Community Risk Assessment

A GUIDE FOR CONDUCTING A COMMUNITY RISK ASSESSMENT

CRR
COMMUNITY RISK REDUCTION

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Vision 20/20

Community Risk Assessment

A Guide for Conducting a Community Risk Assessment

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Preface

Community Risk Reduction

Community Risk Reduction (CRR) is defined by *Vision 20/20* as *a process to identify and prioritize local risks, followed by the integrated and strategic investment of resources (emergency response and prevention) to reduce their occurrence and impact.* Much of the current literature and training materials suggest that Community Risk Reduction programs use a six-step approach towards development. Figure 1 depicts these steps.

Importance of CRR

Community risk reduction is not a new concept for the fire service. Fire departments have been actively involved in fire prevention for many years through public education, building inspections and other activities. Although there is no specific blueprint for developing CRR plans in U.S. fire departments, there are some common and essential steps. Ultimately, the CRR plan will be unique to each fire department, based on the types of risks for that particular community.

Figure 1

Essentially, the fire service exists not only to respond to emergency incidents, but also to proactively prevent or mitigate the impact of such incidents within their communities. CRR provides a more *focused* approach to reducing specific risks. In addition, a comprehensive CRR program involving community partners, firefighters, and other staff, can result in an organizational culture that recognizes the importance of reducing risks within a community. It is important that fire service leaders, their firefighters and other staff begin to shift their thinking towards reducing and mitigating risks, as this will ultimately be expected by their communities and elected officials. This will probably not be a simple or immediate change. As with any organizational culture—particularly within the fire service—there tends to be substantial resistance to what's new, and a strong investment in the old ways of doing things.

Risk Defined

Definitions of "risk" can be found in a variety of publications, reports and other sources. One definition is: *human behavior, systems malfunctions, or an event that results in an ignition or other detrimental incident leading to a negative impact to life, property and/or natural resources.* Another simple definition is: *the potential or likelihood of an emergency to occur.* A "risk assessment" simply asks, "How risky is the situation?"

Risks that affect a community on a regular basis can be human-created or naturally occurring. Examples include preventable injuries, fires and frequently occurring forms of severe weather. Examples of more uncommon risks that may occur every 5–20 years, might include domestic terrorism, hurricanes, earthquakes, and major hazardous materials releases.

Risk assessment is basically the identification of potential and likely risks within a particular community, and the process of prioritizing those risks. It is the critical initial step in emergency preparedness, which enables organizations to eventually mitigate (if possible), plan, prepare and deploy appropriate resources to attain a desired outcome.

Degrees of Risk Assessment

The community risk assessment process can be as complex and detailed as local resources permit. Or, using basic skills and resources available to most organizations, can be a more simplified process that will produce basic information that can be used effectively for a CRR program. Several people or a small team may be most effective in completing the assessment. Many communities have access to experts in assorted occupations that can be useful in the process. Often, these individuals and organizations are very willing to provide assistance to the local fire department. Based on individual capabilities, each fire department and community will need to determine the extent to which they will conduct their risk assessment process.

Purpose of this Guide

This guide will focus on the CRR steps involved in *identifying* and *prioritizing* risks, and the processes required for conducting a *risk assessment* in preparation for prevention and mitigation planning. The intent is to provide simple and easily understood guidelines for fire departments and/or other agencies to conduct a risk assessment of their community, with the ultimate goal of developing a local CRR program.

CRR
COMMUNITY RISK REDUCTION

Useful Tools & Resources

There are some useful tools and resources that should be considered before undertaking the risk assessment process:

Human Resources—individuals both within and outside the fire department can be valuable resources. While firefighters may be tapped for their fire and EMS expertise, there may be individuals within the department with other unique skills, such as writing, graphic design, experience in statistical analysis, and other abilities. Private individuals and government employees with knowledge and skills in data analysis, population studies (demographics), crime rates, and other talents, should be sought out.

Word-processing software—an application such as Microsoft Word® will be necessary to document the results of your assessment in a format that can be easily read and interpreted by others, as well as for continuing the planning process. Most popular word-processors can incorporate images, create tables, and import information from spreadsheet applications.

Spreadsheet software—a computer application such as Microsoft® Excel or similar spreadsheet-type program will enable detailed analysis from a variety of data sources. A feature found in such programs is the ability to generate pivot tables from the information stored in the spreadsheet. Among other functions, a pivot table can automatically sort, summarize, count totals, or give averages of data. Pivot tables can make calculating and viewing data much quicker and simpler. Spreadsheet applications are usually capable of creating a wide variety of charts and graphs that can be used in the analysis and written reports. For those with limited or no experience with spreadsheet applications, it would be well worth the time to take a training course to learn the basics, including the use of pivot tables. Or recruit an experienced analyst from within local government or from a partner organization.

GIS software—a geographic information system application (GIS), such as *ArcGIS*® (Esri, Inc.), is an extremely valuable tool for conducting a risk assessment. More than just generating maps, it provides the power to manage data, perform advanced analysis, and much more. GIS applications can import incident data, demographic information, and other electronic records to produce a visual perspective of activity within your service area.

GIS software typically requires advanced training in order to utilize all of its features. Most fire departments do not have internal staff qualified to use such applications. However, many local government organizations have GIS departments or experts that can be recruited for assistance in generating useful maps. For those who have access to *ArcGIS*® *Online*, Esri provides an add-in tool that will generate maps using Microsoft Excel® and, if desired, copied into PowerPoint® for presentations.

STEP 1

Identify Risks

Step 1 in the risk assessment process is to *identify* the various risks to your community and/or service area. This is accomplished by gathering data—in other words, acquiring information about what is occurring within your community. The data will be used to identify both current risks and trends based on historical information. Typically, there will be a large number of resources from which to acquire the data necessary to identify current and potential risks.

Step 1A: Acquire Data that Identifies Risks

Data Elements to Collect

There are a number of data elements that should be considered for acquisition. These might include:
- Incident dates and times.
- Incident types.
- Incident locations (address & any other location data; preferably, latitude and longitude).
- Causes of ignition of fires; heat sources; areas of origin.
- Mortality rates (fire-related; trauma; other medically-related).
- EMS mechanisms of injury and causes of illness; and EMS provider "impressions" (i.e., diagnosis).
- Occupancy information.
- Response times of all units involved ("fractile" method; not averages).
- Rate of dollar loss to value.

You may want to obtain more or less data elements than the ones above. However, at the least, you will want to collect *incident dates, times, types* and *locations* in order to get a minimal perspective of what is occurring within your service area.

Fire Department Incident Data

Many fire departments now document their emergency incidents electronically using computerized records management systems (RMS). Most commercially available applications have been designed to collect incident data based on the *National Fire Incident Reporting System* (NFIRS). The *United States Fire Administration* (USFA) began the NFIRS in 1975. Under this program, local fire departments submit their data to a state organization who, in turn, reports this to the USFA. If your incident data is not easily accessible locally, you may be able to obtain the information from your state, or obtain an account with the USFA, which will allow you to acquire specific reports.

Depending on the type of RMS you have, your system should be able to generate printed reports or export summary information in the form of a database or spreadsheet. You should acquire a minimum of 3–5 years of data (more, if in a very small, low-volume community), so as to ensure you have enough information to provide an adequate perspective of what is occurring. Figure 2 is an example of a partial section of a spreadsheet containing fire department incident data.

Depending on the type of RMS your organization uses, and the extent of the information collected and entered into it, you will need to determine what data elements to extract (or what reports to generate).

	A	B	C	D	E	F	G
1	Run Number	Date	Address	Enroute	Arrived	Cleared	Call Type Code & Description
2	06720	01/01/2008	828 E 15th AVE Kennewick WA 99337	1/1/08 0:10	1/1/08 0:17	1/1/08 0:31	321 - EMS call, excluding vehicle accident with injury
3	00001	01/01/2008	725 N CENTER PKY # D103 Kennewick WA 99336	1/1/08 0:05	1/1/08 0:10	1/1/08 0:22	321 - EMS call, excluding vehicle accident with injury
4	00002	01/01/2008	203 N DENNIS ST Kennewick WA 99336	1/1/08 0:11	1/1/08 0:14	1/1/08 0:29	321 - EMS call, excluding vehicle accident with injury
5	00003	01/01/2008	7001 W CLEARWATER AVE Kennewick WA 99336	1/1/08 0:45	1/1/08 0:48	1/1/08 1:28	321 - EMS call, excluding vehicle accident with injury
6	00004	01/01/2008	1255 N MORAIN ST Kennewick WA 99336	1/1/08 1:45	1/1/08 1:50	1/1/08 2:12	321 - EMS call, excluding vehicle accident with injury
7	00005	01/01/2008	524 E BRUNEAU AVE Kennewick WA 99336	1/1/08 1:51	1/1/08 1:58	1/1/08 1:59	733 - Smoke detector activation due to malfunction
8	00006	01/01/2008	425 S BUCHANAN ST Kennewick WA 99336	1/1/08 1:58	1/1/08 2:05	1/1/08 2:16	321 - EMS call, excluding vehicle accident with injury
9	00007	01/01/2008	1912 W 6TH AVE # B Kennewick WA 99336	1/1/08 3:05	1/1/08 3:10	1/1/08 3:35	321 - EMS call, excluding vehicle accident with injury
10	00008	01/01/2008	2121 S ARTHUR LOOP Kennewick WA 99337	1/1/08 3:13	1/1/08 3:18	1/1/08 3:37	321 - EMS call, excluding vehicle accident with injury
11	00009	01/01/2008	610 N TWEEDT ST # 102 Kennewick WA 99336	1/1/08 5:29	1/1/08 5:32	1/1/08 5:59	321 - EMS call, excluding vehicle accident with injury
12	00010	01/01/2008	7106 W Victoria AVE Kennewick WA 99336	1/1/08 7:13	1/1/08 7:19	1/1/08 7:32	321 - EMS call, excluding vehicle accident with injury
13	00011	01/01/2008	309 S CLEVELAND ST Kennewick WA 99336	1/1/08 10:31	1/1/08 10:36	1/1/08 11:05	321 - EMS call, excluding vehicle accident with injury
14	00012	01/01/2008	307 E 5TH AVE Kennewick WA 99336	1/1/08 10:57	1/1/08 10:59	1/1/08 11:17	321 - EMS call, excluding vehicle accident with injury
15	00013	01/01/2008	4203 W KENNEWICK AVE 3 Kennewick WA 99336	1/1/08 12:32	1/1/08 12:35	1/1/08 12:50	321 - EMS call, excluding vehicle accident with injury
16	00014	01/01/2008	825 W ENTIAT AVE Kennewick WA 99336	1/1/08 13:40	1/1/08 13:45	1/1/08 14:07	321 - EMS call, excluding vehicle accident with injury
17	00015	01/01/2008	805 S JUNIPER ST Kennewick WA 99336	1/1/08 15:29	1/1/08 15:33	1/1/08 15:44	321 - EMS call, excluding vehicle accident with injury
18	00016	01/01/2008	2615 W ENTIAT AVE Kennewick WA 99336	1/1/08 15:50	1/1/08 15:52	1/1/08 16:04	321 - EMS call, excluding vehicle accident with injury
19	00017	01/01/2008	3512 W 10TH AVE # A Kennewick WA 99336	1/1/08 17:05	1/1/08 17:07	1/1/08 17:36	321 - EMS call, excluding vehicle accident with injury
20	00019	01/02/2008	S Huntington ST Kennewick WA 99336 W 10th Ave	1/2/08 6:40	1/2/08 6:43	1/2/08 6:52	322 - Motor vehicle accident with injuries
21	00020	01/02/2008	900 S AUBURN ST Kennewick WA 99336	1/2/08 7:49	1/2/08 7:55	1/2/08 9:07	321 - EMS call, excluding vehicle accident with injury
22	00021	01/02/2008	7001 W Willamette AVE Kennewick WA 99336	1/2/08 8:00	1/2/08 8:03	1/2/08 8:19	321 - EMS call, excluding vehicle accident with injury
23	00022	01/02/2008	8438 W GAGE Kennewick WA 99336	1/2/08 10:39	1/2/08 10:43	1/2/08 10:59	321 - EMS call, excluding vehicle accident with injury
24	00023	01/02/2008	2703 S QUILLAN ST Kennewick WA 99337	1/2/08 12:01	1/2/08 12:03	1/2/08 12:14	321 - EMS call, excluding vehicle accident with injury
25	00024	01/02/2008	1208 W 11TH PL Kennewick WA 99337	1/2/08 17:29	1/2/08 17:32	1/2/08 17:42	321 - EMS call, excluding vehicle accident with injury
26	00025	01/02/2008	6 W 6TH AVE # 201 Kennewick WA 99336	1/2/08 17:49	1/2/08 17:54	1/2/08 18:06	321 - EMS call, excluding vehicle accident with injury
27	00026	01/02/2008	505 S OLYMPIA ST # K3 Kennewick WA 99336	1/2/08 19:26	1/2/08 19:30	1/2/08 19:40	321 - EMS call, excluding vehicle accident with injury

Figure 2

Dispatch Center Data

In most communities throughout the U.S., the local public safety answering point (PSAP) and/or dispatch center collects valuable data through complex and sophisticated computer-aided dispatch (CAD) systems. Although the information collected varies among systems, the data typically includes: incident locations; dates; apparatus dispatch and arrival times; incident type; and much more.

Often, CAD data is downloaded or integrated into the fire department's RMS. In that case, the necessary data may already be in your RMS. If not, most CAD systems can export incident records to a spreadsheet or other format to enable data analysis.

Other Data Sources

The *National EMS Information System* (NEMSIS) *Project* is an effort to create a national emergency medical services (EMS) database. The current NEMSIS *NHTSA Version 3 Dataset* defines over 500 standardized data elements that can be collected. Most state EMS agencies are participating to some degree in collecting EMS incident data from local agencies. If your agency submits electronic EMS data to your state EMS office, you may be able to obtain reports or electronic data from them. You may also request local EMS data (with some limitations) from NEMSIS (www.nemsis.org).

Law enforcement agencies (local, state, and federal) have a long history of collecting and maintaining incident records and other information. These records may include arson reports and drug-related incidents, assaults, and other information that can ultimately impact the fire department.

The *Federal Emergency Management Agency* (FEMA) (www.fema.gov)and *Department of Homeland Security* (DHS) (www.dhs.gov) websites contain substantial information that can be useful in risk assessment—particularly in natural and human-caused disasters. The *National Weather Service* (www.weather.gov) can also serve as a source of information on weather-related events.

The *Centers for Disease Control & Prevention* (CDC) website is another excellent source for health and injury-related sources and materials. Located on their website is the *Web-based Injury Statistics Query and Reporting System* (WISQARS™). It is an interactive database system that provides customized reports of injury-related data.

Firefighter experience can be a valuable source of information. They can be utilized to conduct station-based risk assessment and pre-planning. Information from these activities should be documented and recorded (preferably in an electronic database format).

Step 1B: Develop a Community Profile

The risk assessment should also include obtaining information on the people who are impacted by, or a part of, the problem. Therefore, it will be necessary to acquire data to develop a community demographic profile. Risk is often influenced by economic and social issues. Therefore, the community risk-reduction process must address socioeconomic issues. The *demographic* composition of a community typically includes the statistical data of its population. This should include:

- Age
- Gender
- Income
- Race and ethnicity
- Social and cultural information
- Education
- Housing type, age, and density (optional)

Demographic Data Sources

For most communities, this information is readily available from a variety of sources. This is where involving community partners can be of significant value, as they will often have more comprehensive information regarding the local population. In some cases, a community profile may have already been completed by another government agency or organization. Local and regional demographic sources may include:

- City, state, & county government
- Chambers of Commerce
- School districts/boards of education
- Non-profit organizations
- Neighborhood associations
- Public health (state, local, & federal)
- GIS departments

Figure 3

A significant source for community profile data can be found on the *United States Census Bureau* website[1] and the *American FactFinder* website.[2] It is beyond the scope of this document to provide a complete list of the many data resources that can be found on these websites, but there are many. It is well worth the time to explore these for relevant information.
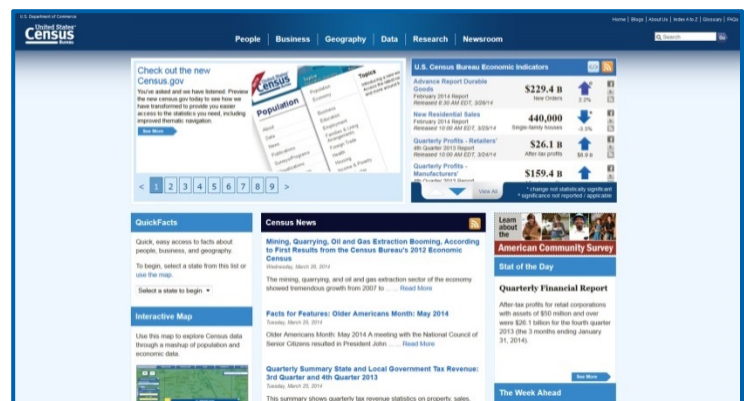
These websites contain very powerful tools and instruments for obtaining a wealth of information concerning the demographics of your community. Although the process for gathering data from these websites may be intimidating initially, it can be easily mastered with experience. You should consider spending some time exploring each of these sites to determine what is available for your community and how to utilize the various tools.

The Census Bureau website contains a vast quantity of data regarding population, businesses, geography and other information. Much of this is limited to broader areas such as states, counties and, in some cases, cities. Within the Census Bureau's website are two other valuable sources of data: the *American Housing Survey*[3] and the *American Community Survey*.[4]

The *American FactFinder* website may provide the most detailed demographic information about your community or service area. It provides data on population, age, business and industry, education, housing, income, poverty and much more.

Figure 4 is an example of a data table generated through the *American FactFinder* website. It is based on the employment rate of the City of Vancouver, Washington by age, race and other factors. The site provides substantial versatility when generating data. Tables can be modified, printed and downloaded and, in some cases, maps can be created.

Community Partners

Other state and local agencies and organizations can be quite useful in the development of your community profile. Typically, they will have important information to share and may have a better insight into loss history, high-risk groups, local business issues, and specific demographics throughout the various neighborhoods. It is strongly recommended to have representatives from the community—especially from groups at the highest risk of fires and other injuries—to serve on your team, so their insights are fully integrated into the plan.

Figure 4

Assessing Community Trends

In order to do a thorough assessment, it will be important to not just evaluate your community's current conditions, but to look at its past and projected future. There are many components to this process, and it can become quite complex. Although a comprehensive analysis to determine future projections may be beyond the capacity of many fire departments, the data may already be available. The U.S. Census Bureau assesses population trends, and local planning departments often have completed projections on community growth and other anticipated trends.

Building the Community Profile

Once you have gathered the necessary data, you can then begin to build and document your community profile and answer specific questions. A bulleted summary table can be an easy way to describe the demographic characteristics of your service area. Appendix A lists the category, description, and various questions to answer about each demographic topic.

Using GIS Technology

The use of GIS technology has continued to proliferate throughout the U.S. Fire Service. It has proven to be not only useful in risk assessment, but other types of planning, preparedness, and incident response and recovery activities. Once you have determined and acquired your data sources, you will need to identify available GIS expertise and potential training requirements. This may include a GIS analyst/technician; other fire departments or government agencies using GIS; and training sources. It can also be useful to network with GIS user-groups in your area, as well as collaborate with other local fire departments.

While it would be useful to gain a basic understanding of GIS technology, it is not necessary to become an expert in this field to utilize GIS when conducting a risk assessment. Many city and county governments have GIS experts that are often willing to assist the fire department in building a GIS project. If your jurisdiction has access to GIS services, their potential value in risk assessment cannot be overstated, and you should cultivate positive relationships with the organization and staff.

GIS map projects are composed of layers of data. Each of the layers can be created from various data sources and stored in a standard relational database. In this way, GIS is *much* more than a map—it is a location-aware information system that allows creating, managing and displaying relevant data. Because information can be organized by a specific geographic location, it enables you to see the relationship between the various data layers.
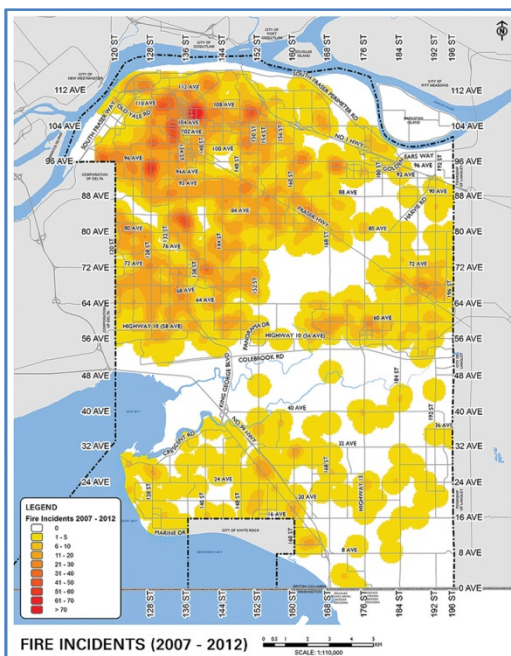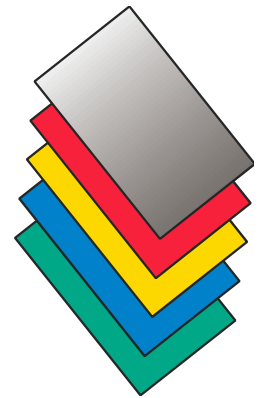

Figure 5 is an example of a map showing the frequency and locations of fires that occurred during a six-year period. The map clearly illustrates the high-risk areas in a community, which can lead to the development of activities for prevention and mitigation.

Using GIS in the Community Profile

GIS technology is widely used by government agencies for a variety of applications. Local government agencies, such as planning or GIS departments, usually have substantial information about their communities. In some cases, they may already have a community profile documented in some form or another. The GIS department may be able to generate maps that can be used later in the CRR process.
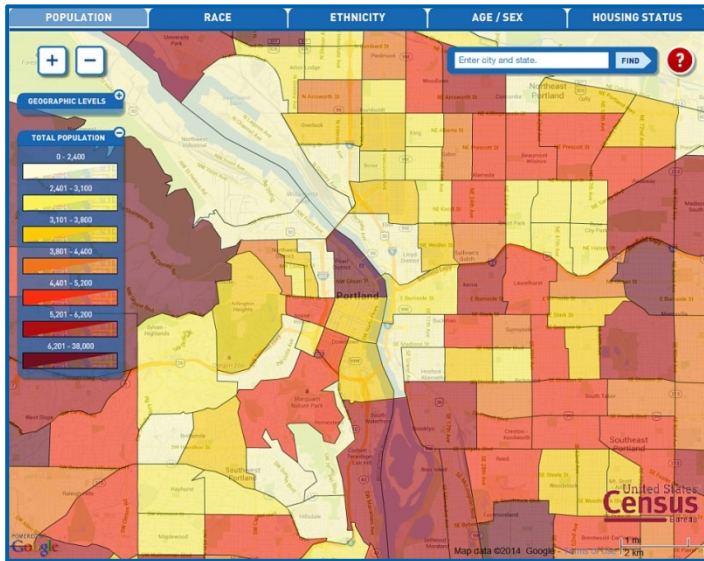
Figure 5

Figure 6

 The U.S. Census Bureau website also has the ability to generate a variety of demographic maps of your community; which can be printed or copied and used in your analysis. Figure 6 is an example of a map generated by the *Census Data Mapper* on the Census Bureau website. It shows the percentage of the population 65 years of age and older for a particular county.

Figure 7 is another map generated through the Census Bureau website. It shows the population, by census groups, for a particular city. Maps can be generated by population, race, ethnicity, age, sex, and housing status.

If your department has access to GIS, local census data can be accessed and utilized to generate custom maps. *ArcGIS*® by Esri® is an application that can incorporate demographic, incident, and other data into useful maps that can provide much greater insight into what risks are occurring, where they are occurring, and within what types of populations.

Figure 7

Step 1C: Identify Causal Factors & Populations at Greatest Risk

When evaluating fire department incident data, it will be necessary to identify those factors contributing to the severity of the hazards and those populations at greatest risk. For example, it was determined in one community that cooking fires were a leading cause of residential fires. Examination of the causal factors revealed that food left unattended on a stove is a common cause, and that these homes have non-working smoke alarms. Residents attempted to fight these fires and were unfamiliar with the proper procedures for extinguishing small kitchen fires.
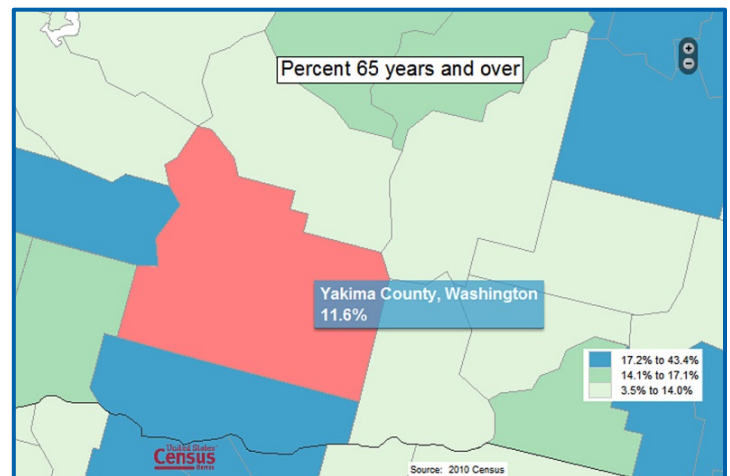
In the previous example, further analysis of the population where these fires occurred, demonstrated that most of these incidents involved older, Spanish-speaking females. Therefore, U.S. Census data and GIS-mapping can be very valuable in identifying at-risk populations. Important and relevant community partners and stakeholders can also be valuable resources at this point in the process. The people most often affected by fire and other emergency incidents themselves, will make great partners in creating strategies to prevent and mitigate risks, and to implement them.

When evaluating causal factors and at-risk populations, consider the following:

- Social factors and cultural influences

- Economic factors

- Environmental elements

- Identify risk factors in specific populations:
  - Children (age 5 & under)
  - Older adults (age 65 & older)
  - People with disabilities
  - People living in poverty
  - Populations that speak little or no English

Understanding the causal factors and populations at greatest risk will contribute to developing programs to address these problems. In the example above, prevention activities would be directed towards managing small kitchen fires, installation of smoke alarms, and directed primarily towards older Spanish-speaking individuals.

Step 1D: Identify Target Hazards

One component of conducting a community risk assessment is to identify specific target hazards within your service area. These are sometimes referred to as "critical facilities." Examples of critical facilities might include:

- Hospitals
- Schools
- Emergency operations centers
- Water/sewage treatment facilities
- Assisted living centers
- Airports
- Hazardous materials sites
- Communications systems
- Community shelters
- Important government offices
- Roadways

You should also consider for inclusion among your list of target hazards, buildings with substantial value to the community (economic, historic, other), and other facilities that, if damaged or destroyed, would have a significant negative impact on the community.

Important Definitions

The definition of target hazards will vary among jurisdictions, and will be partially defined by your organization. FEMA defines these as: "*facilities in either the public or private sector that provide essential products and services to the general public, are otherwise necessary to preserve the welfare and quality of life in the community, or fulfill important public safety, emergency response, and/or disaster recovery functions.*" In order to conduct an effective target hazard assessment, some key definitions must be understood:

Hazards: Known physical features that can ignite and sustain combustion, or existing features (natural or manmade) that have the potential to cause negative impacts to life, property and/or natural resources.

Values: Community assets, including life, property and natural resources.

Target Hazard Data

In most communities, the local assessor's office will have a database that includes a listing of all the *tax parcels* within a community. Tax parcel information includes the property boundaries, use description, building area, number of floors, assessed values, and more.

Some fire departments maintain occupancy data in their records management systems. Typically, this is acquired from information gathered from regular property inspections. Such systems may provide much more comprehensive information for identifying target hazards, and enable you to generate detailed reports that describe significant hazards. In some jurisdictions, property inspections are performed by government organizations outside of the fire department. In these cases, this can be another valuable data source to help in identifying your target hazards.

Using Fire Crews to Identify Target Hazards

One option that can assist in determining target hazards is to utilize fire crews to identify facilities within their station's emergency response service areas. Firefighters assigned to a particular station often have good insight into critical structures and facilities within their area. Sometimes referred to as a "windshield survey," companies can be assigned to drive around their district and identify various target hazards. If possible, they can perform more comprehensive inspections and pre-incident surveys, and document important details. This information can be combined with other target hazard data to develop the final analysis.

GIS-Based Target Hazard Analysis

Target hazards should be contained in listings and/or maps (which distinguish target hazards from other structures) that depict the details and locations of the vulnerable areas and critical structures and facilities. Probably the most effective method of generating a target hazard analysis is the use of a GIS-based model. As mentioned previously, GIS is being widely used among local government entities.

Oliver suggests that a GIS-based assessment is comprised of four elements: [5]

1. Identifying/classifying community hazards.
2. Identifying risk factors, potential and probability.
3. Identifying/classifying community assets/values.
4. Fusing all of the elements into a visual display of the existing hazards: their potential impact on values, and the risk or likelihood of an unwanted event.

Data sources previously mentioned will be necessary to enable a complete GIS target hazard analysis. These data elements are available in most communities, and will be critical in the process of building the target hazard analysis. Sources should include (but not be limited to):

- Utilities locations (electric, gas, etc.)
- Previous fire & other incidents
- Water supplies & hydrants
- Street layers
- Assessed value
- Census tracts
- Tax parcels
- Zip code boundaries
- Occupancy data
- Hazmat permits
- Block groups

STEP 2 Prioritize Risks

Once you have gathered and analyzed all of your data sources, it will be necessary to evaluate, quantify, and determine the consequences; then prioritize the risks.

Step 2A: Describe Risk Attributes & Vulnerability

At this point it will be important to describe the various attributes associated with the risks that have been identified. There are various tools and methods that can be utilized in this process. Table 1 is one component of series of tools that can be used for prioritizing and "scoring" risk. Use this to describe the likelihood of specific risks occurring.

Qualitative Measures of Risk Likelihood

Level	Description	Characteristics
A	Almost Certain	• Event is expected to occur. • High level of recorded incidents and/or very strong anecdotal evidence. • Strong likelihood event will re-occur. • Strong opportunity, reason, or means to occur.
B	Likely	• Event will probably occur. • Regular recorded incidents and strong anecdotal evidence. • Considerable opportunity, reason, or means to occur.
C	Possible	• Event should occur at some time. • Few infrequent, random recorded incidents or little anecdotal evidence. • Very few incidents in associated organizations or comparable facilities. • Some opportunity, reason, or means to occur.
D	Unlikely	• Event could occur at some time. • No recorded incidents or any anecdotal evidence. • No recent incidents in associated organizations or facilities. • Little opportunity, reason, or means to occur.
E	Rare	• Event may occur only in exceptional circumstances.

Source: City of Manningham (Victoria, Australia) Community Emergency Risk Management Plan (2009)　　　　Table 1

Vulnerability is the susceptibility to suffer loss or harm from some type of incident or event. This may vary based on assorted factors, such as preparedness and the capabilities of the fire department and other emergency services providers. A community's ability to resist the impacts and effects of various hazards must be determined. Table 2 is used as a qualitative measure to describe the consequences or impact of a particular risk or event.

Qualitative Measures of Risk Consequence or Impact

Level	Description	Characteristics
1	Insignificant	• No injuries or fatalities. Small number or no people displaced, and only for short duration. Little or no personal support required (support not financial or material). • Inconsequential or no damage. Little or no disruption to community. • No measurable impact on environment. • Little or no financial loss.
2	Minor	• Small number of injuries, but no fatalities. Minor medical treatment required. Some displacement of people (less than 24 hours). Some personal support required. • Some damage. Some disruption (less than 24 hours). • Small impact on environment with no lasting effects. • Some financial loss.
3	Moderate	• Medical treatment required, but no fatalities. Some hospitalization. Localized displacement of people who return within 24 hours. Personal support satisfied through local arrangements. • Localized damage, which is rectified by routine arrangements. Normal community functioning with some inconvenience. • Some impact on the environment with no long-term effects, or small impact on environment with long-term effect. • Significant financial loss.
4	Major	• Extensive injuries, significant hospitalization, large number displaced (more than 24 hours duration). Fatalities. External resources required for personal support. • Significant damage that requires external resources. Community only partially functioning, some services unavailable. • Some impact on environment with long-term effects. • Significant financial loss—some financial assistance required.
5	Catastrophic	• Large number of severe injuries requiring hospitalization. Significant fatalities. General displacement for extended duration. Extensive personal support. • Extensive damage. Community unable to function without significant support. • Significant impact on environment and/or permanent damage. • Huge financial loss—unable to function without significant support.

Source: City of Manningham (Victoria, Australia) Community Emergency Risk Management Plan (2009)   Table 2

Using the results from the previous two tools (Tables 1 and 2), a level of risk can be assigned using the matrix in Table 3.

Qualitative Risk Analysis Matrix: Level of Risk

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (Almost Certain)	HR	HR	ER	ER	ER
B (Likely)	MR	HR	HR	ER	ER
C (Possible)	LR	MR	HR	ER	ER
D (Unlikely)	LR	LR	MR	HR	ER
E (Rare)	LR	LR	MR	HR	HR

Categories of Risk

Extreme Risk (ER)	Detailed research and management planning required at senior levels. Action must be taken to reduce consequences or likelihood.
High Risk (HR)	Chief officer or senior management attention required, further research might be required. Some action must be taken.
Moderate Risk (MR)	Management responsibility must be specified, specific monitoring or response procedures required.
Low Risk (LR)	Manage by routine procedures

Source: City of Manningham (Victoria, Australia) CERM Plan (2009)   Table 3

By combining these three tools and assigning a score to each of your risks, you can begin to prioritize those that will need the most attention for developing strategies and tactics for mitigation. This is a good point at which to also include critical community partners and stakeholders.

Step 2B: Rating (Scoring) Target Hazards

Utilizing a rating or scoring system assigned to each property can help to determine which target hazards are the most critical. One simple method is to apply a criticality score ranging from 1–3: Low, moderate, or high. Some experts recommend the use of the *Occupancy Vulnerability Assessment Profile* (OVAP) score as a method determine and categorize occupancy risks. OVAP criteria can be more detailed and range from 1–5:[5]

Occupancy Vulnerability Assessment Profile Criteria

Criteria Name	Description	Score
Low	Structures that consist of mainly fire-resistive or noncombustible materials	1
Moderate	Structures that consist of an ordinary mix of construction materials	2
High	Structures that consist of significant wood-frame or heavy timber materials	3
Very High	Structures with combustible materials that share walls, attics, etc.	4
Moderate to Extreme	Technological or hazmat exposure (CBRN)	5

Table 4

Occupancy types assigned a higher score are considered to be more critical than those with a lower score. A score should be assigned to each of the following categories:

- Number of occupants/life safety
- Impact (including economic) to the community
- Presences of automatic fire suppression/detection systems
- Number of fire hydrants nearby
- Building usage

- Building construction
- Number of stories
- Overall size (square footage)
- Level of hazard

Figure 8 is an example of a map depicting various locations of target hazards, based on defined criteria using a scoring system. In this case, properties are color-coded in accordance with their particular score, making it easier to quickly identify those with the highest levels of risk. Another option would be to generate a map depicting only those facilities with the highest levels of risk, rather than all properties and structures.

There are software applications available for developing a GIS-based analysis. *ArcGIS®* by Esri® is a very powerful GIS application. Departments using *ArcGIS for Desktop* can obtain the *Target Hazard Analysis* tool, which has been specifically designed for use by the fire service and other public safety agencies.
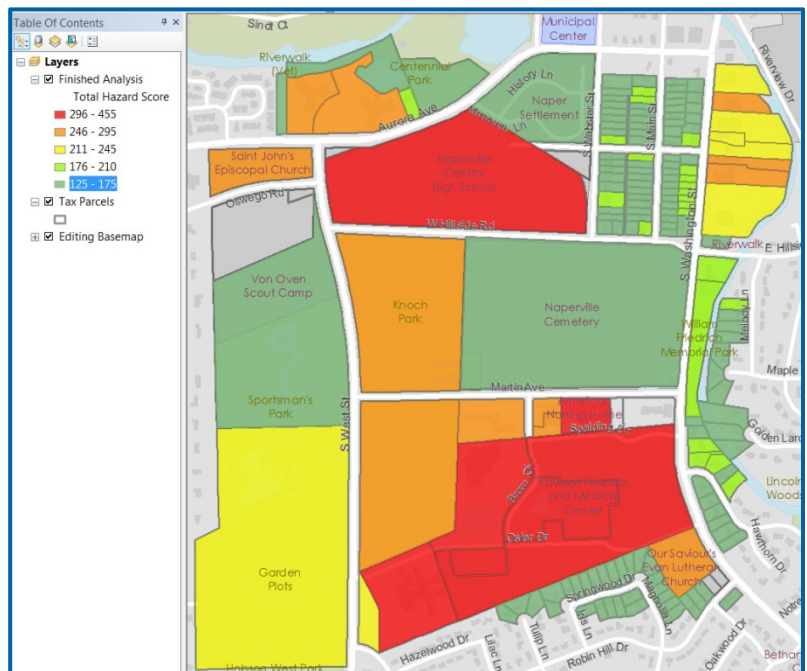

Figure 8

STEP 3 Putting It All Together

After you have collected and quantified your data, and prioritized the various risks, it will be necessary to distill it all into a legible and decipherable document. Keep in mind that the document may be reviewed by individuals, community partners, elected officials and others without technical expertise or backgrounds in the fire service and risk assessment.

Most spreadsheet or database software applications are capable of generating many different types of bar graphs, pie charts and line graphs. Word processing software typically enables the creation of simple or sophisticated tables that can be incorporated into your document. As mentioned previously, GIS can be very valuable by generating maps to illustrate locations and trends of incidents, hazards, and occupancies.

The use of tables, graphs, charts and maps should be used to illustrate the results of your assessment. What follows is an example of a *simple* risk assessment of a fictional community in the United States. It includes a number of maps, tables and charts as examples of presenting your data visually.

EXAMPLE: Results of a Community Risk Assessment of Bolton, Washington

With support from community leaders, city management, and local elected officials, the City of Bolton Fire Department (BFD) conducted a community risk assessment using a systematic approach to the process. Ultimately, the results of this assessment will be utilized to create a complete Community Risk Reduction (CRR) plan that will include strategies and tactics to mitigate risks to the community.

Two primary categories were examined: service demand and community risks. Service demand consisted of a retrospective analysis of five years of fire department incident data from 2009 through 2013. Data was acquired from the department's records management system (RMS) and computer-aided dispatch (CAD) records from the communications center.

As with all other communities, the City of Bolton has potential risks. Such risks can be human-caused (e.g., preventable injuries, fires) or naturally occurring (e.g., frequently occurring severe weather; earthquakes, hurricanes). During this process, BFD identified and prioritized potential and likely risks, and subsequently prioritized them.

Demographic Profile

The City of Bolton has an estimated 2013 population of 93,257, with a land area comprising just over 27 square miles. There are an approximate 3,350 persons per square mile. Table 3-1 lists the percentage of age distribution, gender and racial/ethnicity composition of the city. More than 16% of residents are foreign born; the majority being from Latin America. The population has increased by 29.6% since 2000.

City of Bolton Population	Percent of Population
Persons under 5 years	8.6%
Persons under 18 years	28.3%
Persons 65 years & over	13.1%
Female persons	50.7%
Caucasian only	67.1%
Black or African American only	1.7%
American Indian & Alaska Native only	2.0%
Asian only	1.5%
Pacific Islander only	0.1%
Two or more races	4.4%
Hispanic or Latino	41.3%

Source: U.S. Census Bureau   Table 3-1

Figure 3-1 is a map depicting population distribution by location. It shows that the east side of the city is comprised predominately of Hispanic/Latino persons, while the west side consists mostly of Caucasians. Other races represent a very small percentage of the population.
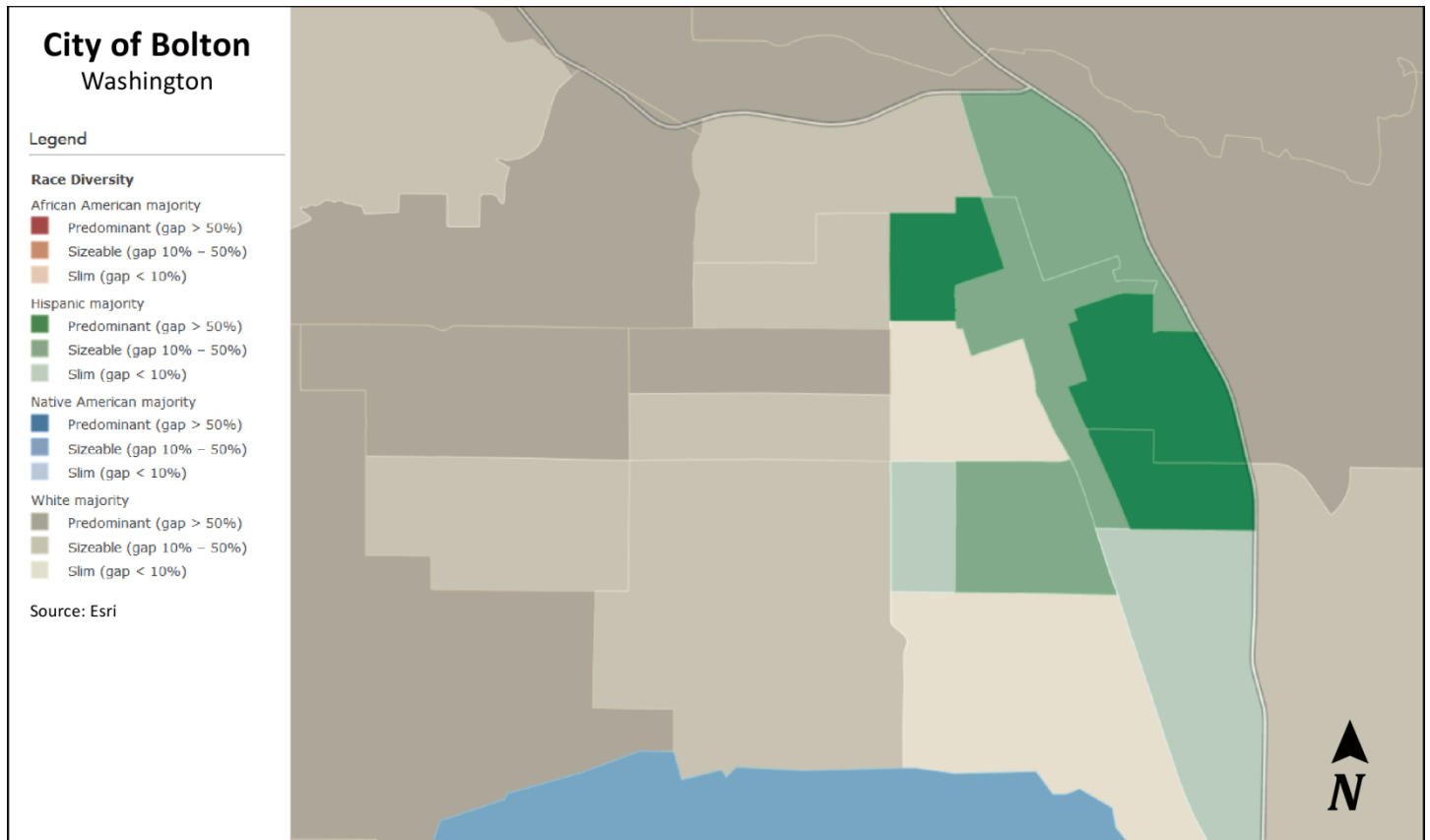

Figure 3-1

Social Characteristics

For all persons age 25 or greater, 74% have a high school education or greater, and 18% have a Bachelor's degree or higher. There are 33,226 households averaging 2.67 persons per household. The per-capita crime rate in Bolton for 2013 was 544/100,000 persons.

Economic Characteristics

Median household income during the period 2008–2012 was $40,569. Per capita income during 2013 was $20,516. Approximately 23% of the population is considered below the poverty level. Median gross rent per month is $760. Current unemployment rate is 14.4%.

The most common industries for males is *construction* at 10%, followed by *agriculture* (8%), *groceries* and *merchant wholesalers* (6%), *healthcare* (6%), and *accommodation* and *food services* (6%). For females, *health care* leads at 19%, followed by *educational services* (14%) and *accommodation* and *food services* (9%).

Housing Profile

There are 34,829 housing units, with a home ownership rate of 54.3%. Median value of owner-occupied homes is $157,200. Just over 30% of housing units are multi-unit structures.

Bolton Fire Department Resources & Service Areas

BFD operates five Type 1 engines and two identical 100-foot ladder trucks out of five strategically located fire stations (Stations 91–95) within the city. Each apparatus is fully staffed 24 hours per day, seven days per week. There is one engine located at each station, with one truck located at Station 91 and another at Station 93. The majority of locations within the city can be reached within 4 minutes of each fire station.
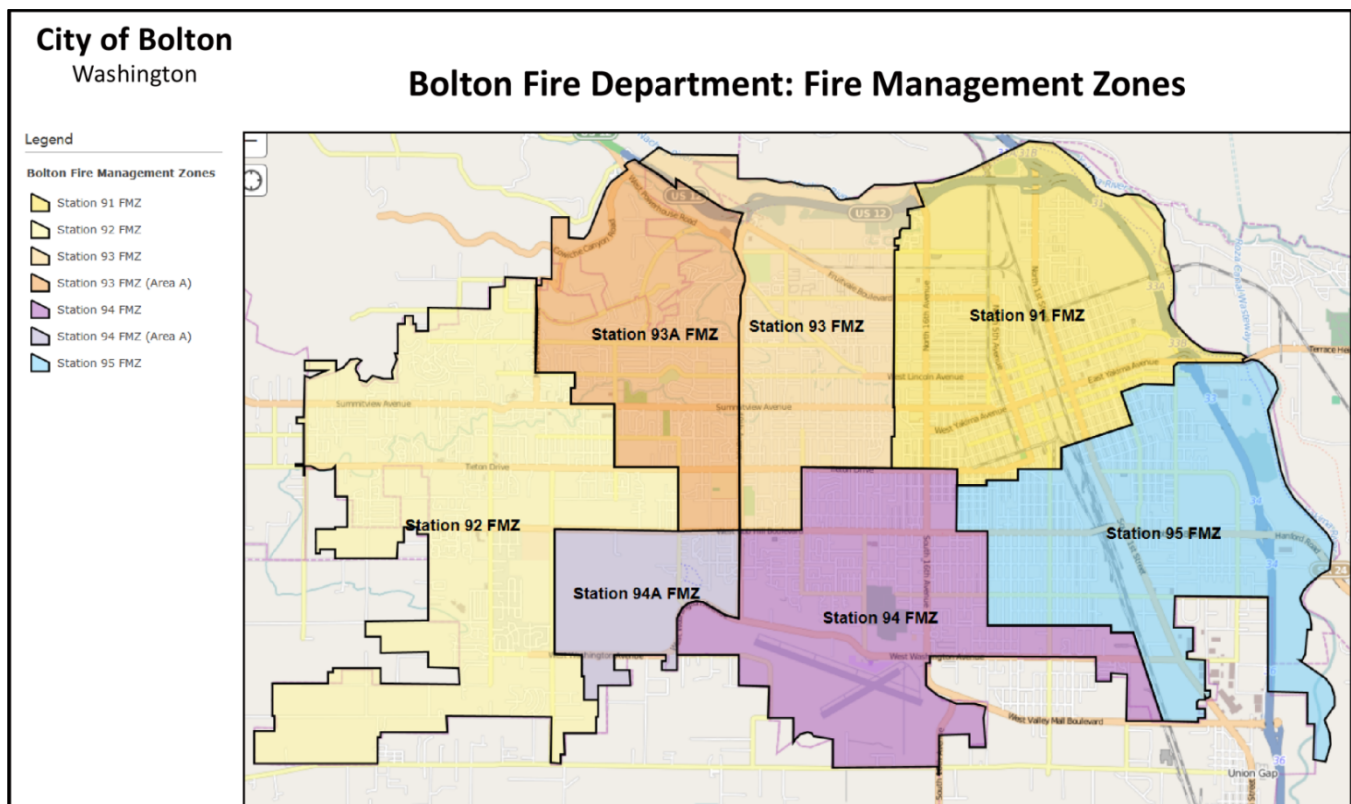

Figure 3-2

The five stations serve seven fire management zones (FMZ); with Stations 93 and 94 each having two FMZs. Each station's FMZ represents those geographical areas that are the closest—in terms of response times—to that particular station (see Figure 3-2).

Each apparatus is staffed with at least one certified EMT-Paramedic, and fully equipped with advanced life support (ALS) equipment and supplies. Each truck company carries extrication equipment and a hydraulic tool for heavy rescue.

BFD Service Demand

During the 60-month period of January 1, 2009 through December 31, 2013, the Bolton Fire Department was dispatched to a total of 45,931 incidents—or an average of 9,186 calls annually. Of these, 2,351 (5.12%) were recorded as "Dispatched and canceled en route." Excluding those calls in which no apparatus arrived, the total number of incidents evaluated was 43,580. However, this number does include multiple incidents recorded as false alarms and as "no incident found on arrival."

Incident Types

Call (incident) types were based on the *National Fire Incident Reporting System* (NFIRS) Version 5.0 standard definitions, as developed through the *U.S. Fire Administration, National Fire Data Center*. "Incident Type" is defined as the situation found by emergency personnel on arrival at the scene, and includes the full spectrum of fire department activities from fires to EMS to public service. NFIRS incident types are organized into nine series. Within each of these are additional codes that define the incident more specifically. The primary incident-types are listed in Table 3-2, with the total volume of each for 2009–20013:

NFIRS Incident Type Series Code/Title	Total BFD Incidents
100—Fires	**1,982** (4%)
200—Overpressure Rupture, Explosion, Overheat (No Fire)	**42** (<1%)
300—Rescue & Emergency Medical Service (EMS) Incidents	**34,012** (74%)
400—Hazardous Condition (No Fire)	**699** (2%)
500—Service Call	**2,403** (5%)
600—Good Intent Call	**3,994** (9%)
700—False Alarm and False Call	**2,722** (6%)
800—Severe Weather and Natural Disaster	**13** (<1%)
900—Special Incident Type	**64** (<1%)

Note: Includes *all* calls dispatched, including cancelled en route.   Table 3-2

CRR
COMMUNITY RISK REDUCTION

Figure 3-3 depicts annual incident volumes by type and year. Incident types were placed in three categories: fires, EMS, and others. The data show that overall demand for service has declined by 14.7% since 2009. Much of this can be attributed to a change in the EMS dispatch protocol. Beginning in 2013, BFD was no longer dispatched to certain requests for "emergency" medical care in which it was unnecessary for a fire department response. Incidents of fires and other calls have remained relatively steady over the last 60 months.

Bolton Fire Department
INCIDENT VOLUMES BY TYPE & YEAR
2009–2013
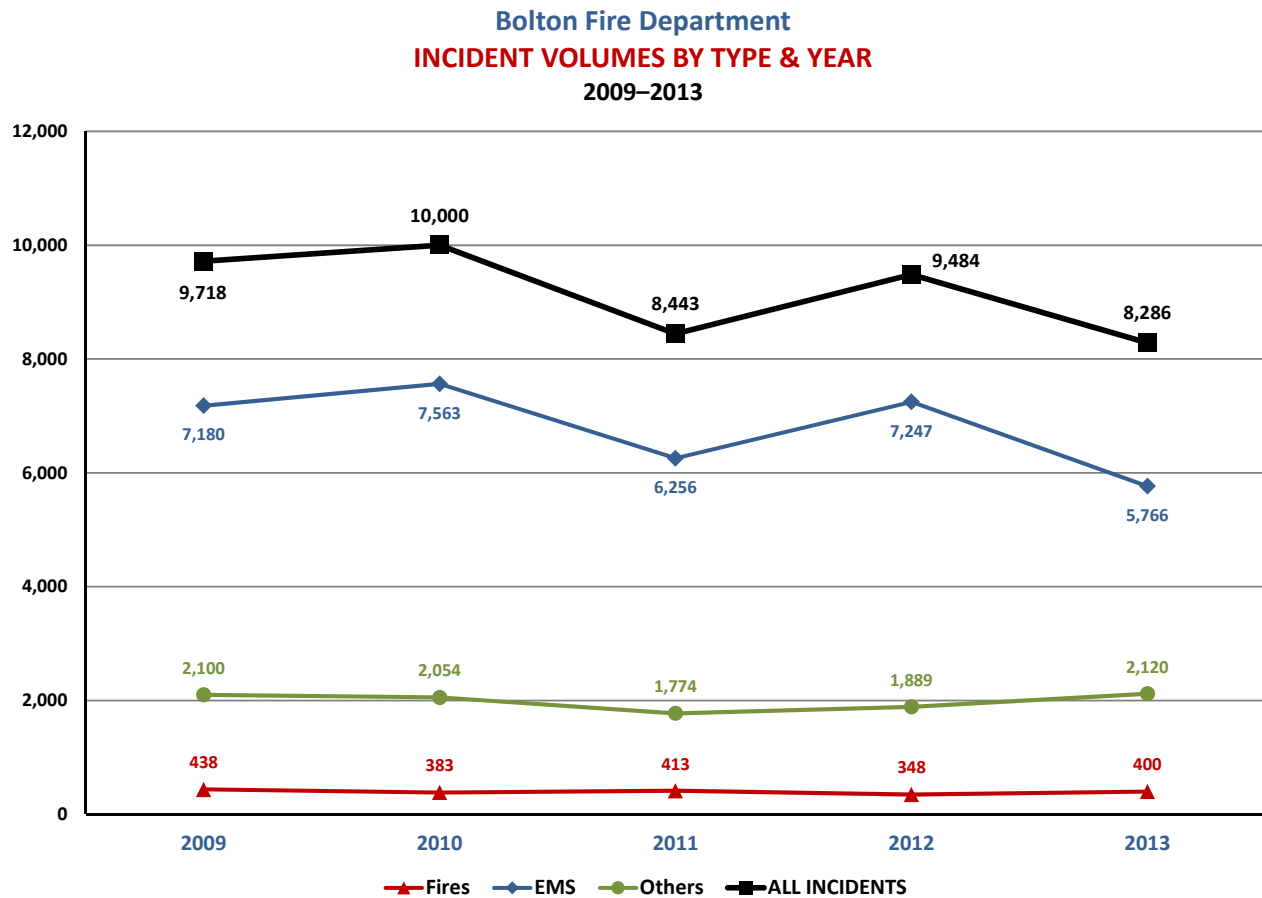
Figure 3-3

Additional analysis of BFD's incidents showed no significant statistical differences in call volumes when considering day-of-week or month-of-year. The conclusion drawn is that the department's call volume by incident type remains consistent throughout the year. The frequency of incidents, by hour-of-the-day, is analyzed for the purpose of predictability. The busiest periods for BFD is between the hours of 0800 (8:00 am) and 2000 (8:00 pm) daily. These times are consistent among all incident types.

Fire Incidents

An analysis of fire incidents categorized within the NFIRS 100 series was conducted to determine a more detailed insight. Table 3-3 lists the top five most frequent fire-related incidents, by year, during 2009–2013. As shown, building fires, cooking fires, and passenger vehicle fires were the three most common.

Five Most Frequent Fire-Related Incidents by Year

NFIRS Incident Type	2009	2010	2011	2012	2013	TOTALS
111–Building fires	132	126	103	89	104	**554**
113–Cooking fires (no extension)	71	64	58	35	46	**274**
142–Brush or brush-and-grass mixture fires	27	28	36	37	45	**173**
131–Passenger vehicle fires	22	30	68	26	25	**171**
100–Fires, other	9	7	49	36	32	**133**
Annual Totals:	**261**	**255**	**314**	**223**	**252**	**1,305**

Table 3-3

Nearly 70% of building fires occurred in 1- or 2-family dwellings or multifamily dwellings. About 60% of these originated in the kitchen area and extended to other rooms. The other 30% of building fires occurred in a wide variety of property types.
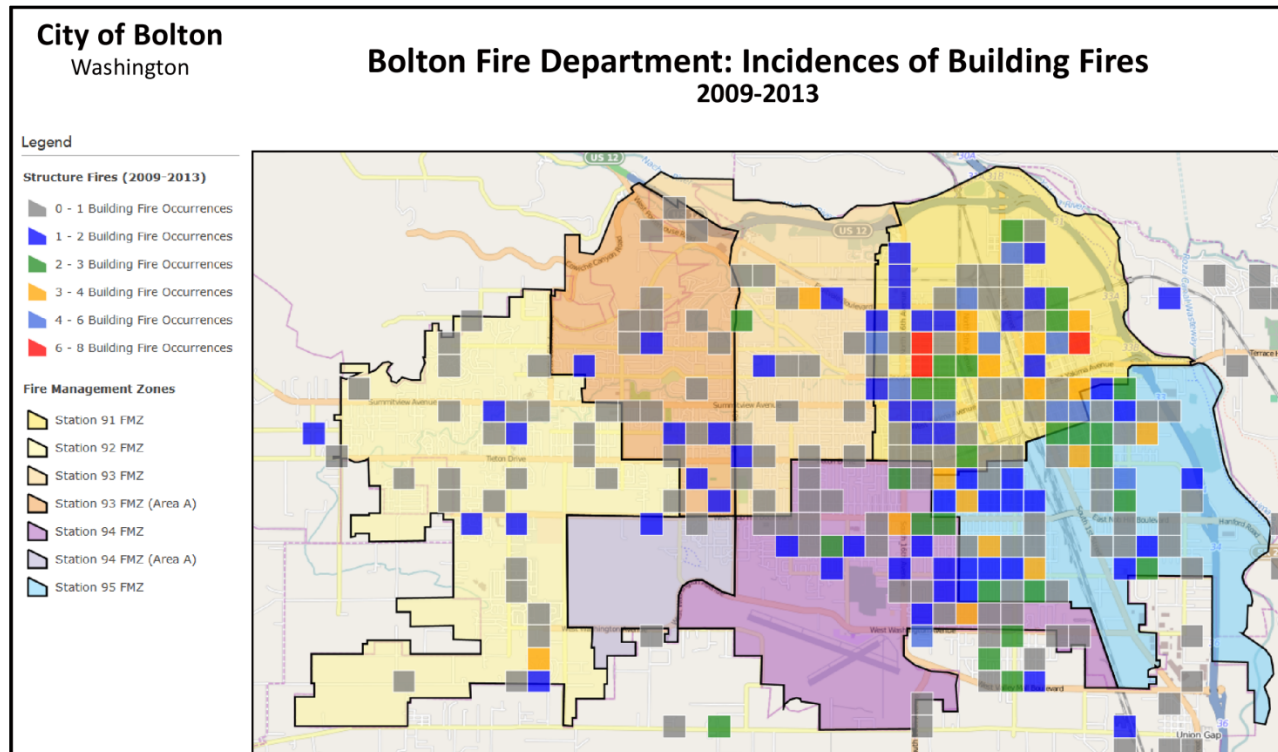

Figure 3-4

As shown in Figure 3-4, the majority of building fires occurred in the northeastern portion of the city, within Fire Management Zone 91.

Cooking fires without extension (NFIRS 113) represented the second most frequent types of fires. When combined with building fires originating in the kitchen, cooking-related fires represent the most significant types of fires within the City of Bolton. Figure 3-5 illustrates that the majority of these occur within the eastern and northeastern portions of the city, primarily in households with a median income of less than $24,000 annually or between $24,000 and $39,000 annually.
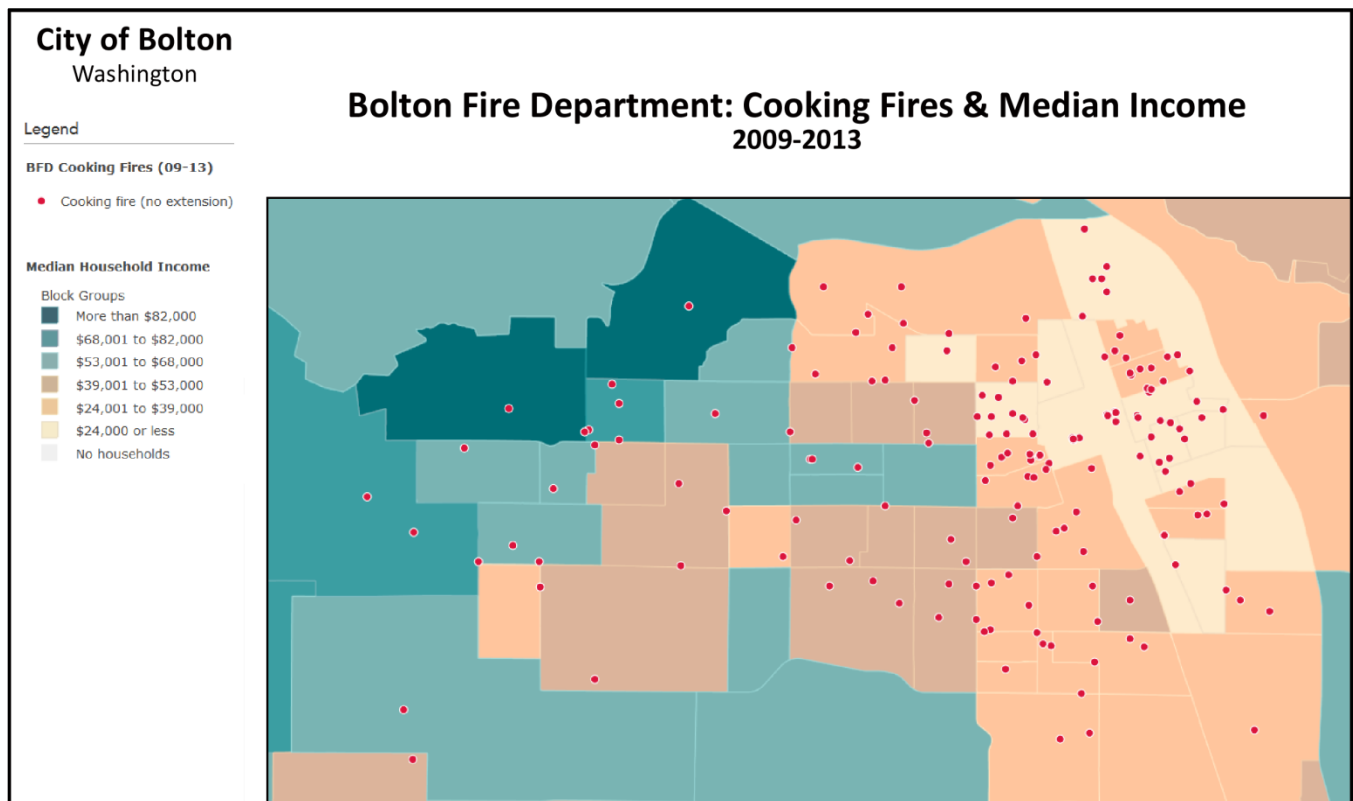
Figure 3-5

Further GIS analysis showed that the majority of cooking fires (without extension) occurred predominately in Hispanic, Spanish-speaking residences among median ages of 27.1–35 years and 27 years or younger. These results are consistent with building fires originating in the kitchen.

In approximately 55% of cooking fires without extension, and building fires originating in the kitchen, that a smoke alarm was either not functioning, did not alert the occupants, or none were installed in the residence.

The frequency of brush fires (NFIRS 142) and passenger vehicle fires (NFIRS 131) over the previous five years are approximately the same, and represent the third and fourth highest number of incidents. However, when combining the number of brush fires with other incidents categorized as wildland-types (grass fires; forest, woods, or wildland fires; grass fires; natural vegetation fires), the incident-count increases to substantially. Thus, wildland-type fires were the second most frequent fire-related incidents.

Of all the combined wildland-type fires, the majority (26%) occur around 1- or 2-family dwellings; 20% in open lands or fields; and 15% in vacant lots within residential neighborhoods. Figure 3-6 illustrates the density of wildland-type fires by location. The map shows that most occur in the eastern and northeastern portions of the city, in the residential neighborhoods of FMZ 91 and 95, followed by FMZ 93.
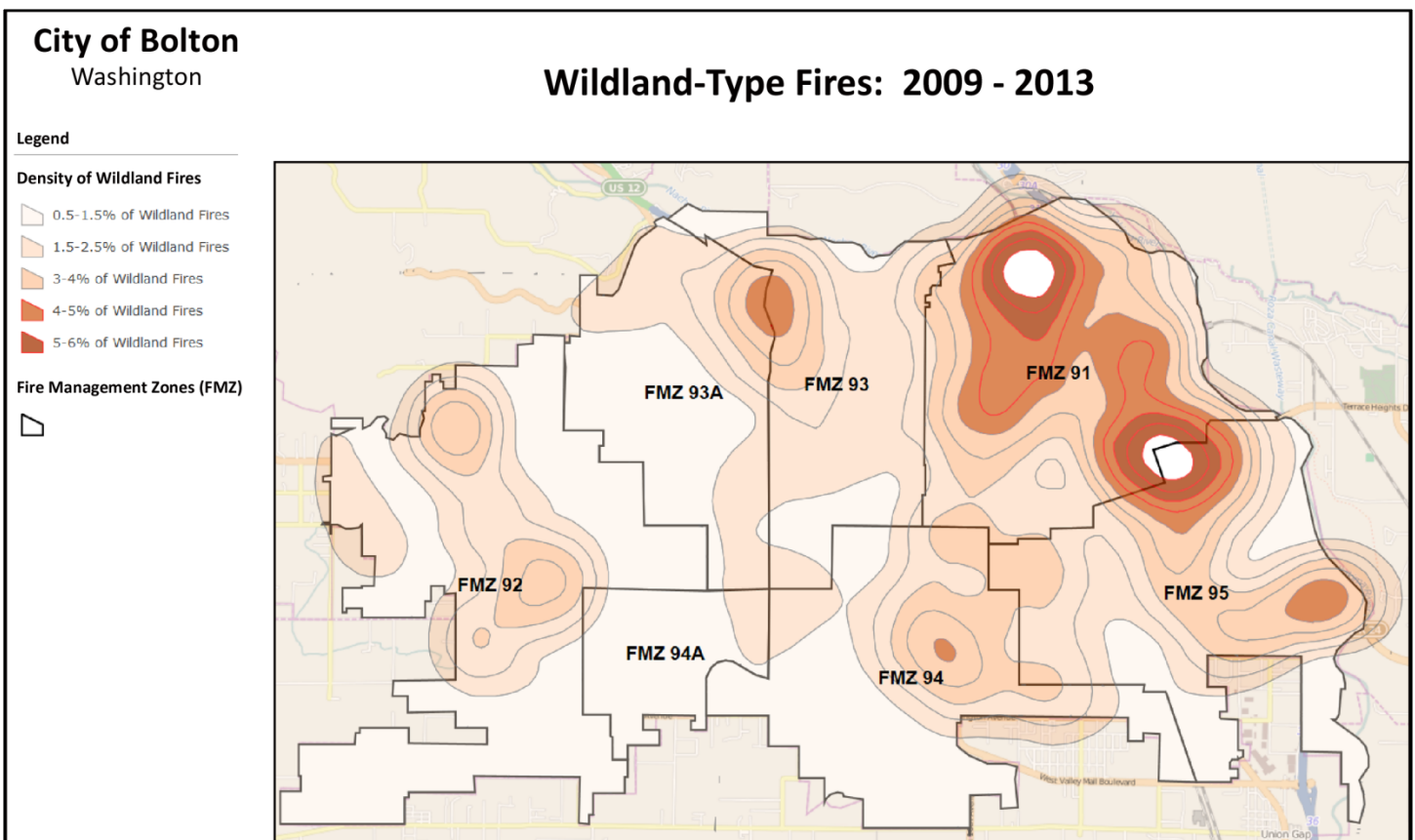

Figure 3-6

EMS Incidents

Incident records indicated that during 2009–2013, there were a total of 41,706 patient encounters (consisting of 34,012 separate incidents); resulting in an annual average of 8,341. Patient gender consisted of 54% males, and 46% females.

Ages ranged from less than 1 to 105 years, with an average of 54 (mean 55). Female patients averaged 56 years, and males 52. Individuals aged 16 or younger, comprised 7.4% of the patients.

The NFIRS categories give a very broad description of most EMS incidents, but are inadequate in describing more specific details of illnesses and injuries. For example, the majority of EMS incidents were categorized as *321–EMS call (includes patient refusals)*. In order to get a more complete perspective of EMS, it was necessary to examine patient records greater detail. This was done by evaluating the primary impressions and causes of each case.

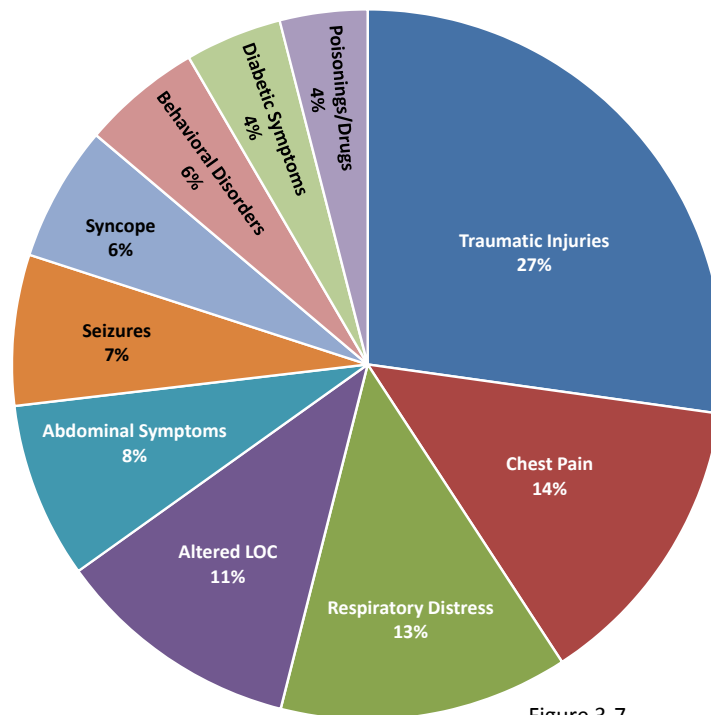**EMS Incidents: Top Ten Most Frequent Primary Impressions
2009–2013**

Figure 3-7

Figure 3-7 shows that the most frequent primary impression involved traumatic injuries (27%); followed by chest pain (13%), altered level of consciousness (11%), and abdominal symptoms (8%). The data showed that 28% of traumatic injuries were a result of a fall. Of these, the majority were ground-level falls involving female patients 62 years of age or older.

Percent of Injuries from Falls by Age Group & Gender
2009–2013

Age Range	Females*	Males*
0–17 years	6%	6%
18–28 years	4%	5%
29–39 years	1%	8%
40–50 years	7%	12%
51–61 years	7%	4%
62–72 years	**13%**	6%
73–96 years	**16%**	5%

*Percent of all documented falls (percentages rounded)   Table 3-4

Non-traumatic cardiopulmonary arrest cases represented a relatively small number of EMS incidents. Most occurred at home, and approximately 25% presented with an initial rhythm of ventricular fibrillation. About 20% of all arrests occurred in public locations. However, there were no cases in which an automated external defibrillator was available or deployed.

Other Incidents

After excluding fires (NFIRS 100) and EMS (NFIRS 300), the remaining types were place in the "Other Incidents" category. Table 3-5 lists these in order of quantity.

Other Incident Types	Total BFD Incidents
600—Good Intent Call	3,994
700—False Alarm and False Call	2,722
500—Service Call	2,403
400—Hazardous Condition (No Fire)	699
900—Special Incident Type	64
200—Overpressure Rupture, Explosion, Overheat (No Fire)	42
800—Severe Weather and Natural Disaster	13

Table 3-5

CRR
COMMUNITY RISK REDUCTION

The top three *other incidents* (NFIRS 600, 700, 500) represented 20% of *all* incident types in which BFD was dispatched over the last five years. Within each of the NFIRS categories are subcategories that provide a more specific description of the incident.

The most common types within the *NFIRS 600–Good Intent Call* category were:

- 611–Calls Dispatched & canceled en route (53%)
- 622–No incident found on arrival at dispatch address (20%)
- 651–Smoke scare, odor of smoke, not steam (15%)

Within the *NFIRS 700–False Alarm & False Call* category, 745–Alarm system activation (no fire), unintentional represented the most common. False alarms occurred most frequently in single- and multi-family residences (35%), followed by public schools (9%), and hotels/motels (6%).
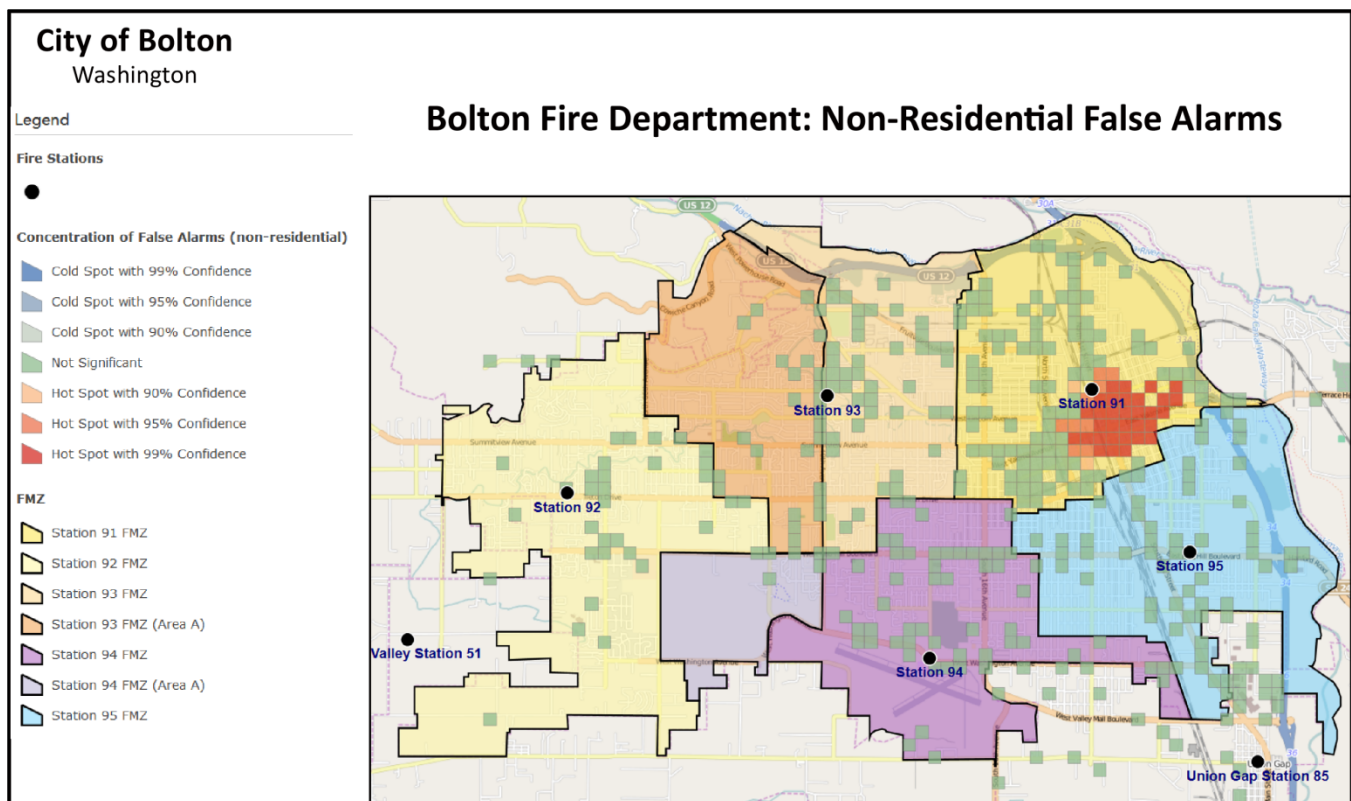

Figure 3-8

Figure 3-8 is a map illustrating the concentration of non-residential (primarily commercial) false alarms within the city. The majority of these occurred within FMZ 91, and in the downtown area.

Within the *NFIRS 500–Service Call* category, the most common types were:

- 554–Assist invalid was the most frequent (36%)
- 510–Person in distress, other (33%)
- 551–Assist police or other governmental agency (7%)

A substantial percentage of the "assist invalid" incidents occurred in nursing homes and retirement facilities that provide 24-hour care and/or assistance.

Target Hazard Analysis

BFD's Office of the Fire Marshal is currently conducting a citywide inspection program of all occupancies. This process will include assigning an *Occupancy Vulnerability Assessment Profile* (OVAP) score for all occupancies within the city. Data from this will enable a comprehensive GIS-based analysis and identification of the various target hazards located in Bolton.
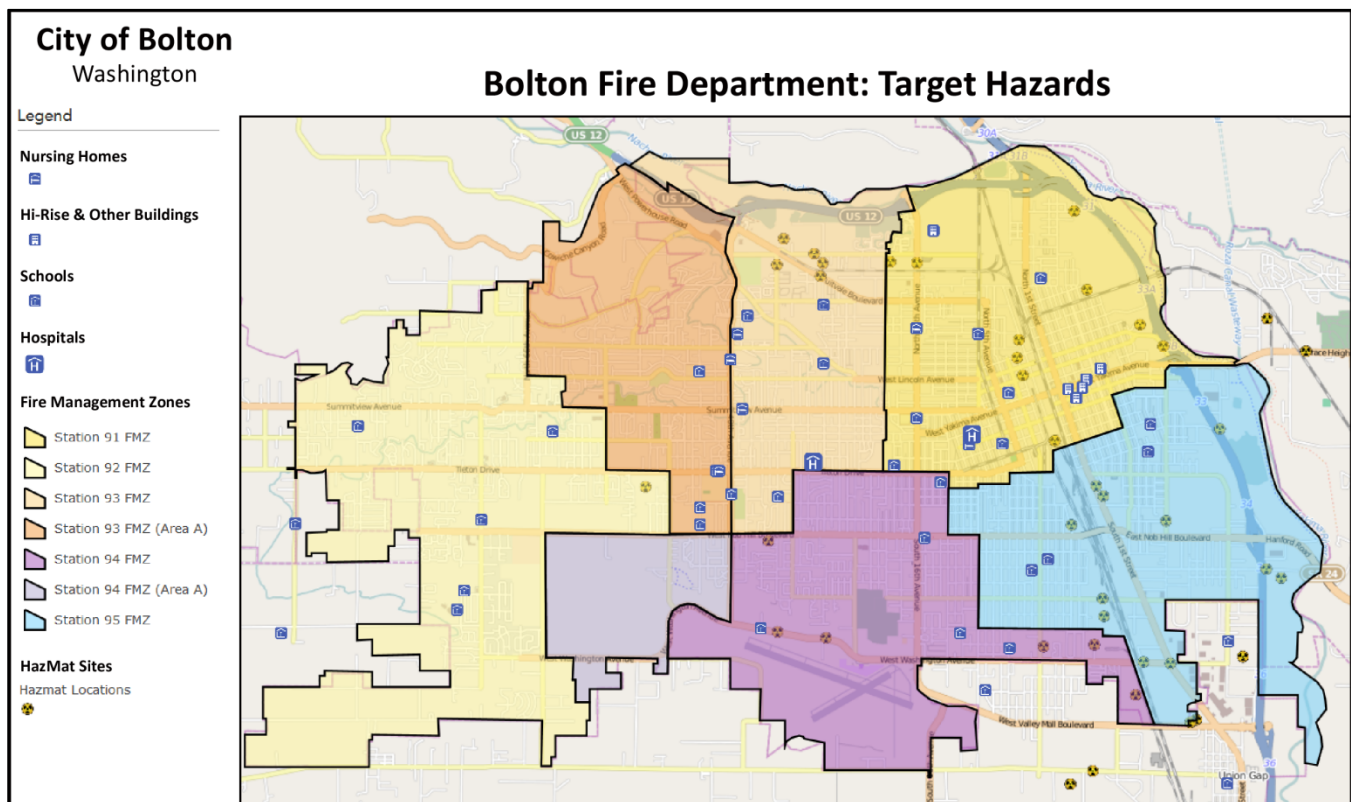

Figure 3-9

In the meantime, other major target hazards have been identified, as depicted in Figure 3-9. These include nursing homes, high-rise and other buildings (consisting of three floors or greater), all public schools, both hospitals, and locations of hazardous materials sites. This information will assist in determining where best to locate fire suppression and other specialty resources for each FMZ.

Community Risk Priorities

Based on the assessment of incident and demographic data from the City of Bolton, the top three priorities for community risk have been identified. These are potential risks that can ultimately be mitigated through various strategies; which will be addressed through a comprehensive community risk reduction plan.

Priority 1: Cooking Fires

There has been a steady increase in cooking fires over the last five years. Some confined to the kitchen area, and others originating in the kitchen and extending into other rooms; eventually resulting in building fires. A significant number of these fires occur in homes with predominantly Spanish-speaking residents under the age of 35 years. Most of the residents had none or non-working smoke alarms, and the inability (absence of a fire extinguisher or other means) or unfamiliarity with procedures for properly suppressing cooking-related fires. During the CRR planning process, it will be necessary to consider a plan that targets specific neighborhoods with both educational materials (in both Spanish and English) and a program of home visits. This should include installation of smoke alarms and proper methods of extinguishing cooking-related fires.

Priority 2: Ground-Level Falls

EMS-incident data showed that the majority of ground-level falls occurred among females aged 62 years and older. The types of injuries were usually hip and lower-extremity fractures. While such injuries can be significant in younger persons, they are often much more devastating in the elderly. They frequently result in long-term functional impairment, nursing home admission and increased mortality.

Ground-level falls are preventable in many cases by make homes safer by reducing tripping hazards; improved lighting ; and adding grab rails in bathrooms. In addition, regular exercise to improve strength and balance; annual eye exams; taking calcium and Vitamin D supplements; and ensuring that any medicines they are taking do not have side effects such as dizziness or drowsiness can all help to reduce the potential for falls.

Priority 3: Wildland-Type Fires in Residential Areas

When taking into account all wildland-type incidents, they represent the second most common fire-related incidents—the majority occurring at or around residential areas. The frequency of these fires has increased by 255% over the previous five years, and will continue to rise as the city expands its boundaries to the east and west. Wind-driven embers, not flames from the wildfire, tend to be the biggest threat to residential properties during wildfires.

There are a number of options that can help homeowners to prevent and minimize wildland fires from progressing into residential structure fires. Creating a defensible space around the home by modifying, reducing, or clearing potential wildfire fuel materials or vegetation to create a barrier can slow the spread of wildfire. A good defensible space also allows room for firefighters to fight fires more safely.

The use of fire-resistant building materials (particularly fire-resistant roofing); reducing flammable materials or fuels outside the home; and landscaping with fire-resistant plants are other preventative measures.

Conclusion

Utilizing the results of this risk assessment, the Bolton Fire Department will begin the next steps in the Community Risk Reduction planning process. This will start with the development of strategies and tactics to mitigate risks, followed by the preparation and implementation of a CRR plan. After implementation, the department will monitor, evaluate and modify the plan as necessary.

(Note: The maps used in the previous risk assessment example represent an actual geographic locality within Washington State; including fire station locations. However, this is intended for illustrative purposes only, and does not represent authentic incidents or data-analysis results from that particular community.)

References

1. United States Census Bureau: www.census.gov

2. American FactFinder: http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

3. American Housing Survey: http://www.census.gov/programs-surveys/ahs/

4. American Community Survey: http://www.census.gov/acs/www/

5. Oliver, D. (2011, November). *FireRescue Magazine,* 42–47

6. Esri: http://www.esri.com

7. Vision 20/20: http://www.strategicfire.org

APPENDICES

Appendix A: Building the Community Profile

CATEGORY	DESCRIPTION	QUESTIONS TO ANSWER

Demographical (people-related information	Population, distribution, age, ethnicity & cultures	• Total community population?
		
		• Population of each census tract?
		
		• Which census tracts have the greatest concentration of high-risk populations:
		  ▪ Children under 5 years?
		  ▪ Older adults?
		  ▪ People in poverty?
		  ▪ People with disabilities?
		  ▪ People who speak little or no English?

Social Characteristics	Education levels & family profiles	• What are the demographics of education levels throughout your community?
		
		• What census tracts include the greatest populations of the following:
		  ▪ Single-parent homes?
		  ▪ Two-parent homes?
		  ▪ People living alone?
		  ▪ Older adults living alone?

Economic Characteristics	Employment profile & rates; income levels	• What is the employment profile?
		  ▪ Types of jobs?
		  ▪ Work in community or commute?
		  ▪ Major *local* employers?
		  ▪ Unemployment rate?
		  ▪ Income-level ranges?

Housing Profile	Age of homes & occupants; types of residential occupancies; home ownership vs. rental properties; transience among residents	• What is the overall housing profile of your community?
		  ▪ Average age of homes?
		  ▪ New (or recent) construction?
		  ▪ Homes with automatic detection and suppression equipment?
		  ▪ Types of residential construction?
		  ▪ Types of residential properties (single, family, duplex, multi-unit)?
		  ▪ Renter vs. owner occupied?
		  ▪ Transience (how often do people re-locate)?

Growth Trends	Past & future population growth trends (consider using the U.S. Census Bureau website to obtain this information)	• How has the population changed in the previous 20 years? • What will the profile look like in 10 years?

Source: Leadership Strategies for Community Risk Reduction–VIP Pre-Course Materials; FEMA, National Fire Academy

Appendix B: List of Risk Assessment Resources

Training Programs

Community Risk Issues & Prevention Interventions (W0347)
U.S. Fire Administration (apps.usfa.fema.gov/nfacourses/catalog/details/146)

This 2-day course is designed for students who work in the field of prevention. Students learn a basic overview of the "three E's" of prevention--education, engineering, and enforcement. The course concludes that the most effective way to combat community risk issues is to develop strategies that use all "three E's." Course content includes evaluation of the types and levels of community prevention; how injuries, fires, and burns can be prevented; strategies and countermeasures to help people understand the injury, fire, or burn event and reduce the loss; and* prevention approaches—behavior changes, legislation, and enforcement and engineering.

Executive Analysis of Community Risk Reduction (R0274)
U.S. Fire Administration (apps.usfa.fema.gov/nfacourses/catalog/details/707)

This 10-day course is the second course in the Executive Fire Officer Program (EFOP). The course is a mixture of philosophy and application--the value of the community risk reduction and the process of applying risk reduction to the community. It involves developing partnerships with the community to implement programs, initiatives, and services that prevent and/or mitigate the risk of human caused or natural disasters. Traditional fire prevention programs are addressed.

Leadership Strategies for Community Risk Reduction (R0833)
U.S. Fire Administration (apps.usfa.fema.gov/nfacourses/catalog/details/10441)

This 6-day course is designed to enhance knowledge and skills necessary to lead, manage and apply fire prevention strategies and community risk reduction initiatives at the local level. This course will give students tools and techniques to raise the level of importance for prevention within their organization. The course will demonstrate how fire prevention and other risk reduction initiatives can benefit them directly and individually.

Cultural Competence in Risk Reduction (R0394)
U.S. Fire Administration (apps.usfa.fema.gov/nfacourses/catalog/details/10493)

This new six-day NFA course seeks to improve cultural and linguistic determinants within the application of risk reduction strategies. This course aims to connect fire/EMS prevention personnel with diverse and cultural groups with the community(s) they serve, specifically to increase the reach and effectiveness of fire/life safety prevention services and programs. CCIRR is designed for a variety of prevention specialists such as public fire and life safety educators, inspectors, juvenile fire setter intervention specialists, fire marshals and code enforcers.

Conducting Local Risk Reduction by Company Officers (R0186)
U.S. Fire Administration (apps.usfa.fema.gov/nfacourses/catalog/details/10503)

This new 6-day NFA course seeks to improve the skills of Company Officers (COs) to lead and conduct risk-reduction activities within the service area of their station/community. The course is both for the CO who is currently engaged in risk-reduction activities and the CO who desires to lay the foundation to start community risk reduction.

Advanced Technology for Community Risk/Standards of Cover
Center for Public Safety Excellence (CPSE) (www.publicsafetyexcellence.org/development-training/workshops.aspx)

Designed for accreditation managers and their GIS specialists, this one-day seminar (or five-week webinar) focuses on using GIS and related tools to conduct the analysis required to complete the CFAI Community Risk and Standards of Cover (SOC) process. The workshop covers the data necessary to use GIS and Excel software and produce the exhibits necessary for a defendable Community Risk/SOC study.

Publications & Other Documents

RHAVE and Community Risk Assessment for Volunteer Fire Departments
Ronny J. Coleman, Senior Fire Protection Consultant
A short paper discussing the Risk, Hazard, and Value Evaluation (RHAVE) tools.

Guide for the Evaluation of Fire Risk Assessments, 2013 Edition (NFPA 551)
National Fire Protection Association (NFPA) (nfpa.org)
This document identifies various types of fire risk assessment methods and describes the properties these methods should possess.

Funding Alternatives for Emergency Medical and Fire Services (FA-331/April 2012)
*U.S. Fire Administration/FEMA (*www.usfa.fema.gov/downloads/pdf/publications/fa_331.pdf)
The purpose of this manual is to identify the various grants and innovative funding alternatives available for emergency medical services (EMS) and fire protection services. Where appropriate, a discussion of the pros and cons of a particular funding source are discussed. In some instances, examples are given to illustrate how alternative funding is being successfully implemented in EMS agencies and fire departments across the country.

Addressing Community Wildfire Risk: A Review and Assessment of Regulatory and Planning Tools
The Fire Protection Research Foundation and National Fire Protection Association (NFPA)
(www.nfpa.org/~/media/files/research/research%20foundation/rfwuiregulatoryassessment.ashx)
A study that was conducted to review and assess the effectiveness of regulatory planning tools designed to address community wildfire risk, and to communicate lessons learned to communities considering such regulation. The project deliverables define the WUI regulatory landscape through the identification of regulatory tools, categorization of these tools, and their evaluation to clarify their effectiveness.

Managing Fire & Rescue Services
ICMA (bookstore.icma.org/PreviewPacks/pp42813.pdf)
Includes a chapter on community risk assessment and management.

Firewise Toolkit
National Fire Protection Association
(www.firewise.org/~/media/Firewise/Files/Pdfs/Toolkit/FirewiseToolkit.pdf)
Contains various information and tools concerning the NFPA's Firewise program.

Roles & Responsibilities of the Chief, Municipal Officials, & Citizens in Today's Protection Environment
National Fire Protection Association (NFPA)
(www.riskinstitute.org/peri/images/file/RolesandResponsibilitiesPERISymposiumPaper.pdf)
A short paper discussing the roles and responsibilities of public officials in community risk analysis.

Risk Assessment Worksheet: A Tool for Company Officers & Fire Prevention Inspectors
John Kobarda, London Fire Services, Ontario, Canada
A research paper developed to provide a risk assessment worksheet for the fire service.

Fire Risk Assessment Form
Fire Risk Assessment.com
Simple form for documenting potential fire risks.

Basics of Risk Assessment
U.S. Fire Administration
A one-page "coffee break" document discussing the basics of risk assessment.

Risk Assessment for CRR Effort
Mike Senchyna
A synopsis of methods promoted in the NFA's "Conducting Local Risk Reduction by Company Officers."

Internet Resources

U.S. Fire Administration/FEMA, Fire Prevention & Public Education:
www.usfa.fema.gov/fireservice/prevention_education/
Contains a wide variety of information and resources on community risk assessment.

Center for Public Safety Excellence: www.publicsafetyexcellence.org
Provides a community risk and standards of cover course. As part of the accreditation process, outlines standards for community risk analysis.

National Fire Protection Association (NFPA): www.nfpa.org
Website has a number of publications for download on risk assessment; particularly on wildfires, and other publications that must be purchased.
NFPA Firewise Communities: www.firewise.org

The Firewise Communities Program was developed in 1986 in response to the realization that the problem of home destruction from brush, grass and forest fires was one of national scope. The program teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses.

Fire Risk Assessment, Fire Risk Assessment Guide: www.fire-riskassessment.com/fire-risk-assessment.html
A website that lists a step-by-step guide to doing a risk assessment, along with other resources. It aims to provide business owners and managers with online information and advice on a range of workplace safety issues that affect all business premises. This site does not sell any product or service, so the information provided will be unbiased as well as free. The information is provided as a free resource, not from the viewpoint of the fire authority.

Public Risk Management Association (PRIMA): www.primacentral.org
The website of an association dedicated to promote effective risk management in the public interest as an essential component of public administration.

International City/County Management Association (ICMA): icma.org
Provides a list of assorted fire service documents and resources.

Centers for Disease Control & Prevention (CDC), Injury & Violence Prevention:
www.cdc.gov/injury/index.html
Has a wide variety of information and statistics concerning traumatic injuries and violence. Also includes information on burn injuries and fire deaths. Other web pages include substantial information on heart disease, stroke and other diseases. It contains the WISQARSTM (Web-based Injury Statistics Query and Reporting System); an interactive database system that provides customized reports of injury-related data.

National Weather Service: www.weather.gov
Includes a weather safety web page, along with weather-related statistics concerning various weather fatalities and injuries.

Federal Emergency Management Agency (FEMA): www.fema.gov
Contains a wide variety of information on disaster planning and other disaster-related issues.

U.S. Energy Information Administration: www.eia.gov
Information, statistics and publications on commercial buildings; including building energy consumption.

Mesonet: www.mesonet.org
Real-time weather reporting for Oklahoma only. Has a specific page for public safety officials.

National EMS Information System (NEMSIS): www.nemsis.org
The NEMSIS Project is an effort to create a National EMS Database. The database will contain data from local and state agencies from across the nation.

National Center for Education Statistics, Common Core of Data (CCD): nces.ed.gov/ccd
A program of the U.S. Department of Education that annually collects fiscal and non-fiscal data about all public schools, public school districts and state education agencies in the United States.

United States Census Bureau: www.census.gov
Demographic data available for specific cities, towns and communities. Numerous other data on business, economics and housing.

Intterra: http://www.intterragroup.com
Company has multiple resources that can help with risk assessment; especially concerning wildfire issues.

Other Census Bureau web pages
American Housing Survey: www.census.gov/housing/ahs/
American Community Survey: www.census.gov/acs/www/
American Fact Finder: factfinder2.census.gov/faces/nav/jsf/pages/

Computer Software & Applications

Geographic Information System (GIS) for Public Safety
Esri (http://www.esri.com/industries/public-safety/fire-rescue-ems)
The company provides a number of tools and applications that could be potentially useful in planning and community risk analysis.

Target Hazard Analysis
Esri (http://solutions.arcgis.com/local-government/help/target-hazard-analysis/)
Used to identify and quantify properties that should be targeted for pre-incident planning to mitigate such a loss. Requires ArcGIS for Desktop (Standard or Advanced).

Lifestyles-Esri Tapestry Segmentation
Esri (www.esri.com/data/esri_data/tapestry)

VISION Risk Assessment
Emergency Reporting (www.emergencyreporting.com/products/vision.html)
Enables fire and emergency service agencies to analyze and categorize community risks and hazards. There are three different versions with various features.

Firehouse Analytics
Firehouse Software, Inc. (www.firehousesoftware.com/products/fh-analytics.php)
A multi-directional data analysis tool to evaluate the data collected from all modules of Firehouse (FH) Software. Must have FH software to utilize this module.

ImageTrend Fire Department Management System
ImageTrend, Inc. (www.imagetrend.com/products/eds/fire-bridge)
Fire service software that has add-on modules with an advanced visual analysis and reporting system, and a mapping and reporting system. Requires the basic system to utilize the add-on modules.

StatsFD
Animated Data, Inc. (www.statsfd.com)
Formerly *NFIRS 5 Alive*, the software utilizes existing raw NFIRS data to generate a variety of reports and analyses of community risks (based on occupancy and operational data) and operational performance. Generates heat maps and 3D geographic models.

FireView™ Dashboard
The Omega Group (www.theomegagroup.com/fire/omega_dashboard_fire.html)
Allows users to analyze data by providing a snapshot of recent events displayed in the form of maps, charts and reports. It is a browser-based solution that can be customized to meet the needs of each user.