were cultivated in large part by Japanese-American and Filipino-American farmers. Algona incorporated in 1955, and the blue heron serves as the city's logo.

The Boeing Company opened a fabrication plant in Auburn in 1965, which resulted in some traffic challenges for Algona residents. In response, Algona Boulevard was developed, and State Route 167 (the state highway traversing Algona) was extended to the City of Tacoma (southbound). Around the same time, a new water-supply system was developed, replacing the existing water district and sewer system.

In 1973, the Algona Elementary School closed and a new school was built on Milwaukee Boulevard, named "AlPac Elementary." In 1975, the old Algona Elementary School building was renovated and became Algona City Hall - housing both the police department and the library.

In 1980, the population increased to 1,467 as major businesses opened. Such companies included the Tharco Manufacturing Plant, which developed packaging products for shipping, display, and in-plant-handling applications; Dyna Craft, a manufacturer of medium and heavy-duty trucks; and AccuDuct, manufacturing duct systems, and sheet metal components.

In 1986, Tim's Cascade Style Potato Chips (“Tim’s”) was established in Auburn. Tim’s developed a facility in Algona that produced chips and snacks, and even had the company headquarters located in Algona for some time.

Throughout its history, Algona has maintained its strong sense of community in a small-town setting.

City of Auburn

The City of Auburn, located 20 miles south of Seattle, was home to some of the earliest non-Indian settlers in King County. Nestled in a fertile river valley, Auburn has been both a farm community and a center of business and industry for more than 150 years. Auburn is located near the original confluence of the Green and White rivers, both of which contain runoff water from the Cascade Mountain range. The valley was originally the home of the Skopamish, Smalhkamish, and Stkamish Indian tribes. Today, the Muckleshoot Tribal Reservation land is located in southeast Auburn.

The first foreign / outside explorers and traders reached the region in the 1830s, with many settlers first arriving in the 1850s. The arable land, the abundant salmon, and the proximity to both Puget Sound and the mountain passes made it an ideal location for settler farmers and fishermen wishing

to sell their goods. From the 1860s to the late 1880s, Auburn had been a bustling center for hop farming, but an aphid infestation in 1890 destroyed nearly all of the crops. Moving forward, most of the farms were dairy farms and berry farms. While the land was very fertile, area farmers continually faced annually flooding, resulting in logjams that would redefine the course of the water flow. Eventually, government engineers stepped in and built a diversion dam to channel the water along the Stuck River.

Another impetus to Auburn's growth was the railroad; the Northern Pacific Railroad put a rail line through Auburn in 1883, followed in 1902 by the Seattle-Tacoma Interurban line ("the Interurban"). The Interurban allowed farmers to get their product to the markets within hours after harvest, boosting the local economy. The railroad, coupled with improving roads, resulted in many new businesses in Auburn, among them the Borden Condensery and the Northern Clay Company (operational in Auburn from 1905-1927). The Interurban served the valley area for 26 years, ending service on December 30, 1928.

The post-WWII era was prosperous for Auburn, bringing more businesses and a community college to the city. In 1963, The Boeing Company built a large facility to mill sheet metal skin for jet airliners. As time went on, many farms disappeared as the land was converted for industrial use. In the 1990s, a sizeable mall (the Outlet Collection Seattle) was built in the valley, attracting consumers from all over the Puget Sound region. Additionally, the Muckleshoot Indian Tribe beginning in 1995, vigorously pursued economic development projects that led to the creation of the Muckleshoot Mall, the Muckleshoot Casino, and the White River Amphitheater. Today the tribe oversees 1,400 jobs on a $31 million payroll, making it the second largest employer in southeast King County. Proceeds from these ventures support tribal members, programs and local charities.

City of Pacific

The City of Pacific straddles the King County - Pierce County line, 28 miles south of Seattle, with the City of Algona to the north and the cities of Sumner and Edgewood to the south. The community arose after the Seattle-Tacoma Interurban Railway began service in 1902, bringing growth and development to the White River Valley area. Shortly after, real-estate developer Clarence Dayton Hillman platted the town of "Pacific City" in 1906.

The growth of the hop as a crop spread throughout the White River Valley in both King and Pierce counties in the 1880s and 1890s, bringing prosperity to local communities. As a result, the population increased, new businesses opened, and more homes were built. However, in 1890 an epidemic of plant lice (aphids) destroyed nearly all the hops, and despite efforts eradication efforts, hop harvesting ended within the year. Moving forward, local farmers began focusing on growing potatoes, vegetables, and fruit.

In 1909, Pacific incorporated as a town, reporting a total population of 413 in 1910. By then, Third Avenue was the center of the town, and early businesses included: Arnold's Hotel, Cook's Grocery, Loofborrow's Bakery, Cox's General Mercantile (later called Wadell's Store), a blacksmith shop, a grocery and feed store, and a livery stable.

In 1919, the Pacific City Electric Light System was built by the community and run by James Edward Dyler. As the city grew, the system quickly became inadequate and electric service was taken over by Puget Power. The Pacific Fire Department, organized in 1932 by Marion Hugh's, chose their first Chief (Carl Nyberg) who held the position until retirement in 1972. In 1976, the fire department moved into a new building at 133 Third Ave SE.

The installation of sewage systems throughout the valley hastened the conversion of farmland for industrialization in the 1970s. Land became more valuable, resulting in increasing taxes. Farmers became unable to grow and sell enough crops to pay these assessments and found it hard to get produce into major supermarkets. The supermarkets and other retail chains also impacted the local business community, and most of the small businesses that served Pacific over the years eventually went out of business except for Gius' Market. Today Pacific still maintains a small-town atmosphere and is known as a quaint Washington town.

Area Topography and Geology

The VRFA is located in Western Washington, in the lowland area between the Olympic Mountains and the Cascade Range, where many rivers and valleys have developed over time. The valley extends the length of the response area from north to south. The elevation of the valley portion of the service area is relatively low, with an average elevation of approximately 70 feet above sea level. The area is considered to be part of the Greater Puget Sound Region. The area terrain was created by a drift plain that stretches from the Olympics across the lowland to the Cascades. In the valley, hills rise to the east and west, and while this terrain creates a beautiful landscape, these hills affect emergency responses. Hillsides above a 15% slope are considered landslide hazard areas and can be adversely affected by the effects of local runoff, drainage problems, and seismic events.

Area Climate

The service area has a maritime climate; atmospheric conditions over the Pacific Ocean heavily influence the weather. About two-thirds of the Pacific Northwest precipitation occurs during half of the year (October through March), and due to the Pacific storm track, much of this precipitation is captured in the mountains. Precipitation begins to decline in late spring / early summer with high-pressure systems to the west, generally keeping the region relatively dry with pleasant summertime temperatures.

On average, the service area experiences mild summers (low / mid 60's to the high 70's) and damp cool winters (mid to low 30's). The average annual high / low temperatures are 62 / 44 degrees Fahrenheit, respectively. On average, the area receives 43 inches of yearly rainfall, compared to the US average of 39 inches per year. Snowfall averages about 5 inches per year in the Puget Sound lowlands and tends to be in short timeframes. See table 1 below for more detailed information about the average temperatures and precipitation by month.

As the climate continues to change in King County, it is predicted that the area will experience increased rainfall, more flooding from extreme precipitation events, a decline in the snowpack in

the mountains, rising sea level along the Puget Sound shoreline and more severe droughts during summer months.

Table 1: Average Temperatures & Precipitation by Month, City of Auburn

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F	64	71	81	86	92	100	99	99	96	86	74	69	100
Average high °F	47	51	55	61	67	72	77	78	72	62	52	46	62
Average low °F	35	36	39	42	47	52	55	55	51	44	39	35	44
Record low °F	−10	−5	10	25	27	33	38	34	28	24	−1	3	−10
Average precipitation **mm**	130	110	100	74	53	43	23	30	46	86	150	150	940
Source: Weather.com													

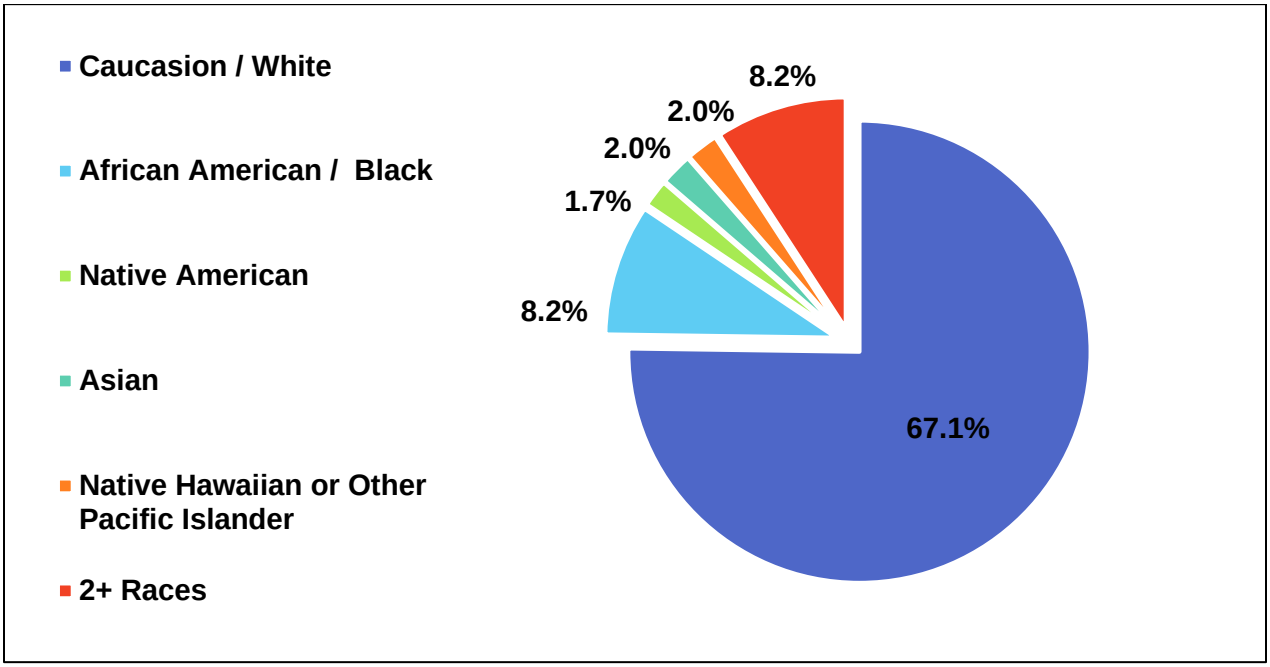
Area Population

City of Algona

The 2017 ACS estimated population of Algona was 3,171. Parts of Algona have seen growth in medium density single-family development. Generally, residential areas have seen development consistent with moderate population growth, while the commercial sector has remained somewhat dormant.

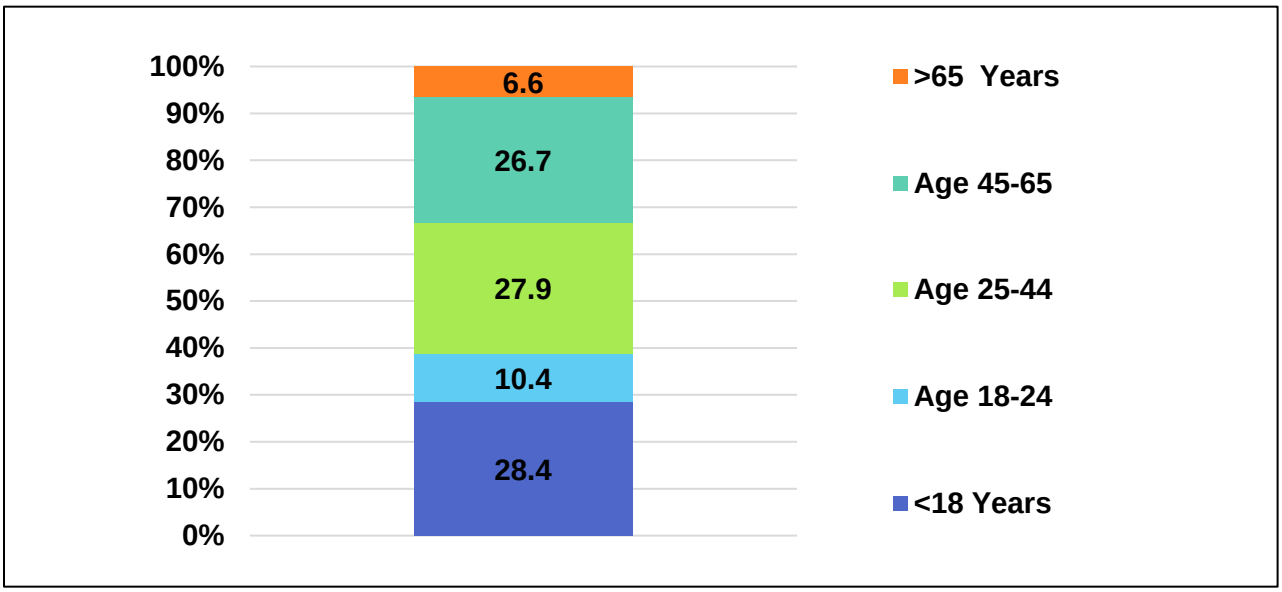
According to the 2017 ACS estimate, the 67.1% of the population identified their race as Caucasian / White, 8.2% as African American / Black, 11.7% Asian, 2.0% Native Hawaiian / Pacific Islander, 1.7% Native American and 8.2% as two or more races. Too, 19.2% of the population considered their ethnicity to be Hispanic / Latino (see figure 3 below).

Figure 3: Racial Makeup, City of Algona 2017



As for gender, the 2017 ACS estimate indicated that 50.8% of the population identified as male and 49.2% identified as female. The age group breakdown for the city (2017) was: 28.4% age under 18 years; 10.4% age 18-24; 27.9% age 25-44; 26.7% age 45-65 and 6.6% age 65 and over (See figure 4 below).

Figure 4: Age Makeup, City of Algona 2017

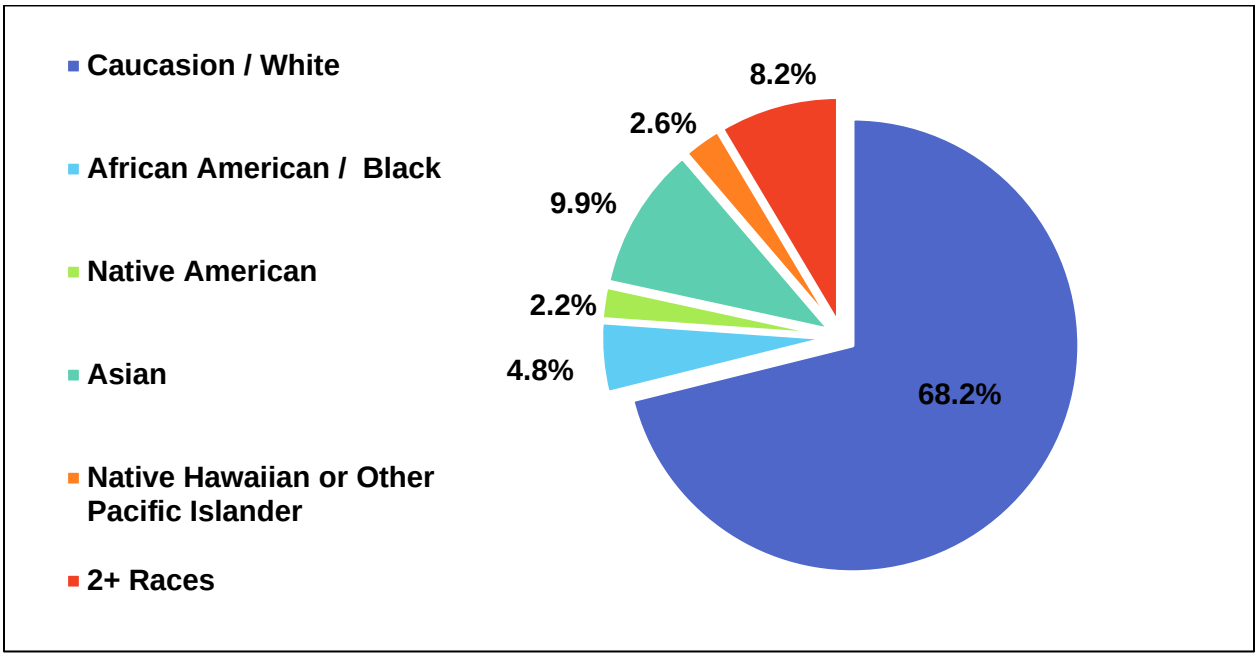


City of Auburn

The city of Auburn is ranked as the 14th most-populated city within the state of Washington, with a population of approximately 77,440 (2017 ACS 5-year population estimate). Proximity to both the City of Seattle and the city of Tacoma, combined with a prime central location within the Puget Sound, has helped Auburn grow at a steady rate.

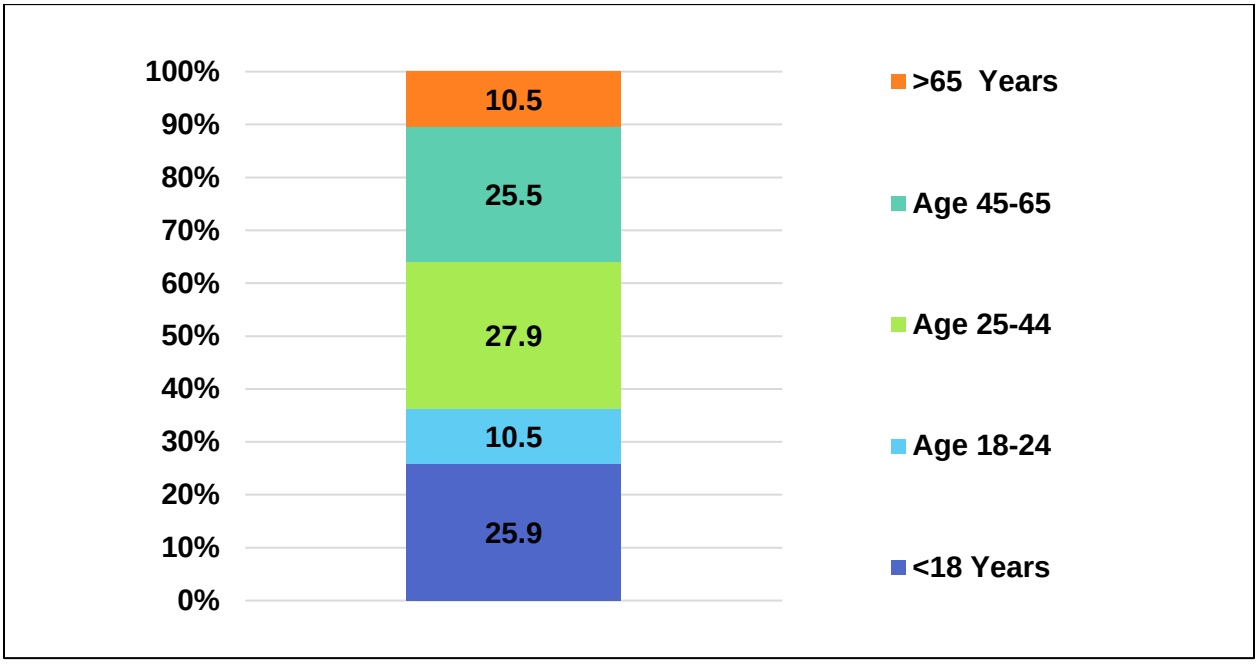
According to the 2017 ACS estimate, 68.2% of the population identified their race as Caucasian / White, 9.9% as African American / Black, 4.8% Asian, 2.6% Native Hawaiian / Pacific Islander, 2.2% Native American and 8.2% as two or more races. Too, 14.4% of the population considered their ethnicity to be Hispanic / Latino (see figure 5 below).

Figure 5: Racial Makeup, City of Auburn 2017



As for gender, the 2017 ACS estimate indicated that 48.8% of the population identified as male and 51.2% identified as female. The age group breakdown for the city (2017) was: 25.9% age under 18 years; 10.5% age 18-24; 27.9% age 25-44; 25.5% age 45-65 and 10.5% age 65 and over (see figure 6 below).

Figure 6: Age Makeup, City of Auburn 2017

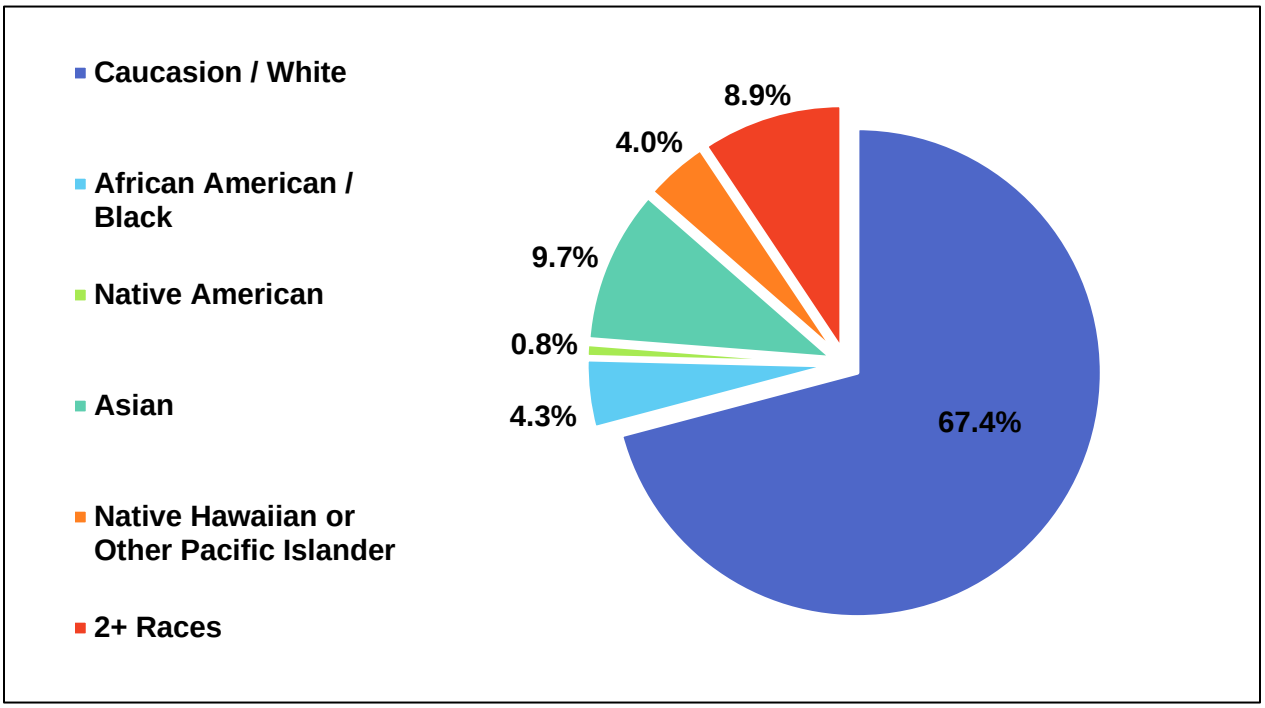


City of Pacific

The 2017 ACS estimated population of Pacific was 7,113. The community has grown substantially over the past three decades, and the primary source of growth in the coming years will be in-migration and should reflect the general increases in population expected in King County. Due to the city of Pacific's location along major transportation routes to Seattle (North) and Tacoma (South), it is expected that Pacific will continue to grow in population as a commuter community.

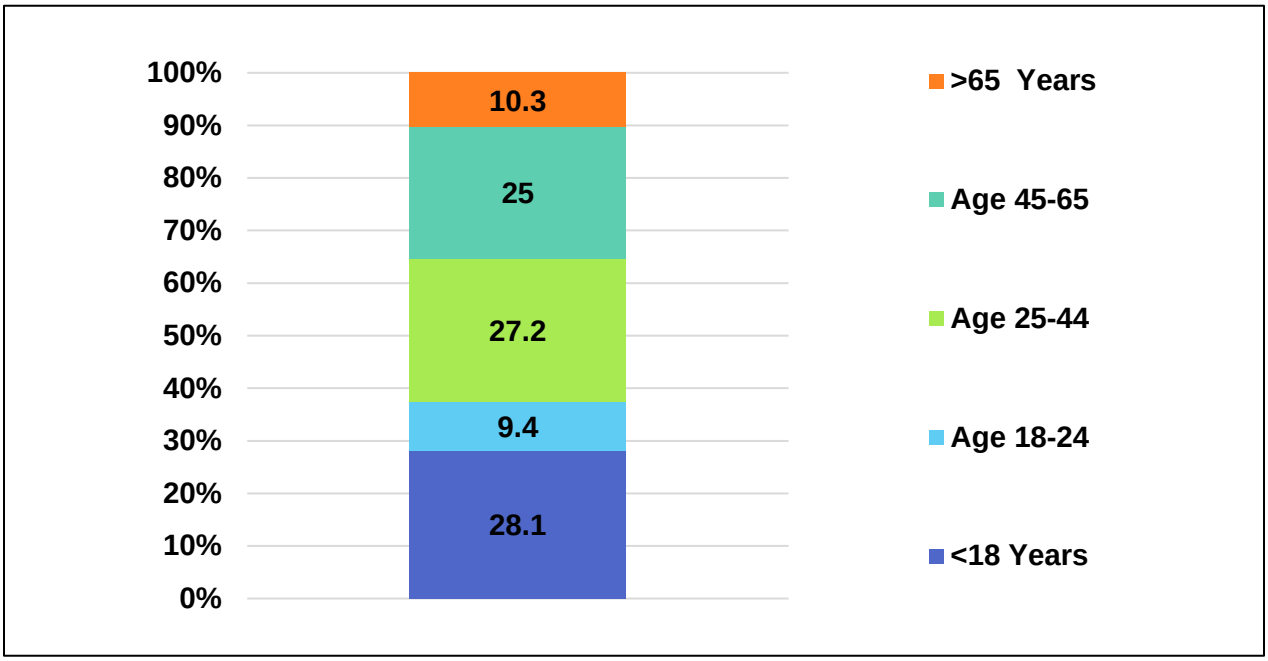
According to the 2017 ACS estimate, the 67.4% of the population identified their race as Caucasian / White, 4.3% as African American / Black, 9.7% Asian, 4.0% Native Hawaiian / Pacific Islander, 0.8% Native American and 8.9% as two or more races. Too, 19.9% of the population considered their ethnicity to be Hispanic / Latino (figure 7 below).

Figure 7: Racial Makeup, City of Pacific 2017



As for gender, the 2017 ACS estimate indicated that 48.2% of the population identified as male and 51.8% identified as female. The Age group breakdown for the city (2017) was: 28.1% age under 18 years; 9.4% age 18-24; 27.2% age 25-44; 25.0% age 45-65 and 10.3% age 65 and over (figure 8 below).

Figure 8: Age Makeup, City of Pacific 2017



Area Development

The VRFA is located within the two most populous counties in the State of Washington (King County and Pierce County). Over the last five years, development, rapid growth, and new construction have contributed to a considerable increase in emergency response call-volume. The VRFA responded to over 12,000 calls in 2018, a 22% increase over 2013. Additionally, the VRFA's daytime population can increase to over 100,000, due to the daily influx of commercial workers employed within the service area. Despite the recent rapid growth, Algona, Auburn, and Pacific remain some of the most affordable communities in King County in which to live.

Rail and motor vehicle transportation is prevalent throughout the VRFA service area. Three major highways / freeways run along the edge or cross cut the service district: the Interstate-5 Corridor (major north / south corridor), Highway 167 (major north / south corridor) and Highway 18 (major east / west corridor). Auburn is home to a major rail yard and commuter train hub and operates a Municipal Airport (110-acre facility) that houses over 300 aircraft and conducts over 400 air operations daily (see photo 3 below).

Photo 3: Auburn Municipal Airport

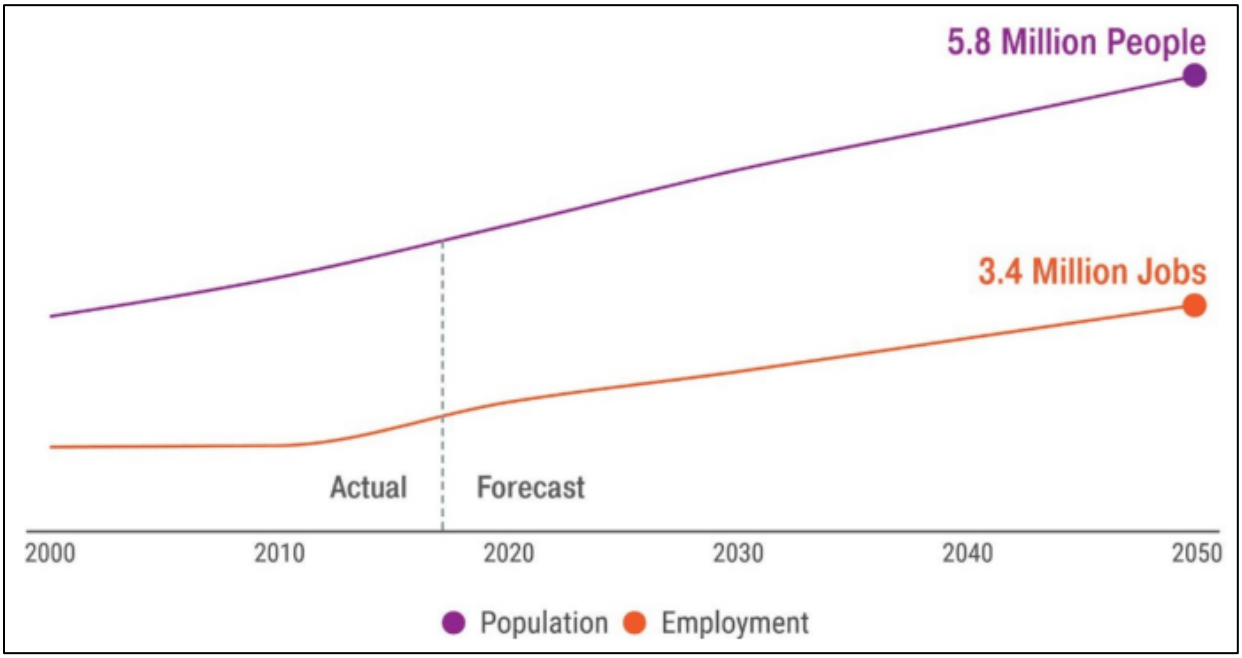
The three communities (cities) that are served by the VRFA are similar in many ways, but each community is also unique. For instance, all three cities experienced considerable growth with the completion of the Highway 167 corridor in the early 1970s. And while the cities of Algona and Pacific are similar in size, the City of Auburn is comparatively much larger. The Cities of Algona and Pacific each have a downtown business area and small manufacturing / warehouse facilities along the 167 corridor, but over 50% of each cities land area is specifically for single-family residential use. Auburn, on the other hand, has a much larger and more diverse business

community involving transportation, major manufacturing, and distribution functions. In addition, Auburn has a large portion of multi-family residential units and many large assisted living facilities.

The “Comprehensive Plan” of each of the three cities aligns with the goals of the King County Growth Management Act (KC GMA) and “Vision 2040”, including reducing urban sprawl, encouraging affordable housing, protecting the environment and enhancing the state’s high quality of life. The “Vision 2040” element of the KC GMA recognizes the different roles cities play in the region – from regional centers to small communities. The vision stipulates that each community is to develop plans that strive to encourage compact development, provide for a fair share allocation of jobs, population, and housing to reduce rural growth pressures. This updated plan, will, in turn, demonstrate a planning process for the incoming jobs and the population growth forecasted by the Puget Sound Regional Council (PSRC).

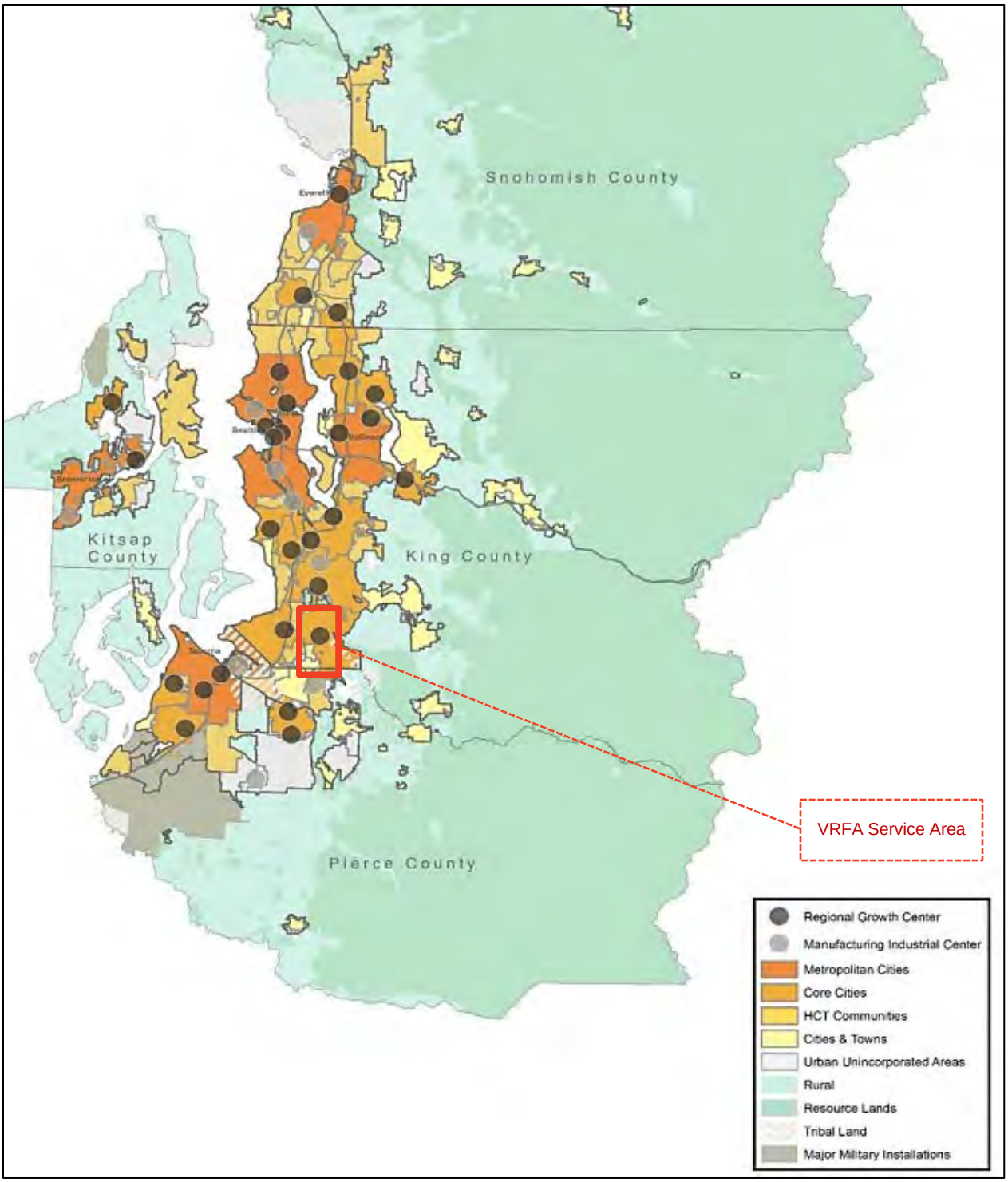
Over the next 30 years, the Central Puget Sound Region is slated to grow by more than 1.8 million residents and 1.2 million jobs. The PSRC is well underway in the planning process guiding how growth should be apportioned through 2050.

Figure 9: Population & Employment Trends, Central Puget Sound Area, By Decade (PSRC)



Underpinning the long-range planning effort is the designation of existing urban growth areas, rural areas, and resource areas as well as the classification of cities and unincorporated areas, and areas with special regional-centers designations (i.e., Regional Growth Centers and Manufacturing Industrial Centers). The designations are associated with specific growth targets, which differ between each of the alternatives. The Auburn area is identified as a regional growth center.

Figure 10: Geographical Map, Tri-County Area (PSRC)



The forecast for strong regional growth and development will impact the demand for service and should maintain a steady rise in call volume. This planning assumption should be a strong consideration in the strategic planning process for the VRFA.

Agency Funding

The Agency is funded via several mechanisms, mainly through the fire benefit charge (FBC) (52% of total income) and through an annual property tax levy (39% of total revenue). The FBC must be renewed by the voters every six years, and the most recent renewal occurred in February 2018, with voter support surpassing 75%. Additional funding is accrued through King County EMS Levy funding (4%), ambulance transport fees (2%), permit fees (1%), tribal services (1%) and other (1%). See figure 11 below for the breakdown of VRFA revenue sources.

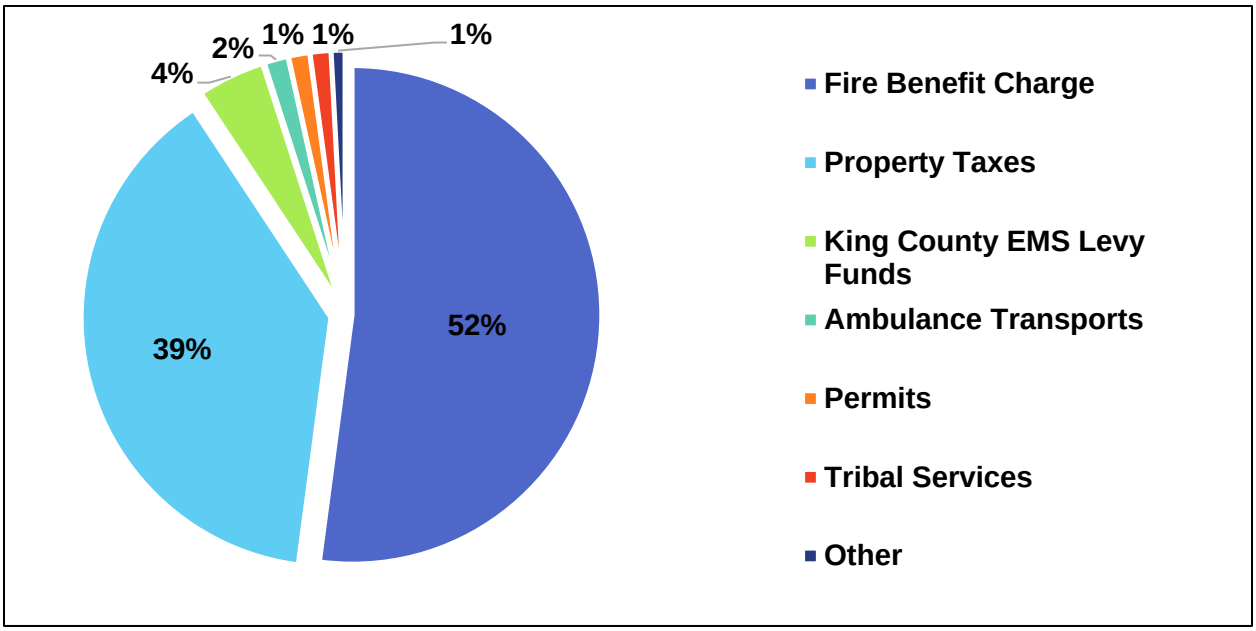
Property Taxes

To carry out the purposes for which a regional fire protection service authority is created, as authorized in the plan and approved by the voters, the governing board of an authority may annually levy taxes (RCW 52.26.140). These taxes are *ad valorem* taxes on properties located within the authority and may not exceed fifty cents unless expressly permitted by law. Levies above the amounts described over the aggregate dollar rate limitations or both may be made for any authority purpose when so authorized at a special election (RCW 84.52.052). Any such tax, when levied, must be certified to the proper county officials for the collection of the tax as for other general taxes. The taxes, when collected, shall be placed in the appropriate authority fund or funds as provided by law and must be paid out on warrants of the auditor of the county in which all, or the largest portion of, the authority is located, upon authorization of the governing board of the authority. For the VRFA, taxes are issued on properties within the service area. The 2018 assessed valuation of the VRFA service area was $12,772,022,738 (this number includes the cities of Algona, Auburn, and Pacific), and the Fire District #31 assessed valuation was $13,148,827.

Benefit Charges

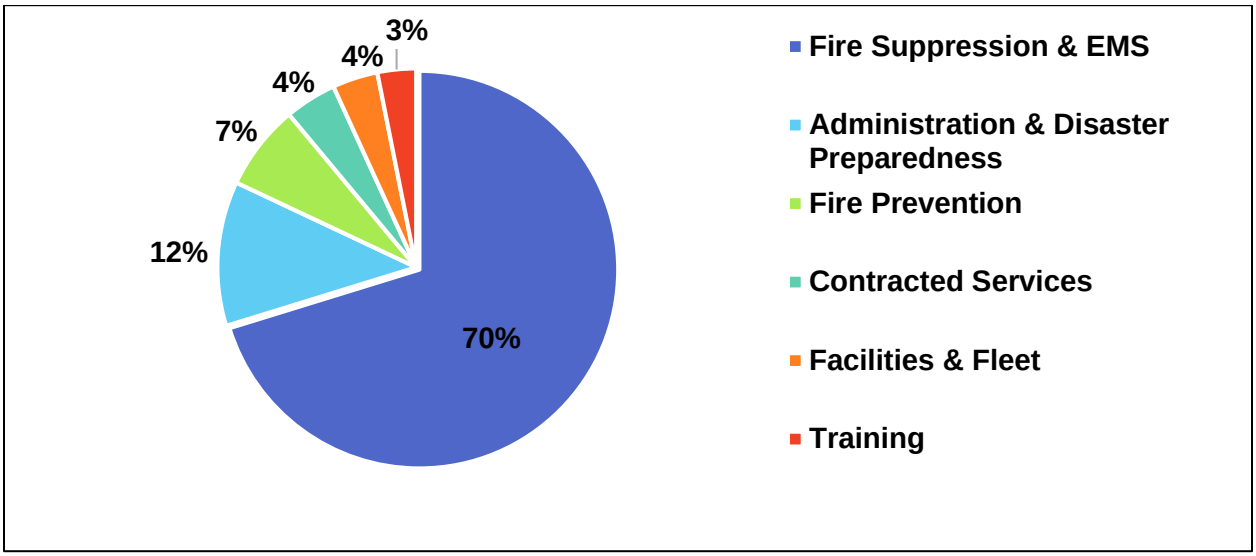
According to the Revised Code of Washington (RCW 52.26.180), the governing board of a regional fire protection service authority may, by resolution, as authorized in the plan and approved by the voters, for authority purposes authorized by law, fix and impose a benefit charge on personal property and improvements to real property which are located within the authority on the date specified and which have received or will receive the benefits provided by the authority, to be paid by the owners of the properties. For the VRFA, a fire benefit charge is issued on personal property and improvements to real property within the service area.

Figure 11: VRFA Revenue by Source



Within the VRFA, each division participates in an annual budget process, to fulfill the goals outlined within the VRFA's strategic plan while maintaining the commitment to providing high-quality service at an economical cost to residents. The process is collaborative to ensure that all program managers are aware of the priorities and needs of all programs and divisions. The VRFA Leadership Team reviews and recommends budget proposals to the VRFA Board of Governance, which adopts the final budget in November of each year.

Figure 12: VRFA Expenditures by Division



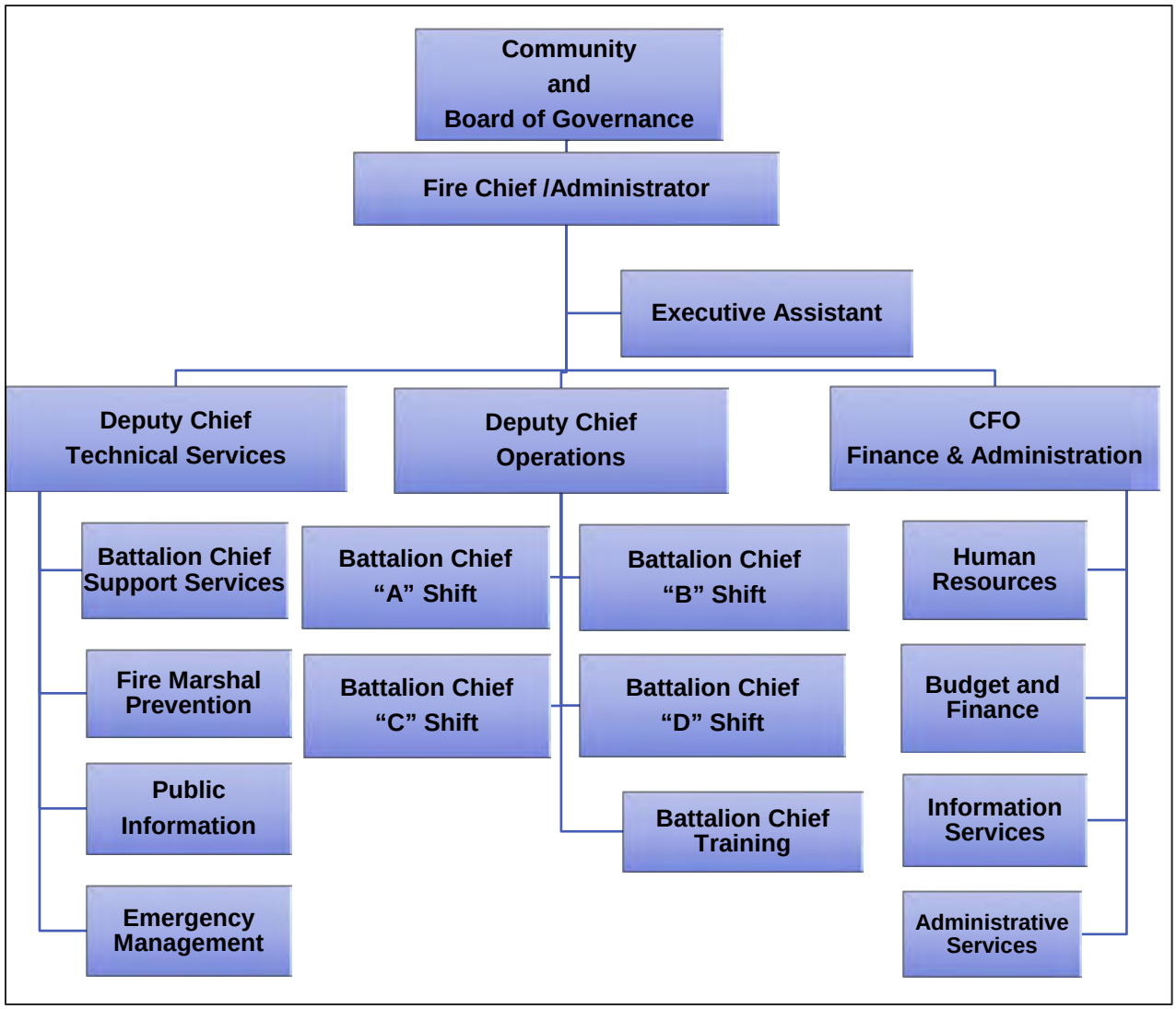
SECTION II: DESCRIPTION OF AGENCY, PROGRAMS & CHARACTERISTICS

Programs and Services Overview

The VRFA provides several services, which are described in more detail in the following sections. Below is an overview of the programs and services delivered by the VRFA:

1. Emergency medical services (EMS)
    a. Basic life support (BLS) services
    b. Community Medical Team (CMT) Program
2. Fire suppression services
3. Hazardous materials (HazMat) response services
4. Technical rescue services
    a. Dive rescue
    b. Rope rescue
    c. Surface / subsurface water rescue
    d. Swift water rescue
    e. Urban search and rescue
5. Fire prevention services
    a. Public education and outreach
    b. Plan review
    c. New construction inspections
    d. Risk reduction inspections
    e. Code compliance reviews
    f. Fire investigations
6. Emergency management program

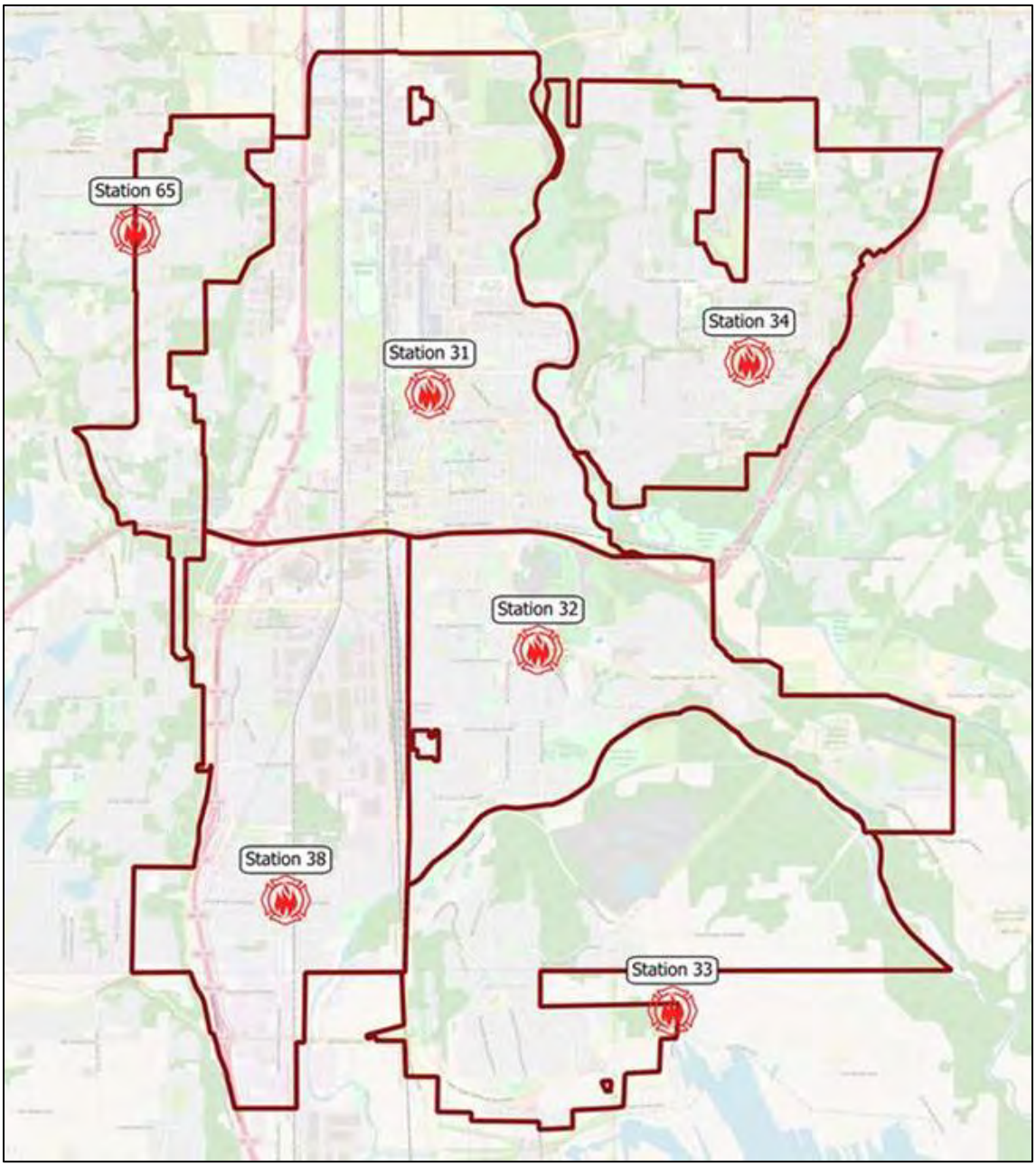
Figure 13: VRFA Organizational Structure, 2019



Fire Stations and Resources

The VRFA provides services from six fire stations: stations 31, 32, 33, 34, 35 and 38. The VRFA also contracts with a neighboring fire department, South King Fire and Rescue, to provide coverage for the "West Hill Annexation Area." Fire stations 31, 32, 33, 34, 38 and SKF&R Station 65 are staffed 24/7 response stations. Station 35, the only non-response station, houses emergency management, the Fire Marshal's Office, Planning and Logistics and other support services. The VRFA operates a single battalion with five response zones (see figure 14).

Figure 14: VRFA Response Zones



Fire Station 31

1101 D Street NE
Auburn, WA 98002

Fire Station 32

1951 R Street SE
Auburn, WA 98002

Fire Station 33

500 182 Avenue SE
Auburn, WA 98092

Fire Station 34

31290 124th Ave SE
Auburn, WA 98092

Fire Station 35

Support Services
2905 C Street SW
Auburn, WA 98002

Fire Station 38

133 3rd Avenue S.E.
Pacific, WA 98047

Apparatus and Related Staffing

The VRFA Operations Division staffs a front line fleet that includes five fire engines, two medical aid units, and one battalion chief. The VRFA also has a variety of ambulance and specialized support vehicles to facilitate responses to emergencies involving hazardous materials, high-angle rope rescues, and water-related emergencies. A well-maintained reserve fleet is ready to be deployed any time that a primary apparatus is out of service or when additional staffing is needed for large scale emergency incidents, ensuring the VRFA community remains protected.

Photo 4: VRFA Engine

Photo 5: VRFA Ladder Truck

Photo 6: VRFA Aid Car

The VRFA's minimum daily staffing level is 20 personnel, one Battalion Chief, five Captains, and 14 Firefighters. All personnel work a 24-hour shift in a four platoon system. Engine and ladder companies are staffed with a minimum of three personnel - one captain and two firefighters. Aid units are staffed with two firefighters. The Battalion Chief is the shift commander and the five captains each manage a response zone.

Table 2: Fire Station Staffing Levels

Station	Location	Unit	Staffing
Station 31: Headquarters	1101 D ST NE, 98002	Battalion 31 Engine 31 Ladder 31 Aid 31	1 3 cross staffed 3 cross staffed 2
Station 32: South Auburn	1951 R ST SE, 98002	Engine 32 Aid 32	3 2
Station 33: Lakeland	500 182 Ave E, 98092	Engine 33	3
Station 34: Lea Hill	31290 124 Ave SE, 98092	Engine 34	3
Station 38: Algona	133 3rd Ave SE, 98047	Engine 38	3
			Minimum Staffing: **20 personnel**

Resources

The VRFA has assorted resources, including apparatus, personnel, and tools. The section below provides a detailed breakdown of the most vital vehicular resources.

Battalion Chief – The Battalion Chief (BC) rig is operated by the on-duty BC (known as the shift commander), who is responsible for supervising suppression personnel. Each shift BC works a 24-hour shift and manages all significant incidents.

Engine Company – The VRFA staffs five engine companies that respond to fire, EMS, and other emergencies. Each engine is staffed with a minimum of three personnel and is equipped with a 1,250 GPM single-stage fire pump, 500 gallons of water, extrication equipment and ground ladders.

Ladder Company – The VRFA cross staffs one ladder truck at station 31. Depending on the nature of the alarm, either the engine or the ladder truck will respond to the incident. The ladder truck will typically respond to commercial fires, high-rise fires, multi-family unit fires, multi-story structure fires.

Aid Unit – The VRFA provides BLS services by deploying two Type III ambulances (aid units). These aid units provide BLS treatment and transport to local hospitals.

Rescue / Squad Unit– This specialty apparatus carries technical equipment for swift-water / sub-surface water rescue and rope / high-angle rescue incidents. This unit has a motorized boat and raft resources.

Air Unit (Trailer) – The mobile air unit is a specialty apparatus that can be brought to an emergency scene to refill self-contained breathing apparatus (SCBA) bottles. This unit is also used to fill cascade systems at various stations.

HazMat Trailer – The VRFA has a trailer equipped with the supplies needed for company and technician level hazardous material emergencies.

Tender – The VRFA has a 2,500 gallon water tender that is cross-staffed with an aid unit at Station 32. This apparatus will respond to requests for assistance in areas with limited water systems or wildland deployment for water shuttling support.

Brush Rig (Type V) – This is a wildland piece of equipment on a Ford F550 chassis that is cross-staffed with an engine at station 34 and deployed locally and as a regional asset to support wildfire suppression.

Table 3: VRFA Station Staffing Overview

Station	Apparatus	Vehicle Type	Function	Height / Pump / Tank
31	60B	Aid Unit	Front Line	
	60	Aid Unit	Reserve	
	53B	Type 1 Engine	Front Line	NA/1,500/750
	68	Aerial	Front Line	100/1,500/300
	114A	Command	Front Line	
	102A	Command	Reserve	
32	62B	Aid Unit	Front Line	
	56B	Aid Unit	Reserve	
	54B	Type 1 Engine	Front Line	NA/1,500/500
	58	Type 1 Engine	Reserve	NA/1,500/750
33	42C	1 Ton Pickup	Front Line Rope Truck	
	41B	Type 1 Engine	Front Line	NA/1,500/750
	55	Type 1 Engine / Telesquirt	Reserve	65/1,500/300
	66	Water Rescue Unit	Water Rescue	
	70	Boat & Trailer	Water Rescue	
	77	Mobile Air Unit	Front Line	
34	59	Type 1 Engine	Front Line	NA/1,750/750
	13	Type V Brush Truck	Wildland*	*
	67	Type 1 Engine	Reserve	NA/1,500/750
	72/79	ATV & Trailer	*	
35	53	Type 1 Engine	Reserve / Training	NA/1,500/750
	45A	1 Ton Pickup (Decon)	Front Line	
	78	HazMat Decon Unit	Front Line	
	101A	CMT	Front Line	
38	104A	CMT	Reserve	
	64B	Type 1 Engine	Front Line	NA/1,500/750
	63	Type 1 Engine	Reserve	NA/2,000/750
NEW	AF63B	Type 1 Engine	Front Line	NA/1,500/500

Staffing Levels

The VRFA's minimum daily suppression staffing level is 20 personnel. These personnel staff five engines, one ladder, two aid cars, and a command vehicle. All engines and ladders are staffed with a minimum of 3 personnel. An engine / ladder company is staffed with a captain and two firefighters. Aid cars are typically staffed with two firefighters. A battalion chief staffs the command vehicle. All suppression personnel work 24-hour shifts on a four platoon schedule.

Every VRFA firefighter is a state certified Emergency Medical Technician / Defibrillation Technician (EMT-D). The firefighters also receive continuing education for their EMT skills through a regional training consortium and recertify every three years. In addition to their EMT-D certification, all VRFA uniform personnel are International Fire Service Accreditation Congress (IFSAC) certified to the FFII standard.

The VRFA also staffs a Community Medical Team (CMT). The CMT is staffed, Monday through Friday 8am-5pm with two firefighters who provide low acuity response for 911 calls. Typically, such calls involve patients who are suffering from chronic illness, an acute injury or fall, or some other type of non-emergent issue. This program also utilizes two full-time social workers that assist the firefighters with low acuity responses and manage a caseload to address underlying problems with vulnerable populations. The program's goal is to reduce non-emergent responses for emergency units and improve the quality of life for at-risk population groups.

Mutual and Automatic Aid

Automatic Aid

The VRFA has automatic aid agreements with the following neighboring departments:

- Puget Sound Regional Fire Authority
- South King Fire and Rescue
- King County Fire District #44
- East Pierce Fire and Rescue

The VRFA is covered under the King County EMS levy and receives funding and ALS response services through a cooperative agreement. The VRFA contracts with American Medical Response (AMR) to provide BLS transports to local area hospitals.

Mutual Aid

The VRFA has a signed inter-local agreement that provides mutual aid to the following departments and jurisdictions in the greater King County - Bellevue, Boeing, Burien, Kirkland, Mercer Island, Redmond, Seattle, Snoqualmie, Tukwila, Duvall, Eastside Fire and Rescue, Enumclaw, Fall City, King County Airport, Mountain View Fire District #44, North Highline, Northshore, Port of Seattle, Puget Sound RFA, Renton RFA, Shoreline, Skykomish, Skyway,

Snoqualmie Pass, King County Medic One, South King Fire and Rescue, Vashon, and Woodinville.[1]

Service Delivery

Emergency Medical Support (EMS) Operations

Emergency medical services (EMS) encompass the majority of the service demand for the VRFA, with the increasing number of incidents taxing VRFA response capabilities.

EMS operations begin with the 911- emergency call system. Any emergency call into 911 is routed through the regional dispatch center (ValleyCom), where dispatchers notify the appropriate resources. Responding fire crews are responsible for evaluating the resources required (en-route or on-scene) to stabilize the situation effectively. The VRFA, like many other Zone 3 agencies, supplies ValleyCom with dispatch criteria involving predetermined resources (VRFA run card).

Basic Life Support (BLS) Operations

VRFA Firefighters (EMT-D) are trained to deliver oxygen therapy, perform blood sugar monitoring, administer epinephrine, and perform cardiac defibrillation to treat a myriad of medical and traumatic emergencies. The VRFA firefighter / EMT-Ds work under guidelines established by the King County Medical Program Director, a physician with the University of Washington / Harborview Medical Center.

Engines, ladder trucks, aid units, and Battalion Chiefs are capable of delivering BLS interventions. BLS providers assess and treat life-threatening injuries through protocols to stabilize the patient as much and as soon as possible on-scene or while during transport to medical facilities. Some of the common BLS interventions include airway management, bleeding control, extrication, cardio-pulmonary resuscitation (CPR), and cardiac defibrillation.

Advanced Life Support (ALS) Operations

If a patient is deemed to be "sick," Advanced Life Support (ALS) operations can be requested by the first company on-scene or initially by the 911 dispatcher. ALS is utilized for, but is not limited to, the following functions: cardiology, pharmacology, advanced airway, respiratory therapies, trauma, burns, orthopedic injuries, extrication, and resuscitation. Through a tiered system, the VRFA contracts King County Medic One for ALS services. While the VRFA aid units do provide transport services, it is at the discretion of the company officer to determine if the VRFA will transport or if the contracted American Medical Response (AMR) will provide transport to local area hospitals (usually for BLS patients).

[1] For specific information on the amount of mutual aid received and provided, see Appendix A.

Fire & Rescue Operations

VRFA firefighters are cross-trained in multiple disciplines. In addition to fighting fires, services include controlling destructive water leaks to investigating suspicious odors, helping with windstorm damage, performing complex rescues and more. A fire engine serves as the platform for delivering these services and is often referred to as the "Swiss Army Knife" of the fire service. Besides being outfitted with fire hose, water and pumps, a fire engine carries a diverse assortment of other essential tools, such as rescue tools, chain saws, specially designed wrenches, hand tools, pry bars, hammers, absorbent material, traffic cones, air monitors and more. Firefighters inspect and maintain their equipment daily to ensure Agency readiness to respond and perform when needed.

The variables of fire growth dynamics and property / life risks are used to determine the fire ground tasks required to mitigate potential losses. The fire ground tasks are interrelated but can be separated into two basic types - suppression and rescue. Suppression tasks are those actions necessary to confine and extinguish the fire, while rescue tasks are those associated with locating trapped occupants and safely removing them from hazard zone.

Suppression Tasks

Fire suppression tasks are accomplished by using one of two methods or a combination thereof; (a) deployment of handheld hose lines or (b) fixed master streams. The decision to use hand lines or master streams depends upon the size, extent, and location of the fire, water supply, available personnel, resources and the risk profile (the recognized threat to life, property, and personnel).

Pre-Flashover Stage

If the fire is in the pre-flashover stage, firefighters can typically perform a “quick hit” (a fire attack using a straight stream from the exterior of the structure into the fire compartment) or an “offensive fire attack” into the building using hand lines. Quick hits and properly positioned hand lines can quickly extinguish fires or protect trapped victims until they can safely exit the building.

Post-Flashover Stage

If the fire is in the post-flashover stage and has extended beyond the capacity of hand-held hose lines, or if structural damage is a threat to firefighter safety, the structure is typically declared lost. In this situation, master streams generally are deployed defensively to extinguish the fire and keep it from impacting surrounding exposures.

Rescue Tasks

Rescue tasks are based upon several variables, including the number of occupants, occupant location, occupant status, and occupant ability to self-rescue. For example, ambulatory adults generally need less assistance than those with restricted mobility. Before initiating actions, the Incident Commander (IC) selects an appropriate initial strategy (command mode): (1) offensive mode, (2) defensive mode or (3) rescue mode.

Offensive Mode

The offensive strategy typically employs an aggressive seat-of-the-fire attack by the first-arriving firefighters. The top priorities of this strategy are to: immediately stabilize the incident, rescue trapped victims, and minimize property losses. Because the objective is to confine and extinguish the fire in a specific area, the ultimate goal of protecting life in unaffected areas can be achieved simultaneously. The offensive strategy is a preferred fire attack method because its use has dual benefits (fire suppression and life protection).

Defensive Mode

The defensive strategy generally consists of an exterior attack designed to either confine the fire to the structure of origin or to block the expansion of the fire to nearby exposures by taking a defensible position. No attempts are made to rescue civilian victims from the active fire area due to either non-survivable conditions or structural risks that outweigh the chances of a successful rescue. Nearly all firefighting is performed from outside the involved structure or from unaffected areas on or in the structure.

Rescue Mode

Rescue mode is an operational mode that focuses on immediate actions meant to protect or rescue occupants to prevent serious injury or death. The first company on-scene may utilize the 2-in/1-out “exemption”, this is exemption is written into law and allows firefighters to perform a “known” rescue with limited resources, rescue mode ends when the second company arrives on-scene or when the rescue situation is resolved, whichever occurs first.

Aviation Rescue and Firefighting

As stated earlier in this document, the VRFA provides fire protection services for the City of Auburn Municipal Airport. The Auburn Municipal Airport is a class 3 airport conducts over 400 operations daily to small fixed wing aircraft and helicopters. These aircraft have a minimal passenger load.

Marine / Shipboard and Firefighting

Services not provided.

Wildland Firefighting

The Valley Regional Fire Authority (VRFA) Wildland Firefighting Program provides Type-1 (Structural Fire Engine) and Type-5 (Brush Firefighting Engine) response capabilities to King County Zone-3 via mutual and automatic aid requests. The VRFA also provides Regional, State Wide and Out of State response capabilities via the Department of Natural Resources requests, Washington State Fire Mobilization requests and through Emergency Management Assistance Compact (EMAC) Agreements. In 2018 the VRFA responded to 8 major wildland fires in support of partners at the Department of Natural Resources, The State of Washington and the State of California.

The VRFA Wildland Firefighting Team consists of 20 National Wildfire Coordinating Group (NWCG) "Red Card Certified" Firefighters, those include Battalion Chiefs, Captains, and

Firefighters. NWCG Wildland Certified Firefighters are required to complete wildland fire continuing education training annually, demonstrate fire shelter deployment proficiency and also complete an arduous pack test, a fast-paced three-mile walk, wearing a 45lb weight vest in 45 minutes or less. The VRFA will be adding a 2500 gallon Type II Support Tender / Water Tanker to Agency operational capabilities in 2019.

Hazardous Materials (HazMat) Response Services

The VRFA is a partner in the South King County Hazardous-Materials (HazMat) providers group. This group consists of seven fire agencies who share the responsibility of providing HazMat emergency response to the region with firefighters trained to the highest level, known as "Level-A Technicians." Technician-certified personnel are equipped to respond with specialized vehicles, tools, and protective equipment, allowing them to take appropriate action to stabilize a spill or release. HazMat Technicians are trained to deal with a broad spectrum of emergencies, ranging from spills of industrial products that are used in manufacturing and transported over the roadways, to releases of products that are carried over the region's vast railway network. These technicians are also trained in first response to weapons of mass destruction (WMD) incidents where criminal or terrorist elements might employ chemical, biological, radiological or nuclear dispersal devices. VRFA members below the technician level are trained to the First Responder-Operations level.

The VRFA also deploys a regional resource for decontamination. This apparatus responds on request with other regional assets to assist with decontamination for contaminated victims or technicians making level A or B entry to mitigate a spill or release.

Surface / Subsurface Water Rescue

VRFA rescue technicians, assigned to station 33, are crossed trained in swift water, underwater (SCUBA) and rope rescue disciplines. The VRFA works in tandem with the Renton Regional Fire Authority to provide underwater (SCUBA) rescue and recovery for King County Fire Emergency Response Zone 3. This joint response effort is designed to ensure adequate personnel and equipment are available when needed to carry out these high-risk and low frequency rescue operations. Supervised by a Battalion Chief, four VRFA Captains and twelve VRFA firefighters are trained and certified in rescue operations and technical support roles. When dispatched to a water rescue call within Zone 3, VRFA and Renton technicians respond simultaneously.

Swift Water Rescue

VRFA swift-water rescue technicians with their specially equipped boats and rope rescue equipment, stand ready to be deployed 24/7/365. By utilizing partnerships with the other King County Fire Emergency Response Zone 3 agencies, this technical resource can be quickly mobilized to assist in rescuing people from floods and other water-related incidents on the area's swiftly moving rivers.

Rope Rescue

The VRFA provides rope rescue response in low, medium, and high angle environments. All technical rescue specialists are certified rope technicians. Many areas in the VRFA response district contain natural environments with steep angles that require specially trained and equipped technicians to perform rescues.

Urban Search & Rescue

The VRFA has six personnel assigned to Washington Task Force 1 (WTF-1), a FEMA Urban Search and Rescue Team serving the northwest region of the country. Twenty-eight of these USAR teams are strategically located throughout the United States with the mission of assisting rescue operations on a large scale, federally declared disasters. Each task force is equipped with a cache of equipment that accompanies them to the disaster area and contains everything from listening devices to search cameras and includes items such as food, water, and clothing. The cache is designed to fully support the needs of each task force without outside assistance for many days. In August of 2005, VRFA USAR firefighters responded with Washington Task Force 1 to the Gulf States in response to Hurricane Katrina.

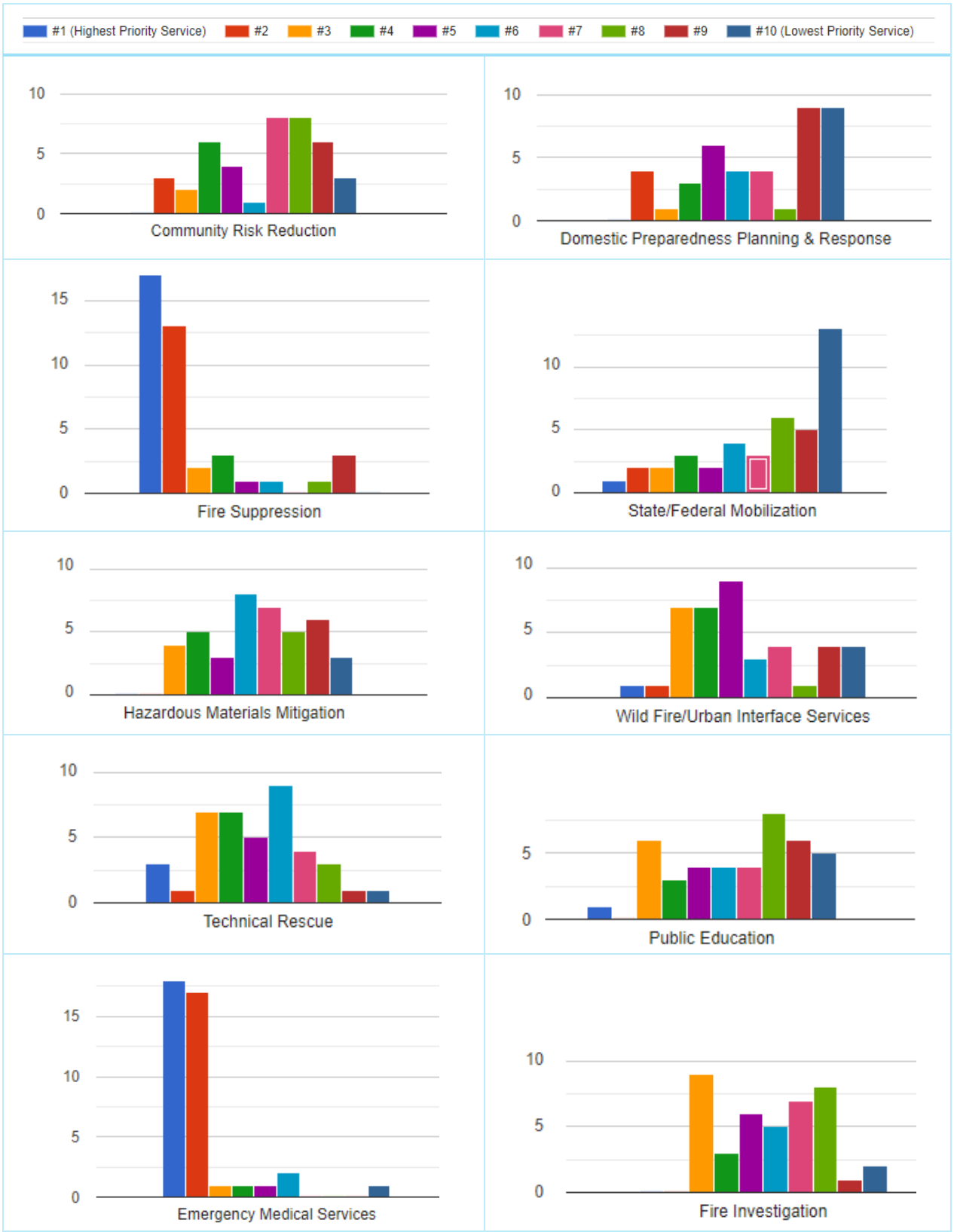
Citizen Commitment

The VRFA established a Citizen Advisory Committee (CAC) consisting of representatives from the three-member cities in both the business and residential communities. The CAC was guided by the Accreditation Team and asked to help determine what current and future service levels could be expected. The VRFA conducted a CAC meeting on April 2nd, 2019, to obtain the necessary input from the community and develop the visioning process. The committee also considered social and economic issues, future funding limitations, and current levels of service and performance. The visioning process clarified the following needs and desires for planning:

- Community expectations
- Areas of necessary improvement
- Services prioritization

The community group was shown a presentation on VRFA services to help make a more educated decision on the prioritization of those services. They provided their perspective on what they thought the community would support to meet future service demands. Summarizing the CAC comments it was clear they felt the community had strong support for the fire department and that the Agency should strive to be a "Leading Public Service Agency." A survey was conducted to get the communities' perspectives on the prioritization of services. The survey was given to the CAC and was sent out via social media outlets. The accreditation team received over 40 completed surveys. The survey results clearly showed that EMS and Fire Suppression responses are the two most valued services.

Figure 15: Service Prioritization Survey Results



Strategic Goals

The 2018-2022 "VRFA Strategic Plan" identifies three goals, nine objectives, and multiple actions. While many ongoing initiatives are moving forward, the completion of the SOC will drive a new strategic planning process in the latter half of 2019. Below is an overview of the list of goals and objectives from the Strategic Plan:

Goal #1 - Improve the strength of the VRFA team	
Objective(s)	**Action(s)**
1.1: Continue to improve labor-management communication and relationships	• Develop an understanding of others' interests to find common ground to reach an agreement with a focus on the betterment of the VRFA • Improve follow-through; finish what is started, implement, whenever possible, systems for accountability • Seek opportunities for partnership on issues of common benefit
1.2: Foster employee familiarity with, understanding, of and commitment to the VRFA Strategic Plan	• Introduce the plan to all levels of the organization and provide training to sustain the plan and assist in its implementation in day-to-day operations and activities
1.3: Recognize and reward employee performance consistent with the VRFA guiding values, as expressed in the Strategic Plan	• Improve the on-going procedure for identifying outstanding employee performance and successes

Goal #2 - Manage the Agency more effectively	
Objective(s)	**Action(s)**
2.1: Create and implement a leadership development program	• Provide more leadership and professional development training built upon current leadership programs, monthly command staff training, and first level supervisor meetings
2.2: Improve communications and collaboration	• Improve the process to ensure an organization-wide understanding of general orders, directives, memos, etc. • Ensure understanding of the spirit and reason behind policies. • Strive for consensus • Communicate organizational priorities • Focus on positive examples. Identify, recognize, and encourage people who lead the way and encourage others to follow
2.3: Maintain sound financial practices	• Continue use of conservative budgeting approach • Continue to seek sustainable funding sources (e.g., grants, partnerships) • Continue to utilize technology to increase productivity and efficiency • Maintain reasonable financial reserves to meet emergent needs

Goal #3 - Increase Agency value through service to citizens and other stakeholders	
Objective(s)	**Action(s)**
3.1: Seek opportunities to form partnerships with community members and stakeholder groups.	• Encourage coordinated involvement in community organizations, groups, and activities • Create special programs and activities that demonstrate respect for the community and enhance community safety • Promote a culture of customer service throughout the organization • Work toward continual improvement of the fire protection grade • Achieve accreditation by 2022
3.2: Expand the use of performance measurement	• Inform everyone throughout the organization of the benefits of the collection and analysis of timely, accurate, relevant data to measure progress towards Agency goals
3.3: Focus on making strategic improvements	• Enhance capabilities and maximize effective / efficient use of resources • Evaluate and improve scope and quality of services using both industry-standard and internally developed metrics • Prepare the Agency workforce for future service demands • Evaluate current and projected facility and response model needs • Develop plans for needed facilities, equipment, personnel and systems to provide for future needs • Perform risk assessment

Insurance Rating

The VRFA member cities and Fire District 31 were re-evaluated in 2017 by the Washington State Survey and Rating Bureau (WSRB). The WSRB is funded through assessments of subscribers (conducted every four years), based on premiums written in Washington State. The WSRB evaluates every community's fire protection / suppression capabilities.

The WSRB assigns each community a "Fire Protection Class" grade (range of 1 through 10), where a grade of 1 would indicate exemplary fire protection capabilities, and a grade of 10 would indicate that the community's capabilities (if any) are insufficient for insurance credit. This rating system is generally considered more rigorous than the more common Insurance Services Office (ISO) rating used nationwide.

To determine a community's Fire Protection Class Grade, the WSRB objectively evaluates four major areas every five years: fire department elements, water supplies, emergency communication systems, and fire safety controls. The sections below provide insight into each of these areas.

Fire Department / Agency Resources & Capabilities

The WSRB reviews the resources of fire agencies, including (but not limited to): engine companies, ladder companies, distribution of fire stations and fire companies, automatic aid received, response to alarms, equipment carried on apparatus, apparatus maintenance, pumping capacity, reserve apparatus, department personnel, and training. This element accounts for nearly 40% of the final community "Fire Class Protection" grade.

Water Supplies

The WSRB reviews the types of water supplies used to determine adequacy for fire-suppression purposes. The primary evaluation tasks for this element are based on calculating required fire flows for buildings and conducting flow tests to measure water pressures and volume. The WSRB also considers hydrant size, type, and installation, as well as the inspection frequency and condition of fire hydrants in the service area. This element accounts for nearly 35% of the final community "Fire Class Protection" grade.

Emergency Communications Systems

The WSRB investigates each community's 911 system, to include the facilities, handling and dispatching of fire alarms, the dispatch personnel and any training related to internal [2] Emergency communications. This element accounts for 9% of the final community "Fire Class Protection" grade.

Fire Safety Controls

Finally, The WSRB takes into account all fire prevention activities such as fire code enforcement, public education, and building code enforcement. This element accounts for 16% of the final community "Fire Class Protection" grade.

It is important to note that more than half of a community's classification grade is determined based on capabilities that are *not under the direct control of the fire department*. The final grades for the communities within the VRFA service area are as follows: Algona – 4, Auburn – 3, Pacific – 4 and Fire District # 31 – 4.

[2] In this context, "internal" emergency communications systems refers to the way that the 911 process is conducted for the Agency (emergency requests from the public to dispatch). "External" emergency communications systems refer to the way that the Agency or other public officials communicate emergency information to the public.

SECTION III: ALL HAZARD RISK ASSESSMENT OF THE COMMUNITY

Overview

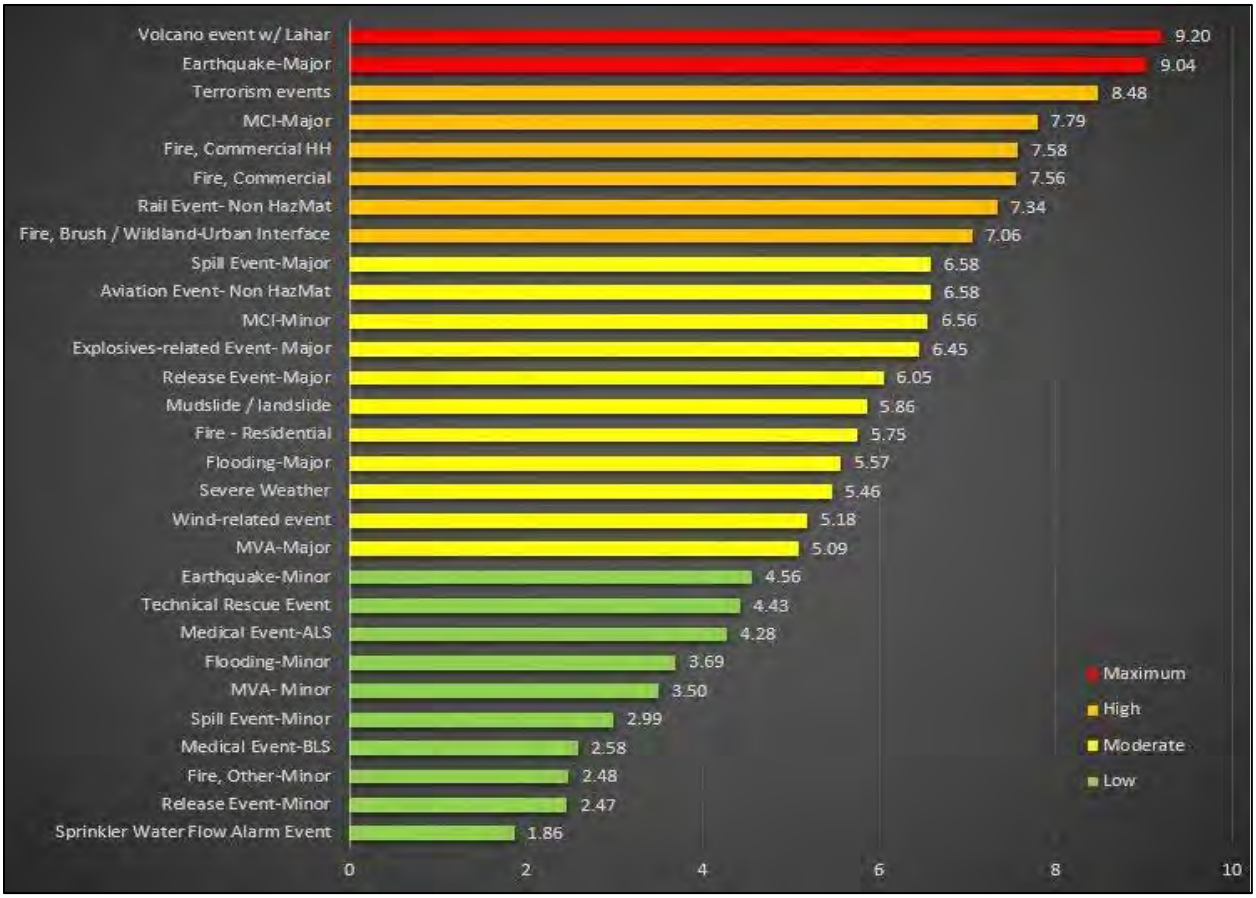
To effectively develop a risk assessment for the service area, a comprehensive hazard and vulnerability examination was conducted. This examination assessed certain risks and vulnerabilities within the VRFA service area to accurately determine resource capabilities during day-to-day operations as well as disaster operations.

The sections below describe the method by which the comprehensive risk assessment was developed.

All-Hazard Risk Assessment

Hazards to the VRFA service area were identified based on one of four "hazard source" categories: human hazards, material hazards, mechanical hazards, and natural hazards. Below is an overview of the process for identifying relevant hazards to the service area, based on the source of the hazard.

Figure 16: Hazard Risk Scores, by Severity Ranking



Process & Methodology

To assign risk scores to the identified hazards, a risk assessment was conducted using a customized 3-axis methodology. This process focused on identifying the potential *consequences*, *impacts* and the *probability* of different types of hazards (to the service area). First, hazard threats were identified based on one of four "source" categories, and then the final list of hazard threats were grouped into one of the following *classifications*:

I. **Hazard threats relative to disaster and / or terrorism emergency event** (Volcano Event with Lahar, Earthquake-Major, Earthquake-Minor, Terrorism Event, Explosives Related Event, Landslide / Mudslide, Flooding Event-Major, Flooding Event-Minor, Severe Weather Event, Wind Related Event)

II. **Fire emergency event** (Fire-Commercial High Hazard, Fire-Commercial, Fire-Residential , Fire-Other Minor, Sprinkler Water Flow Alarm Event)

III. **Emergency medical event** (MCI-Major, MCI-Minor, Medical Event-BLS, Medical Event-ALS , MVA-Major, MVA-Minor)

IV. **Rescue emergency event** (Technical Rescue Event)

V. **Hazardous materials emergency event** (Spill Event-Major, Spill Event-Minor, Release Event-Major, Release Event-Minor)

VI. **Transportation emergency event** (Rail Event (Non-HazMat)**,** Aviation Event)

VII. **Wildland fire emergency event** (Fire- Brush / Wildland Urban Interface)

Next, the hazard-related *consequences* were categorized into matrix-form, in order to assign risk scores based on the potential *impacts* of each hazard event to the following two entities: (1) the community and (2) the Agency. This process involved creating "risk scoring criteria" for the potential impacts to the community and the potential impacts to the Agency. This process was repeated for all 5 planning zones, and is outlined in detail in the following section.

Community Impact Analysis & Scoring Process

For the community impact of each hazard event, four main areas of impact (indicators) were identified: (A) life-safety impacts, (B) economic impacts, (C) infrastructural impacts and (D) environmental impacts. Within each of these areas, impact descriptors were developed, and risk scoring criteria were outlined.

Agency Impact Analysis & Scoring Process

For the Agency impact of each hazard event, two areas of impact (indicators) were identified: (A) resources required (personnel required to staff apparatus and to command the scene) and (B) duration of the call (total minutes spent on the incident).

Required Resource Calculations

In order to calculate the (minimum) amount of personnel required for each particular hazard event response, the VRFA run card by FRL[3] was used. For example, per the VRFA run card, an "aid call" (BLS or ALS), requires a minimum response of: 1 aid car (2 personnel) OR 1 ladder truck (3 personnel) OR 1 engine (3 personnel), depending on the availability of apparatus at the time of the call. This process was used to calculate staffing for all common emergency events (fires, EMS events, HazMat incidents etc.).

While this process was straight forward for common emergency events, it was more difficult to assign minimum staffing to hazard events that are not as common (earthquakes, flood events, landslides etc.). For such hazard events, the maximum staffing was assigned.

Duration of Call Calculations

To assign an accurate duration of time spent on each type of hazard event, the average amount of time spent on historical calls were analyzed. For common emergency events, averages were calculated (previous three years of data), based on FRLs. For the more uncommon hazard events, the average amount of time spent on scene was either maxed out (to a reasonable degree) or an educated guess was made based on similar duration events.

Probability Scoring

Once all of the identified hazard events were given risk scores for potential impacts to the *community* and to the *Agency*, a *probability score* was assigned. The probability risk scoring criteria was based on historical data concerning the frequency (of occurrence) of past hazards (per FRL), as well as any potential consequences (life safety, economical, infrastructural, environmental etc.). Finally, a mathematical formula was developed and utilized to obtain a final risk score for each hazard event, weighting certain scores for enhanced accuracy.

Infrastructural Risk Assessment

Critical infrastructure and related services were assessed to evaluate capabilities and capacities that would be affected during hazard events. Hazard-event related disruption to such infrastructure and / or services was reviewed, to assess VRFA strategic and tactical planning for operations and resource deployments in each zone. Consideration was given to the following related infrastructure / services: transportation infrastructure, services and utilities, hospitals / medical centers, communications infrastructure, HazMat storage facilities and large recreational locations / venues.

Demographic Risk Assessment

An assessment of demographic factors in the service area was conducted to generate a comprehensive picture of the potential impacts and consequences of hazard events, as well as the probability of an event occurring (based on historical area data). Using census and population

[3] *Frequency Response Lists (FRLs) are response codes associated with particular emergency incidents, and are assigned by the designated dispatch Agency. FRL designations indicate which resources (apparatus and personnel) are to be deployed for which types of incidents.*

data from the City of Auburn, the City of Algona and the City of Pacific, a demographic profile for the service district was created. This demographic data was further broken down by zone, to identify any underlying risk factors such as population density, concentration of vulnerable populations (senior living facilities, schools, etc.), areas with concentrated limited English-speaking populations and others.

POPULATION FACTORS

The population density in a geographical area can have implications for resource / service requests. Population density values are useful for establishing resource thresholds and allocation planning for day-to-day operations as well as disaster operations.

SOCIO-ECONOMIC FACTORS

Certain socio-economic factors play a role in service utilization, particularly for poverty and sub-poverty level households. Household income levels that are at or below the poverty line are sometimes more likely to utilize 9-1-1 services (pre-hospital services) instead of traditional scheduled medical care (due to the higher cost of scheduled medical care). Therefore, geographical areas with a high density of low-income households may present a higher utilization rate of services / resources.

VULNERABLE POPULATIONS

Vulnerable populations present unique challenges for service delivery. In particular, certain age demographics and related densities can indicate the utilization of pre-hospital services.

Children / Infants

Children and infants are a unique population because they are less able to care for themselves or others during emergencies or disasters. In areas of high densities of children / infants (schools, nurseries, daycare centers, etc.), planning considerations focus on resource / staffing plans, particularly for disaster situations.

Aging Populations

For geographical areas that are densely populated with seniors (assisted or independent living facilities), (pre-hospital) calls for service are usually higher than in other areas. Historical rates of service utilization for these areas can be used to approximate the probability of future related service calls.

Limited English Populations (LEPs)

In the context of emergency / disaster communications with the public, sharing information with LEPs can be challenging. To mitigate communication barriers that arise during response operations, identifying and working with LEPs ahead of incidents is critical.

Such demographic information was taken into consideration during the hazard-consequence evaluation process. For instance, while reviewing the consequences of a large flood event, high-risk populations (dense low-income housing, for example) along the valley floor were identified as particularly at-risk for significant flood-related damage (resulting in a potential financial impact to the community and individuals).

Human Hazards

Manmade hazards are defined as those which originate via human action or inaction and can be intentional or accidental. Some of the most common related hazards include terrorism (active shooter, explosives-related events, etc.), motor vehicle incidents, and other accidents. Such incidents are of particular relevance to the VRFA in that the incidents present an elevated risk for human injury / death (as well as damage to the built environment and natural environment). The section below provides an overview of the hazard events and related circumstances of such incidents.

Explosives-Related Event

- Explosives-related Event- Risk Score: 6.4

Incendiary devices are mechanical, electrical, or chemical devices that are used to initiate explosions and fires. The purpose of such devices can be intentional (terrorism) or unintentional (accidental) in nature. Intentional incidents are intended to damage a primary target or to provide a diversion preceding an even larger terrorist / criminal act. Unintentional incidents can result from various sources (petroleum-related accidents, natural gas leaks, clandestine drug labs, etc.).

The severity of impact from an explosives-related event is based on the amount and type of explosive materials involved. While there are no notable explosives-related events on record for the service area, ongoing vigilance in regards to fortifying critical infrastructure and soft targets is ongoing.

Multiple Casualty Incident (MCI)

- Major MCI- Risk Score: 7.79
- Minor MCI- Risk Score: 6.56

A Multiple Casualty Incident (MCI) is defined by the presence of multiple patients, affecting the treatment decisions of individual patients. During such incidents, the number of patients or the severity of their injuries can quickly overwhelm on-scene resources. Operations are adjusted to maximize the efficient use of available resources to provide the best treatment possible for as many patients as possible. MCI's can be as small as a handful of patients or as large as dozens or hundreds of patients. For risk scoring, a "minor" MCI is an event involving 1-20 patients, and a "major" MCI is an event involving 21+ patients.

During an incident, interagency cooperation is per the National Incident Management System (NIMS). For the service area, the dispatch provider (Valley Communications) pre-designates resource run cards for MCIs based on the number of patients involved (see table 4). All related requests for mutual aid are coordinated through the King County Office of Emergency Management via Valley Communications.

Table 4: ValleyCom Zone 3 MCI Run Card

# of Patients Involved	# of Units Required		# of Medics Required	Transport Resources Required	# of Chiefs Required
	Total Fire Units	Minimum Requirements			
1-10	5 units	Aid / Engine / Ladder	2 1 MSO	5 Ambulances	1
11-20	8 Units	2 MCI Units	3 1MSO	10 Ambulances	2
21-30	12 Units	1 BLS Strike Team 2 MCI Units 1 Rehab Unit	4 1 MSO	15 Ambulances	3
31-40	16 Units	2 BLS Strike Teams 2 MCI Units 1 Rehab Unit	4 1 ALS Strike Team 1 MSO	20 Ambulances 1 Metro Bus	3
41-50	18 Units	2 BLS Strike Teams 1 Engine Strike Team 3 MCI Units 1 Rehab Unit	4 2 ALS Strike Teams 1 MSO	25 Ambulances 2 Metro Buses	4
50+	18 Units	1 Structural Task Force 2 BLS Strike Teams 1 Engine Strike Team 3 MCI Units 1 Rehab Unit	5 2 ALS Strike Teams 1 MSO	30 Ambulances 2 Metro Buses	5
100+	18 Units 1 Rehab Unit	1 Structural Task Force 2 BLS Strike Teams 1 EMS Task Force 3 MCI Units	5 2 ALS Strike Teams 1 MSO	35 Ambulances 2 Metro Buses	5

Medical Events

- Advanced Life Support Event- Risk Score: 4.28
- Basic Life Support Event, Risk Score: 2.58

The term “medical events” refers to medical treatment and related care delivered at the scene or during transport to medical care facilities. The VRFA provides on-scene basic life support (BLS) care and transport services via capable apparatus, along with advanced life support (ALS) care and services via the King County Medic One System.

Advance Life Support services are provided at the county level via the King County Medic One System. This tiered system is designed to dispatch the appropriate resources based on defined dispatch protocols. All emergency calls (911 calls) are routed via the regional dispatch center (ValleyCom, for the VRFA service area), where call receivers question the reporting person and feed the information to the dispatcher console. Dispatchers then evaluate this information to determine the appropriate level of response. More severe life-threatening emergencies (cardiac events, trauma with shock, etc.) require BLS unit(s) (aid car, engine or ladder) in addition to the closest ALS Medic Unit, whereas less serious emergencies may only require the closest BLS unit. Over the last 3 years in the VRFA service area, BLS responses made up on average 80% of EMS call volume, while ALS accounted for the remaining 20% of EMS total responses.

Multiple Vehicle Accidents (MVA)

- Major MVA Event- Risk Score: 5.09
- Minor MVA Event- Risk Score: 3.50

Motor vehicle incidents frequently occur in the VRFA service area. Typically, resources required for response to a collision are generally manageable with regular staffing levels and require a short on-scene time. These incidents are expedited to ensure vehicle occupants with traumatic injuries are transported to trauma centers within the "Golden Hour."

Technical Rescue Event

- Tech Rescue Event- Risk Score: 4.43

Technical rescue responses vary significantly in terms of which resources are required and the length of time spent on the scene. Typically, technical rescue incidents require a substantial amount of time on-scene to set up rescue systems, locate / rescue victims, and to remove victims from the hazard area. Zone 3 uses a regional response model to mitigate technical rescue events effectively. For technical rescue, the VRFA provides rope, swift and surface water, and dive rescue services to the Zone 3 resource list. The VRFA has approximately 16 trained rescue technicians, about 2-4 of which are on duty daily.

ROPE RESCUE

Rope rescue events involve trained personnel using rope and specific liberation techniques to rescue victims with limited or no egress route. Incidents may include situations where hikers get trapped down a steep ravine, or occupants get trapped at high angles.

SWIFT / SURFACE WATER RESCUE

Swift and surface water rescue (SSWR) events involve utilizing a boat, or shore based rescue operation, where trained rescue technicians attempt to retrieve people or animals that are unable to escape a body of moving water. The VRFA has one boat in service for such incidents, primarily for use in incidents occurring in the Green or White Rivers.

DIVE RESCUE

Dive rescue activities are conducted for retrieving water-submersed items and victims (i.e., submerged car extrication, recovery of deceased individuals).

Terrorism Event

- Terrorism Event- Risk Score: 8.48

While there is no universal definition of terrorism, the most comprehensive definition is: "*the unlawful use of force or violence against people or property with the intention of intimidating, causing fear and / or coercing societal groups, individuals or governments for a particular cause or purpose."* The Federal Bureau of Investigation categorizes terrorism in the U.S. as one of two types: domestic terrorism or international terrorism. Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of the government or population without foreign direction. International terrorism involves groups or individuals whose terrorist activities are foreign-based and / or directed by countries / groups outside the United States, or whose activities transcend national boundaries.

While terrorism is often associated with the use of weapons such as chemical, biological, radiological or nuclear weapons, terrorism can also include incidents from arson, incendiary / explosive devices (see the section below), active shooter situations, sabotage, hazardous materials releases, agro-terrorism, and cyberterrorism. One major area of growing concern in the public safety arena is the targeting of first responders via secondary explosive devices on-scene.

Mitigation factors in the service area include built-in fire detection and protection systems, fire-resistive construction techniques, and security measures that reduce exposure or risk. Non-compliance with fire and building codes or failure to maintain existing fire protection systems can substantially increase the effectiveness of a fire weapon.

POTENTIAL TARGETS

Targets are often located near high traffic / high-visibility routes with convenient transportation access. Examples of potential targets in the service area include:

- Government buildings, courthouses, schools, hospitals, and shopping centers
- Symbolic targets such as places of worship and cultural centers
- Utilities such as dams, dikes, water supplies, electrical and gas distribution systems, pipelines, chemical facilities
- Railheads, interstate highways, tunnels, airports, bridges, overpasses
- Recreational facilities such as sports stadiums, theaters, parks, casinos, concert venues
- Financial institutions and banks
- Sites of historical and symbolic significance, tribal areas / landmarks
- Scientific research facilities, academic institutions
- Telecommunications, newspapers, radio and television stations
- Chemical, industrial, and petroleum plants
- Business offices
- Law enforcement, fire, emergency medical services, and responder facilities / operations centers
- Special events, parades, religious services, festivals, celebrations

ECONOMIC IMPACTS

The economic impacts from terrorist events could be significant for the service area in terms of loss of life and property, disruption of business activity, and long-term emotional effects. Based on the size of the terrorist event, full recovery could require significant resources at the local level; utility losses could cause a reduction in employment and business. The local governments of the member cities may lose sales tax, and the finances of private utility companies and businesses may be disrupted. The economic impacts of the loss of a roadway or railway would have severe effects on the economy and local jurisdictions' ability to provide services. Loss of travel routes would result in loss of commerce and could impact the ability to provide emergency services to citizens by delaying response times or limiting routes for equipment such as fire apparatus, police vehicles, and ambulances. The ability to receive fuel deliveries would also be impacted, potentially affecting Agency response activities.

MATERIAL HAZARDS

Material Hazard events are marked by the involvement of items / agents (chemical, biological, radiological, nuclear, physical, etc.) that have the potential to cause harm to humans, animals or the environment, by itself or through interaction with other factors. These hazards include hazardous materials incidents (releases, spills, leaks) and fires (structural, special, brush, etc.).

Structure / Wildfires Fires

- High Hazard Commercial Structure Fire Event- Risk Score: 7.58
- Commercial Structure Fire Event- Risk Score: 7.56
- Brush / Wildland Urban Interface Fire Event- Risk Score: 7.06
- Residential Structure Fire Event- Risk Score: 5.70
- Other Minor Fire Event- Risk Score: 2.58

A structure fire is defined as any building fire that involves the structural components of the building. Fires in buildings that do not involve the structural elements are typically referred to as "room and contents" or "compartment fires."

Structures can range in type, including residential single-family dwellings, multi-story garden apartments, strip malls, and high-rise buildings. While response activities focus on fires that occur inside these types of buildings, sometimes fires originate outside of the building structure. Resources on scene at structure fires concentrate on the safety of fire / public safety personnel, life preservation (building occupants), preventing property loss / environmental damage, and incident stabilization.

Structure fires carry an inherent risk that is determined by the building occupancy types, layout and the fire load associated with each incident. Current research shows that modern fires grow faster and present a more inherent risk to occupants and firefighters than structure fires thirty years ago, mostly due to the increased flammability of contemporary building materials and furnishings. As a result, flashover occurs faster, reducing both the amount of time available for escape and the time until structural collapse. There are several classifications of structural fires, based on occupancy type and the resources required for response: commercial high hazard fires, commercial fires, residential fires, and other minor fires.

HIGH HAZARD COMMERCIAL STRUCTURE FIRES

High hazard commercial buildings receive a special designation to distinguish these structures from other commercial facilities. Fires in these structures are unique due to the characteristics that make these facilities inherently dangerous to the occupants and / or firefighters. These buildings span several different occupancy types but can be multi-family, industry, or storage facilities for hazardous materials. Due to the associated potential for a higher fire load, or other significant hazards, more resources are allocated to such incidents than other commercial facilities.

COMMERCIAL STRUCTURE FIRES

Commercial buildings include businesses, apartments, and many other occupancy classifications. Often, these facilities are connected, sharing a common wall, creating exposure issues. Fires that break out in such environments require more resources (personnel and apparatus), than smaller structures, like a single family residence, due to high occupancy levels, size of the building, structural layout, fire loading or proximity to adjacent units.

WILDFIRE / URBAN INTERFACE:

The most significant wildfire risk, generally speaking, is at or near the outer borders of the VRFA response area, the more rural areas. Where the topography steepens, on the east and west hills, significant challenges with fires in the summer months exist. Additionally, recent climate change has significantly contributed to conditions that are more conducive to rapid fire spread, especially where forested areas butt up against neighborhoods and other developed regions. Wildfire Urban-Interface events (WUI) generally require a significant amount of resources.

RESIDENTIAL FIRES

Residential fires encompass fires that occur inside single family structures. Such incidents require moderate resources, due to the lower occupancy load, physical separations, and generally smaller structures (vs. commercial buildings).

OTHER MINOR FIRES

Other types of fires include those which are generally small and contained to one area, such as dumpster fires or car fires. These types of fires often require the least amount of resources, due to the contained nature and size of the incident and can typically be handled by one or two engines.

Hazardous Materials (HazMat) Events

- Major Spill Event- Risk Score: 6.58
- Major Release Event- Risk Score: 6.05
- Minor Spill Event- Risk Score: 2.99
- Minor Release Event- Risk Score: 2.47

Hazardous Materials (HazMat) include any substance that has the potential to cause damage to people, the natural environment, and / or the built environment. The term "spill" relates to incidents involving leaks of liquid hazardous materials. The term "release" refers to incidents involving hazardous gas leaks or leaks involving liquids that easily vaporize (hazardous materials only). While it is most likely that a release or spill event would be the result of industrial or transportation accidents, intentional releases (terrorism) or emergency venting of chemicals to prevent a more significant scale catastrophe can occur.

Because the category of hazardous materials is extensive, it is difficult to calculate the probability or potential outcome. While significant events that pose a serious risk to human life are rare, minor events such as petroleum spills are more common. Hazardous materials move through the service area daily (via highways, rail lines, and pipelines) and are stored in several fixed facilities throughout the region.

The Emergency Planning and Community Right-to-Know Act (EPCRA) outlines provisions and requirements for emergency planning based on the reporting of hazardous / toxic chemicals in the local area. EPCRA's regulations help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. Of particular importance are the following key provisions of EPCRA:

EMERGENCY PLANNING

Local governments are required to prepare chemical emergency response plans and to review the plans at least annually. Local facilities that maintain Extremely Hazardous Substances (EHS) on-site in quantities greater than corresponding threshold planning quantities (TPQs) must cooperate with local government in emergency plan preparation.

EMERGENCY NOTIFICATION

Local facilities are required to immediately report accidental releases of EHS and hazardous substances defined under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

COMMUNITY RIGHT-TO-KNOW REQUIREMENTS

Local Facilities handling or storing any hazardous chemicals must submit Material Safety Data Sheets (MSDS's) (or Safety Data Sheets, SDS's) to state and local officials and local fire departments. Hazardous chemicals are defined under the Occupational Safety and Health Act and its implementing regulations. Facilities must also submit an inventory form for these chemicals, to state and local officials and local fire departments.

As a part of EPCRA, Congress requires states to maintain a State Emergency Response Commission (SERC), responsible for developing a Local Emergency Planning Committee (LEPC) for each district. Broad representation by fire officials, health officials, government and media representatives, community groups, industrial facilities, and emergency managers ensures that all necessary elements of the planning process are represented.

Release or spills of hazardous materials can happen during transport, storage or manufacture, and gaseous / volatile materials pose a threat for widespread contamination, or if liquid-based materials are spilled near a secondary means of conveyance (storm drains, etc.). In the service area, the Burlington Northern Santa Fe (BNSF) Railway, the Union Pacific Railway (UP), Small & Sons, Inc., Cenex, Inc., Ferrellgas, Inc., Boeing, Inc., and areas near the Williams Northwest Natural Gas Pipeline represent the highest risk for hazardous materials release.

The VRFA participates with the LEPC for the district (King County) and maintains an active inventory of MSDS / SDS records for local facilities. The Boeing Company supports a Level "A" HazMat response team trained for events that may occur at their facility. If a release occurred at Boeing, internal resources would be the best equipped to function as primary responders. If a release occurs outside of Boeing's specific jurisdiction, the Boeing HazMat response team is available to assist in other incidents in the service area. And, although Boeing has the capability to respond and mitigate spills and / or releases, the VRFA as the Authority Having Jurisdiction (AHJ) is ultimately responsible for managing and ensuring compliance to the Washington Administrative Code's during a HazMat response on Boeing property.

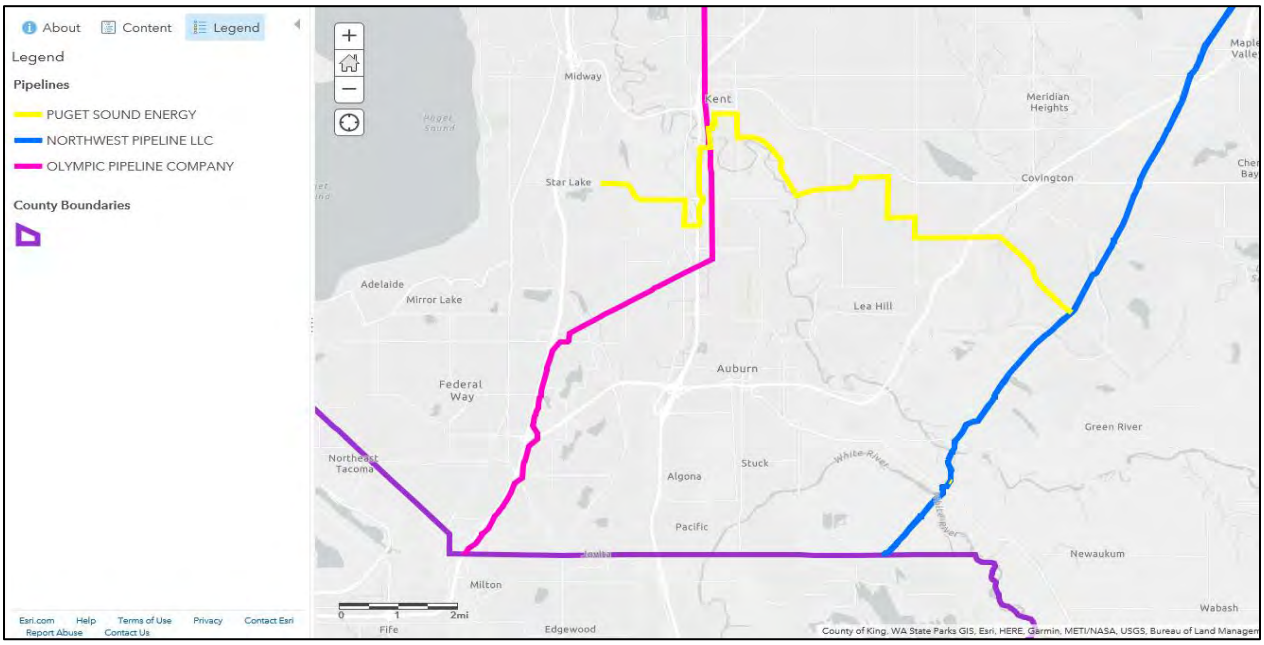
Vulnerability prediction can be challenging for a hazardous materials release since the range of possible emergencies is dependent on which chemical is released. In general, people that are more physically sensitive to the presence of contaminants will be more vulnerable (children and seniors, and individuals with pre-existing sensitivities to airborne contaminants). Individuals living near to major transportation routes or sites that use hazardous materials are also more vulnerable based on their proximity to possible sources of exposure.

Tracking the history of hazardous materials events is difficult, as many incidents go unreported or are too minor to warrant a HazMat response. The most serious event in recent history was a toxic cloud accidentally released from Boeing in 1995, resulting in the evacuation of twelve buildings and several hospitalizations (no fatalities).

PIPELINES

Along the periphery of the VRFA service area, there are several underground pipelines. As seen in figure 17, Puget Sound Energy (Via Williams Gas Pipeline West) operates a natural gas pipeline along the northern edge Auburn City Limits (running East-West), and the Olympic Pipeline Company operates a petroleum pipeline along the north-western edge of the service area (running North-South).

Figure 17: Pipelines, King County



Mechanical Hazards

Mechanical hazard events are defined as incidents that occur due to powered or manual (human) use of tools, equipment or machinery. Such incidents can result from system failures due to technical glitches or human error. Events such as aviation incidents (accidental plane crashes

during takeoff or landing, plane fires, or other malfunctions) or rail incidents (collisions, derailments, fires, etc.) are addressed in the following section.

Aviation Event

- Aviation Event, Non-HazMat- Risk Score: 6.58

The City of Auburn operates a (self-funded) general aviation airport, housing approximately 370 aircraft and hosting nearly 149,000 takeoffs / landings per year. The airport provides fuel service from above ground storage tanks based on a 12,000-gallon capacity. About 60% of airport activity is general transient aviation, 36% is local general aviation, 4% percent is air taxi services, and less than one percent is military activity. The airport provides hanger and tie-down rental, aircraft charter, aircraft rental, repair stations, and pilot training. Potential hazards related to the airport include terrorist actions, hazardous materials releases / spills, fuel releases, and collision accidents.

The Auburn airport is the only general aviation airport in the area and is also one of the busiest general aviation airports in the state. Long-term disruptions to airport operations could result in economic losses for the service area. There have been no significant hazard incidents at the airport to date. However, there is always the possibility of on-site direct accidents (collisions, landing / takeoff malfunctions, etc.), hazardous materials release from fuel storage or targeted terrorist attacks.

Rail Event (Non-HazMat)

- Non-HazMat Rail Event- Risk Score: 7.34

There are many rail lines running through the service area, including passenger rail and freight.

FREIGHT BY RAIL

The Union Pacific Railroad (UP) and the Burlington Northern Santa Fe Railway (BNSF) have rail lines running through the city of Auburn. The UP line runs north-south, and is just east of the Interurban Trail. BNSF has a triple-track, federally designated, high-speed rail line. The BNSF Stampede Pass line runs east-west through downtown Auburn, entering Auburn at the east end of town near Auburn-Black Diamond Road and merging with the north-south line just south of the Auburn Station.

BNSF operates a rail yard between *A Street SE* and *C Street SW*, south of SR-18. At grade railroad crossings, there are crossover points between vehicles, pedestrians, bicycles, and rail traffic. The city of Auburn has several at-grade railroad crossings, as outlined in the table below. In regards to response activities, the road / rail crossings described in the table below are the most vulnerable locations for vehicular / train collisions, as well as pedestrian / bike incidents associated with rail lines / trains.

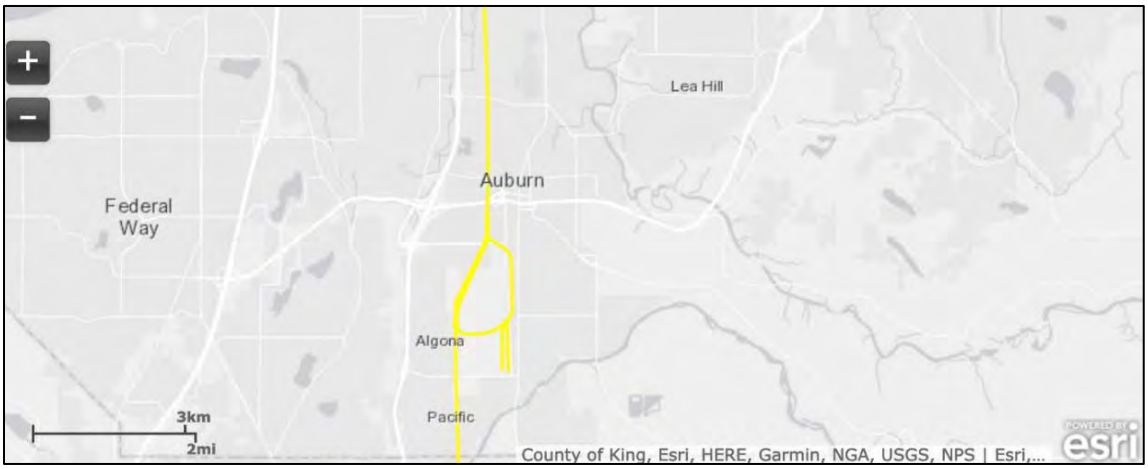
Table 5: Freight Rail through the VRFA Service Area

Railway	Road Crossing Location
Union Pacific	44th Street NW, Auburn WA
Union Pacific	37th Street NW, Auburn WA
Union Pacific	29th Street NW, Auburn WA
Union Pacific	West Main Street, Auburn WA
Union Pacific	15th Street SW, Auburn WA
Burlington Northern Santa Fe	37th Street NW, Auburn WA
Burlington Northern Santa Fe	29th Street NW, Auburn WA
Burlington Northern Santa Fe	3rd Street NW, Auburn WA
Burlington Northern Santa Fe	West Main Street, Auburn WA
Burlington Northern Santa Fe	Auburn Black Diamond Road, Auburn WA

Recent safety upgrades to the Auburn-area railway / roadway intersections include the installation of a pre-signal system where *37th Street NW* crosses the BNSF tracks, to stop westbound motor vehicles on *37th Street NW* to the west of the grade crossing in advance of the traffic signal at *B Street NE*. This pre-signal is intended to prevent vehicles from stopping directly on the crossing by giving advanced notice of the arriving train. The pre-signal system is already in place at the *West Main Street* crossing and the *15th Street SW* crossing.

Figure 18: BNSF Railroad

Figure 19: Union Pacific Railroad



PASSENGER RAIL

King County Metro Transit (KCMT) operates the Sounder Commuter Rail (Sounder Train), a 12-stop passenger train that runs North / South directly through the City of Auburn. This service is operated by BNSF, running Monday-Friday during peak commute hours. In addition to this commuter service, Amtrak operates a daily train (Coast Starlight Line) that runs through the city of Auburn. While the Coast Starlight Line does not have a stop in Auburn, the high-speed train runs along the same North / South track as the Sounder Train.

Figure 20: Sounder Train and Amtrak Rail Lines

Rail-Related Hazard Events

Due to the nature of rail (rapid transport of materials or people), multiple types of hazard incidents could occur, including (but not limited to):

- Rail-related non-HazMat fire event
- Train derailment
- Train and motor vehicle collision
- Train and pedestrian / bicycle collision
- Train and train collision
- Electrical hazard incidents
- Terrorist activity

Sprinkler Water Flow Alarms

- Sprinkler Water Flow Alarm Event- Risk Score: 1.86

Sprinkler water flow alarms (SWFA) are water deployment systems intended to suppress fires and to alert the local response agency. The VRFA responds to SWFAs often, though the vast majority of the alarms are not related to fire incidents (i.e., false alarms, ruptured pipes, broken sprinkler heads). Such events are relevant to the VRFA in that each call event pulls resources (personnel and apparatus), limiting the number of available resources (for other events) during the time of the

call. In addition, unattended buildings that have a sprinkler head activation can suffer a significant amount of property damage if the system is not shut down immediately.

Natural Hazards

Natural hazards are those that exist in the natural environment and have the potential to cause personal injury / death, damage to the built environment, and/or damage to the environment. Such hazards can be geological (earthquakes, landslides, volcanic eruptions), meteorological (hurricanes, tornados, windstorms), or hydrological (flooding). The natural hazard-events associated with the Pacific Northwest Region include droughts, earthquakes, extreme heat events, flooding, lahars, landslides / mudslides, liquefaction, pandemics, tornados, tsunamis, wildfires, windstorms, winter weather, and volcanic activity. Based on documented historical events, the most common hazard-events (occurring at least once in the last 30 years) to the service area include earthquakes, flooding, landslides / mudslides, severe weather, volcanic activity, and wildfires.

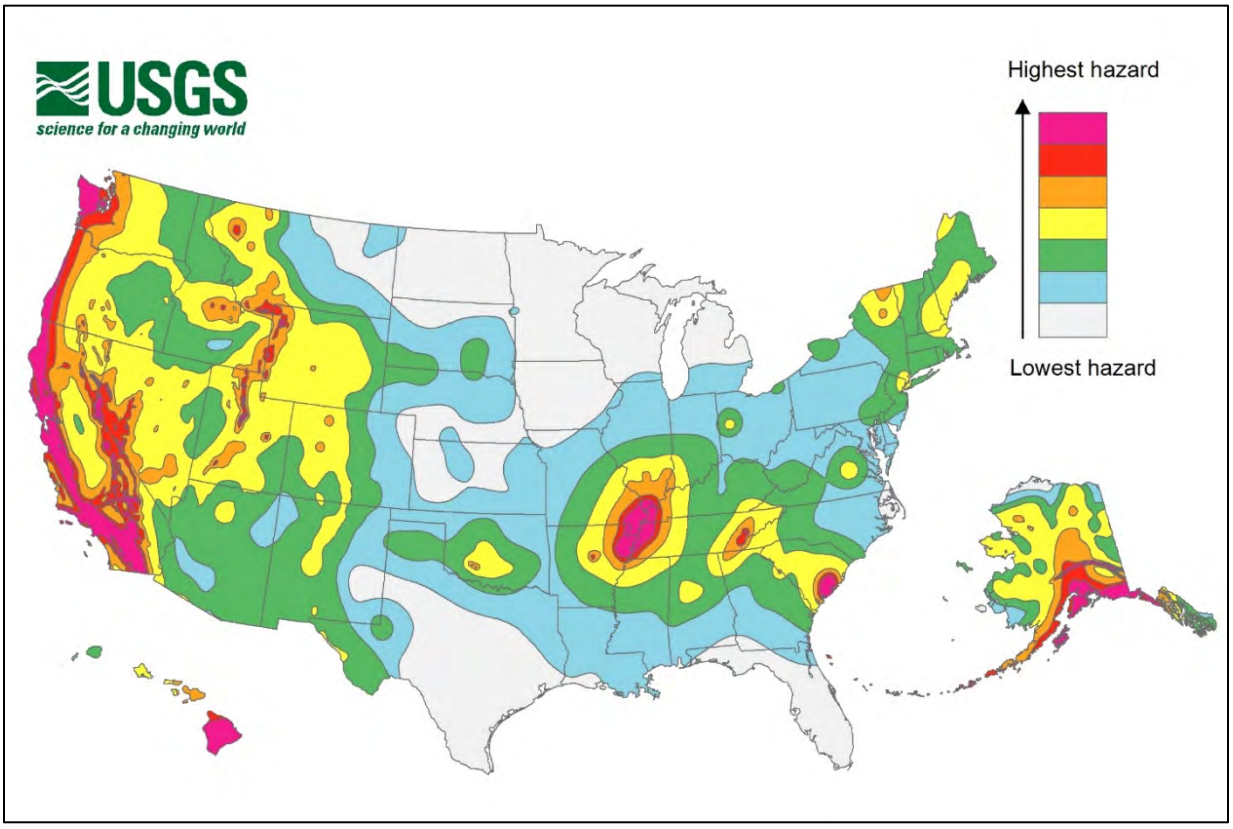
Earthquake

- Major Earthquake Event- Risk Score: 9.04
- Minor Earthquake Event- Risk Score: 4.56

Earthquakes are a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface (tectonic or oceanic plate movement). The ground shaking can cause built structures to collapse, disrupt utilities / communications and sometimes trigger landslides, avalanches, flash floods, fires, and tsunamis. Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk.

Earthquakes can occur at any time of the year and are nearly impossible to predict with a significant warning. While newer seismic-sensing technology can track some seismic activity, such technology is currently incapable of sensing when a major seismic event will occur. The strength of an earthquake is usually described in reference to the Richter scale, which utilizes a logarithmic number to quantify the overall magnitude (M) of the earthquake event (based on the strength of ground waves). Earthquakes are sometimes described using the modified Mercalli Scale, which allows for event-specific characteristics (observations) to be taken into consideration. The Mercalli scale is used to rate intensity on a Roman numeral scale ranging from I-XII.

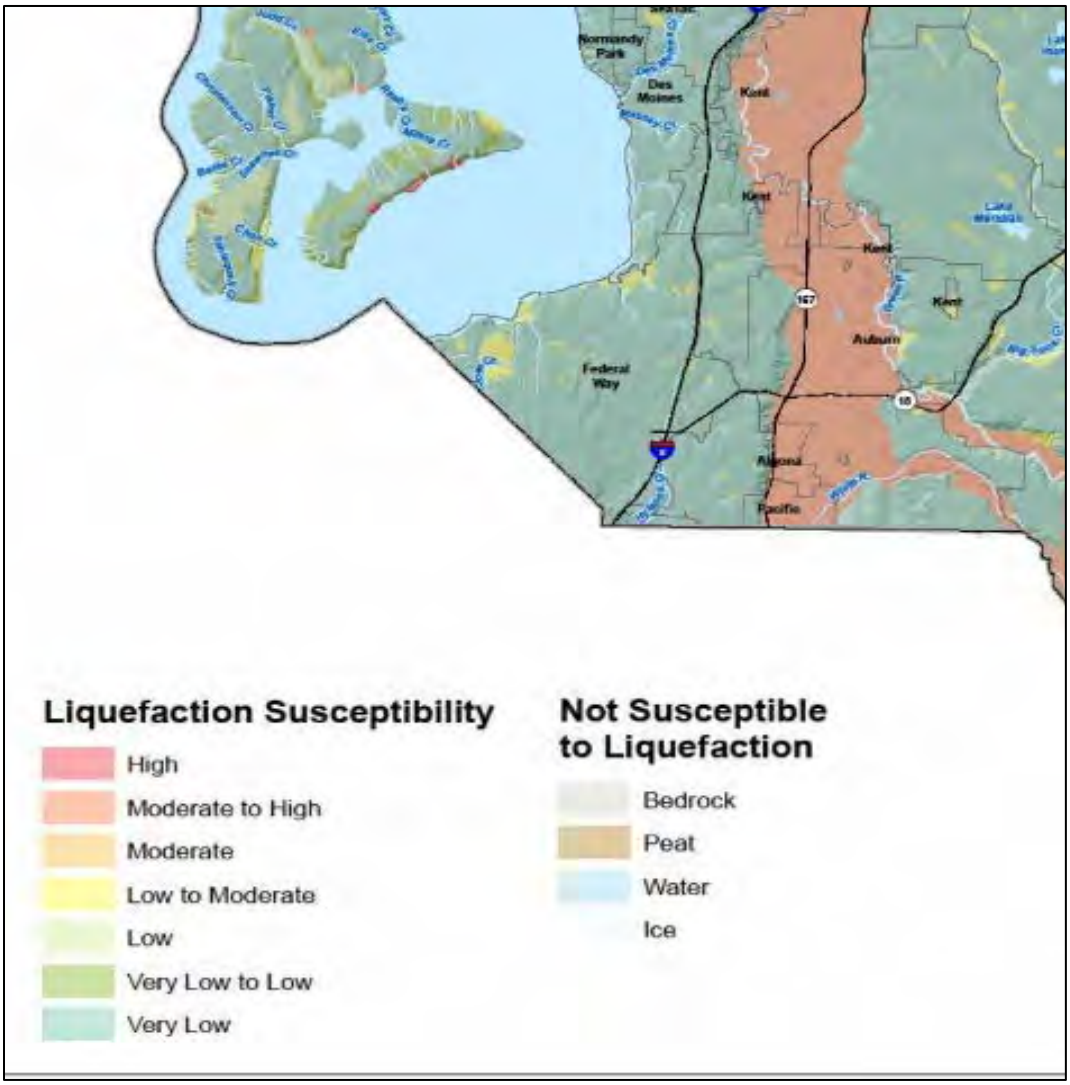
Figure 21: Ground Shaking Hazard (2% probability of exceeding peak ground acceleration in 50 year time frame)



King County sits on the "Pacific Ring of Fire," a geological area known for volcanic activity and frequent seismic activity. Washington State is close to the convergence of several tectonic plates (Pacific, North American, and Juan de Fuca), and there are a substantial number of faults within the county and adjacent counties. One primary focus of concern is the "Cascadia Subduction Zone" (interface between tectonic plates), which can produce earthquakes with a magnitude of 9.0 or higher (Richter scale). A subduction zone earthquake in the area would have an epicenter in the Cascadia subduction zone (of the coast of Washington or Oregon) and would produce 1+ minutes of strong ground shaking, followed by many aftershocks and massive tsunamis (major catastrophic damage).

Soil liquefaction can occur with strong ground shaking. Sandy / silty materials saturated with water behave like a liquid, causing pipes to leak, roadways to buckle and building foundations to be damaged. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it (sand boils). Based on the soil content, the cities of Auburn, Algona, and Pacific are at an elevated risk, medium to high, for liquefaction (See Figure 22 for information on liquefaction susceptibility in the service area).

Figure 22: Soil Liquefaction Susceptibility



All critical infrastructure in the service area is vulnerable to the earthquake hazard. Hazardous materials releases can occur during an earthquake from fixed facilities or transportation-related incidents. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment.

Facilities storing hazardous materials are particularly vulnerable if the neighborhoods surrounding the facilities become isolated post-quake. For instance, following an earthquake, structures storing hazardous materials could rupture and leak into the surrounding area or a nearby waterway, having a disastrous effect on the environment. Secondary hazards associated with earthquakes are likely to have some of the most damaging effects on the environment; earthquake-induced landslides can significantly impact the surrounding habitat. Too, streams can be rerouted, changing the water quality and potentially damaging habitat / feeding areas.

Based on standard operating procedures, the general approach to earthquake response for the VRFA is to (1) assess damage to fire stations, (2) conduct roll call, (3) perform area assessment

(windshield surveys) and (4) conduct response activities. If the situation required, the Department Operations Center (DOC) is activated to monitor the ongoing situation, to organize resource allocations, and to communicate with regional partners (City, County EOCs).

Flooding

- Major Flood Event- Risk Score: 5.57
- Minor Flood Event- Risk Score: 3.69

Flooding in the service area usually follows a significant wet weather system that occurs in the Cascade Mountains (snowpack melts). Melting snow runoff and constant precipitation fill the rivers rapidly. In the VRFA service area**,** floods have the potential to damage infrastructure via the following mechanisms:

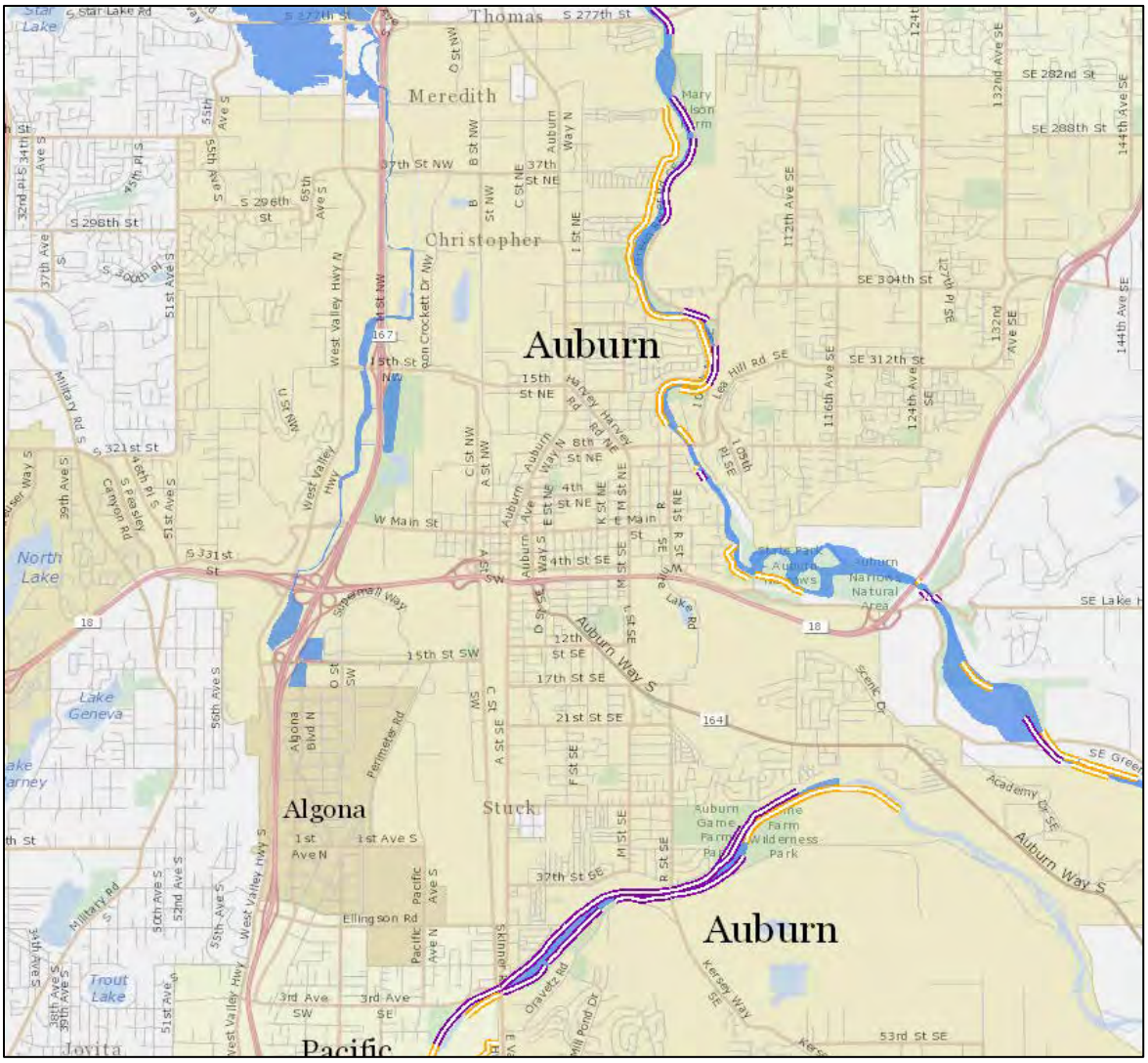
- Floodwaters and debris can block roadways and railroads, isolating residents and hindering access throughout the area
- Bridges can be washed away or blocked by debris, resulting in isolation and limited ingress/egress
- Floodwaters can back up drainage systems, resulting in urban flooding
- Culverts can be blocked by debris
- Floodwaters can seep into drinking water supplies causing contamination
- Sewer systems can be backed up, causing waste to spill into homes, neighborhoods, rivers, and streams
- Underground utilities can also be damaged / disrupted

RIVERINE FLOODING

In the service area, riverine flooding occurs in the form of overbank flooding of rivers / streams. This process occurs after heavy precipitation floods many smaller streams, which then drain into the major rivers. Two types of flood hazards are generally associated with riverine flooding: Inundation and channel migration.

Inundation takes place when floodwaters and debris flow through an area that is not usually covered with water. Inundation events typically cause minor to severe damage, depending on velocity / depth of the flow, flow duration, debris quantity / type, and the land uses along the flood path. Channel migration happens when the banks and soils erode as a result of flowing water. The associated erosion and sediment deposits results in the migration of a river channel across a floodplain.

Figure 23: Riverine Flood Hazard Areas



URBAN FLOODING

Urban flooding occurs in developed areas where there are limited or no drainage facilities to control flows or excess runoff. As natural land is developed, the soil loses the ability to effectively absorb rainfall, resulting in an accumulation of water on impermeable concrete / asphalt. During periods of heavy rain, roadways can quickly become swiftly moving "rivers," causing major safety hazards. Too, storm drains often back up due to the volume of natural debris, causing localized flooding.

The Green / Duwamish River is a 93-mile-long river system that originates in the Cascade Mountains and flows into the city of Auburn. The basin is divided into four sub-basins: the upper watershed (above Howard Hanson Dam), the middle Green, the lower Green, and the Duwamish estuary. The middle Green runs from the outlet of the Green River Gorge (River Mile 45) down to Auburn (River Mile 31). The lower Green runs from Auburn down to the Duwamish River (River Mile 11). The most significant structural flood risk reduction features along the river include the

Howard Hanson Dam (HHD) and the levee system that lines the riverbanks along much of the lower Green River and portions of the middle Green River. Since the early 1960s, dam and levee operations have worked to contain most of the major river flood events from Auburn downstream.

The White River originates in the glaciers on the northeast face of Mount Rainier, flowing from its headwaters to the northwest, joining several major tributaries (the Greenwater River and Boise Creek). Mud Mountain Dam (MMD) is a flood control dam (River Mile 30) that has had a significant effect on flooding in the White River. The river eventually flows through the White River Canyon, a deep and generally undeveloped valley on the county line, and portions of the Muckleshoot Indian Tribe Reservation. Development is typically concentrated in the downstream end of the basin, where both industrial and residential land uses are common.

With headwaters on Mount Rainier glaciers, the White River has flow increases from annual snowmelt (late summer), but not to a level of flood concern. Flooding along the White River is determined by the operation of the Mud Mountain Dam. In the service area, several significant routes pass through the 100-year floodplain: State Route 167, State Route 18 and Auburn Way.

MONITORING & FLOOD ALERT SYSTEM

The White River Monitoring Group (comprised of the Seattle District Army Corps of Engineers, in partnership with local representatives from King County, City of Pacific, City of Auburn, The VRFA, East Pierce Fire and Rescue, City of Sumner, City of Peirce and others) has developed a comprehensive plan for monitoring / observing flood levels along the White River. Of the twelve monitoring locations, seven are in the jurisdiction of the VRFA (see table 6)These points are strategically used to observe and track the river levels and flow rate, assisting in flood preparation and planning activities.

Table 6: White River Flooding Observation Points

Location	Focus Items
White River Estates (Auburn)	• Overtopping at the log jam • U/S at the end of the sand bar • Freeboard on super sacks
"A" Street Bridge	• Scour both banks, upstream of bridge • River stage (check gauge at 3rd and Skinner) • Debris accumulation at the bridge • White river pump operation and sewer level at the right bank, upstream of A Street Bridge.
3rd Place Southeast	• Seepage under HESCOs • Water level of concrete armor on revetment • Groundwater in Oakhurst crawl spaces • Storm sewer water level
Pacific City Park	• Ponding in the park • King County Lot at upstream end of park • Megan's Court at the downstream end of park • Seepage or destabilization of HESCOs • Pump, check valve and overtopping of HESCOs at the end of 4th avenue SE
White River Estates (Pacific)	• Freeboard on HESCOs • Overtopping, seepage or destabilization of HESCOs • Storm sewer water level • City pump operation
Butte @ County Line Road	• Overtopping of Government Canal • Encroachment toward Butte Avenue • City pump operation
Butte Pit @ 8th and Stewart	• Ponding • Overtopping along road

King County offers a "Flood Alert System" to quickly and simultaneously send voice calls, text messages, and emails to registered residents (subscribers). Subscribers have options to receive alerts regarding six different river systems (including the Green and White rivers), using three separate phase thresholds for multiple phone, text and email contacts.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The NFIP makes federally-backed flood insurance available to homeowners, renters, and business owners in participating communities. For most participating communities, FEMA prepares a Flood Insurance Study that displays water surface elevations for floods of various magnitudes, including the 1% annual chance flood (100-year flood) and the 0.2% annual chance flood (500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent / location of flood hazards for each community. NFIP participants are required to participate in regulating development in floodplain areas, ensuring that three main criteria are met:

1. New structures (and those under significant modification) must be elevated to prevent damage from a 100-year flood.
2. New floodplain development plans cannot exacerbate existing flood issues or increase the potential damage to other properties.
3. New floodplain development must demonstrate reasonable and conservative efforts to reduce adverse effects on vulnerable “salmonid” species.

All three member-cities (Auburn, Algona, and Pacific) participate in the NFIP.

THE COMMUNITY RATING SYSTEM (CRS)

The CRS is a voluntary sub-program within the NFIP that supports floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are offered at a discounted rate, to reflect extra flood mitigation activities. Participants of CRS must demonstrate adherence to the following three parameters: Reduce flood losses, facilitate accurate insurance ratings, and promote awareness of flood insurance. The city of Auburn (NFIP community #530073) has been participating in the CRS program since 1991, resulting in an average 25% premium discount per year.

Table 7: Area and Structures in the 100-year Floodplain

City	Area in floodplain (Acres)	# of Structures in Floodplain, by Structure Type				
		Residential	Commercial	Industrial	Religious	Education
Algona	0	0	0	0	0	0
Auburn	1,472	41	85	7	0	2
Pacific	193	137	2	0	1	0

DAMS & DIKES

For the service area, the following dams (and dam-like structures) are at risk for flood events: the Howard Hanson Dam, the Mud Mountain Dam, Lakeland South Pond, Lake Young's Reservoir and Lake Tapps Dam. These dams are at risk for a range of water-related issues, such as seepage, inability to regulate flow, or complete dam failure.

Significant historical events:

- July 1976, increased discharge from the Mud Mountain Dam resulted in a surge in water flow, killing two children playing in the White River near Auburn.
- 2009, seepage issues were discovered at the Howard Hanson Dam (Green River), catalyzing the U.S. Army Corps of Engineers to begin improvements to reduce the risk of downstream flooding (improvements completed in 2011).

Landslides / Mudslides

Avalanches occur when debris (rocks, soil, and foliage) moves down a slope. Landslides can be minor or significant, varying in speed. Landslides can be initiated by storms, earthquakes, fires, volcanic eruptions, or human modification of the surrounding land. Mudslides (mudflows/debris flows) are "rivers" of rock, earth, foliage and soil materials saturated with water. Mudslides develop in the soil overlying bedrock on sloping surfaces when water rapidly collects in the ground during heavy rainfall or rapid snowmelt. A mudflow can quickly move down slopes or through channels and can strike with little or no warning, potentially traveling miles from the source. Mudslides can grow as they descend, picking up trees, boulders, cars and anything else in the path.

Landslides and mudslides can be extremely destructive, posing severe hazards to properties on or below hillsides. Landslides deform and tilt the ground surface, potentially resulting in foundation destruction, the offset of roads, and broken underground pipes. Slides can occur at any time, but the majority occur during the rainy season (January after the water table has risen during the wet months of November and December). In King County, landslides usually happen during or immediately after major storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. Precipitation influences the timing of landslides on three scales: total annual rainfall, monthly rainfall, and single precipitation events.

Landslides are common features in river and stream valleys across King County. While small landslides are often caused by human activity, large landslides are usually caused by naturally occurring phenomena. Naturally occurring landslides can disrupt roadways and other infrastructure lifelines, destroy private property, and cause flooding, bank erosion, and rapid channel migration. Landslides can result in secondary effects such as blocking road access, which isolates residents and businesses, delaying commercial, public, and private transportation. Too, power and communication failures can arise as vegetation or poles on slopes get knocked over. Landslides also have the potential of destabilizing the foundation of structures, especially bridges / overpasses.

Table 8: Exposure and Value of Structures in Landslide Risk Areas, by City

City	# Of Buildings Exposed	Total Value	% Of Total Assessed Value, Citywide
Algona	14	~$14M	1.6%
Auburn	132	~$176M	0.98%
Pacific	1	$400,000	0.05%

As for critical infrastructure, the City of Auburn has three such structures that are in high-risk landslide areas (one bridge and two water supply facilities). The cities of Algona and Pacific have no critical infrastructure located in the high-risk landslide areas. There are several small landslides in the service area each winter season, usually following heavy rains. Such events typically involve temporary road closures while debris is cleared, after which road utilization returns to normal. Transportation routes that are particularly at risk (for blockage / closures) due to landslides include the West Valley Highway, Peasley Canyon Road, Lea Hill Road SE and Kersey Way SE.

Figure 24: Landslide Hazard Areas, City of Algona

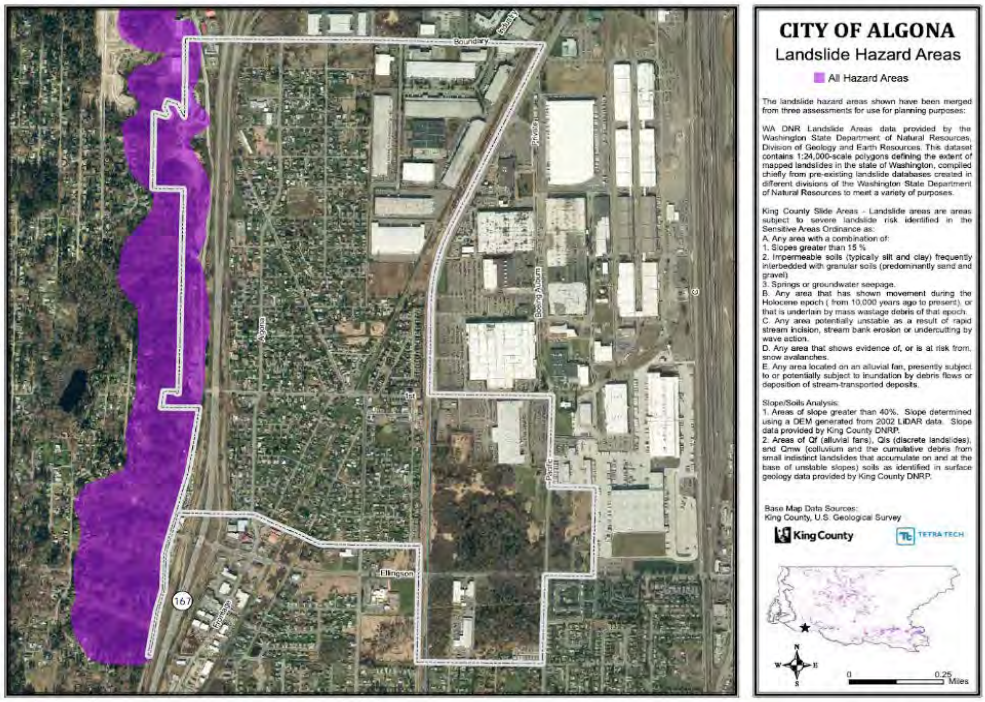
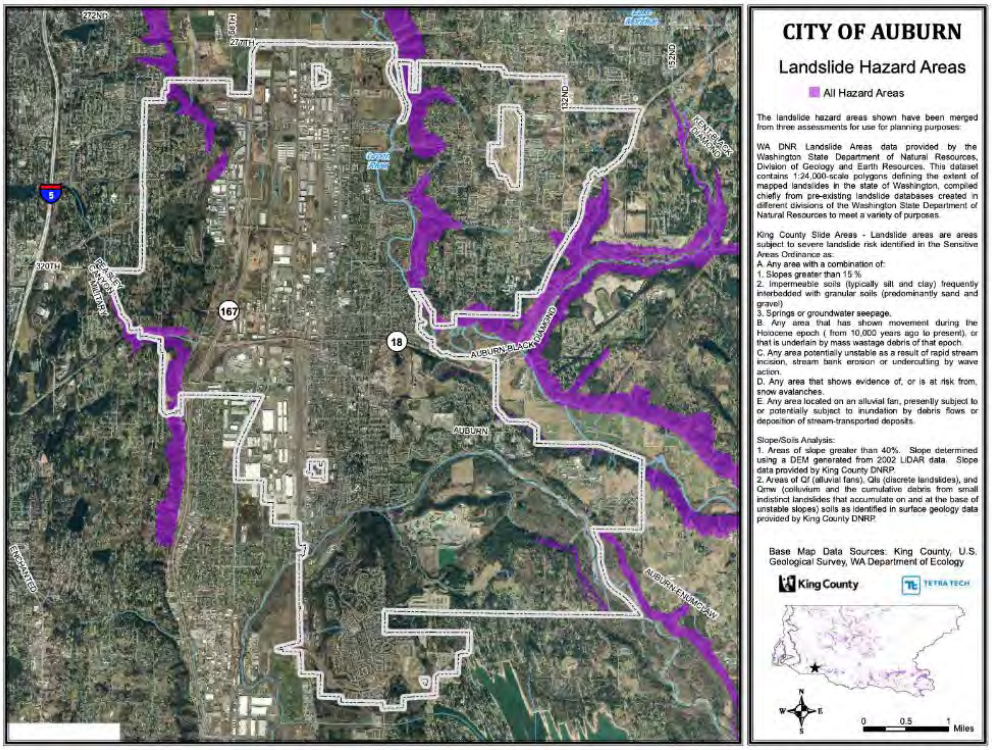


Figure 25: Landslide Hazard Areas, City of Auburn



Severe Weather

- Severe Weather Event- Risk Score: 5.46

Severe weather encompasses a range of events, including but not limited to heavy rain, snow, ice, extreme temperatures, strong winds, and thunderstorms. Extreme cold-weather conditions (snow, ice, heavy rain) occur annually between October and April, and severe heat-related events occasionally happen in the summer.

The most common problems associated with severe storms are immobility and loss of utilities. While fatalities are not common, roadways often become impassable due to flooding, debris, ice or snow. Power lines can be knocked down from high winds, and other utilities (water, cellular, fiber) may also be disrupted. While rare, lightning strikes can also cause severe damage to property and the environment as well as physical injury.

Historically, winter weather in the service area is moderate. However, every few years there is a winter storm that involves greater than usual snowfall / ice, requiring school closures, road closures, and the activation of warming shelters. The most recent such events include the winter storm of January 2009 (record snowfall and ice and warming shelter activated) and the winter storm of February 2018 (warming shelters activated).

EXTREME HEAT

Extreme heat events are marked by summer weather that is significantly hotter and more humid than the annual average, and heat waves are extreme heat events that last for two or more days.

SNOWSTORMS

A winter storm is defined as an event with significant snowfall, ice and / or freezing rain, with the quantity of precipitation varying by elevation. Heavy snowfall is considered to be 4+ inches in twelve hours or six or more inches in 24 hours for non-mountain areas. Heavy snow has the potential to paralyze transportation in the service area, resulting in stranded drivers, a reduction of supply flow, and a disruption in emergency and medical services. Accumulations of heavy and wet snow have the potential to collapse buildings and knock down trees and power lines. In more rural areas, some residents may end up isolated for days. Along the ridges or areas of higher elevation, heavy snow can lead to avalanches. Financially, the cost of removing snow, repairing damages, and loss of business can potentially have economic impacts on the service area.

EXTREME COLD

In general, freezing or near freezing temperatures for a continuous period define extreme cold events. Extreme cold can often accompany severe winter storms. Fatalities are possible during extreme cold events, but are usually indirectly related to the actual weather event; fatalities from traffic accidents on icy roads and heart attacks while shoveling snow are much more likely. Too, Icy roads that result in major traffic accidents make it very difficult for emergency personnel to get around, creating a secondary threat to public safety if first responders cannot adequately respond to calls.

While all residents of the service area are at risk for severe winter weather, vulnerable populations (elderly, low income, linguistically isolated, people with life-threatening illnesses, homeless, isolated residences, etc.) are at significantly higher risk.

CRITICAL FACILITIES AND INFRASTRUCTURE

Downed trees / debris, heavy wet snow and ice have the potential to negatively impact power and above-ground communication lines. The freezing of power and communication lines can cause line breakage, disrupting electricity and communication, leaving some populations isolated and without the ability to call for assistance. Water systems can also be disrupted, as freezing temperatures result in breaks in cast iron mainlines or failures of commercial / residential water lines. Inadequately insulated potable water and fire sprinkler pipes can rupture and cause extensive damage to property.

Table 9: Loss Potential for Severe Winter Weather (KC HM Plan)

City	Total Assessed Value, in dollars	Estimated Loss Potential, in dollars		
		10% Damage	30% Damage	50% Damage
Algona	$902,612,000	$90,261,200	$270,783,600	$451,306,000
Auburn	$17,992,313,000	$1,799,231,300	$5,397,693,900	$8,996,156,500
Pacific	$830,743,000	$83,074,300	$249,222,900	$425,371,500

Volcanic Events

- Volcanic Event with Lahar- Risk Score: 9.20

A volcano is an opening in the earth's crust that ejects magma, rock fragments, gases, and ash. There are several hazards related to volcanic eruptions, which are distinguished by the different ways in which volcanic materials and other debris flow from the volcano. For instance, molten rock can erupt in the form of lava, which may flow out as a viscous liquid or via explosion from the vent in the form of solid chunks of rock. Lahars (rapidly flowing mix of water and rock debris) are commonly associated with volcanic eruptions, heavy rains, and debris accumulation. Finally, falling ash from explosive eruptions can reach hundreds of miles downwind and drifting clouds of fine ash can cause severe damage to the engines of jet aircraft hundreds or thousands of miles away.

Washington has five major volcanoes in the Cascade Range—Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens and Mount Adams. Mount Rainier, which lies 40 miles south (as the crow flies) of the service area, has seen 14 eruptions in the last 9,000 years, including four massive mudflows / lahars. Three lahar scenarios involving Mount Rainier have been mapped by the United States Geological Survey (USGS) (see figure 26). The three scenarios are:

- **Case 1, Large Lahars** (Recurrence intervals 500-1,000 years)—Areas that could be affected by cohesive lahars that originate as enormous avalanches caused by weak, chemically altered rock comprising the volcano can occur with or without eruptive activity.

- **Case 2, Moderate Lahars** (recurrence intervals 100-500 years)—Areas that could be affected by relatively large, non-cohesive lahars, which are commonly caused by the melting of snow and glacier ice by hot rock fragments during and after an eruption. They can also have a noneruptive origin.
- **Post-Lahar Sedimentation**—Areas subject to post-lahar erosion and sedimentation and the ongoing potential for flooding.

The cities of Algona and Pacific are at particularly high risk for case 1, case 2 and case 3 effects from a lahar, and Auburn is at risk for case 3 effects (see table 10). When it comes to economic vulnerability related to lahars, the potential impacts on the service cities are high. For instance, in a case one lahar, the estimated value of exposed structures (and their contents) for Algona and Pacific are ~98% and ~96%, respectively (see table 11). This means that ~98% of the total assessed value of all structures in the city of Algona is at risk during a case one lahar (96% for the city of Pacific, and ~20% for the city of Auburn).

Table 10: Exposure & Value of Structures and Contents, by USGS Lahar Case (Measured in % of Total Assessed Value per City)

City	*Case 1*	*Case 2*	*Case 3*
Algona	97.75%	6.87%	0%
Auburn	19.66%	none	50.81%
Pacific	95.54%	51.68%	none

Table 11: Number of Buildings Exposed to Damage, by USGS Lahar Case

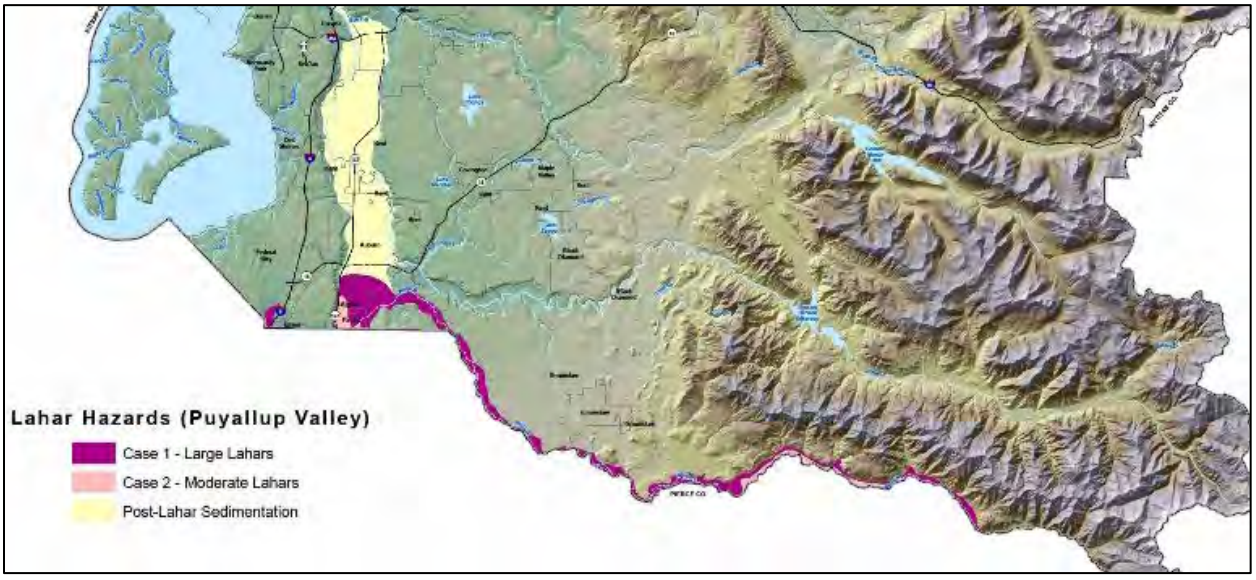
City	*Case 1*	*Case 2*	*Case 3*
Algona	1,116	261	1
Auburn	3,708	none	8,283
Pacific	2,073	1,127	none

Table 12: Number of Critical Facilities & Critical Infrastructure in USGS Case 1 Lahar

City	*Protective Function*	*Schools*	*HazMat*	*Other*	*Bridges*	*Wastewater*	*Power*	*Dams*
Algona	1	1	0	0	1	0	1	1
Auburn	1	7	10	2	1	4	0	2
Pacific	2	1	0	0	4	1	0	0

With lahars and lava flows, the most significant hazard to public safety is the threat of being buried, crushed or burned by the flowing or falling debris. Such debris can also damage (and carry away) buildings, vehicles, infrastructure, and the natural environment. Debris flows are usually confined to the downslope areas in the valley, meaning that evacuation routes are targeted to higher ground (valley sides). The city of Auburn (in tandem with the cities of Algona and Pacific) has a lahar evacuation plan with associated signage (evacuation routes) posted around the city. These routes guide citizens to higher ground, in the opposite path of debris flow from Mount Rainier. While the city of Auburn has an emergency alert system called “CodeRed” (also used by King County), the Washington State Emergency Management Division also has a lahar warning system. This system uses sensors to record ground vibrations. During lahar, the system issues an automatic alert to local emergency management agencies. Local emergency managers then notify the public about evacuation procedures. This tool is extremely useful to the three service cities; a USGS study estimated that a case 1 lahar would reach the City of Auburn within ~96 minutes of the warning alarm activation (EMD, 2012; see Figure 26

Figure 26: Lahar Hazards by USGS Case Scenario



Wildland Fires

- Brush / Wildland Urban Interface (WUI) Fire Event- Risk Score: 7.06

Wildfires are characterized by uncontrolled fire on undeveloped land that requires fire suppression. Such fires can be ignited naturally (lightning) or by humans (accidentally or intentionally). Wildfires pose a significant risk to the natural environment, including the destruction of timber, wildlife habitats, scenic vistas, and watersheds. The probability of a wildfire depends on fuel conditions, topography, and weather. Wildfires can result in health impacts, loss of life, and property loss. Smoke and air pollution from wildfires can be a health hazard, especially for vulnerable populations.

The wildland fire season in Washington State generally starts in early July and lasts until late September. Climatic conditions such as drought, snowpack, and localized weather can expand the length of the fire season. The areas of risk within the VRFA service area include the east and west hills, heavily forested areas on the valley floor and other areas where urban interface zones are present.

In the event of a wildfire in the VRFA service area, there would likely be little damage to critical infrastructure, with roadways and railroads mostly remaining undamaged. Power line-structures are the most vulnerable to wildfire because most are composed of wood materials. Too, in the event of a wildfire, pipelines provide a potential source of fuel for a secondary incident (explosion). When it comes to critical facilities and critical infrastructure, the City of Auburn has N=7 locations that are within the Fire Behavior Fuel Model Ten (FBFM10[4] Areas of vulnerability include one government building, one school, three water supply locations, one wastewater facility, and one communication location.

Currently, there are two registered Tier II hazardous material containment sites in wildfire risk zones. During a fire event, hazardous materials storage containers could rupture due to heat and act as fuel for the fire, escalating the fire to unmanageable levels. In addition, they could leak into surrounding areas, saturating soils and seeping into surface waters, and have a disastrous effect on the environment.

WUI fires occur where combustible vegetation comes into contact with combustible structures, creating a combination of the hazards associated with wildfires and structure fires. WUI fires have increased in frequency over the last few decades' as urban sprawl expands into more rural areas. When a WUI fire breaks out, the threat of extreme property damage and loss of life often force firefighters to focus efforts on protecting homes and structures, sometimes at the expense of protecting wildland resources or working to slow the fire.

[4]FBFM10 is one of the thirteen "Fire Behavior Fuel Models" (FBFM) that serve as input to a model of surface fire behavior and spread. The FBFM represents the distribution of fuel loading among live and dead surface fuel components, size classes, and fuel types. The most common fire-carrying fuel type describes the fuel models (grass, brush, timber litter, or slash), loading and surface area-to-volume ratio by size class and component, fuel bed depth, and moisture of extinction.

Wind-Related Events

- Wind-Related Event- Risk Score: 5.18

Windstorms can be a frequent problem in the service area and have been known to cause damage to utilities. Lower wind speeds along the valley are still high enough to knock down trees and power lines. Severe windstorms and downed trees can have significant impacts on power and above-ground communication lines; the loss of electricity and phone services would leave specific populations isolated and unable to call for assistance.

STORMREADY DESIGNATION

The City of Auburn is certified as "StormReady" through the National Weather Service (NWS). Started in 1999, StormReady helps supply communities with the communication and safety skills to save lives and property before and during emergency / disaster events. The StormReady designation demonstrates support for communities by better preparing for life safety activities during severe weather through advanced planning, education / outreach, and enhanced awareness.

Historically, three significant wind-related events involved major power outages across the service area: January 1993 (loss of power for 1-3 days), December 2006 (loss of power for multiple days) and October 2007 / December 2007 (loss of power for 24 hours).

Community Risk Reduction

Overview

The VRFA Fire Marshal's Office (FMO) is responsible for fire prevention activities such as education / outreach, permit, and compliance / fire investigation. The Community Risk Reduction Program (CRRP) utilizes the "Five E's" of prevention for risk reduction measures (education, engineering, enforcement, economic incentive, and emergency response). To this end, the FMO takes the safety of the community and firefighters very seriously and focuses on the following activities to ensure the safest environment possible:

- *Education and public outreach*
  - Business owners
  - Community members
- *Permit review and inspections*
  - Building and fire permit reviews
  - Land use reviews
  - Right of way use reviews
- *Facility compliance and inspections*
  - Production and related processes
  - Storage practices
  - General fire and life safety
- *Fire investigations*
  - Origin and cause determination
  - Criminal cases

With these major areas of focus in mind, this section provides an overview of the activities of the VRFA FMO.

Education

The Valley Regional Fire Authority uses several programs to provide public education, including school-based education, fire station tours, community events, and more.

School Based Education

Classroom fire and life safety lessons are provided to approximately 4,500 students in fourteen public and four private elementary schools. As a supplement and reinforcing tool, a safety activity newsletter titled "Safety Zone" is also produced and distributed to all elementary school children during the annual school year. All teaching personnel adhere to the National Fire Protection Agency (NFPA) 1035 guidelines for minimum job performance requirements for fire and life safety educators. See table 13 below for more information on the average number of school-based classes taught by the VRFA each year.

The Public Information and Education Officers and firefighters visit preschool classes and daycare centers to teach basic fire safety behaviors and to introduce young children to firefighters. Fire personnel utilize two nationally recognized educational programs for teaching fire safety to preschool age children.

Each of the four high schools in the service area receive the "*Think Again*" classroom program annually. This program educates students about risks associated with driving under the influence of drugs / alcohol and distracted driving, to reduce crashes and to increase seatbelt usage.

The "*Fire Stoppers*" program is an educational intervention program designed to teach parents and children about fire safety and the destructive consequences of fire. Each family meets individually with a trained interventionist, generally after an unsafe fire-related incident has occurred. The interventionist recommends either education alone or education combined with counseling based on the situation, to reduce the risk of activity reoccurrence.

Station Tours & Related Services

Firefighters provide several fire station tours and on-site visits annually, following a station tour guideline for delivering appropriate educational messages for each particular age group. Too, the Public Information and Education Officers (PIEOs), firefighters and VRFA front office staff fit approximately 120 free helmets annually for citizens and provide training on the correct helmet fitting technique. Life jacket fitting / sales is also offered as a part of comprehensive water safety education.

Public Events

Over 10,000 children attend the annual “Auburn Kid’s Day” event, where the PIEOs, firefighters and other staff run several safety activity stations and tour families through VRFA apparatus. The VRFA PIEOs conduct children’s safety classes and staff educational booths at child-aimed safety fairs and community events including the “YMCA Healthy Kids Day”, “King County Health

Department Community Health Fair", the "Latino Health Fair", career talk events at local schools, "Algona Days", "Pacific Days" and others.

Over 200 local boy and girl scouts attend the annual VRFA Scout Night. For Scout night, several learning stations are set up for scouts to obtain their merit badges in the areas of fire safety / home escape planning, first aid, fire station tour, ropes and knots, kitchen safety and other areas.

Annually, approximately 20 classes are provided to local businesses, community groups, and apartment complexes on the topic of fire safety in the business or home. Most of these classes include fire extinguisher training as a large portion of the lesson, many classes include hands-on discharge of extinguishers and the use of live fire.

Both CPR and First Aid / CPR combination classes are offered to the public in a monthly format and by request for groups and businesses (for a nominal fee). The American Heart Association (AHA) provides the content and certifies the VRFA instructors. Participants receive AHA CPR or CPR / First Aid Certification cards after completing the course(s).

Table 13: Average Annual Summary of Educational Outreach

Education Level	Average Number of Classes taught, per year	Instructor Qualifications
Kindergarten	43 classes	Public Education Certification (5 years' experience) OR Firefighter
Grade 1	45 classes	Public Education Certification (5 years' experience) OR Firefighter
Grade 2	37 classes	Public Education Certification (5 years' experience) OR Firefighter
Grades 9-12	34 classes	Firefighter
Juvenile Fire Setter Intervention	*8 students*	Juvenile Fire Setter Certification
Fire Station Tours	41 classes	Firefighter
Adult Education	20 classes	Public Education Certification (5 years' experience)
First Aid	10 classes	American Heart Association Certification AND Public Education (5 years' experience) OR Firefighter

Personal Safety Resources

The VRFA PIEOs are certified "Child Passenger Safety Technicians" and assist with a car seat inspection program hosted by the "South King County Child Passenger Safety Coalition" and "Safe Kids of South King County." The car seat inspections are held once a month.

VRFA personnel also teach classes on fall injury prevention to older adults, both in the home setting and at senior health fairs. VRFA firefighters also distribute fall injury prevention materials when responding to fall incidents and refer patients to King County Emergency Medical Services for further evaluation and intervention to prevent additional falls.

Through grants secured by the Public Education Division, the VRFA gives out and installs smoke alarms and batteries to senior citizens and low-income families. Additionally, hearing-impaired smoke alarms are distributed and installed annually.

Table 14: Summary of Annual Community Education Events

Type of Event	Average Number of Events per Year	Instructor Qualifications
Fire Safety Education	20	Public Education Certification (5 years' experience) OR Firefighter
Fire Service Career Education	3	Firefighter
Bike Helmet Fittings	120	Public Education Certification (5 years' experience) OR Firefighter
Car Seat Installation & Education	48	Public Education Certification (5 years' experience)
Fall Prevention Education	4	Public Education Certification (5 years' experience)
Smoke Alarm Installations	189	Public Education Certification (5 years' experience) OR Firefighter

Engineering

The VRFA FMO evaluates building and fire permit plans for compliance with the national and local codes. By evaluating building plans, conducting site visits, and working with local citizens and business owners on safe building construction / modifications, the VRFA FMO is promoting fire and life safety in the service area. Some of the target areas for plan reviews and inspections include fire sprinkler systems, fire alarm systems, storage practices, process analysis, Emergency Responder Radio Coverage systems, and more.

The FMO also evaluates land use permits for compliance with the national and local codes and standards. Through this process we ensure that fire response vehicles have access to buildings and fire hydrants, gates and doors as necessary, adequate water flow, and other items that affect the ability of the responding fire units to access buildings and suppress the fire.

Business License reviews and inspections are vital to the fire and life safety of the community. The business license inspection is the FMO first opportunity to educate new business owners on the national and local codes that affects the business they are conducting. New business license reviews educate the business owners on how to provide a safe environment from the onset. Too, the VRFA FMO reviews approximately 700 plans (fire sprinkler, alarm, tenant improvement, building, mechanical, fire service line) per year, resulting in approximately 1,200 *construction site inspections*. The FMO conducts about 1,200 *risk reduction inspections* annually, spending many hours communicating with the community regarding building plan development.

Table 15: 2018 Fire Permit Review Activities

Type of Permit	Number of Permits issued	Inspector Qualifications
Business License	120	ICC Fire Plan Review OR ICC Fire Inspector I
Construction Review	400	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II
Land Use	270	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II OR ICC Fire Marshal
Right of Way	30	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II OR ICC Fire Marshal

Enforcement

In tandem with engineering, enforcement involves ensuring commercial buildings, large residential complexes, and other structures comply with occupancy and other regulatory requirements over time. The FMO collaborates with the building departments and code enforcement units of the three-member cities to ensure compliance. Typically, compliance is accomplished through education and follow up visits. If necessary, the appropriate city official will work directly with the VRFA FMO staff to ensure compliance is achieved with the proper level of enforcement.

Risk Reduction Inspections

The FMO, through risk reduction inspections, works to ensure that fire and life safety codes are maintained. Risk reduction inspections are completed by the International Code Council (ICC) certified fire inspectors and firefighters. Firefighters receive training on an annual basis from VRFA ICC-certified fire inspectors to ensure code requirements are applied correctly. The most common code violations include building maintenance issues (address not visible, keys not provided, occupant load not posted), unprotected / blocked hydrants, egress issues (hallways / doorways are not kept clear for safe egress), poor fire extinguishing system maintenance (fire extinguishers, fire alarms, fire sprinkler systems), inadequate housekeeping (poor storage practices), poor commercial cooking processes (system not maintained or cleaned), and electrical issues.

Construction Site Inspections

Construction site inspections are required when a permit for construction is issued by the city having authority, and are initiated by the contractor during the construction process. Each permit can require three or more inspections. Construction inspections (either tenant-based or new construction based) ensure that the engineering inputs are installed in each building per local and national codes and standards. Compliance is achieved in most cases through educating property owners on the codes and standards, fire science, engineering advances, economic incentives, and emergency response capabilities. Construction inspections include fire sprinkler underground, fire sprinkler systems, fire pumps, fire alarm systems, cooking hood and duct systems, hazardous materials and tanks, underground tank removal, emergency responder radio enhancements, high piled storage, and many others.

For both risk reduction inspections and construction inspections, issues of non-compliance are resolved at the lowest level, but if needed, they are submitted (via referral) to the city having authority for enforcement.

Table 16: Average Annual Fire Inspection Targets

Inspection Type	Target Number of Annual Inspections	Inspector Qualifications
Business License	90	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II
Certified Inspector Risk Reduction	1,200	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II
Engine-Company Level Risk Reduction	1,200	Firefighter
Construction Site Inspections	1,200	ICC Fire Plan Review OR ICC Fire Inspector I OR ICC Fire Inspector II

Fire Investigations

The FMO is responsible for ensuring that all fires within the response area receive a thorough and proper investigation. The VRFA has established threshold limits by fire outcome, which effectively determines the level of investigation required. For example, large incidents such as fires with burn injuries / deaths, fires resulting in damage greater than $10,000, fires that are suspicious, and fires where all accidental cause has been ruled out require a specially trained investigator. These trained investigators use scientific methods from national guidelines to investigate and determine fire origin and cause (O&C). The engine company officer investigates all other fires that do not meet the threshold limits mentioned above. If a fire exceeds the capability or training of the engine company officer (Captain), the officer can dispatch a certified fire investigator for assistance.

Fire investigators also utilize the "Five E's" in the investigation process to determine O&C and to prevent future fires. For example, residents and owners are educated on the fire investigation process, the type of help that is available at the time of a fire, the O&C results, and other prevention and mitigation measures. Engineering is also a consideration in the scientific investigation process; fire protection systems (smoke detectors, fire alarm systems, and fire sprinklers) are located and evaluated to determine their current operational state and functionality. When a fire is determined to be of incendiary origin, criminal prosecution (enforcement) is pursued by the VRFA fire investigator in collaboration with local police departments and the local prosecutor's office. A financial incentive can be in the form of recouping monetary loss through an insurance policy or limiting the damage during firefighting and the investigation process (economic incentive).

Table 17: Annual Fire Investigation Activities

Type of Fire	Average Number of Annual Inspections	Investigator Qualifications
Brush	8	Commissioned Police Officer AND IAAI[5] CFI[6] OR IFSAC[7] Fire Investigator
Commercial	15	Commissioned Police Officer AND IAAI CFI OR IFSAC Fire Investigator
Other	20	Commissioned Police Officer AND IAAI CFI OR IFSAC Fire Investigator
Residential	15	Commissioned Police Officer AND IAAI CFI OR IFSAC Fire Investigator
Vehicle	15	Commissioned Police Officer AND IAAI CFI OR IFSAC Fire Investigator

Economic Incentive

The VRFA provides financial incentives for fire reduction / mitigation activities via reduced "Fire Benefit" charges for commercial buildings with fire sprinkler systems. For instance, a commercial structure with a fire sprinkler system installed throughout the structure can receive a 10% reduction of the "Fire Benefit Insurance" quote.

Emergency Response

Finally, one of the main functions of the VRFA is to provide emergency response resources for the cities of Algona, Auburn, Pacific, and Fire Protection District 31. The services fall into four main categories - fire protection, EMS, technical rescue, and hazardous materials response. The VRFA staffs five 24/7/365 fire stations that are strategically located in the 40 square mile response area.

[5] *International Association of Arson Investigators*
[6] *Certified Fire Investigator*
[7] *International Fire Service Accreditation Congress*

Structural Risk Assessment

Independent of the accreditation process, the VRFA FMO is in the process of finalizing a structural risk assessment scoring process / tool. The process / tool follows the National Fire Protection Association (NFPA) instructor Dave Lyman's Model and is based on *risk* and *mitigation factors*. While this Standard of Cover does not intend to delve into the minute details of the VRFA structural risk assessment process, there is value in providing an overview of the high level elements of this process / tool.

Risk Factors

The following are the risk factors used (to assign a risk score to each structure) in the aforementioned process / tool (indicators): ignitability, combustibility, danger level, and defined hazards. These indicators are described in more detail below.

Ignitability – Buildings are identified by construction type, and then national statistics are used to determine how often each particular construction type is involved with fire.

Combustibility (ISO Occupancy Factor) – Occupancy combustibility classifications consider the combustibility of contents and its effect on the structure. Combustibility classifications include noncombustible, limited-combustion, combustible, free-burning, rapid burning.

Danger level – Buildings are identified by construction type, and then national statistics are utilized to determine how often people are injured / killed by fires in each construction type.

Defined Hazards

- *Target hazards* – Local knowledge is applied to buildings in the service area, including storage practices, processes used, or known like-hazards.
- *Critical Facilities* – Identified critical facilities provide services and functions essential to a community, especially during and after a disaster (critical infrastructure). Such facilities are given a unique score to reflect the level of risk.
- *Fire Operation Permits* – Buildings are given a score based on occupancy requirements and fire operations permits (per provisions in the International Fire Code and Washington State Amendments).

Mitigation Factors

The following risk indicators are also used in structural risk assessments: fire alarms, fire sprinkler systems, fire resistance, and WSRB rating. For each structure, the following indicators are examined, resulting in a cumulative numerical score[8]:

Fire Alarms – Are fire alarms present in the structure? (Yes / No)

[8] *For categories with Yes / No responses, "yes" responses are given a higher numerical score and "no" answers are given a lower numerical value, affecting the overall cumulative numerical (quantitative) score. Too, the construction type categories are assigned numerical scoring values.*

Fire Sprinklers – Are fire sprinklers present in the structure? (Yes / No)

Fire-Resistive Factors

- *Construction type*: What is the building construction type? (Type I / Type II)
- *Exposure status*: Is there another structure within 60 feet of the structure? (Yes / No)

WSRB Rating – As mentioned in section II above, each city and district is assigned a WSRB "Fire Protection Class" grade, which serves as an evaluation of the fire protection capabilities of each community. The scoring system is based on a numerical classification of one through ten, one being the highest level of protection and ten being the lowest. Such grades are relevant to the structural risk assessment scoring process in that each structure is assigned the WSRB rating score of the city (or district, in the case of structures in Fire District #31) in which the structure is located.

Based on the risk and mitigation factors described above, the VRFA FMO's structural risk assessment process classifies commercial occupancies into the following risk categories: (a) maximum[9] hazard, (b) high hazard, (c) moderate hazard, and (d) low hazard. For example, structures scored in the "low hazard" risk category usually:

- feature mitigation measures like fire alarm systems and fire sprinkler systems
- do not store or manufacture (large volumes of) combustible hazardous materials
- are built with non-combustible or fire resistive materials
- have a low ISO occupancy factor (combustibility risk)
- do not need fire operation permits
- are not a high risk to life hazards (occupancy load and egress factors)

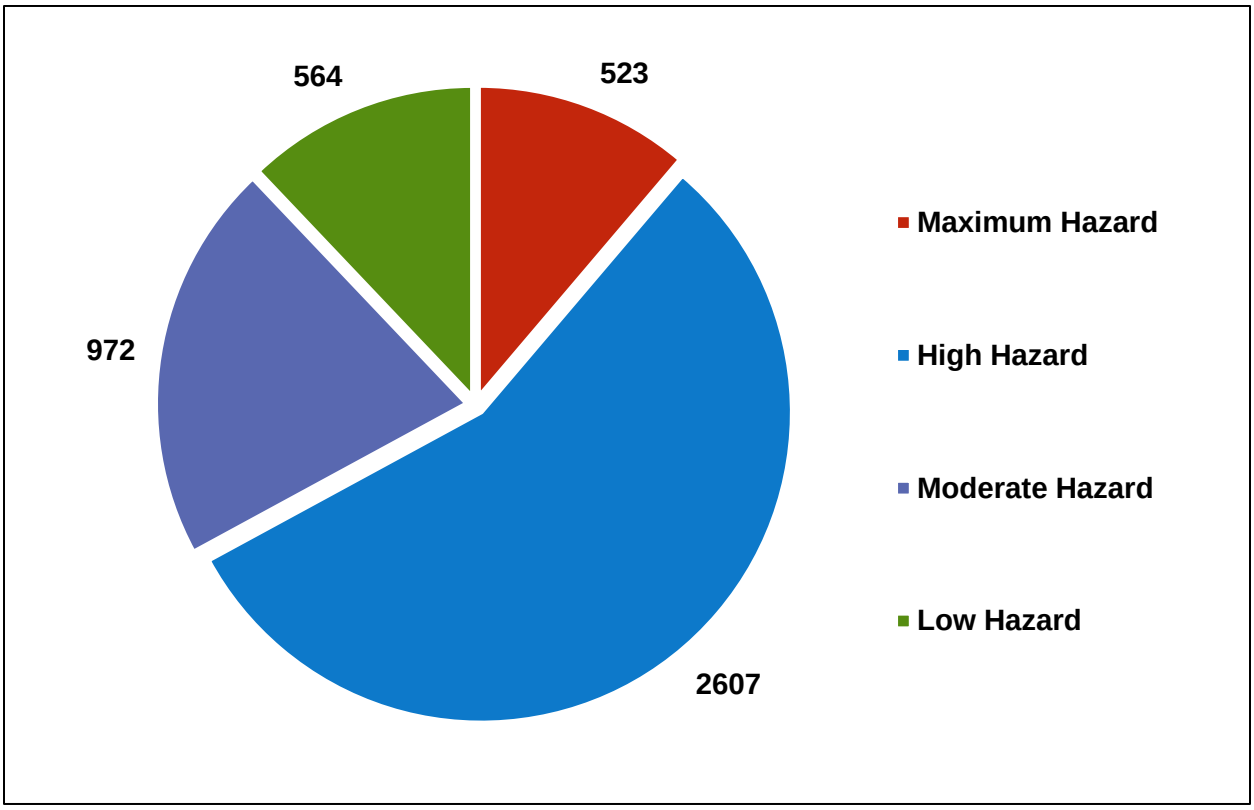
On the other hand, structures scored in the "maximum hazard" risk category:

- may not have fire alarm systems or fire sprinkler systems
- may store or manufacture hazardous materials
- are built with combustible materials
- may have a high ISO occupancy factor
- may require fire operation permits
- may represent a high risk to life hazards (occupant load and egress abilities)

While other factors certainly come into play, the four risk categories are a useful way to organize, classify, and manage structural risk to life safety of occupants and first responders. Figure 27 below depicts the number of structures assessed in 2018 within the VRFA service area and their associated risk category.

[9] *Maximum hazard risk signifies a structure that is at the highest risk for life safety of the public and first responders during a fire-related event.*

Figure 27: Number of Assessed Occupancies in 2018, by Risk Category



SECTION IV: CURRENT DEPLOYMENT AND PERFORMANCE

Critical Tasking

Successful emergency response operations require an effective response force (ERF) that is properly prepared, equipped, and trained. Determining the effective response force is a process that is unique to each agency. This process involves evaluating the community risk assessment, service impact considerations, and then, through critical tasking, determining staffing levels, resource types, number of resources and the required capabilities of the response force. For the VRFA, the ERF levels reflect the ability of the force to set up equipment while simultaneously handling scene specific tasks (i.e., emergency medical, fire ground, hazardous materials, and technical rescue tasks).

Response staffing is based on the initial alarm (call type), as well as any potential subsequent alarm task-requirements. If a VRFA Officer determines that an incident requires a change in initial resources assigned, the response plan is modified, and additional resources are requested.

Per the risk classification/assessment process, the VRFA has broken down each of the area hazard events (see Figure16: Hazard Risk Scores, by Severity Ranking in section III for more information) into one of four risk level classifications based on the risk score: low, moderate, high, and maximum. The following section provides information on critical staffing and tasking for each of the major service disciplines at all risk level classifications.

Emergency Medical Services (EMS) Response

EMS resources are dispatched based on predesignated response plans (run cards). Many of the VRFA Basic Life Support (BLS) calls require a single BLS-resource (unit) staffed with two or three firefighters / EMTs. The VRFA's minimum daily staffing is 20 BLS providers (firefighters and officers). As mentioned in section II, the VRFA is under the King County Medic One Levy system for ALS services. A King County Medic Unit is housed at VRFA Station 31 and responds to ALS incidents in the VRFA service area. If this unit is not available, the closest King County Medic Unit is dispatched in its place.

Evaluating BLS and ALS service delivery capabilities is crucial when trying to accurately calculate critical tasks. As an example, chest pain can progress quickly to cardiac arrest, resulting in a pulseless patient who requires a higher level of care. Many of these incidents see a rapid decline in patient survival rates without immediate or prompt intervention from bystanders or first responders. The same is true for victims of severe trauma, where blood loss is significant; without timely intervention, injuries can result in irreparable damage or death.

Since many EMS calls vary in scope and required resources, this document will only provide critical tasking for one type of EMS incident, cardio-pulmonary resuscitation (CPR).The tables on the following pages outline the critical staffing and critical tasking activities for CPR incidents.

Cardio-pulmonary Resuscitation (CPR)

Table 18: Critical Staffing - CPR

Vehicle / Apparatus Type	Number	# of Personnel
Engine / Ladder	1	3
Aid	1	2
Battalion Chief	1	1
Total:	***3***	***6***
Note: King County Medic One Paramedics are dispatched to all VRFA CPR incidents. Paramedics deliver all ALS interventions, while personnel listed in the table above deliver BLS care and may assist ALS providers.		

Table 19: Critical Tasking - CPR

Task	# of Personnel
Command	1
Chest Compressions	1
AED / Defibrillation Management	1
Airway Management	1
Patient Care / Incident Documentation	1
Total:	***5***
Note: Any personnel not accounted for in this list are still working. CPR protocols have determined that a firefighter will always remain on standby, ready to take over compressions. This transfer of compression duty takes place every two minutes, ensuring that a refreshed rescuer is performing chest compressions.	

Fire Suppression Response

The variables of fire dynamics, fire growth rates, and potential loss of life and property determine the fire ground tasking for suppression and / or rescue. The VRFA is a 100% NIMS compliant organization, and also uses the nationally recognized incident management program called "Blue Card" to manage incident operations. All VRFA, as well as other Emergency Response Zone 3 Officers, complete a rigorous certification process as well as annual training requirements to recertify every three years as a Blue Card Incident Commander (IC). This command system determines how ICs process information based on eight critical fire ground factors. This evaluation process determines how resources are assigned based on the prioritization of the incident objectives and the strategy that is chosen- either offensive, defensive, or a combination of the two. This decision-making process and all other fire ground procedures are captured in the Zone 3 Command Procedures. Fire responses for critical tasking purposes are broken into three risk categories - low, moderate, and high, outlined in the tables on the pages below.

Low Risk Fire Events (“Other Fires”)

Table 20: Critical Staffing- Low Risk Fire Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	1	3
Total:	***1***	***3***

Table 21: Critical Tasking- Low Risk Fire Event

Task	# of Personnel
Investigate*	1*
Attack Line	2
Pump Operator	1
Water Supply / Hydrant*	1*
Total (minimum):	***3***

Moderate Risk Fire Events ("Residential Fires")

Table 22: Critical Staffing- Moderate Risk Fire Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	3	9
Ladder	1	3
Aid	1	2
Battalion Chief	1	1
Total:	***7***	***15***

Table 23: Critical Tasking- Moderate Risk Fire Event

Task	# of Personnel
Command	1
Attack Line	2
Pump Operator	1
Water Supply / Hydrant*	1*
Standby / Rapid Intervention Crew	2/3
Search and Rescue	3
Ventilation	3
Forcible Entry	2
Backup Line	2
Total (minimum):	***14 to 16***

High Risk Fire Events ("Commercial Fires")

Table 24: Critical Staffing- High Risk Fire Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	5	15
Ladder	1	3
Battalion Chief	1	1
Total:	***7***	***19***

Table 25: Critical Tasking- High Risk Fire Event

Task	# of Personnel
Command	1
Attack Lines	5
Pump Operator	1
Water Supply / Hydrant*	*
Standby / Rapid Intervention Crew	3
Ventilation	3
Back-up Line	3
Forcible Entry*	*
Search and Rescue	3
Safety	1
Total:	***20***

Hazardous Materials (HazMat) Response

Incident response guidelines and best practices for HazMat incidents are defined in Section 2 of the King County Model Procedures Guide. These procedures are endorsed by the King County Fire Chiefs Association as a template for planning, training and responding to HazMat incidents. The tables below indicate the critical staffing and tasking of VRFA personnel as well as other Agency staffing (as necessary) for both low and moderate risk hazmat incidents (outlined below).

Low Risk Spill or Release Event (Minor HazMat Event)

Table 26: Critical Staffing- Low Risk HazMat Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	1	3
Total:	***1***	***3***

Table 27: Critical Tasking- Low Risk HazMat Event

Task	# of Personnel
Investigation*	*
Containment	2
Attack Line	1
Water Supply / Hydrant/Pump Operator*	*
Total:	***3***

Moderate Risk Release, Spill or Explosives-related Event (Major HazMat Event)

Table 28: Critical Staffing- Moderate Risk HazMat Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	3	9
Battalion Chief	1	1
Hazardous Material	2	8
Medic Unit	1	2
Total:	***7***	***20***

Table 29: Critical Tasking- Moderate Risk HazMat Event

Task	# of Personnel
Command	1
Safety (Tech)	1
Entry Team / Sampling (Tech)	2
Standby Team (Tech)	2
Research Team (Tech)	2
Decontamination	2
Hazmat Group Supervisor (Tech)	1
Water Supply / Pump Operator	1
Attack Line	2
Evacuate Hot Zone	2
Isolate / Deny Entry	Police Department
Medical / Rehab	2 Medics
Total:	***18 (8 Techs)***

Technical Rescue Response

The VRFA operates within the Zone 3 regional response model for technical rescue. This model guides trained technician-level responders in mitigating water, rope, confined space, trench, machine, and vehicle rescue incidents. Resources are predetermined and committed by individual fire service agencies into preloaded FRL's to be dispatched at the request of local jurisdictions. The VRFA provides rope, surface, swift and underwater rescue (SCUBA) trained technicians, who are deployed from VRFA station 33. The tables below outline the critical staffing and tasking for qualifying technical rescue events (rope, surface, swift water, and underwater rescue).

Low Risk Technical Rescue Event

Table 30: Critical Staffing- Low Risk Technical Rescue Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	1	3
Total:	***1***	***3***

Table 31: Critical Tasking- Low Risk Technical Rescue Event

Task	# of Personnel
Command	1
Patient Assessment & Extrication*	*
Medical Treatment	2
Total:	***3***

Moderate Risk Technical Rescue Event ("Surface Water Rescue")

Table 32: Critical Staffing- Moderate Risk Technical Rescue Event

Vehicle / Apparatus Type	Number	# of Personnel
Engine	1	3
Aid	1	2
Squad	2	6
Battalion Chief	1	1
Total:	***3***	***12***

Table 33: Critical Tasking- Moderate Risk Technical Rescue Event

Task	# of Personnel
Command	1
Witness Interview	2
Rescue Group Supervisor (Tech)	1
Shore Rescuer (Tech)	1
Boat Rescuer (Tech)	2
Technical Safety (Tech)	1
Patient Assessment & Medical Evaluation	2
Total:	***10***

SECTION V: EVALUATION OF CURRENT DEPLOYMENT & PERFORMANCE

As previously mentioned, Valley Communications provides dispatch services for the VRFA service area and is the designated Public-Safety Answering Point (PSAP). Emergency response time measurements are broken down into the following categories: (a) dispatch, (b) turnout time, (c) travel time and (d) total response time. The information below provides an outline of how each emergency response category is processed.

Emergency Response Evaluation

Dispatch

Alarm Handling Time

Alarm handling is the period of time from the receipt of an alarm (911 call) at the primary PSAP until the appropriate emergency unit(s) can be notified (paged) to the incident. Emergency calls are taken and broken down into a specific incident type by dispatch, based on each agency's FRL. The VRFA FRL contains 111 different types of responses, which are broken into the following incident-based categories: emergency medical services (EMS), fire suppression, hazardous materials (HazMat), technical rescue, and wildland fire.

Unit Notification

Unit notifications are conducted through a paging system that utilizes Computer Aided Dispatching (CAD) capabilities. Firefighters wear pagers at all times, allowing for immediate notification of an impending emergency at any time of the day or night. All VRFA apparatus are equipped with a Mobile Data Computer (MDC), which allows for the easy transfer of information between dispatch and the responding units.

Station Order

When an emergency call is received by dispatch (911), the location of the caller / incident is identified, and the dispatcher immediately notifies (pages) the required resources from the appropriate response agency. For example, for an EMS call for medical aid at the scene of a motor vehicle accident on SR-167, north of 15th St. NW, ValleyCom would identify which response zone the incident occurred in (for this example, it would be VRFA station 31). The VRFA run card for this call type has predetermined that an aid unit and a fire engine OR ladder truck be notified to respond, therefore, ValleyCom would dispatch VRFA Aid-31 and VRFA Engine - 31 OR VRFA Ladder - 31 to this alarm.

Turnout Time

Turnout time is the period of time from the unit notification (page) to the apparatus going in motion toward the location of the incident. Once dispatch sends notification of an emergency to the appropriate VRFA units, personnel will proceed immediately to their assigned apparatus and don the necessary protective equipment. An MDC or voice prompt will be utilized to notify ValleyCom that the unit is responding to the incident.

Travel Time

Travel time is the period of time from the unit beginning its response (going in motion) to arriving at the proper incident location. Once the VRFA unit has arrived at the location of the incident or is “in the area," the MDC or radio will be utilized to relay that the unit has arrived on the scene. Many times, the MDC will be the primary method of notification; however, units may place themselves on location via radio before relaying other important information or giving instructions to other responding units (size-up report).

ERF Travel Time

ERF travel time is the period of time between en-route to on-scene for the minimum number of firefighters to arrive within a maximum prescribed time. For example, a low-risk *aid call* would require two personnel to arrive on-scene in a maximum specified amount of time; whereas, a moderate-risk *fire call* would require 16 personnel to arrive in a maximum prescribed amount of time.

ERF Total Response Time

ERF total response time is the period of time from the receipt of the alarm to arrival on scene for the minimum number of firefighters. Again, ERF is evaluating the minimum number of personnel need (determined by critical tasking) to arrive in a maximum prescribed amount of time.

Total Response Time

The total response time (TRT) is the period of time from the alarm receipt at PSAP to the unit(s) arriving on-scene.

System Reliability

When it comes to overall system resilience, several concepts come into play. These concepts form the backbone of a reliable, sustainable, and efficient response force. To adequately describe, achieve, and maintain such a system, the VRFA relies on the definitions and applicability of concepts as outlined below.

Resilience

Resilience is best defined in the context of the "system's ability to quickly recover from an incident or event, or to adjust easily to changing needs or requirements." Supporting tenants of resilience include resistance, absorption, and restoration.

- *Resistance* is the concept of limiting resource consumption, with the overall goal of conducting all necessary activities while maintaining efficiency and sustainability of resource availability.
- *Absorption* relates to the ability to add or duplicate resources, based on changing circumstances and opportunities.
- *Restoration* serves as the ability of the system to return to full functionality or routine operations.

Reliability

Reliability is defined as the ability of the system to perform and maintain its functions in routine circumstances, as well as in unsympathetic or unexpected circumstances. Resilient systems survive unforeseen events because they are robust and redundant. In the case of emergency services, reliability looks at historical incident data to measure performance by following identified performance baselines. System reliability revolves around the time it takes to respond to the incident while overcoming distance and traffic conditions. Depicting reliability can help resolve issues regarding consistent maintenance of baseline performance indicators, reviewing the Agency's ability to respond to surges in service requests and much more.

The VRFA defines reliability as the system's ability to consistently deliver services within baseline performance expectations. Specifically, if the VRFA's target benchmark performance remains consistent from year to year, the system is reliable. If the target benchmark performance improves (i.e., the percentage increases), the system becomes more reliable. If performance declines (i.e., the percentage decreases), the system becomes less reliable. The VRFA uses many policies, procedures, and agreements to ensure that the system consistently achieves reliability. Resistance is built into the VRFA's performance improvement plan (PIP) by conducting activities that positively impact resource availability and response performance.

Policy

The VRFA policy manual includes policies on mandatory staffing, emergency staffing, and scheduling to ensure the minimum number of personnel are on duty each day. The VRFA also has several strategies, captured in policy, for large scale events that could result in a system surge, including earthquakes, wind storms, and floods.

Agreements

In addition to the existing VRFA policies, local jurisdictions (Valley Communications, Emergency Response Zone 3 and King County) have established mutual and automatic aid agreements, which serve as resource sharing plans for system surges and large scale events. Such agreements allow local agencies to share resources county-wide. Upon an official disaster declaration from the State Governor, the VRFA also can utilize the Washington State Mobilization Plan to access resources from across the State.

Procedures

During planned training events, the VRFA "up-staffs" with either an engine, an aid car, or both. These units move as necessary to a response zone on a pre-planned schedule to cover units during out-of-service training or other non-emergency events. These procedures preserve minimum staffing levels and allow the VRFA to maintain reliability and address potential system surges. The VRFA also monitors the availability of resources through a unit utilization report – the amount of time a unit is unavailable to respond to emergencies.

Performance Data

The tables below provide performance data, for the VRFA entire response area, for 2020 by type of incident (i.e., EMS, Fire, HazMat).[10] The VRFA has established "benchmark targets" as a means over time to improve performance.

Table 34: EMS Response Performance Benchmarks, 2020

N = 9,675 Incidents	NFPA Benchmark Target (minutes, seconds)	VRFA Benchmark Target (minutes, seconds)	2020 90th Percentile Baseline Performance (minutes, seconds)	2020 VRFA Benchmark Performance (%)
Alarm Handling Time	1:04	1:04	2:32	43.19%
1st Unit Turnout Time	1:00	1:30	2:02	59.69%
1st Unit Travel Time	4:00	5:00	7:28	65.57%
1st Unit Total Response Time	6:04	7:34	10:56	59.05%
Effective Response Force Travel (N=8,675)	8:00	5:30	8:26	65.75%
Effective Response Force TRT (N=8,675)	10:04	8:04	11:41	60.43%

Table 35: Fire Suppression Performance, 2020

N = 1,549 Incidents	NFPA Benchmark Target (minutes, seconds)	VRFA Benchmark Target (minutes, seconds)	2020 90th Percentile Baseline Performance (minutes, seconds)	2020 VRFA Benchmark Performance (%)
Alarm Handling Time	1:04	1:04	2:42	48.45%
1st Unit Turnout Time	1:20	1:45	2:20	58.61%
1st Unit Travel Time	4:00	5:00	8:09	57.68%
1st Unit Total Response Time	6:24	7:49	11:53	52.16%
Effective Response Force Travel (N = 1,508)	8:00	5:45	8:38	64.54%
Effective Response Force TRT (N = 1,508)	10:24	8:34	12:05	60.49%

[10] *Due to a small number of incidents (N value), Technical Rescue Performance was not evaluated for 2020.*

Table 36: HazMat Performance, 2020

N = 118 Incidents	NFPA Benchmark Target (minutes, seconds)	VRFA Benchmark Target (minutes, seconds)	2020 90th Percentile Baseline Performance (minutes, seconds)	2020 VRFA Benchmark Performance (%)
Alarm Handling Time	1:04	1:04	3:25	33.03%
1st Unit Turnout Time	1:20	1:45	2:27	48.60%
1st Unit Travel Time	*N/A**	5:00	7:36	56.30%
1st Unit Total Response Time	*N/A**	7:49	13:05	39.83%
Effective Response Force Travel (N = 49)	*N/A**	6:45	7:35	75.51%
Effective Response Force TRT (N = 49)	*N/A**	9:34	11:53	71.43%

*** Benchmark not specified by NFPA**

Response Zones

The Agency evaluated response zone data (station response areas) and other information to identify unique characteristics. In addition, the first arriving resource and the arrival of the ERF were also analyzed. Inevitably, this process allowed the Agency to identify resource limitations and evaluate our ability to safely and reliably mitigate emergencies that are specific or unique in each response zone.

Captains in the VRFA manage response zones and are tasked with evaluating and determining the need for additional resources by doing a rapid scene assessment (size up). Critical tasking for each type of risk allows the Agency to determine the ERF for each hazard zone, based on risk severity and call type, to pre-plan so the correct type of resources can be acquired quickly to ensure successful outcomes.

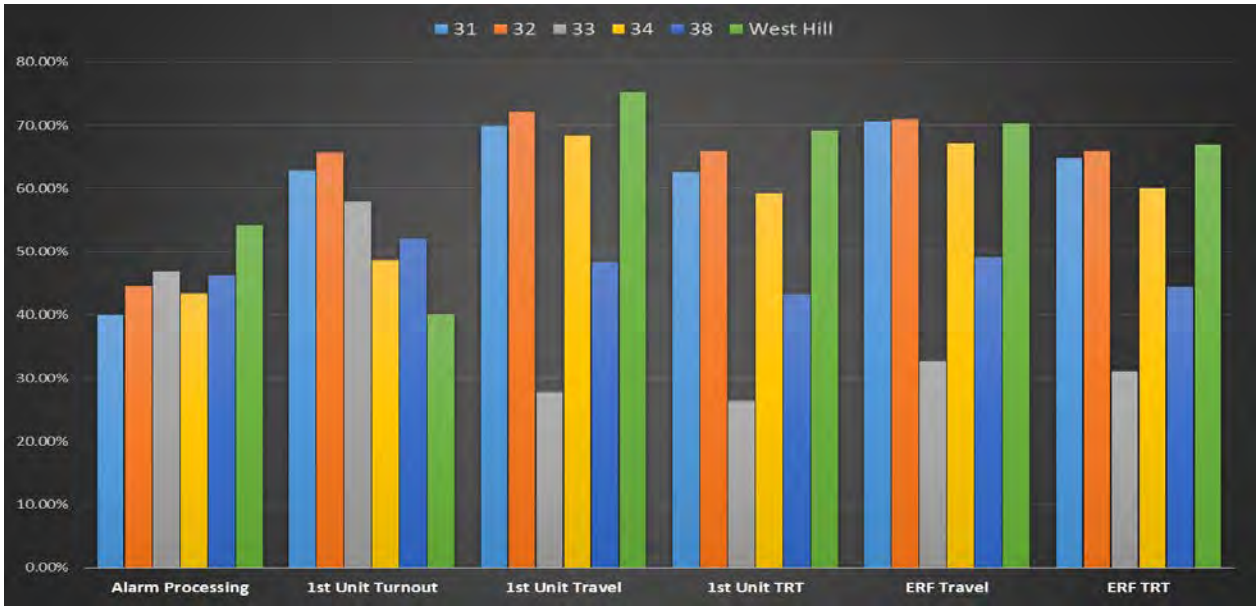
Proactive risk reduction steps were also evaluated to help identify methods to reduce potential emergency responses. Additionally, the response zone evaluation also measured how often some of the most high-risk events occur within the service area. The VRFA's Community Risk Reduction Program (CRRP) has identified that community outreach, education, and fire safety inspections can be a powerful risk reduction tool.

The valley floor, predominately covered by station 31, 32 and 38, is the most populated area and carries the lion's share of the Agency call volume. Also, more prevalent on the valley floor is the business community, especially in station 31 and 32's response areas. Many large warehouses, industrial complexes and large multi-family and assisted living facilities result in a significant number of calls and pose a much higher risk for large commercial fires. Conversely, less populated response areas (covered bystations 33 and 34) present a steady stream of responses to residential

properties for aid calls and fires. Also more prevalent in 33 and 34's response zones are heavily forested areas and steep topography integrated among several planned developments, creating a higher risk for a significant wildfire or urban-interface event.

The charts below (figures 28-30)) provide benchmark performance data for 2020 by response zone (fire station response districts). In addition, this section has "unit utilization" charts (figures 31-32) depicting the percentage of time that a particular unit is unavailable during emergency responses.[11]

Figure 28: EMS Response Benchmark Performance, by Response Zone[12]



[11] For additional related visuals, see Appendix C for information about call density in the service area (heat map); Appendix D and Appendix E for structure fire response charts; and Appendix F for call volume by unit over a three year period.

[12] For more detailed information on EMS response benchmark performance by response zone, see Appendix G.

Figure 29: Fire Suppression Response Benchmark Performance, by Response Zone[13]

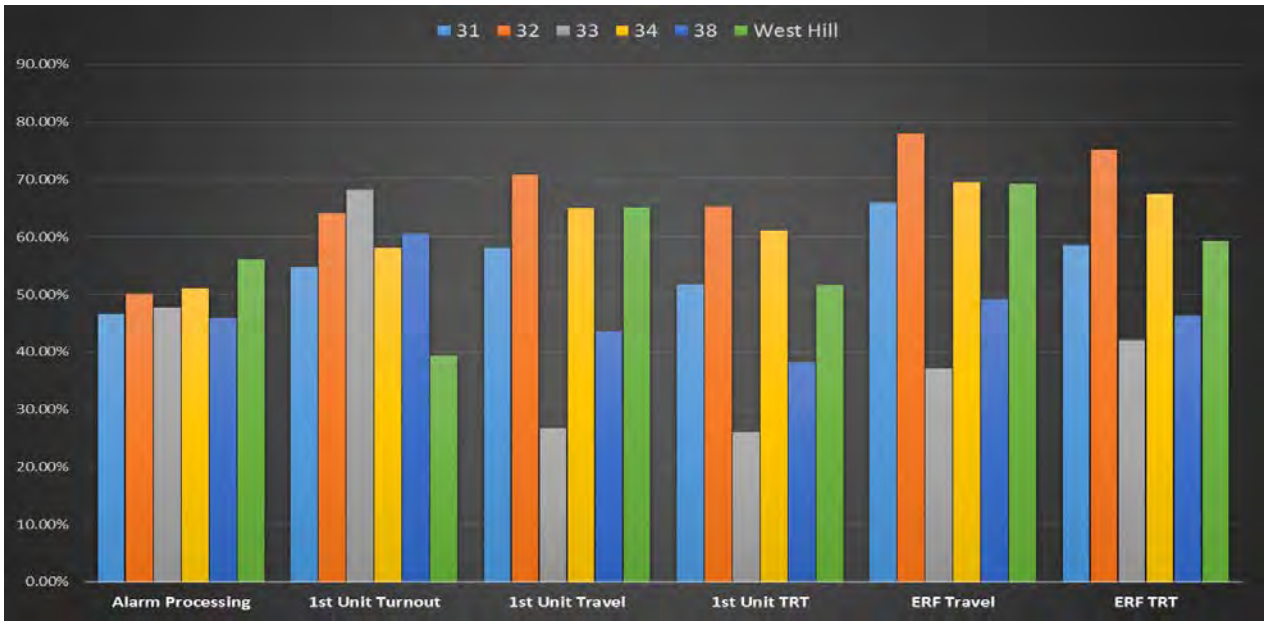
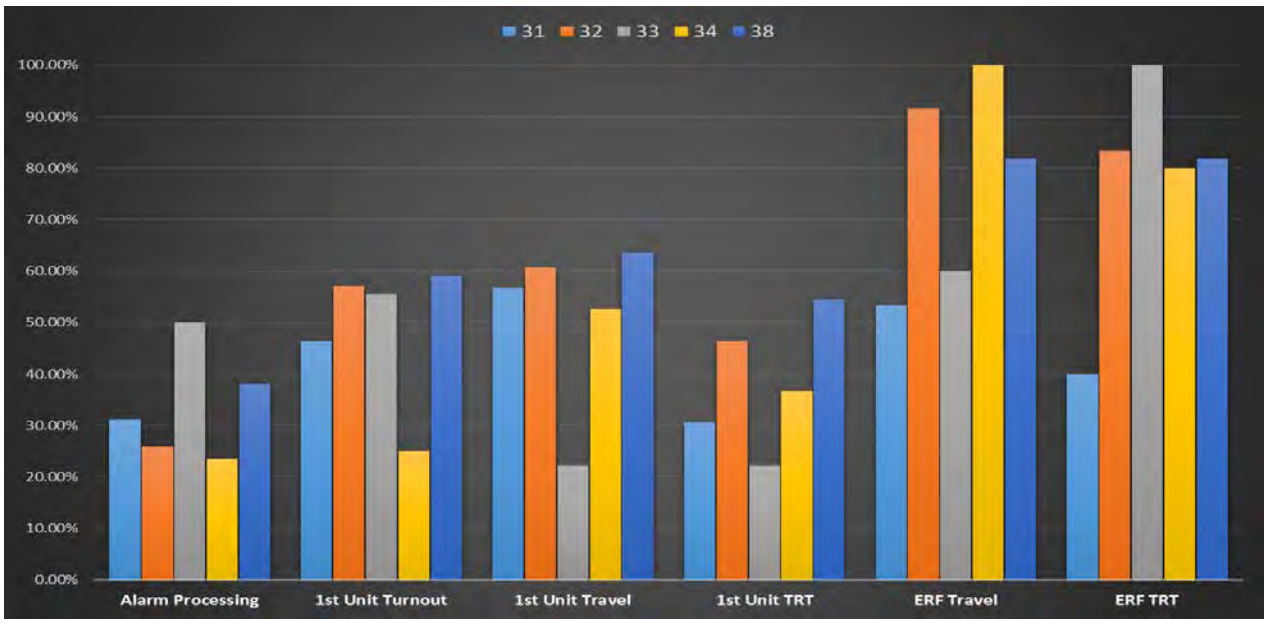


Figure 30: HazMat Suppression Response Benchmark Performance by Response Zone[14]



[13] *For more detailed information on fire response benchmark performance by response zone, see Appendix H.*
[14] *For more detailed information on HazMat response benchmark performance by response zone, see Appendix I.*

Figure 31: Aid Car Unit Utilization (%), By Year

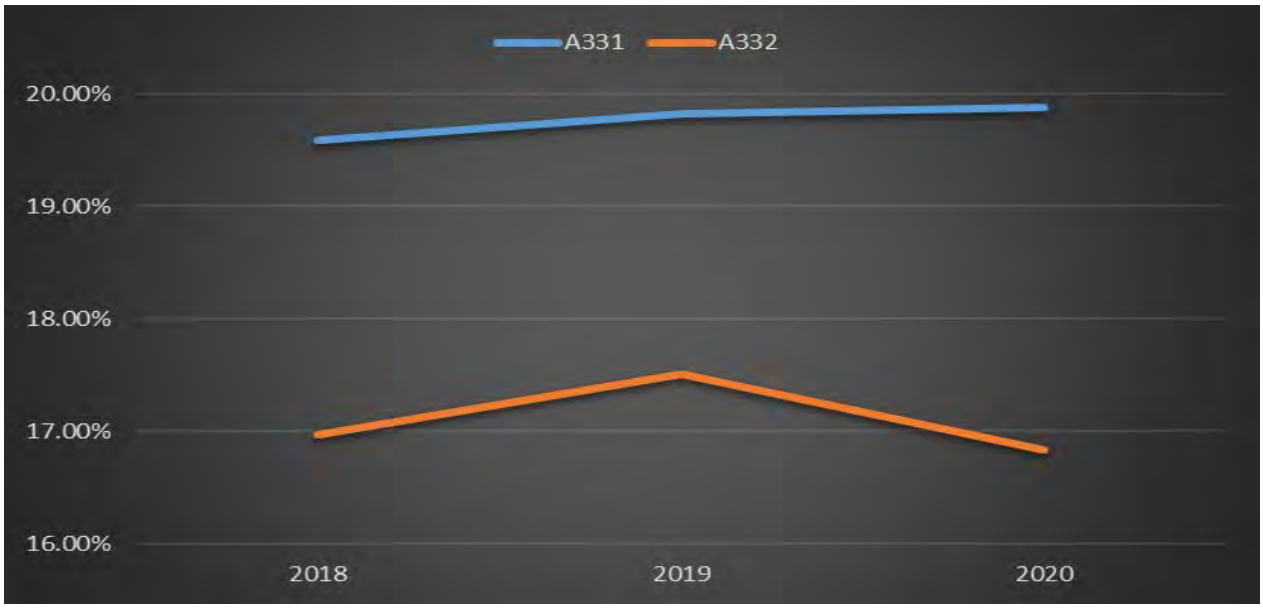
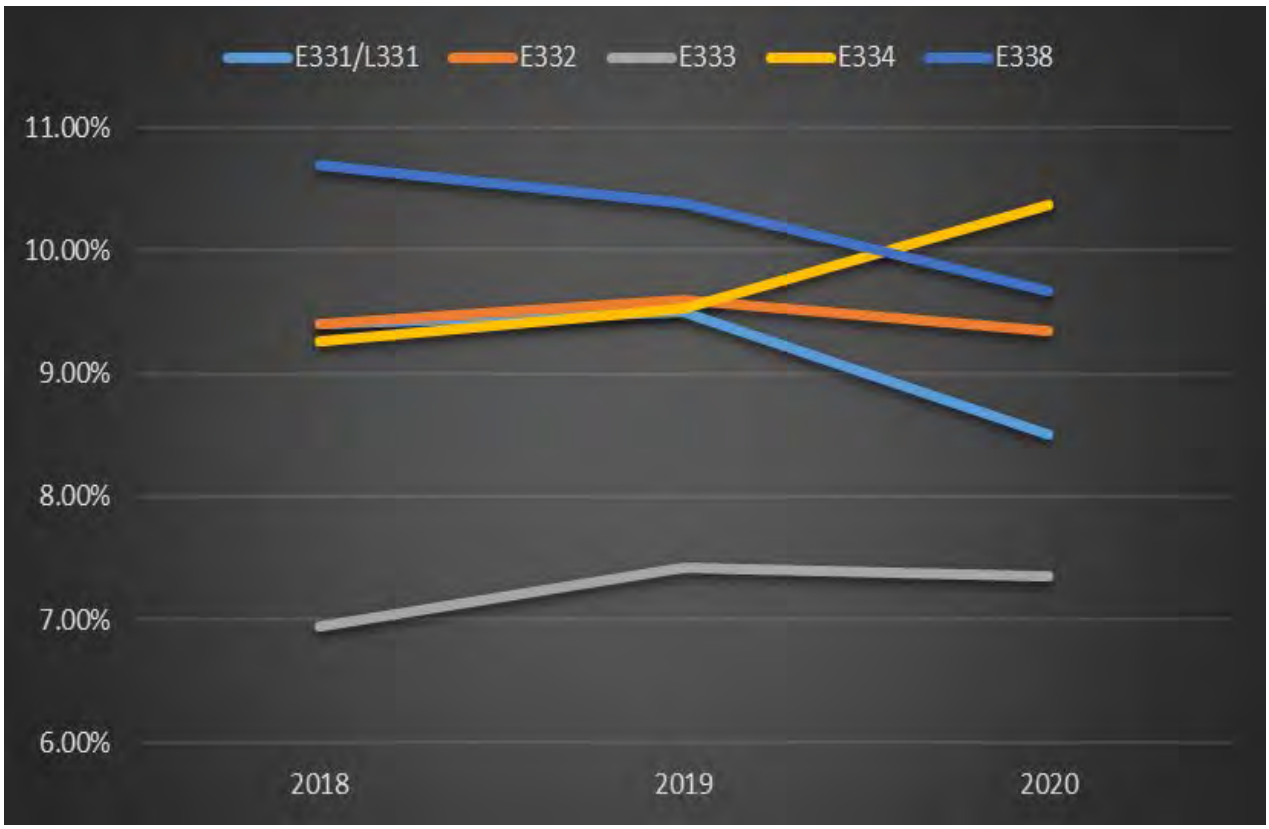


Figure 32: Engine Unit Utilization (%), By Year



SECTION VI: PLAN FOR MAINTAINING & IMPROVING RESPONSE CAPABILITIES

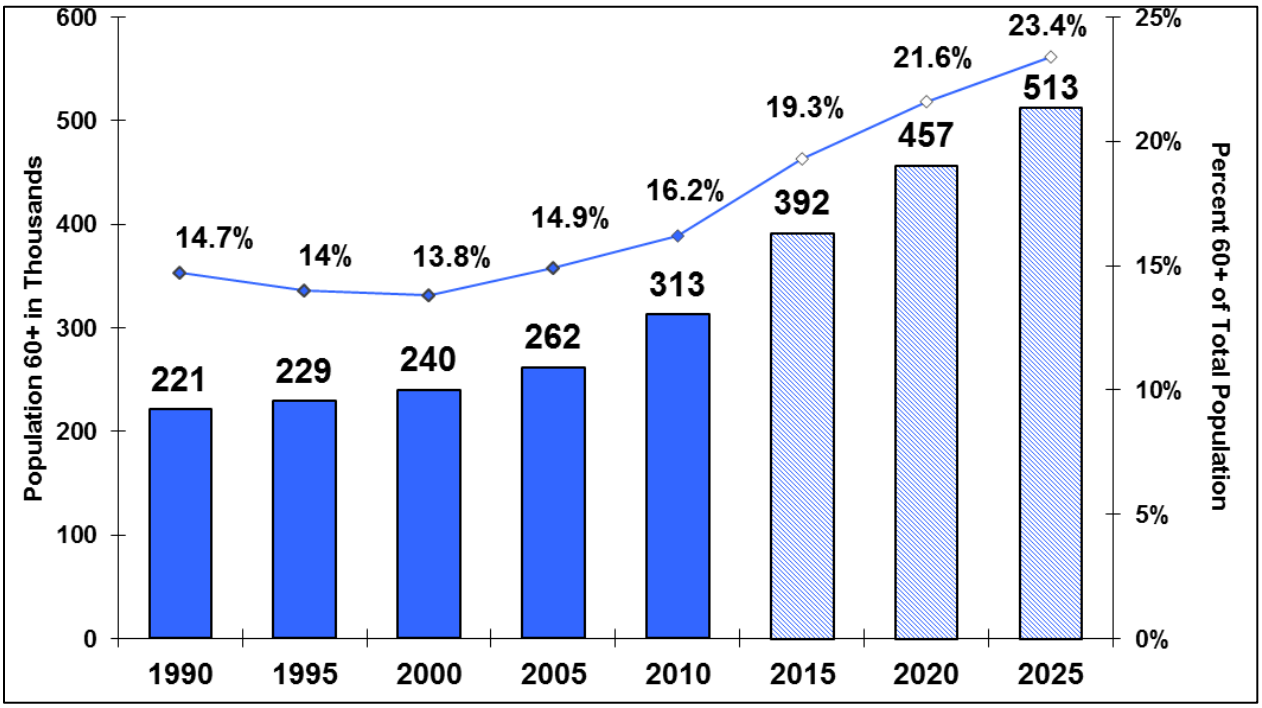
Maintaining & Improving Response Capabilities

The VRFA service area is located in a predominately urban area within south King County. This region is diverse in arrangement with manufacturing, transportation, and other critical infrastructure. Comparatively, the communities of Algona, Auburn and Pacific are amongst the lowest income earners in King County, resulting in concentrated pockets of low-income residents and a mostly-uniform risk of fire suppression responses.

While the Agency risk assessment revealed a broad range of potential hazards within the service area, the economic status of the community underscores the many older structures that lack modern fire protection systems, elevating the risk for fire loss in the VRFA response area.

Furthermore, as people are living longer, the needs (calls for service) of the increased aging population are higher than in previous decades. In the last ~30 years alone, the percent of adults aged 60+ in King County has increased by nearly 7% (see figure 33), a trend that leads the percent of change for the same demographic nationwide. Too, other health risk factors (i.e., increased obesity-associated morbidity rates) are contributing to an increase in cardiovascular disease, effectively elevating the number of requests for service to significant medical events.

Figure 33: King County Residents Age 60+, by Number and Percent of County Population, 1990-2025 (Source: Aging King County)



The VRFA's critical tasking analysis for low, moderate, and high-risk event categories resulted in an evaluation of the Agency's response planning to ensure adequate resources are being deployed effectively. The Agency compared current response run cards (FRL's) to the critical tasking tables and found the two to be similar, although not identical. Furthermore, it was determined through this analysis that the most populated and vulnerable areas are adequately addressed in the current deployment plan. The Agency does, however, understand that a more detailed plan will be necessary to continually improve performance and keep up with increasing service demand.

Establishing Benchmark Performance

Industry Research

The VRFA took into consideration many factors such as industry standards, local agency methodology, and the specific needs of the VRFA member communities to validate our established benchmark performance targets. While the established response performance times from NFPA 1710 appear to be well below most agency's baseline performance or current capabilities, the VRFA does acknowledge that NFPA 1710 is the recognized standard for fire department response and deployment. Research indicates that most local accredited fire agencies use the NFPA 1710 standard to identify their benchmark performance targets within their SOC.

The VRFA also realizes that each emergency response has its own set of unique characteristics and circumstances that will affect how quickly the emergency may escalate, which makes it challenging to target benchmark response-time goals. That said, it is clear that time is a significant factor in many emergency incidents, including severe medical emergencies – cardiac arrest, stroke, and significant trauma, as well as fire responses and other time-sensitive events.

Community Needs

When evaluating the VRFA service area and the specific needs of the community, the following factors were examined:

1. The building occupancies and use types
2. The probability and impact of anticipated hazard events
3. Response data, trends, and patterns
4. The availability of suppression and non-combustible construction features
5. The financial vitality of the communities served

As stated earlier, residents within the VRFA service area are some of the lowest wage earners in King County. Additionally, the communities of Algona, Auburn, and Pacific have some of the most affordable residential and business properties in King County. With a wide variety of industries, especially in the City of Auburn, structural use-types and the lack of modern construction features and suppression systems contribute to a higher level of risk when compared to more affluent neighboring areas.

Population Density & Service Demand Capabilities

Over the last five years, development and rapid growth have contributed to a considerable increase in emergency responses (call-volume) in the VRFA service area. The VRFA has seen an increase in requests for service of nearly 22% since 2013. Over the next 30 years, the Central Puget Sound region is slated to grow by more than 1.8 million residents and 1.2 million jobs.

This dramatic increase in growth will undoubtedly continue to impact service demands and travel times in the area. Furthermore, development is building upwards, and the ceiling limit of 8-stories within the City of Auburn is forecasted to be soon removed. Additionally, plans have been submitted to construct an 18-story high-rise hotel on the Muckleshoot Indian Reservation Land to better serve patrons in Washington State's largest casino. And, although these buildings will have state-of-the-art fire suppression systems, the changing skyline, increase in population, increased traffic density, and other factors could significantly impact VRFA response time capabilities and resource needs.

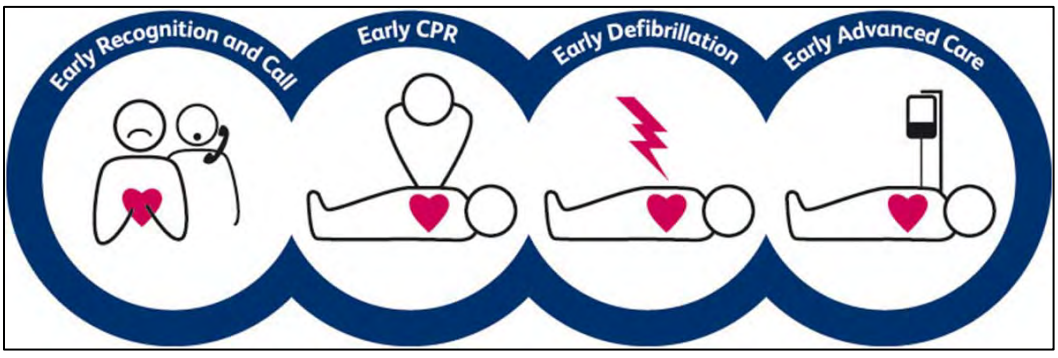
Target Performance

Emergency Medical Response

Due to the wide variety of conditions for each emergency event, it is challenging to define standard response measures for achieving desired outcomes (life safety, hazard suppression, etc.). With the variables of staffing requirements, equipment / resource needs, and call type remaining relatively constant, the remaining variable is *time.* As is often the case, time can be the most significant factor when determining success or failure in emergencies.

As is the case in many emergencies, the more time that passes before responders can intervene, the less chance there is of limiting damages, injury, or death. The principle of time in relation to response success applies directly to EMS responses. For instance, the total response time performance (original 911 call to arrival on scene) and the relationship to cardiac-arrest survival has been examined by researchers extensively. Findings indicate that agencies that incorporate CPR-trained citizens with early defibrillation (from bystanders or responders) and rapid ALS interventions tend to have higher cardiac-based survival rates. Due to the significance of the arrival time in relation to successful response outcomes, time is the only other factor measured in department performance reports and is the basis of the baseline and benchmark standards.

Figure 34: Chain of Survival Graphic

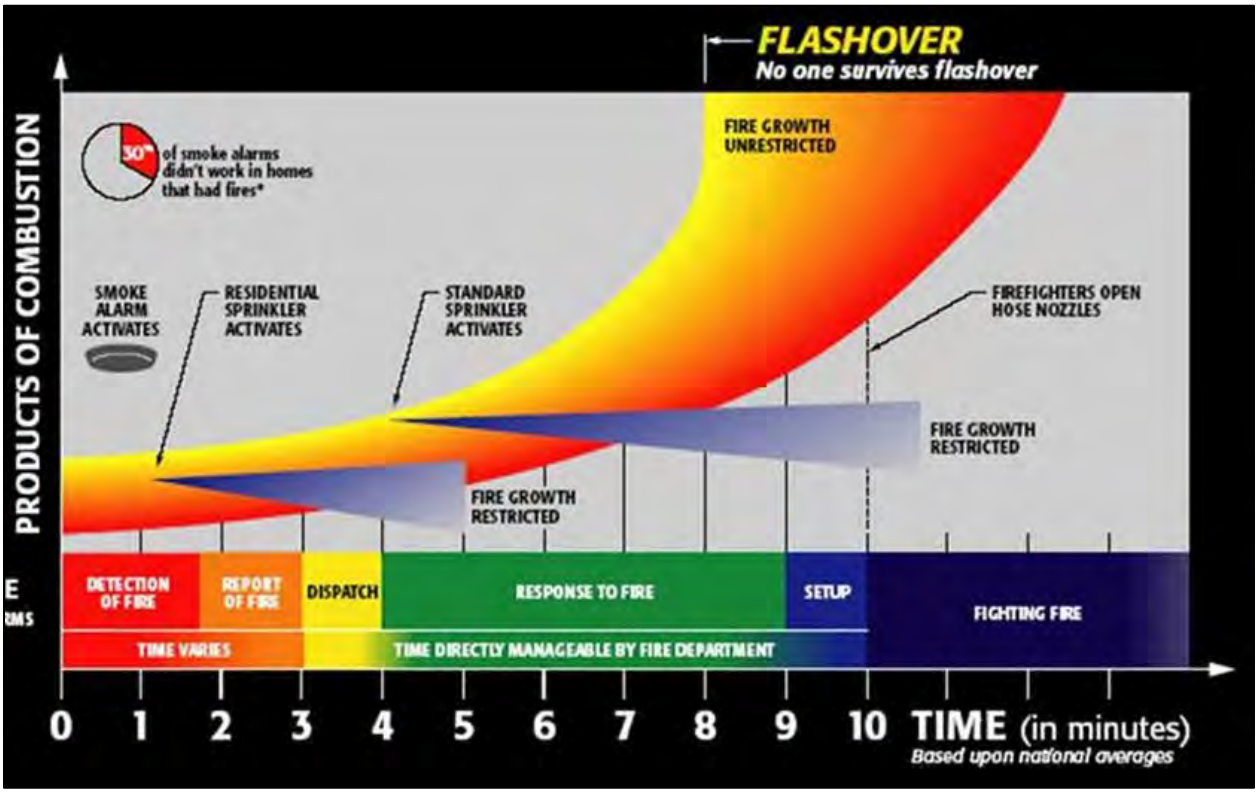


Fire Suppression

Fire response research, particularly regarding the flashover time-temperature curve, indicates that it is challenging to determine if and when flashover will occur. Current research shows that the fuels (modern home furnishings) that are present in today's homes have more stored "potential energy," resulting in a much higher "peak heat release rate" during combustion. This stored potential energy will reach flashover stage much quicker than fuels used in legacy home furnishings (30 years ago) if conditions in the fire compartment allow for rapid fire growth over time (see Figure 35 below for a visual representation of the flashover process).

Moreover, the stage of the fire affects both staffing, positioning, deployment, and equipment needs, particularly during initial deployment. Early smoke detector notifications or early activation of a suppression system can have a significant impact on alerting occupants and restricting (or stopping) fire growth. However, if neither of these mitigation sources is present, firefighters must arrive within a specific timeframe and set up rapidly to adequately suppress the fire. This suppression effort must occur early in the time-temperature curve model to have the most beneficial results. The response crew's efficiency in completing tasks has a direct impact on time and suppression rates; the inability to quickly deploy a hose line or a delay in assigning fire ground tasks will invariably contribute to fire growth.

Figure 35: Time vs. Products of Combustion (Flashover)



Automatic & Mutual Aid

The Zone 3 Fire Chiefs are committed to a process of resource sharing and have worked diligently over the last decade to decrease the visibility of all response borders. Time and resources have been devoted to the development of response plans and the interoperability of resources throughout Zone 3. Additionally, all fifteen Zone 3 fire departments are now members of the South King County Fire Training Consortium. This training consortium links all member agencies to the same training materials (The Firefighter Fundamentals Manual), the same fire suppression equipment and has us utilizing the same inventory for fire apparatus to ensure the seamless integration of response resources on any given incident.

Delivery System Components

The VRFA can measure all aspects of time performance, including – alarm handling, turnout, and travel time for all response resources. These components are what make up the Total Response Time (TRT).

Relationship of Baseline Benchmark Performance

As stated above, the Agency looked at several different factors to establish benchmark performance standards. One critical factor was identifying an achievable target below the current baseline performance. The final model sets the benchmark at one standard deviation below the 90th percentile baseline performance, rounded to the nearest 15 seconds, for turnout time, travel time, and TRT. The alarm handling benchmark was set to the NFPA standard.

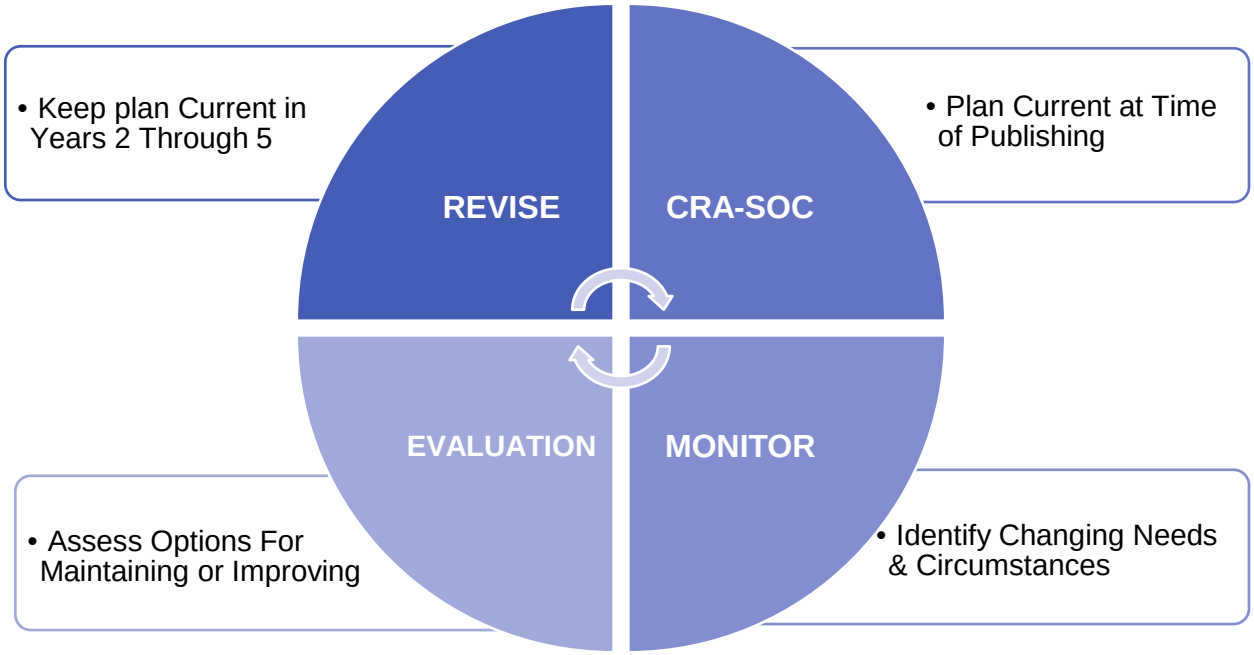
Performance Gaps

The performance gaps established between the baseline and benchmark performance indicators will be addressed in the VRFA Strategic Plan. This planning process will determine short and long term improvements that will help the VRFA improve time performance. Additionally, work will continue with partnering agencies to enhance automatic / mutual aid agreements and address other issues impacting response time performance. The VRFA will also investigate the use of new technology where possible, such as closest unit dispatching (Automatic Vehicle Location - AVL) to improve.

Performance Audits

Performance audits will be conducted quarterly to monitor the Agency's benchmark performance. Performance audits will be used to establish trends, and measure performance that validates resource deployment is achieving optimal performance and is effectively mitigating emergencies. In addition to internal quarterly audits, the VRFA will include response time outcomes in the VRFA annual report. The annual report will be published in the second quarter of each year and reviewed and discussed at the June Board of Governance meeting. This review will provide notification to the Agency's Board of performance gaps and the progress made in achieving or moving toward target benchmarks.

Figure 36**: Keeping the CRA-SOC Current**



SECTION VII: CORRELATION OF CRA-SOC DOCUMENT TO CFAI MODEL

Assessment & Planning

The VRFA has fully engaged in the process of continual improvement through accreditation. The CRA-SOC is the first step in the process. The adopted performance metrics within this document will be updated frequently to remain relative and meaningful to the organization, and the communities served. Strategic planning will follow the adoption of the SOC to assist the VRFA in achieving their identified target benchmarks.

Goals & Objectives

One of the main purposes of creating an SOC is to identify all hazards present with in the response area and classify those hazards into risk categories based on probability, community impact, and Agency impact. Prioritizing risk helps the Agency evaluate the current deployment model, and to ensure that proper hazard and risk mitigation capabilities exist. The SOC has identified benchmarks targets to drive future planning and improvement based on rational, data-based analytics. Decisions derived from this process have revealed a clear vision of where the Agency is today and where we intend to be in the future. Specific goals and objectives will be developed through the strategic planning process to address gaps in performance and the overall direction of the Agency.

Performance Improvement Plan

The VRFA SOC established, based on three years of data, baseline performance levels for all types of responses as well as benchmark targets and performance gaps. This evaluation process will result in the development of a Performance Improvement Plan (PIP). The PIP will identify issues and suggest the necessary adjustments to improve results. Some issues may be more correctable than others and may involve many different factors influencing decisions to address or not address the deficiency.

Today, the VRFA is considered to be a reliable Agency with strong community support. However, the Agency does recognize, based on afore mentioned performance gaps, that improvements are possible and that a more detailed review of response-time performance is necessary.

Furthermore, the Agency understands that the review of the current data suggest that upward trends in population growth, construction, and increase in vulnerable residents are driving call volume up, which can negatively impact response-time performance. Below are the steps identified for initiating a process of improvement through evaluation, education, and planning:

- Monitor performance quarterly to identify concerns
- Measure results to identify negative factors widening performance gaps
- Address any acute issues that can be addressed immediately (call processing, turnout times and travel times)
- Create a strategic plan that proposes actions to address and mitigate negative factors

- Assign actions to responsible parties to improve performance (vulnerable populations, emergency management planning, and community risk reduction)

Quarterly Performance Monitoring & Reporting

The VRFA Data Analyst will be responsible for developing and monitoring a quarterly report. The report will be submitted to the VRFA Fire Chief, Deputy Chief of Operations and the Deputy Chief of Technical Services.

Measure Results

Quarterly reports will be examined to ensure performance gaps are stable, or trending upward, to ensure the VRFA remains reliable. Action may be necessary to address issues contributing to a widening gap. These reports will also be used to validate the impact of proactive steps taken to reduce gaps in performance.

Improve Call Processing, Turnout and Travel Times

The VRFA has engaged external stakeholders and other Zone 3 agencies to address call processing times. The Zone 3 Fire Chiefs will be looking at how to move forward and engage the PSAP to address all underlying issues contributing to extended call processing times.

The VRFA will develop a plan to improve turnout times. Currently, on a daily basis, the shift Battalion Chief reports turnout time performance in the "daily report." Any turnout time that exceeds 120 seconds must be accompanied by an explanation of why the standard was not achieved. Ongoing planning on how to improve turnout times to meet the newly established benchmark of 90/105 (EMS, Fire respectively) seconds is planned for 2019 / 2020.

The VRFA strategic plan will address potential long term solutions to staffing, deployment, and station locations with the intent of improving travel times and overall performance.

Address Planning & Program Deficiencies

Vulnerable Populations

Like other industries across the United States, the fire service has changed significantly over the last couple of decades. As communities' needs change, so must we; looking for new and innovated ways to create value for citizens is imperative to the VRFA's success and the overall health of the service communities. In recent years across King County, the region has seen a significant increase in vulnerable populations, including (but not limited to):

- The elderly
- Individuals in mental crisis
- Uninsured / underinsured individuals / families
- Non-English speaking populations
- Homeless and migrant individuals / groups
- Immune-compromised individuals
- Children
- Others

In response to this developing need, the VRFA teamed with King County and South King Fire and Rescue to participate in a pilot program – the “Community Medical Technician” (CMT) program. Currently in its third year, and now referred to as the “Community Medical Team,” the program is having a tremendous impact on the most vulnerable community members. The CMT unit is staffed with two full-time firefighters and two full-time social workers, each working a 40 hour work week. The CMT receives information from emergency responders through a referral system built into the Agency’s EMS reporting tablet. This referral process helps technicians and social workers identify community members that need more focused care on underlying issues that create the initial call to 911. This program not only helps the citizens of the communities; it also alleviates building pressure on emergency response resources, increasing the Agency’s resource availability.

Emergency Management Planning

In April 2018, the VRFA partnered with South King Fire and Rescue (SKFR) to hire the first full-time Emergency Management Coordinator (EMC). The EMC is primarily responsible for performing technical duties that involve planning, organizing, facilitating, implementing and overseeing various aspects of emergency management in the service area (Algona, Auburn, Pacific, Des Moines, Federal Way and parts of Unincorporated King County). More specifically, the EMC works with the member cities, regional stakeholders, community members, and other collaborators to prepare the VRFA, SKF&R, and the general region for all-hazards emergency / disaster events. This readiness is achieved through planning, policy development, exercise development / delivery, and other preparedness improvement activities. Therefore, the VRFA Emergency Management Program has significantly expanded, mostly due to the addition of a full-time emergency management dedicated position.

The overall Emergency Management Program timeline is based on a cyclical process involving the tenants of assessment, planning, training, exercises, implementation, and evaluation / re-assessment. Additionally, to supplement existing disaster-related Agency policies / protocols, the EMC is in the process of developing two relevant documents: (1) a VRFA "Disaster Preparedness Plan" and (2) a VRFA "Disaster Response Protocol." Too, several internal tabletop exercises will be conducted from 2019-2020, to test, validate and improve existing protocols for standing up the Department Operations Center (DOC), staffing the DOC, and internal / external communications during disasters.

In addition to creating, evaluating and improving existing emergency management based plans / protocols, the EMC regularly (weekly and monthly) attends regional meetings, work groups, external exercises, training events, conferences and more. This collaboration-centric approach enhances the VRFA's participation in, visibility and dedication to working closely with regional stakeholders.

Finally, the EMC works frequently with the community, educating community members and groups about disaster preparedness and response activities. The EMC delivers and teaches a Community Emergency Response Team (CERT) program in the area, working closely with community members and neighborhoods to train and equip citizens so that they are better able to take care of themselves during the first hours of disasters.

Community Risk Reduction Program (CRRP)

During the past two years the VRFA Fire Marshal's Office has dedicated staff time to evaluating, revising and creating policies and standard operating procedures with the goal of refining and improving internal processes to further reduce community risk. One of the key areas of focus is the Community Risk Reduction Inspection (RRI) program. With over 4,600 assigned building inspections in the response area, and only two full-time certified inspectors, the VRFA FMO recognized that the inspection program was not sustainable in its current form. Revising the RRI program from a GIS-based process to a risk / mitigation based process seemed to be a feasible solution.

The goal of the new risk/mitigation inspection program is to focus on the highest hazard occupancies (maximum and high hazard) with certified inspectors (one / two-year rotation) and use additional resources to complete inspections (three / four-year rotation) on the less hazardous occupancies (moderate and low-hazard). The maximum hazard occupancies (N=523 inspections) will be inspected each year, high hazard occupancies (N=2607 inspections) inspected every two years, moderate hazard occupancies (N=927 inspections) inspected every three years, and low hazard occupancies (N=563 inspections) inspected every four years.

NFPA 1730 provides a formula to calculate employees' available hours and inspection completion capabilities, using this formula it is estimated that certified fire inspectors can complete N=600 inspections annually. With the addition of the company-level inspection program, a single engine company, while concurrently completing all other assigned duties, can complete N=60 inspections annually in their response zone. This calculation, when multiplied by the number of on-duty resources each day, equals N=1,200 inspections per year. This program will ensure that approximately N=2,400 inspections will be completed annually and that the risk mitigation inspection program will exceed the current RRI program goal of N=2,292 yearly inspections.

During the first year (2018), risk and mitigation measures were identified by reviewing the risk / mitigation models in different industries and determining which model best followed the NFPA guidelines. That same year, the VRFA implemented a “company level” inspection program. This program was implemented for two fundamental reasons: to provide firefighters with the opportunity to gain more familiarity with buildings in their response zones and to improve the frequency of inspection in low / moderate-hazard occupancies. In addition, an emphasis was placed on data collection to identify operational permits correctly. The improved data collection process is being used to formulate risk / mitigation scores for the RRI program. This new program also allowed certified inspectors to focus their time on the high / maximum-hazard occupancies identifying sprinkler systems, alarm systems, occupancy types, and occupancy use.

During the second year of the CRRP (2019), the FMO is focusing on continuing to improve data collection and formula adaptation to meet the needs for each risk and mitigation factor, those factors that are weighted to meet the specific needs of the communities served. The VRFA FMO has identified four risk and four mitigation measures to categorize occupancies. As mentioned in section IV above, the risk measures included in the Structural Assessment are ignitability, combustibility, danger level, and defined hazards (target hazards, critical facilities, and operational permits). The mitigation measures include fire alarm presence, fire sprinkler presence, fire resistive

indicators (type I or II construction and exposure status) and Washington Survey & Rating Bureau scores.

The VRFA FMO is currently able to evaluate each occupancy to achieve a risk / mitigation score. In 2019, the risk score multiplier for a category called “year last inspected” and the “combustibility” risk will be defined and added to the risk / mitigation matrix. The "year last inspected" category will allow the VRFA to prioritize an inspection by the number of years between inspections. Certified fire inspectors are inspecting occupancies based on the year it was last inspected using data from the old GIS system. Engine company-level inspections continue in the low and moderate hazard occupancies.

The third year of the RRI program (2020), will evaluate the programs value and sustainability. Inspections will be assigned by implementing the risk / mitigation score criteria - structural Assessment Score and the weighted factor of the "year last inspected,” allowing inspections to be completed based on the highest priority.

Over time, the program will continue to be refined via service goals, including: professionalism, credentialing, frequency of inspections, and thoroughness of inspections. As conditions or situations change / evolve, the weighting factors can be adjusted to ensure the program remains effective.

Table 37: Risk Reduction Inspection Program Timeline

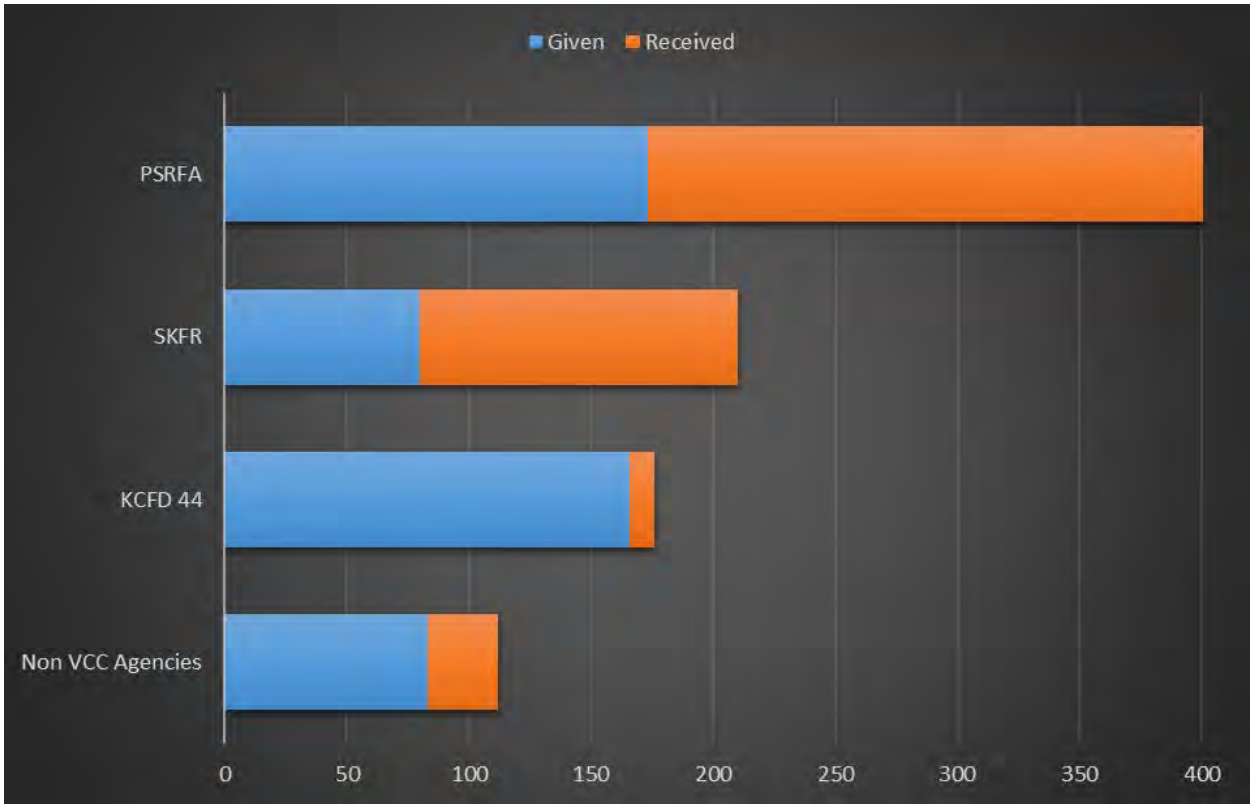
2018	2019	2020	2021	2022
• Identify needs • Identify process • Start data collection	• Identify and define hazards • Identify and define mitigations • Research formulas • Select formula • Continue data collection • Populate VRFA data into the formula • Evaluate the effectiveness of the formula	• Implement RRI program for Certified Inspectors and engine company level inspections • Adjust and evaluate the program • Peer review the program with the mentor	• Set service goals, including inspection quality goals, inspection timeliness goals, and inspection professionalism goals • Determine how to measure goals • Continue program evaluation	• Implement service goals and evaluate effectiveness of the program • Adjust and make changes identified by the service goals

Summary

The VRFA is committed to the accreditation process. Much of the strategic or longer-term planning will occur during the update of the VRFA strategic plan. On a positive note, many of the current initiatives that are underway are positively impacting our communities, especially the most vulnerable population groups. In addition, these programs have proven to be cost efficient, reducing the tax burden to customers, by leveraging strong partnerships. Development, implementation, and evaluation will continue as we strive to improve and become an accredited agency through the Center for Public Safety Excellence.

SECTION VIII: APPENDICES

Appendix A: Mutual aid provided and received, 2018-2020



Appendix B: Natural hazard events, by member city

City of Algona

TABLE 2-6.
NATURAL HAZARD EVENTS

Type of Event	FEMA Disaster # (if applicable)	Date	Preliminary Damage Assessment
Severe Winter Storm	4056	2012	No information available
Severe Winter Storm	1963	2011	No information available
Severe Winter Storm	1817	2009	No information available
Severe Winter Storm	1825	2008	No information available
Earthquake	1361	2001	No information available
Severe Winter Storms	1159	1997	No information available
Earthquake	196	1965	No information available

City of Auburn

TABLE 3-6.
NATURAL HAZARD EVENTS

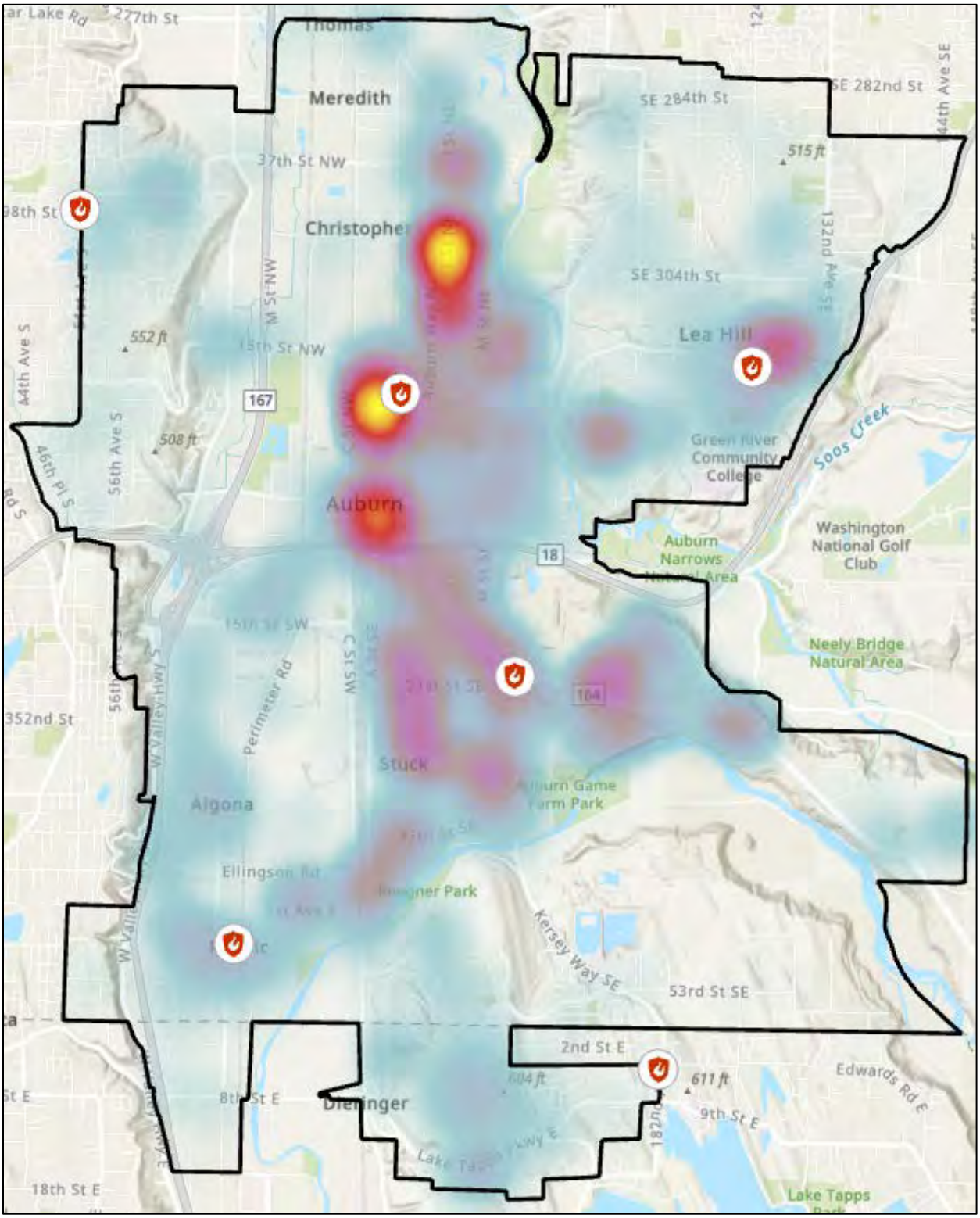
Type of Event	FEMA Disaster # (if applicable)	Date	Preliminary Damage Assessment
Severe Storms/ Floods/ Landslides/ Mudslides	1671-DR-WA	Nov. 2-11, 2006	$26,362
Severe Winter Storms/ Wind/ Landslides/ Mudslides	1682-DR-WA	Dec. 14-15, 2006	$75,860
Windstorm/ Snowstorm/ Cold Weather	N/A	Jan. 5-16, 2007	No unusual expenses reported
Excessive Heat	N/A	July 9-11, 2007	No unusual expenses reported
Windstorm	N/A	Oct. 18, 2007	No unusual expenses reported
Severe Storms/ Flooding	1734-DR-WA	Dec. 1-7, 2007	$3,289
Severe Winter Storm/ record and near-record snow	1825-DR-WA	Dec. 12, 2008 – Jan. 5, 2009	$71,092
Severe Winter Storm/ Landslides/ Mudslides/ Flooding	1817-DR-WA	Jan. 6-16, 2009	Initial expenses = $87,851 Ongoing expenses approx. $4 million
Excessive Heat	N/A	July 28-31, 2009	No unusual expenses reported
Excessive Heat	N/A	July 8-9, 2010	No unusual expenses reported
Snowstorm	N/A	Nov. 22-23, 2010	No unusual expenses reported
Rain Event	N/A	Dec. 8-18, 2010	$1,500
Severe Winter Storm/ Flooding/ Landslides/ Mudslides	1963-DR-WA	Jan. 11-21, 2011	$93,954

City of Pacific

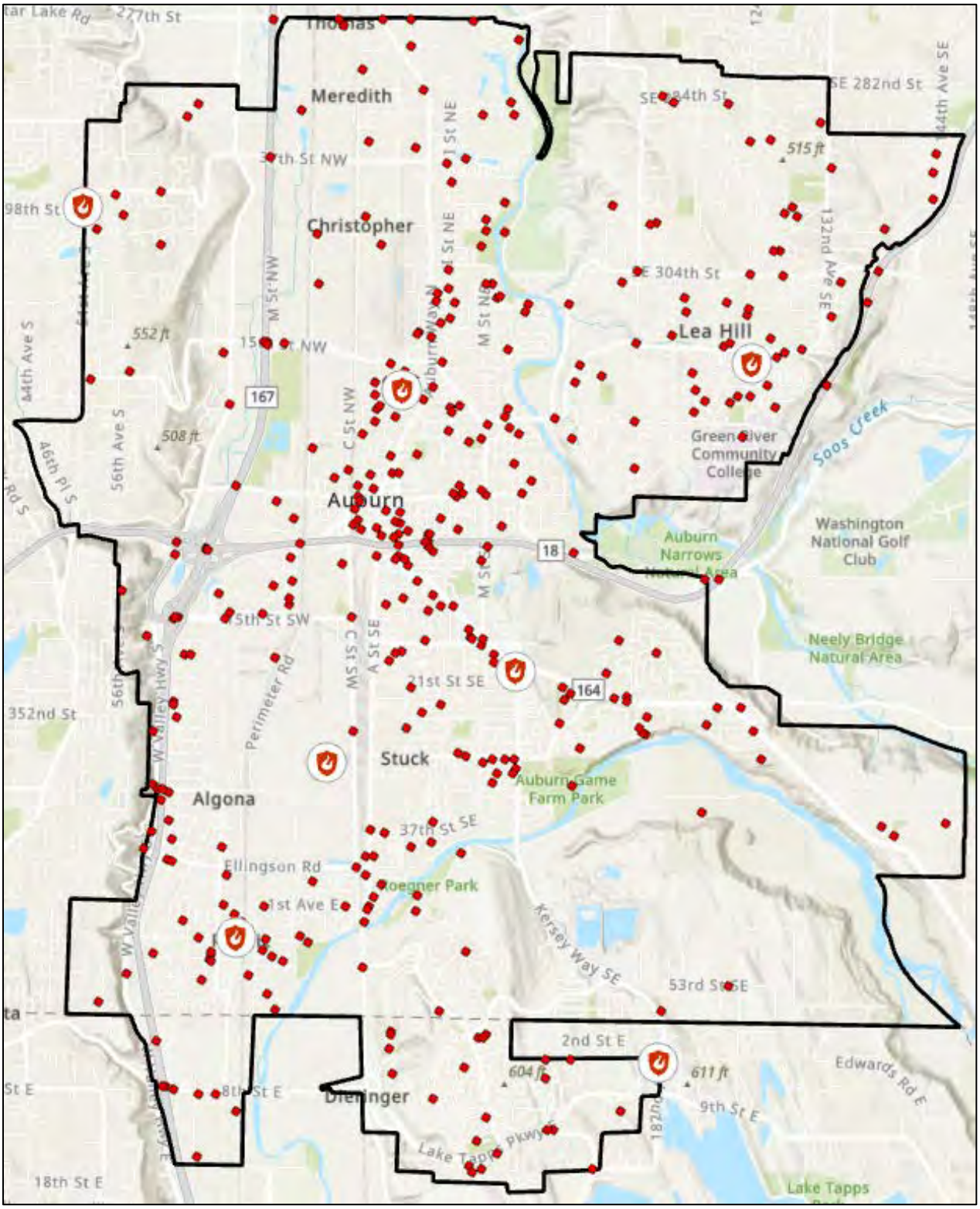
TABLE 19-6.
NATURAL HAZARD EVENTS

Type of Event	FEMA Disaster # (if applicable)	Date	Preliminary Damage Assessment
Washington Severe Winter Storm, Flooding, Landslides and Mudslides	4056	January 2012	
Severe Winter Storm, Flooding, Landslides and Mudslides	1963	January 2011	
Severe Winter Storm	1825	March 2009	$22,300
Severe Winter Storm, landslides, Mudslides and Flooding	1817	January 2009	$15.2 million
Severe Storms and Flooding	1734	December 2007	$1,000
Severe Winter Storms, Wind, Landslides and Mudslides	1682	February 2007	$36,000
Severe Storms, Floods, Landslides, Mudslides	1671	December 2006	No information available
Earthquake	1361	February 2001	No information available
Flooding	1172	March 1997	$500
Winter Storm and Flooding	1159	December 1996	No information available
Flooding	1100	February 1996	$160,000
Flooding and Wind	1079	November 1995	No information available
Storms, High Wind and Flooding	896	December 1990	$2,000
Severe Storms and Flooding	852	January 1990	No information available
Severe Storms and Flooding	757	January 1986	$500
Volcanic Eruption	623	May 1980	No information available
Storms, High Tides, Mudslides and Flooding	612	December 1979	$15,000
Severe Storms and Flooding	492	December 1975	$500
Heavy Rains and Flooding	328	February 1972	$500
Heavy Rains and Flooding	328	February 1972	$500
Wind Storm	137	October 1962	No information available

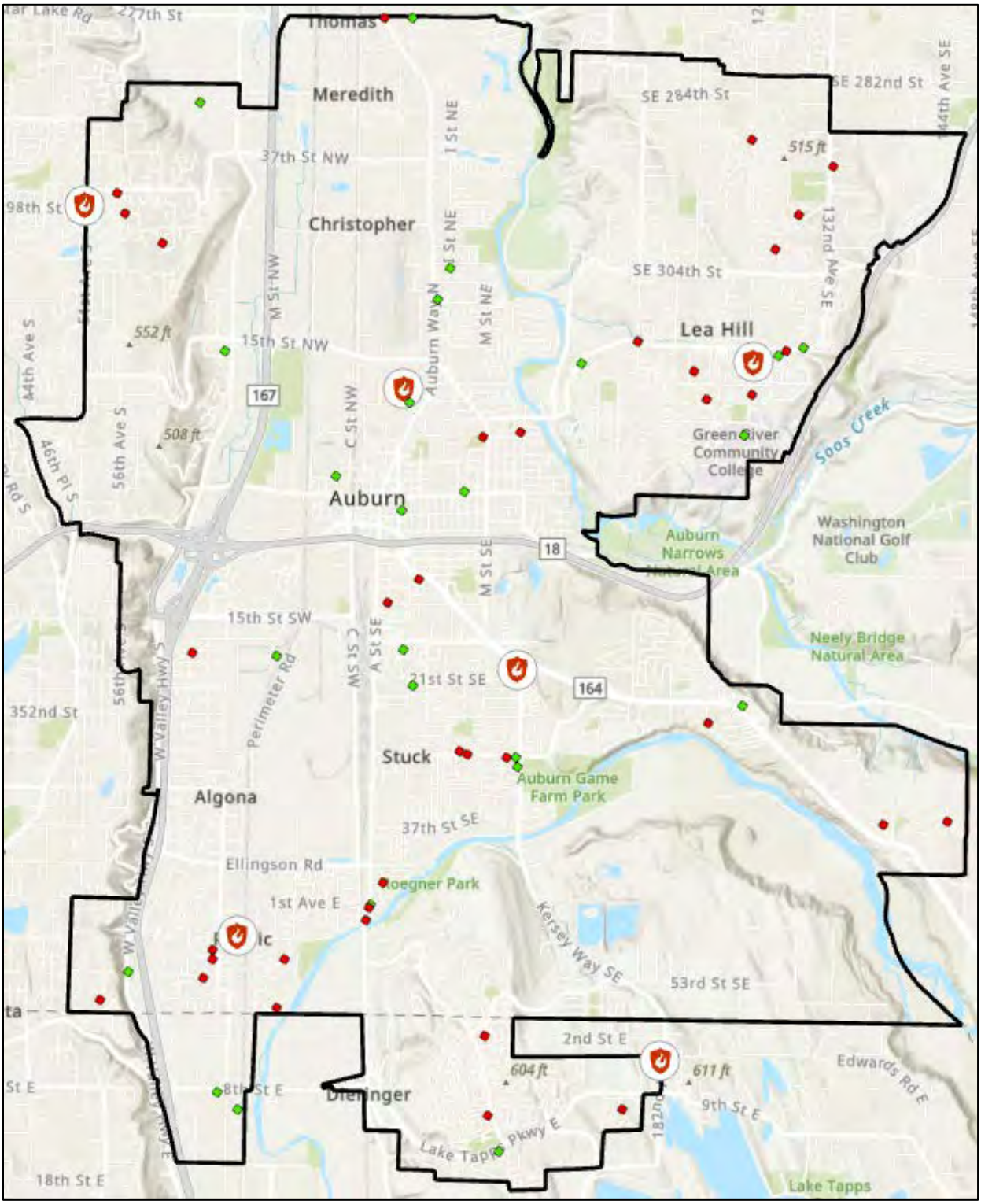
Appendix C: 2020 Call Density Map (heat map)



Appendix D: ALL fires, 2020

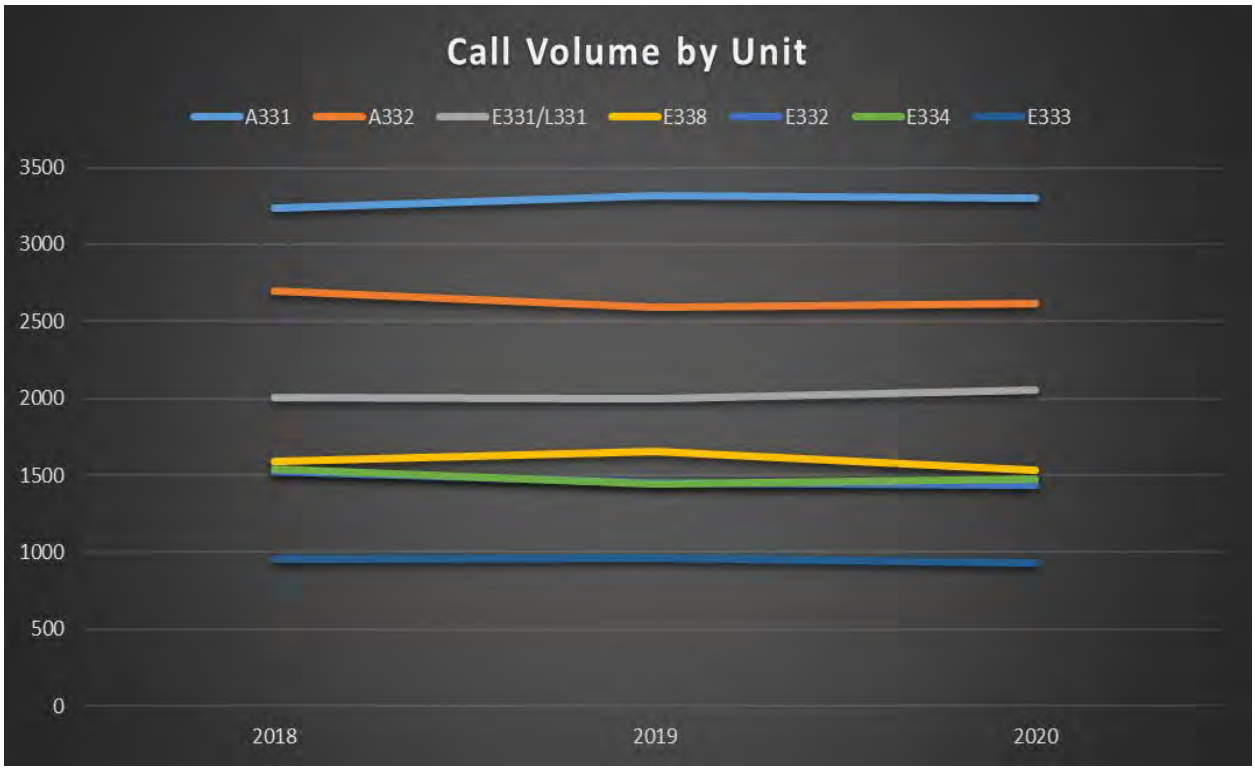


Appendix E: Commercial and residential fires, 2020[15]



[15] *Commercial fires are designated by green dots, and residential fires are designated by red dots.*

Appendix F: Call volume by unit, 2018-2020



Appendix G: EMS Performance 2020, by response zone

		Alarm	1st Turnout	1st Travel	1st TRT	ERF Travel	ERF TRT
Benchmark Target		**1:04**	**1:30**	**5:00**	**7:34**	**5:30**	**8:04**
Station 31	Baseline	2:42	2:00	7:04	10:33	7:37	10:59
	Performance	39.98%	62.80%	69.84%	62.67%	70.55%	64.82%
	N value	3,867	3,484	3,982	3,954	3,634	
Station 32	Baseline	2:27	1:58	6:59	10:32	8:26	11:35
	Performance	44.53%	65.71%	72.14%	65.95%	71.00%	65.90%
	N value	2,632	2,511	2,681	2,649	2,353	
Station 33	Baseline	2:17	2:03	8:29	12:15	9:41	13:21
	Performance	46.94%	57.93%	27.77%	26.36%	32.71%	31.04%
	N value	539	523	551	550	484	
Station 34	Baseline	2:28	2:00	7:02	10:35	8:25	11:45
	Performance	43.41%	48.72%	68.39%	59.24%	67.22%	60.00%
	N value	1,085	1,051	1,101	1,104	969	
Station 38	Baseline	2:21	2:09	8:32	11:48	10:05	13:15
	Performance	46.35%	52.07%	48.33%	43.31%	49.13%	44.48%
	N value	1,109	1,064	1,138	1,129	983	
West Hill	Baseline	2:04	2:33	7:05	10:55	8:17	11:23
	Performance	54.23%	40.07%	75.26%	69.20%	70.24%	66.93%
	N value	284	277	287	289	252	

Appendix H: Fire Suppression Performance 2020, by response zone

		Alarm	1st Turnout	1st Travel	1st TRT	ERF Travel	ERF TRT
Benchmark Target		**1:04**	**1:45**	**5:00**	**7:49**	**5:45**	**8:34**
Station 31	Baseline	3:00	2:24	7:58	11:56	8:08	11:58
	Performance	46.62%	54.75%	58.06%	51.74%	65.99%	58.57%
	N value	532	495	546	545	538	
Station 32	Baseline	2:30	2:09	7:05	10:58	7:39	11:55
	Performance	50.15%	64.15%	70.80%	65.28%	77.91%	75.16%
	N value	333	318	339	337	326	
Station 33	Baseline	2:06	2:17	8:36	11:42	8:42	11:46
	Performance	47.71%	68.22%	26.79%	26.13%	37.04%	42.06%
	N value	109	107	112	111	108	
Station 34	Baseline	2:44	2:10	7:46	11:52	8:13	12:02
	Performance	51.06%	58.01%	65.04%	61.07%	69.53%	67.39%
	N value	235	231	246	244	234	
Station 38	Baseline	2:33	2:25	9:30	12:41	9:56	12:44
	Performance	45.93%	60.53%	43.55%	38.21%	49.15%	46.29%
	N value	246	228	248	246	237	
West Hill	Baseline	2:40	2:49	6:54	11:49	8:49	12:07
	Performance	56.06%	39.34%	65.15%	51.52%	69.23%	59.38%
	N value	66	61	66	66	65	

Appendix I: Hazmat Performance 2020, by response zone

		Alarm	1st Turnout	1st Travel	1st TRT	ERF Travel	ERF TRT
Benchmark Target		**1:04**	**1:45**	**5:00**	**7:49**	**6:45**	**9:34**
Station 31	Baseline	3:42	2:34	7:55	13:28	8:04	12:02
	Performance	31.25%	46.43%	56.76%	30.56%	53.33%	40.00%
	N value	32	28	37	36	15	
Station 32	Baseline	3:22	2:03	6:27	11:06	6:39	9:48
	Performance	25.93%	57.14%	60.71%	46.43%	91.67%	83.33%
	N value	27	28	28	28	12	
Station 33	Baseline	2:35	1:54	7:28	11:51	7:17	9:03
	Performance	50.00%	55.56%	22.22%	22.22%	60.00%	100.00%
	N value	8	9	9	9	5	
Station 34	Baseline	3:35	2:27	9:32	15:18	6:01	12:57
	Performance	23.53%	25.00%	52.63%	36.84%	100.00%	80.00%
	N value	17	16	19	19	5	
Station 38	Baseline	2:27	1:56	6:53	10:45	6:59	10:53
	Performance	38.10%	59.09%	63.64%	54.55%	81.82%	81.82%
	N value	21	22	22	22	11	
West Hill	*Not evaluated due to low N value*						