



City of Lethbridge



FIRE DEPARTMENT MASTER PLAN

Final Report

February 2017

Prepared by:



Our Project: 13-7514

EXECUTIVE SUMMARY

The City of Lethbridge (City) initiated the development of this Fire Department Master Plan (FDMP) to assist Council in identifying further programs and activities that focus on fire prevention, injury reduction and providing a safer community through an integrated strategy of community risk reduction. This FDMP assesses existing service level targets and identifies recommendations for additional performance benchmarks in response to stakeholder needs. This FDMP focuses on a ten-year horizon within the framework of the current 20 year planning horizon of the City.

The City of Lethbridge Fire and Emergency Services (LFES) reflects a fully-integrated fire services and emergency medical services (EMS) operating model, providing fire suppression, public education and prevention, and emergency medical response to a growing community. The success of the current LFES operating model was acknowledged in 2012 by receiving accreditation for the delivery of emergency medical services. The EMS accreditation process provided a strategic planning framework for Council, the LFES and the community for the delivery of emergency medical services.

The focus of this FDMP is a planning process to assist Council and staff in developing a similar strategic planning framework for the delivery of fire protection services while sustaining the fully integrated Fire/EMS operating model.

The LFES current integrated operating model has served the community well in providing cost-effective and efficient services. In addition to community growth, increasing demands for emergency medical services are currently challenging the sustainability of this model. The analyses within this FDMP indicate that these demands will continue to increase as the community further expands geographically and the demographic profile ages.

The development of this FDMP has included consideration of Council's ongoing commitment to fiscal management and community planning. This includes integrating this plan with the City's Corporate Strategic Plan (2011 to 2017) including the corporate pillars of: **trust and integrity; customer focused; solutions oriented; financial accountability; environmental responsibility; and supportive and caring.**

Other supporting documents include the Integrated Community Sustainability Plan/Municipal Development Plan (ICSP/MDP) 2010, Integrated Growth Management Strategy (IGMS) (October 2013), and the 2012 Transportation Master Plan (TMP), which establishes a long-term transportation planning framework to support the land uses and development patterns anticipated through the ICSP/MDP.

Current industry standards and best practices have been referenced to complete the analyses of the current service delivery model. Priority has been given to proactive strategies that will seek to reduce the occurrence of fires and the delivery of a comprehensive community fire protection and emergency medical response plan that emphasis the use of education and prevention. This includes the transition to an operating model that optimizes the use of three lines of defence including:

I. Public Education and Prevention:

Educating residents of the community on means for them to fulfill their responsibilities for their own fire safety is a proven method of reducing the incidence of fire. Only by educating residents can fires be prevented and can those affected by fires respond properly to save lives, reduce injury and reduce the impact of fires; and

II. Fire Safety Standards and Code Enforcement:

Ensuring that buildings have the required fire protection systems, safety features, including fire safety plans, and that these systems are maintained so that the severity of fires may be minimized.

III. Emergency Response (Fire Suppression):

Providing well trained and equipped firefighters directed by capable officers to stop the spread of fires once they occur and to assist in protecting the lives and safety of residents. This is the failsafe for those times when fires occur despite prevention efforts.

The analysis within this report utilizes the major occupancy classifications of the Alberta Building Code (ABC) and Alberta Fire Code 2006 (AFC) to define the fire risk scenarios within the City of Lethbridge. The comprehensive Community Risk Assessment included within this plan is based on both physical and theoretical factors. Consideration was given to the community risk impacts of property stock, building height and area, building age and construction, building exposures, demographics, geography / topography / road infrastructure, fire loss statistics and fuel load.

The analyses within this report recognize four strategic priorities for the delivery of fire protection services within the City of Lethbridge including:

- The utilization of a comprehensive Community Risk Assessment to determine the level of existing and projected fire safety risks within the municipality as the basis for evaluating the current and future fire protection services;
- The optimization of the three lines of defence including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment;
- The sustainability of a fully integrated Fire/EMS operating model for the delivery of fire protection and emergency medical response; and
- The emphasis of strategies that support the delivery of fire protection services that provide the most cost effective and efficient level of fire protection services resulting in the best value for the community.

The recommendations contained within this FDMP are intended to guide the future strategic plans, business plans, and associated operating and capital infrastructure investment decisions of the Lethbridge Fire and Emergency Services. The recommendations are designed to provide Council with options for establishing service level targets including performance measures to provide the ability for ongoing monitoring and assessment of services in satisfying community and stakeholder needs to achieve the short, medium and long-term objectives of the plan.

Recommendations:

1. That the LFES continues the current practice to review all by-laws and agreements affecting the department on a regular basis.
2. That the LFES continues to provide pro-active leadership in the utilization and application of mutual aid agreements.
3. That the LFES continues to monitor and update the current automatic aid agreements to ensure full cost recovery, including any consumables, staff time, and overtime.
4. That subject to Council's consideration and approval of this Fire Department Master Plan, there will be a need to conduct a review of all existing SOGs and where necessary complete revisions or develop additional SOGs to reflect all levels of service approved by Council.
5. That subject to Council's consideration and approval of this Fire Department Master Plan the department take the following steps regarding their internal standard operating guidelines:
 - Establish and empower a standard operating guideline committee composed of fire service staff to research, develop, and draft new standard operating guidelines and to update existing standard operating guidelines; and
 - Conduct a review of all existing standard operating guidelines and where necessary complete revisions or develop additional standard operating guidelines to reflect all levels of service approved by Council.
6. That the department continues the on-going process of regularly reviewing and updating department policies, operational procedures and relevant by-laws.
7. That the department continues to research and apply technology-based initiatives in order to improve the effectiveness and efficiency of the LFES and its operations.
8. That the department continues the current practice of preparing comprehensive and professional annual reports and that the Community Risk Assessment (contained within **Appendix C**) be maintained on a regular basis and included within the annual reports to Council.
9. That the LFES continues to target a minimum initial response of four firefighters to provide sufficient firefighting resources to conduct initial fire suppression operations including the fireground critical tasks of:
 - Incident Command – 1 firefighter
 - Pump Operation – 1 firefighter
 - Attack Line - 2 firefighters (Confine and Extinguish)
10. That an appropriate **minimum depth of response** to the low, moderate and high risks occupancies within the City of Lethbridge to achieve the required critical fireground tasks includes four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies and 24 firefighters to high risk occupancies.
11. That following the completion of the planned revisions to the current emergency plan model and self-assessment tool by AEMA (Alberta Emergency Management Agency) it is recommended that the City update the current Municipal Emergency Plan (MEP).

12. That the LFES consider appointing a Captain from each platoon to oversee the coordination of training on that platoon.
13. That LFES consider the addition of Fire Field Trainers (equivalent to the existing EMS Field Trainers) to support firefighter training in the department.
14. That regular participation in live fire training be included within the proposed comprehensive annual training program for firefighters within the LFES.
15. That the LFES conduct a detailed review of the current specialized services provided by the department. This analysis should consider the following:
 - Financial operating costs of the sustaining the current team-based model;
 - Partnership opportunities with other external agencies in the delivery of these services;
 - Contracting these services to other agencies or the private sector;
 - Enhancing the level of confined space, trench rescue capabilities of the department; and
 - The need to sustain the diving capabilities of the Water Rescue Team.
16. That the LFES develop a new comprehensive annual firefighter training program that responds to the relevant standards, curriculum and health and safety requirements, and include the following core functions:
 - *Identification of training needs in relation to services provided;*
 - *Coordination / scheduling of theoretical and practical training;*
 - *Monitoring and evaluation in relation to outcomes achieved;*
 - *Ongoing evaluation in relation to industry best practices and legislative requirements;*
 - *Oversight of program objectives and records management; and*
 - *Ongoing assessment of program delivery for efficiency and effectiveness.*
17. That the LFES consider the development of a comprehensive career development plan to support the succession planning needs of the department in the future.
18. That the LFES adopt the “three lines of defence” including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment as a “strategic priority” in the development and delivering of fire protection services.
19. That the LFES assign the roles and responsibilities of a basic Safety Codes Officer to one member of each of the four platoons.
20. That the LFES continues to support and participate in multi-agency inspections of Group A - Assembly Occupancies.
21. That the LFES prioritize the utilization of the Fire Safety Information Centre targeting high-risk and high occupancy buildings in developing pre-planning information for firefighters.
22. The LFES continues to support the delivery of the “Secondary Suites” program targeting the legalization of residential secondary suites.

23. That the LFES prepare and present to Council performance measures, such as those recommended within this FDMP, for each of the fire prevention inspection activities provided by the department as a tool for Council and the LFES to monitor the effectiveness of these activities.
24. That LFES review the current department procedures for the enforcement of the Alberta Fire Code related to requests for inspection or complaints and implement the procedures recommended with the FDMP.
25. That the LFES conduct the following to enhance the department's initiatives targeting Fire Safety Plans and Pre-Plans:
 - Identify annual targets for the number of Fire Safety Plans to be completed for each occupancy group type; and
 - Identify resource strategies to meet the annual targets, including an enhanced role of on-duty suppression staff including the proposed on duty basic Safety Codes Officer.
26. That the LFES investigate alternative approaches for reinstating a pro-active Home Smoke Alarm Program as identified within the FDMP.
27. That the LFES investigate alternative approaches to the enhanced delivery of Home Escape Planning as contained within the FDMP.
28. That the City of Lethbridge prepares the necessary research and documentation to apply for exemption from the Alberta Safety Codes Act to implement regulations for the installation of residential sprinklers.
29. That LFES prioritize the deployment of a minimum of four firefighters arriving on scene staffing an engine/quint, or alternatively arriving on scene simultaneously in order to safely and effectively initiate the critical fireground tasks for initial response identified within the FDMP.
30. That the LFES implement automatic deployment protocols to confirmed delta and echo fire incidents assigning a minimum of four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies, and 24 firefighters to high risk occupancies in order to safely and effectively initiate the critical fireground tasks for depth of response identified within the FDMP.
31. That the department initiates measures to track and monitor the arrival of staff on-scene (time of arrival and numbers of firefighters), to collect data to monitor and review actual depth of response coverage.
32. That the future facility plan be a six station model for the City of Lethbridge which includes a relocated Station 3, additional station in North Lethbridge, two new stations in West Lethbridge and decommission of the existing Station 2 with implementation as follows:
 - Station 3 be replaced within the short term (2018-2021) through rebuilding near the intersection of Scenic Drive South and Mayor Magrath Drive South and the existing Station 3 decommissioned.
 - Within the short to medium term (2018-2021) construct a new station in West Lethbridge located approximately at the intersection of University Drive West and Macleod Drive West staffed with a primary fire apparatus (minimum staffing of four firefighters).

- Within the medium term (2026-2029) construct a new Station in North Lethbridge located approximately at the intersection of 13 Street North and 26 Avenue North staffed with a primary fire apparatus (minimum staffing of four firefighters).
- Over the long term (2030-2033 years), timed to match growth and development, construct a new station in West Lethbridge located approximately at the intersection of Metis Trail West and Garry Drive West. Once the new station is constructed the existing Station 2 should be decommissioned.

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GLOSSARY OF TERMS

ABC	Alberta Building Code
AEMA	Alberta Emergency Management Agency
AFC	Alberta Fire Code
AHS	Alberta Health Services
ALS	Advanced Life Support
ANSI	American National Standards Institute
BLS	Basic Life Support
CAD	Computer Aided Dispatch
CPSE	Centre for Public Safety Excellence
CFAI	Commission on Fire Accreditation International
CPC	Commission on Professional Credentialing
CFPA-Europe	Confederation of Fire Protection Association Europe
CFSEM	Comprehensive Fire Safety Effectiveness Model
CRA	Community Risk Assessment
CRRP	Community Risk Reduction Plan
DEM	Director of Emergency Management
EMS	Emergency Medical Services
EMT	Emergency Medical Technologist
ERF	Emergency Response Facilities
ERU	Emergency Response Units
FDMP	Fire Department Master Plan
FPO	Fire Prevention Officer
FPPA	Fire Protection and Prevention Act (1997)
FSIC	Fires Safety Information Centre
GIS	Geographic Information Systems
HIRF	High-Intensity Residential Fires
ICSP/MDP	Integrated Community Sustainability Plan/Municipal Development Plan (2010)
IGMS	Integrated Growth Management Strategy
IFSAC	International Fire Service Accreditation Council
IFSTA	International Fire Service Training Association
LEMA	Lethbridge Emergency Management Agency
LFES	Lethbridge Fire and Emergency Services
MTO	Medical Training Officer
MEP	Municipal Emergency Plan
MW	Megawatt
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
OHSA	Occupational Health and Safety Act (2000)

OFC	Office of the Fire Commissioner
PCR	Patient Care Report
PFSG	Public Fire Safety Guidelines
PSCC	Public Safety Communications Centre
QMP	Quality Management Plan
RIT	Rapid Intervention Team
RMS	Records Management System
SCA	Safety Codes Act (1994)
SCC	Safety Codes Council
SCO	Safety Codes Officer
SOG	Standard Operating Guideline
TMP	Transportation Master Plan (2012)

1.0 INTRODUCTION

The City of Lethbridge is a proud, thriving community with small city charm. It is the fourth largest city in Alberta by population, and the third largest by land area, spanning approximately 124 square kilometres. Lethbridge is the business and industry centre of Southern Alberta, with a large institutional presence. The City began as a mining centre and later grew with the expansion of local farming. Lethbridge is surrounded by the County of Lethbridge on all sides, with Cardston County to the southwest.

As the main centre of Southern Alberta, the City of Lethbridge is experiencing steady development and growth. The population grew by over eleven percent between the 2006 and 2011 national census and this growth is expected to continue. With this increase in residents and jobs, one of the biggest challenges for the Fire and Emergency Services department will be to continue providing effective emergency services to meet the needs of the growing community. In order to service the demands of a growing population, it will be necessary to identify and analyze the current and future needs of the City as they relate to the provision of fire and emergency medical services (EMS).

Lethbridge's population is growing in numbers and in diversity. While predominantly of European descent, community members come from a range of different ethno-cultural backgrounds. In order to maintain strong community relationships, Fire and Emergency Services requires a clear approach on how best to serve an increasingly diverse community.

1.1 Study Purpose and Scope

The City of Lethbridge (City) initiated the development of this Fire Department Master Plan (FDMP) to assist Council in identifying further programs and activities that focus on fire prevention, injury reduction and providing a safer community through an integrated strategy of community risk reduction. This FDMP assesses existing service levels and identifies recommendations to sustain, improve or enhance service levels in response to stakeholder needs. This FDMP focuses on a ten-year horizon within the framework of the current 20 year planning horizon of the City.

The City of Lethbridge Fire and Emergency Services (LFES) reflects a fully-integrated Fire/EMS operating model of providing fire suppression, public education and prevention, and emergency medical response to a growing community. The success of the current LFES operating model was acknowledged in 2012 through receiving accreditation for the delivery of emergency medical services. The EMS accreditation process provided a strategic planning framework for Council, the LFES and the community for the delivery of EMS services.

The focus of this FDMP is to assist Council and staff in developing a similar strategic planning framework for the delivery of fire protection services while sustaining the fully integrated Fire/EMS operating model.

A strong focus has been given to aligning with the City's corporate pillars including: ***trust and integrity; customer focus; solutions oriented; financial accountability; environmental responsibility; and supportive and caring.***

The content of this FDMP includes the following primary elements:

- *Supportive Plans and Strategies;*
- *Core Business, Programs and Service levels;*
- *Fire Prevention & Injury Reduction;*
- *Staffing and Deployment Model;*
- *Facilities Master Plan; and*
- *Community Risk Assessment.*

The recommendations contained within the FDMP are intended to guide the future strategic planning, business plans, and associated operating and capital infrastructure investment decisions of the Lethbridge Fire and Emergency Services.

1.2 Department History

The Lethbridge Fire and Emergency Services is a full-time, fully integrated fire and emergency medical services department operating from four stations.

The Lethbridge Fire Brigade was initially formed in 1886 as a volunteer “bucket brigade” to protect the City from fire risk to the community. In 1909 it became a full time fire department with ten members; seven firefighters, a lieutenant, a captain and the fire chief. In 1912 city leaders passed the ambulance service to the fire department in the hopes of ensuring reliable timely response.

2012 marked the 100th anniversary of the department’s role as an integrated EMS service and the 126th anniversary of the department’s fire suppression services. Today the highly trained staff (including front line firefighter paramedics / emergency medical technologists (EMTs), referred to within this document as ‘firefighters’) operate out of four stations strategically located throughout the City. **Table 1** provides a brief history of events and milestones throughout the history of the Lethbridge Fire and Emergency Services (LFES).

Table 1: History of Lethbridge Fire and Emergency Services

Era	Event
1886	Lethbridge Fire Department formed
1912	First Ambulance
1960's	Station 3 opens (South Lethbridge) Fire Prevention Division established
1970's	First Emergency Medical Technicians trained on shift New fire training tower opened Fire Headquarters relocated
1980's	Station 2 opens (West Lethbridge) Third front line ambulance initiated Paramedics hired EMS administration positions created
1990's	First Advanced Life Support Engines Medical Priority Dispatch introduced Fourth front line ambulance initiated
2000's	Fire training moved to certifications EMS field trainers introduced Fifth on duty ambulance for peak hours initiated Fire Degree program of Lakeland College implemented Signing of first Ambulance Services Contract with Alberta Health Services Adopted new provincial medical control protocols
2014	Added three additional peak-hours ambulance units

The current LFES delivers essential public services, making the City a safer place to live, work and enjoy. The LFES is a leader in public education for fire prevention and liaises with other government agencies to lobby for continuous improvement to safety codes.

1.3 Partnerships

The LFES is responsible for service delivery to a wide range of community partners including other emergency service providers within the City and Region, the development industry, as well as other government bodies. Partners of the LFES include, but are not limited to Alberta Health Services,

Lethbridge County, Lethbridge Public Safety Communications Centre, police services (Lethbridge Police Services and Royal Canadian Mounted Police (RCMP) Southern Alberta District), Canadian Home Builders Association Lethbridge Region, Safety Codes Council (Government of Alberta), Office of the Fire Commissioner Alberta, Alberta Emergency Management Agency, Economic Development Lethbridge, the Lethbridge business community, local schools, community groups, and fire and emergency service providers in bordering communities. Effective service delivery hinges on strong and effective community partnerships. Stakeholder consultation for this study incorporated representatives from several of these groups. The consultation process is discussed further in **Section 3.4** below.

2.0 SUPPORTIVE PLANS AND STRATEGIES

LFES considers the City’s supportive corporate plans and strategies, as well as department-specific supportive plans, to be a foundational element of this Fire Department Master Plan (FDMP).

Figure 1 illustrates the supportive plans and strategies that have been reviewed as part of the development of this FDMP to ensure that the LFES Department develops strategies that align with these principles.

Figure 1: Supportive Plans and Strategies



2.1 City of Lethbridge Corporate Pillars

Corporate Pillars represent the City’s shared beliefs, behaviours and attitudes and are intended to guide the City’s delivery of services to its community. The six corporate pillars are:

- **trust and integrity;**
- **customer focused;**
- **solutions oriented;**
- **financially accountable;**
- **environmental responsibility;** and
- **supportive and caring.**

Where applicable, the recommendations within this FDMP have been connected to the City's Corporate Pillars.

2.2 City Council Strategic Plan (2014 to 2017)

The current City of Lethbridge Council was elected in October 2013 to serve a four year term. Council established its strategic priorities for 2013 to 2017 based upon the framework and principles of the City's Integrated Community Sustainability Plan / Municipal Development Plan (ICSP/MDP), incorporating community input resulting from a comprehensive consultation process. City's Corporate Strategic Plan serves as a guidance document, outlining the Council's mission, vision, values and corporate strategic goals to plan for the community of the future. The strategic plan introduces and describes Council's six strategic goals of equal priority.

2.2.1 Council's Strategic Goals

City Council:

- 1. Embraces its role as government leaders of the corporation by strengthening the process of governance**
 - *Demonstrates governance excellence through leadership and setting clear direction*
 - *Encourages and enhances citizen engagement*
 - *Advocate on behalf of the community*
- 2. Demonstrates financial stewardship**
- 3. Stewards Lethbridge toward a well-designed city by ensuring quality urban design**
 - Strive for a well-designed city through proactive planning
 - Are pursuing a more balanced approach to urban transportation options that includes pedestrians, cyclists and public transit users
 - Enhance the vibrancy and liveability of our downtown
- 4. Fosters a safe, healthy and vibrant community through inclusive policies, recreational and cultural opportunities and collaboration**
 - Foster an environment of inclusivity and provide a welcoming community for all residents and visitors
 - Enrich the city as an exciting and active place to live, visit and do business
- 5. Takes a leadership role in the protection and preservation of our natural environment in Lethbridge**
 - Lead in the efficient use of resources and land
 - Conserve and enhance the unique character of the Oldman River Valley through Lethbridge
- 6. Fosters strong relationships with neighbouring communities through collaboration**

Where applicable, the recommendations within this FDMP have been connected to Council's strategic goals.

2.3 Fire Quality Management Plan

The Safety Codes Council describes a Quality Management Plan (QMP) as follows:

“A Quality Management Plan is a document in which an organization (e.g. municipality, regional services commission, corporation, and agency) describes the disciplines (or parts of disciplines) and extent of safety services it intends to provide when it becomes accredited.

A Quality Management Plan consists of the following:

- *details of the discipline(s) and the components of the Safety Codes Act the organization seeks to administer*
- *a statement committing senior management to the plan*
- *an outline of safety policies and standards and the process for ensuring compliance, e.g., the number of inspections and at what stages, plans review (if applicable), verification of compliance, resolution of non-compliance (variances and orders)*
- *a strategy that ensures the ability of a Safety Codes Officer to make decisions without undue influence from management or elected officials”*

The LFES Quality Management Plan provides a high-level directive to ensure general standards of quality in staffing, procedures, and training is being upheld. The latest edition (3rd edition), was approved in July 2016 and establishes that the QMP Manager is responsible for the effectiveness and compliance of the QMP. The plan covers expectations in; personnel training; training implementation; compliance monitoring; documentation; records retention, retrieval, and disposition. The QMP reflects the most recent Alberta Fire Code (2014).

A new service agreement between the City of Lethbridge and Lethbridge County to provide inspection and plan review services was accepted and signed by City Council in July 2015.

2.4 City of Lethbridge Integrated Community Sustainability Plan/ Municipal Development Plan

The City of Lethbridge Integrated Community Sustainability Plan/Municipal Development Plan (ICSP/MDP) 2010 provides a framework for Council and the community to address growth over the next 40 years. Under the umbrella of the *Municipal Government Act* and the South Saskatchewan Regional Plan, the ICSP/MDP is the result of a creative consensus surrounding the social, cultural, economic, built and natural environment, and governance dimensions of sustainability. Policies contained within Section 6.2.4 of the ICSP/MDP highlight the City’s commitment to uphold public safety and security so that residents are safe and feel secure. The City’s FDMP must complement the ICSP/MDP and the other corporate plans and strategies identified therein.

2.5 Integrated Growth Management Strategy

The development of the City's Integrated Growth Management Strategy (IGMS) (October 2013) involved the examination of over 27,000 hectares of land for a time horizon of 100 years. The project study area ignores existing municipal boundaries and includes lands within the City of Lethbridge and Town of Coalhurst, lands within the County of Lethbridge. This includes lands subject to policies with the Inter-municipal Development Plan and lands that may be influenced by the establishment of the Canamex Highway (a Provincial transportation project). The IGMS is intended to provide a practical link between vision-based outcomes defined through Municipal Development Plans and the current development patterns and suggest areas to accommodate City and County growth needs. These components are important inputs into future Inter-municipal Development Plan policies, as well as future development proposals and Area Structure Plans.

2.6 Transportation Master Plan

On April 2, 2013 City Council approved the 2012 Transportation Master Plan (TMP), which establishes a long-term transportation planning framework to support the land uses and development patterns anticipated through the ICSP/MDP. The purpose of the TMP is to guide the long-term development and project alignments of future arterial roadways through the Transportations Systems By-law. This TMP will also establish context for capital improvement decisions. In 2009, the City conducted a Circulation Road Study, which identified the potential to create a new road (bridge) across the Oldman River valley (extension of Scenic Drive). Through the recent completion of the TMP, together with the current ICSP/MDP, the City is able to ensure that alignment of this future road is consistent with the land use policy direction of the ICSP/MDP and the transportation goals of the TMP. Because the road network within the City is a fundamental component of the emergency service delivery, baseline assumptions from the TMP has been incorporated into the FDMP.

2.7 Underground Infrastructure Master Plan

The Underground Infrastructure Master Plan was commissioned in 1997 to address servicing capacity pressures in West Lethbridge. The Plan addressed restrictions posed by existing pipes by developing plans for a capacity of 55,000 people.

2.8 Corporate Work Plan 2015 - 2018

The City of Lethbridge Corporate Work Plan provides brief descriptions of the initiatives and projects resulting from the Council Strategic Plan, as well as those identified within the City's Operating Budget, Capital Improvement Program and other administrative projects. It groups the projects within the City's branches of Governance, Corporate Services, Community Services, Planning and Development and Infrastructure Services. The work plan identifies core services, major projects and initiatives planned for 2015 to 2018 and related timelines for each of the City's business units.

2.9 Fire and Emergency Services Business Plan 2015 - 2018

The 2015 to 2018 Fire & Emergency Services Business Plan states the mission, vision, and values of the department. The identified core business and services levels pertain to: fire suppression; emergency medical services; rescue; training; first medical response; emergency preparedness; public education; fire investigation; fire inspection; and hazardous materials. The five strategic initiatives identified are:

- negotiate a clearly defined contract for Ambulance Service Delivery with AHS;
- present the Fire Department Master Plan to City Council with Levels of Service to be defined by City Council and aligned with customer expectations and department operating budget;
- build a sustainable Training Program in support of defined Levels of Service;
- lead the initiative for a provincial database of all emergency events; and
- implement a risk management strategy that specifically targets life safety hazards in our community to meet the needs of an updated Municipal Emergency Plan.

2.9.1 *LFES Department Annual Report*

The LFES Department prepares a comprehensive and professional annual report each year. The Annual Report highlights the activities and achievements of the department over the year. An overview of fire and medical incidents, public education activities, false alarms, permits, and financial information is provided. The report also outlines activities and events around support services, fire prevention, fire responses, fire training, platoons, speciality teams, medical training, and EMS Resources.

3.0 FIRE DEPARTMENT MASTER PLANNING PROCESS

A depth of knowledge, experience, and context informed this Fire Department Master Plan. There are three areas that embody this as a foundational element to the fire master planning process including: legislation, industry guidelines, and stakeholder consultation.

This section describes the relevant legislation, guidelines and the stakeholder consultation process that was undertaken to frame this Fire Department Master Plan in defining the needs and circumstances of the City of Lethbridge.

3.1 Province of Alberta Legislation and Fire Regulations

This report was prepared in accordance with all relevant provincial legislation and related regulations, including the *Municipal Government Act*, the *Environmental Protection and Enhancement Act*, the *Health Discipline Act* and the *Safety Codes Act*. The *Safety Codes Act* governs safety standards and code regulations in Alberta, including the Building and Fire Codes. This report includes references and consideration of the following:

- *Alberta Building Code (ABC)*
- *Alberta Fire Code (AFC)*
- *Emergency Health Services Act, 2008*
- *Emergency Management Act, 2000*
- *Alberta Emergency Plan, 2000*
- *Emergency Management Act – Government Emergency Management Regulation*
- *FireSmart – Provincial Guidebook for Community Protection for Wildland/Urban Interface Communities*
- *Occupational Health and Safety Act, 2000*
- *Municipal Government Act, 2000*
- *Ministry of Municipal Affairs – Office of the Fire Commissioner (OFC)*
- *Ministry of Municipal Affairs – Fire STANDATA*
- *Safety Codes Act (SCA), 1994 Safety Codes Council (SCC)*

Although the Minister of Municipal Affairs has ultimate responsibility for the *Safety Codes Act*, public safety policy, and the safety codes system in Alberta, the public safety codes system depends on a strong partnership between Alberta Municipal Affairs and the Safety Codes Council. The Safety Codes Council, which was established under the *Safety Codes Act*, is responsible to the Minister of Alberta Municipal Affairs. Through this partnership, the safety codes system is administered in an effective, accountable, comprehensive and sustainable manner, which maintains public confidence in the system. The Safety Codes Council and its partners have been managing the safety codes system in Alberta since 1993. This is unique in Canada; no other province has an organization responsible for what the Safety Codes Council does.

Further detail on these documents and their contextual relevance to fire master planning is summarized in **Appendix B**.

3.1.1 *Office of the Fire Commissioner*

The Office of the Fire Commissioner (OFC) is the provincial body responsible for the general oversight of the fire rescue and search and rescue portion of Alberta's public safety system. Activities that are the responsibility of this Office include:

- providing technical advisory services to Alberta communities and organizations that deliver fire and emergency response and prevention services for citizens;
- coordinating high-quality, uniform training and certification standards for Alberta's fire rescue and search and rescue personnel;
- providing various public safety education campaigns and materials aimed at encouraging Albertans and visitors to Alberta to act safely; and
- collecting, analyzing and publishing fire and emergency response data generated by fire rescue departments and search and rescue teams.

Other activities within the OFC's mandate include advising municipalities on delivery of their public safety education and providing technical inspection and fire investigation services to ensure compliance with Alberta's building and fire codes. The OFC holds the provincial accreditation by the National Board on Fire Service Professional Qualifications and the International Fire Service Accreditation Congress on behalf of the Government of Alberta. The OFC administers these accreditation and certification programs for the fire rescue and search and rescue services. The Office of the Fire Commissioner has a regional office located in Lethbridge.

3.1.2 *Fire STANDATA*

Safety Services, as part of the Ministry of Municipal Affairs, and the Safety Codes Council jointly develop the Alberta Fire Code STANDATA. Some are issued under the authority of the Code or the *Safety Codes Act* as province-wide variances or interpretations, while others are information bulletins that provide general advice. New STANDATA are added on a regular basis. The Fire Code STANDATA provides the industry and stakeholders with fire related information such as:

- Fire Code Variances (e.g. Taqa North Ltd. - Portable Fire Extinguishers [AFC 2.1.5.1.(1)])
- Fire Code Interpretations (e.g. Questions Regarding Flood Impacted Fire Protection, Detection and Notification Equipment [FCI-13-02])
- Fire Code Bulletins (e.g. Inspection, Maintenance & Recharging of Portable Fire Extinguishers [FCB-11.01])
- Previous Codes (e.g. Fire Code Amendment Regulation for Secondary Suites [97 FCI 009])
- Approved Guidelines (e.g. Approved Fire Safety Guidelines for Rooming Houses and Converted Buildings - Information Update [97-FCB-021(R1)])

3.1.3 *Municipal Governance*

Through the legislative authority of the *Municipal Government Act*, City Councils are responsible for creating and evaluating municipal policies and programs. In accordance with Alberta Emergency Management Agency policy, a fire department should identify requirements for the establishment of boundaries, provision of funding and for the formal appointment of a fire chief.

3.1.4 *High Intensity Residential Fires*

As part of its commitment to addressing high intensity residential fires (HIRF) in Alberta, the province recently amended its building and fire codes to help make homes safer from the spread of fire, to provide more time for occupants to escape and for firefighters to respond when there is a fire.

High-intensity residential fires are defined by the HIRF Working Group¹ as:

“fires involving rapid heat release and fire spread beyond the point of origin that usually involve adjacent buildings. The fires also typically include the early exposure of large amounts of combustible materials. HIRFs can occur in any of the following groupings:

- Occupied residential buildings;
- Unoccupied residential buildings that are under construction; and
- A mix of occupied and under-construction residential buildings.”

Fire department response time, as a condition of building construction requirements, has existed in Alberta since the introduction of the 1981 Alberta Building Code. The Alberta Building Code recognizes the positive effects of fire suppression in preventing fire spread to adjacent buildings where the fire department arrives on scene in ten minutes or less. The intent behind the requirement is that when fire suppression staff cannot respond to a fire in less than a ten minute total response time, buildings must be located farther away from the property line or provided with additional fire protection, such as non-combustible siding, no side-yard windows and/or sprinkler systems. Additional fire protection measures slow the spread of fire by either containing it or suppressing it and giving the fire department additional time to arrive before the fire spreads out of control or becomes a high intensity residential fire.

The Alberta Building Code specifies a ten minute total response time that must be achieved for 90 percent of the incidents responded to. Total response time is defined as the time from when a fire department receives the emergency call to the time when a fire department vehicle capable of beginning fire suppression activities (typically a pumper truck with hoses and a crew) arrives at the scene of incident.

¹ High-Intensity Residential Fires Working Group Final Report, (2007) Province of Alberta

3.2 National Fire Protection Standards

The National Fire Protection Association (NFPA) is an international non-profit organization that was established in 1896. The NFPA’s mission is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. With a membership that includes more than 70,000 individuals from nearly 100 nations NFPA is recognized as one of the world's leading advocates of fire prevention and an authoritative source on public safety.

NFPA is responsible for 300 codes and standards that are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation in the United States, as well as many other countries. Its more than 200 technical code and standard development committees are comprised of over 6,000 volunteer seats. Volunteers vote on proposals and revisions in a process that is accredited by the American National Standards Institute (ANSI).

NFPA standards provide insight into best practices within the fire service industry. Applicable NFPA standards are presented within this FDMP, where relevant, as a resource / reference. There is no legislated requirement for the City of Lethbridge to provide the levels of service, or achieve the performance benchmarks identified within the NFPA standards.

3.2.1 National Institute of Standards and Technology

The National Institute of Standards and Technology (NIST) was founded in 1901 as a non-regulatory agency within the United States (U.S.) Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

In April of 2010 NIST released their Technical Note #1661 *“Report on Residential Fireground Field Experiments”* reflecting a collaborative research analyses conducted by leading fire service agencies. The analyses within this report investigated the effects of varying crew sizes, apparatus arrival times and response times on firefighter safety, overall task completion and interior residential tenability using realistic residential fires.

The result of a similar study identified in Technical Note #1797 *“Report on High-Rise Fireground Field Experiments”* was released in April 2013 that assessed the deployment of firefighting resources to fires in high-rise buildings. These studies are both examples of the technical research and analyses that is taken into consideration in order to develop and update the NFPA standards.

3.3 Prevention and Education Best Practices

3.3.1 Comprehensive Fire Safety Effectiveness Model

In developing this FDMP consideration was also given to the relevance of fire protection and prevention strategies being utilized by other jurisdictions that would be considered as best practices. As an example, in the Province of Ontario the Fire Protection and Prevention Act, 1997 (FPPA) reflects the current applicable legislation within that province. Through the leadership of the Office of the Fire Marshal and Emergency Management (OFMEM) municipalities in Ontario are supported in their role of compliance with the FPPA through the issuance of Public Fire Safety Guidelines (PFSG) developed by the fire marshal’s office.

The “Comprehensive Fire Safety Effectiveness Model” utilized within Ontario has gained recognition within the fire service as a proactive and effective model for the delivery of fire protection services. The model utilizes what is referred to as the “Three Lines of Defence” as strategic priorities in developing a comprehensive community fire protection and prevention program.

The “Three Lines of Defence” identified within the Ontario Comprehensive Fire Safety Effectiveness Model include:

- I. Public Education and Prevention**
- II. Fire Safety Standards and Code Enforcement**
- III. Emergency Response**

The first two lines of defence including Public Education and Prevention, and Fire Safety Standards and Code Enforcement are defined as follows:

“I. Public Education and Prevention:

Educating residents of the community on means for them to fulfill their responsibilities for their own fire safety is a proven method of reducing the incidence of fire. Only by educating residents can fires be prevented and can those affected by fires respond properly to save lives, reduce injury and reduce the impact of fires; and

II. Fire Safety Standards and Code Enforcement:

Ensuring that buildings have the required fire protection systems, safety features, including fire safety plans, and that these systems are maintained, so that the severity of fires may be minimized.”

The Comprehensive Fire Safety Effectiveness Model recognizes the high importance of the first two lines of defence in mitigating the potential of a fire occurring. In the event a fire does occur and emergency response is required the model defines the third line of defence as:

“III. Emergency Response (Fire Suppression):

Providing well trained and equipped firefighters directed by capable officers to stop the spread of fires once they occur and to assist in protecting the lives and safety of residents. This is the failsafe for those times when fires occur despite prevention efforts.”

In our view the three lines of defence represent a proven model for optimizing the benefits of proactive prevention and education programs; appropriate use of standards and code enforcement and, as the model suggests, the provision of emergency response as the ‘fail safe’ (last line of defence) for when incidents occur despite all efforts towards optimization of the first two lines of defence.

An example of the historical experience within Ontario reported by the OFMEM while utilizing this model during the period from 2010 to 2014 further confirms the positive outcomes. Over this period the number of fires within Ontario decreased by 23%, resulting in less fire damage as a result of fire, and a decrease in the number of fire related fatalities and injuries; this is despite continued growth in the population and housing stock of Ontario.²

² Source: Analysis of data from the Ontario Office of the Fire Marshal and Emergency Management

In our view the application of the “Three Lines of Defence” model for the City of Lethbridge aligns well with the current focus of the LFES in prioritizing education and prevention. Utilizing the three lines of defence model provides the opportunity to further focus and prioritize the services and programs provided by the LFES in response to the following:

- *The City of Lethbridge is facing considerable **population growth**.* From 2010 to 2050, the population of Lethbridge is expected to grow by 50%. This results in an average annual growth rate of 1.3%. It will be critical that LFES take a proactive approach in education to help ensure the safety of new residents.
- *The 2003 Safety System Review Final Report identifies the **need to improve the approach to public education**.*³ This report was the product of a province-wide consultation of organizations in Alberta. Participants included the City of Lethbridge, Alberta Construction Association, Alberta Fire Chiefs Association, and the Alberta Urban Municipalities Association. The public education recommendations focused on informing the public of the benefits and purpose of existing safety codes and standards as well as the use of all types of media for communication.

The analyses within this report utilizes the findings of the Community Risk Assessment (included in **Appendix C**) and the optimization of the first two lines of defence as a strategic priority towards reducing fire risk within the community and providing the most cost effective and efficient level of fire protection services to the community. Sustaining the level of fire suppression services currently provided by LFES in response to areas such as community growth, intensification, the evolution of new hazards (e.g. illegal drug laboratories) and an aging population is another reason for optimizing the first two lines of defence.

Prioritizing these two lines of defence to address areas of the community identified by the Community Risk Assessment should be considered a strategic priority of this plan. For example, high priority should be given to optimizing the first two lines of defence in areas of the community where vulnerable occupants such as seniors reside.

3.3.2 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations to the Public (2016 Edition)

NFPA has recently finalized a *Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations*. The stated purpose of the standard is to “specify the minimum criteria addressing the effectiveness and efficiency of the fire prevention organization...based on an approved community risk reduction plan” (pg. 4). The standard establishes its criteria through six chapters:

- 1) Organization
- 2) Community Risk Assessment
- 3) Fire Prevention Inspection and Code Enforcement Activities in Existing Occupancies
- 4) Plan Review

³ Source: Public Safety Division, Alberta Municipal Affairs, 2003

5) Investigations

6) Public Education Programs

The essence of the standard is to ensure that a fire prevention organization has a Community Risk Reduction Plan (CRRP) in place and is based on the local needs and circumstances established through a Community Risk Assessment (CRA). A CRA involves the assessment of: demographics; geography; building stock; fire experience (fire loss); responses; hazards; and economics.

A Community Risk Reduction Plan is then used to establish resources and programs that are consistent with identified risk. This would include inspection activities, plan review, investigations, and public education programs. For example, the NFPA 1730 standard identified a minimum inspection frequency cycle which could be refined based on the local context. Additional CCRP implementation considerations within the standard is to circulate the CRRP to all stakeholders who help implement it and to establish partnerships to facilitate implementation. This standard further emphasizes the importance of the application of the first two lines of defence and is consistent with the current industry trend to emphasize prevention and education within the fire service.

3.3.3 *Confederation of Fire Protection Association Europe (CFPA-Europe)*

CFPA-Europe is an association of European national organizations primarily focused on fire prevention, fire protection, safety, security and associated risks. It is a non-profit organization that provides guidelines, education standards, training, arson prevention and conferences and publishes newsletters and recommendations on a European level. The association was founded in the 1970s as a conference for fire protection information exchange. Over the years it transformed to the confederation of several Fire Protection Associations from across Europe with the aim to develop European fire protection recommendations. Currently the CFPA-Europe membership is 18 Fire Protection Associations from 17 European countries. The objectives of the CFPA-Europe are:

- “To advance the knowledge and the understanding of matters relating to fire science, fire prevention & protection, safety & security and other associated risks.
- To encourage the exchange of information in relation with protection of life and property.
- To facilitate co-operation between members for undertaking joint programs.
- To carry out or to commission research and studies. To act as spokesman.
- To promote the European perspective.
- To foster the development of fire protection organizations in new countries.”

CFPA-Europe aims to support and facilitate fire protection activities across Europe and produces guidelines to provide common interpretation and examples of concepts, models and solutions regarding fire protection. With guidelines topics such as: Introduction to qualitative fire risk assessment, Smoke alarms in the home, Recommended numbers of Fire Protection Trained Staff and Fire safety in apartment buildings, the trends of proactive fire prevention and community risk considerations are supported by this guiding association as well.

3.4 Stakeholder Consultation

Stakeholders have provided valuable input during the preparation of this FDMP. This has included the provision of a range of information regarding the context and background of the LFES from a variety of different perspectives. This helped to identify issues and needs associated with the fire and emergency medical services. As well, it provided information for the study's analyses and recommendation phases. Engaging stakeholders helped ensure that multiple perspectives can be brought to the fire department master planning process.

As a part of the data collection process and review of existing services, interviews were conducted with key staff members from all divisions of the LFES. These key stakeholders provided valuable feedback regarding the strengths, weaknesses, opportunities and constraints within the day to day operations of delivering fire and emergency medical services. The feedback collected during this process was an essential element of developing the framework of the plan and the resulting recommendations.

An external group of business and community stakeholders were identified by LFES staff at the onset of this project. These external stakeholders were sent a brief questionnaire-style survey by email and were requested to participate in follow-up telephone surveys. These telephone surveys were carried out to develop an understanding of the services provided by the LFES to provide input to the preparation of this FDMP. The stakeholder engagement results helped to guide suggestions and recommendations throughout this plan. The external business and community stakeholders included the following:

- Alberta Emergency Management (AEMA)
- Economic Development Lethbridge
- Lethbridge Airport
- Lethbridge Regional Police
- Lethbridge School District 51
- Lethbridge Senior Citizen Organization
- Office of the Fire Commissioner, Alberta (Trent West)
- RCMP, Southern Alberta District
- University of Lethbridge

The overall results of the external stakeholder engagement that included nine groups were overwhelmingly positive. Stakeholders were aware of the roles and structure of LFES, with much appreciation for the value that LFES adds to the community through its core services and integrated Fire/EMS service delivery model. Many of the external stakeholders maintain strong working relationships with LFES. The primary gaps addressed included suggestions to place greater emphasis on emergency preparedness and to re-examine the communication plan related to public education.

The recommendations within this FDMP are designed to provide continued support in satisfying the identified community and stakeholder needs through short, medium and long-term objectives. A summary of stakeholder consultation is included in **Appendix A**.

4.0 CORE BUSINESS, PROGRAMS AND SERVICE LEVELS

This section outlines the core businesses, programs and service levels for the LEFS. The core services provided by the department include:

- Public Education
- Fire Inspection
- Fire Investigation
- Fire Suppression
- Technical Rescue
- Emergency Medical Services (Ambulance)
- First Medical Response
- Training
- Emergency Preparedness / Emergency Management

4.1 Mission Statement and Vision

The current mission statement of LFES is:

“Our mission is to safely serve the community by preserving life, preventing injury/illness and protecting property in a professional and timely manner.”⁴

Paralleling the mission statement, the current vision of LFES is:

“Our team will continue to pursue excellence in both emergency prevention and emergency service delivery, improving community health and safety.”⁵

This vision is consistent with current best practices in the fire service of improving public safety through an increased emphasis on prevention activities.

4.2 Organizational Values

To achieve its mission statement, LFES promotes the following set of organizational values:

- **A Supportive Environment** – employee wellness, health and safety; teamwork; lifelong learning; accountable leadership; communication; treating each other with dignity and respect.
- **Focusing on Those Whom We Serve** – acting in a friendly, responsible and caring manner; treating our customers with dignity, kindness and integrity; building relationships between organizations; demonstrating commitment to our mission.

⁴ Source: Fire & Emergency Services Business Plan 2012-2014, p 3

⁵ Source: Fire & Emergency Services Business Plan 2012-2014, p 3

- **Achieving Results** – *timeliness (response times that consistently meet or exceed industry standards); innovation; effective use of technology; accountability and financial responsibility; accuracy, knowledge, and efficiency; preservation of the environment.*⁶

LFES job descriptions also reference the following as organizational values, which are aligned with the City's corporate pillars, as indicated:

- Accountability (aligned with *financially accountable*)
- Continuous Improvement (aligned with *solutions oriented*)
- Safety (aligned with *supportive and caring*)
- Integrity (aligned with *trust and integrity*)
- Customer Service (aligned with *customer focused*)

The Fire Department Master Plan assesses the department with consideration of the mission statement and organizational values, and provides recommendations to assist Council and LFES to continue to meet this mission under existing and future conditions.

4.3 Department Organization and Staffing

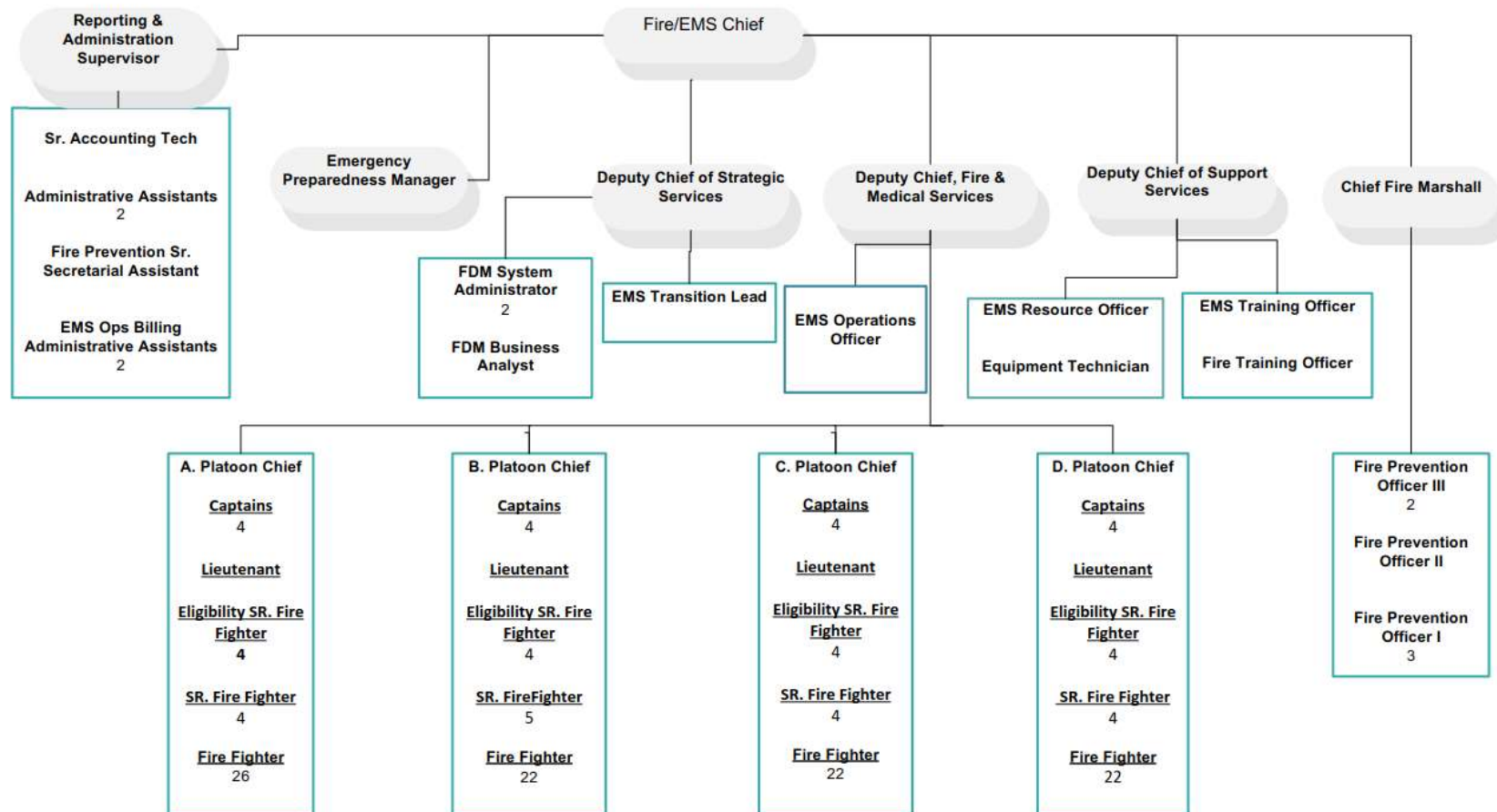
LFES is currently organized into the following divisions:

- Administration
- Strategic Services (Long-term strategic planning & compliance)
- Fire & Medical Services (Operations)
- Support Services (Training)
- Fire Prevention Bureau (Prevention, Code Enforcement & Public Education)
- Emergency Preparedness

The department structure shown in **Figure 2** is reflective of the LFES as of February 2017.

⁶ Source: Fire & Emergency Services Business Plan 2012-2014, p 3

Figure 2: LFES Organizational Chart



4.4 Administration Division

Lethbridge Fire and Emergency Services (LFES) is one of North America’s oldest fully integrated fire/medical services, with a total of 130 years of service. The administrative team oversees and monitors the resources and operations of all department divisions and is itself composed of staff from the different divisions.

Overall management of LFES is overseen by the Fire Chief with the assistance of the management team and administrative staff. The three Deputy Chiefs and the Chief Fire Marshal support the Fire Chief through management of their respective divisions. The Fire Chief is appointed by and reports to the Community Services Director. The Fire Chief and his administrative team have very strong support within the department.

4.4.1 Fire Chief

The Fire Chief is responsible for the administration and operation of LFES, including direct oversight of Deputy Chiefs and the Chief Fire Marshal. All Department regulations, policies and committees for normal operation are established by the Fire Chief. The Fire Chief has complete responsibility for the Fire and Emergency Services Department including the all fire protection activities, such as:

- Rescue, emergency medical services, and other incidents;
- Pre-fire planning;
- Fire disaster planning;
- Post-fire investigation;
- Preventive patrols, inspections, and other fire prevention activities;
- planning, developing, implementing and managing of department policies, programs and procedures;
- Assumes command at major emergency incidents as deemed necessary.

4.4.2 Deputy Chief, Operations (Fire & Medical Services)

The Deputy Chief of Fire & Medical Services provides leadership direction and coordination of day-to-day operations, including direct oversight of Platoon Chiefs and fire suppression staff. Examples of primary responsibilities and duties include:

- Responsible for health and safety of all fire, rescue and EMS crews under authority;
- Assists Fire Chief with the planning, developing, implementing and managing of department policies, programs and procedures;
- Supervises Platoon Chiefs, EMS Operations Officer and Equipment Technician;
- Leads and supports Platoon Chiefs ;
- Evaluates and recommends changes to operations resources;
- Evaluates EMS and fire suppression procedures for effectiveness;

- Ensures operations are in accordance with legislation, regulations, and corporate/department policies;
- Assumes command at major emergency incidents as deemed necessary;
- Performs duties of the Fire Chief when absent and rotates with other Chief Officers for on-call schedule.

4.4.3 *Deputy Chief, Strategic Services*

The Deputy Chief of Strategic Services is responsible for immediate and long-range strategic and fiscal planning for LFES, including aligning service delivery with Corporate and Council objectives. Examples of primary responsibilities include:

- Leads portfolio for strategic and operational projects;
- Aligns Corporate and Council objectives with efficient, safe and effective service delivery;
- Analyzes, monitors and reports on system performance with goal of building and maintaining a sustainable, balanced public safety model that meets best practice guidelines;
- Assists Fire Chief with the planning, developing, implementing and managing of department policies, programs and procedures;
- Supervises LFES IT personnel, administrative assistance and EMS Resource Officer;
- Manages grants, contracts and budget preparation/analysis;
- Participates in strategic planning, budgeting, and recruitment;
- Reports on department fiscal performance and recommends strategies to maximize value;
- Ensures operations are in accordance with legislation, regulations, and corporate/department policies;
- Assumes command at major emergency incidents as deemed necessary;
- Performs duties of the Fire Chief when absent & rotates with other Chief officers for on-call schedule.

4.4.4 *Deputy Chief, Support Services*

The Deputy Chief of Support Services provides direction and coordination for emergency management, training and manages the health, safety, and wellness of LFES. Examples of primary responsibilities include:

- Provides direction and coordination for emergency management / emergency preparedness;
- Manages the health, safety and wellness of the LFES;
- Leads and supports the training officers;
- Works with City's Fleet Services to manage fire apparatus;
- Assists Fire Chief with the planning, developing, implementing and managing of department policies, programs and procedures;
- Evaluates and recommends training priorities to ensure effective capabilities;
- Evaluates training components to ensure effectiveness of protocols and equipment;

- Ensures operations are in accordance with legislation, regulations, and corporate/department policies;
- Assumes command at major emergency incidents as deemed necessary;
- Performs duties of the Fire Chief when absent & rotates with other Chief officers for on-call schedule.

4.4.5 **Chief Fire Marshal**

The Chief Fire Marshal oversees the Fire Prevention Bureau (fire prevention and education operations), including direct supervision of Fire Prevention Officers. Examples of primary responsibilities include:

- Provides fire prevention and education direction for Fire Prevention Officers;
- Coordinates programming and resources with LFES Administration and Suppression staff;
- Oversees fire origin and cause investigations;
- Ensures public safety is adhered to and is in accordance with legislation, regulations, and corporate/department policies.

4.4.6 **Administrative Support**

LFES currently has seven administrative staff, including three secretarial assistants, three data entry clerks, an IT administrator and a business analyst. The administrative team is responsible for tasks including records management, payroll, timekeeping, and billing.

4.4.7 **Bylaws and Agreements**

The *Municipal Government Act* and the *Safety Codes Act (SCA)* allow a municipality to pass bylaws to operate their municipality and specifically their fire and/or emergency services department(s). Bylaws provide the community with important information with regard to the level of service that their municipality intends to provide. Bylaws also provide municipal staff with the authorization to provide these services as well as the responsibility to achieve the prescribed service level.

City of Lethbridge Bylaw 5542 authorizes the establishment and operation of the Fire and Emergency Services Department. It establishes the Fire Chief as the appointed head of the department and allows the Fire Chief to appoint other officers to the department and to act on his/her behalf if necessary. The bylaw also outlines the Fire Chief's responsibilities. Bylaw 5542 in its current state was adopted in 2009 and came into force on January 1, 2010.

The Fire Chief has complete responsibility and authority over the Fire and Emergency Services Department as authorized by Bylaw 5542, and is also responsible for other City of Lethbridge bylaws relating to fire and medical services, including:

- Dangerous Goods Transportation and Handling Bylaw 5254; and
- Open and Commercial Burning Bylaw 5431.

Our review of the existing bylaws approved by the Lethbridge Council for the Fire and Emergency Services Department indicates that all required bylaws are in place. Our review also indicates that regular reviews occur and bylaws are updated as required. Ensuring these documents are regularly reviewed and updated to reflect any changes in service level or changes in authority are important functions.

It is recommended that the LFES continues the current practice to review all by-laws and agreements affecting the department on a regular basis.

4.4.8 **Mutual Aid Agreements**

Mutual aid agreements are predetermined plans that allow a participating fire department to request assistance from a neighbouring fire and/or emergency services department. City of Lethbridge Bylaw 5542 authorizes the LFES to enter into such agreements.

There are two main scenarios when mutual aid agreements are enacted:

1. When a fire and/or emergency services department is on-scene at an emergency and has received information that immediate assistance is required, it may ask for mutual aid assistance from a neighbouring department.
2. Where distance and/or conditions are such that a neighbouring fire and/or emergency services department could provide a more timely response, departments may immediately request a simultaneous response from a participating department.

LFES is an active participant in the *Agreement on Area Resource Sharing During Municipal Emergency Responses in Southern Alberta* mutual aid agreement, which is signed by 35 other area municipalities. As the largest fire and emergency services provider in the region, LFES is more often called upon to provide assistance than to request help from another jurisdiction and plays a strong leadership role within the group. This review confirmed that the LFES continues to be a leader in the development, support, and utilization of mutual aid agreements. It is recommended that the LFES continues to provide pro-active leadership in the utilization and application of mutual aid agreements.

4.4.9 **Automatic Aid Agreements (Fire Protection Agreements)**

In contrast to mutual aid agreements, automatic aid agreements are programs designed to provide and/or receive assistance from the closest available resource, irrespective of municipal boundaries, on a day-to-day basis.

The obvious advantage of implementing an automatic aid program is that the person experiencing the emergency receives fire services from the closest available provider by supplying seamless service through the elimination of artificial service boundaries. Some additional benefits that an automatic aid agreement provides are:

- ✓ An enhancement of the level of public safety;
- ✓ A reduction of the critical element of time between the commencement of a fire and the application of an extinguishing agent to the fire by dispatching the closest available suppression services;
- ✓ The reduction of life, property and environmental losses; and
- ✓ The improvement of public and fire-fighter safety.

LFES currently has two automatic aid agreements in place for which it receives agreed upon fees from the receiving parties. The current automatic aid agreements are:

- *Memorandum of Agreement in Quadruplicate* with the County of Lethbridge; and

- *Fire Fighting Aid Agreement* with the Blood Tribe Department of Health.

As the largest fire and emergency services provider in the region, LFES is in a position to offer services to other jurisdictions through additional full-cost recovery automatic aid agreements. This FDMP contains recommendations where applicable opportunities may exist.

The current automatic aid agreements are serving their respective parties well and are not significantly impacting LFES core service delivery. In addition, these agreements serve as a predictable revenue source. It is recommended that the LFES continues to monitor and update the current automatic aid agreements to ensure full cost recovery, including any consumables, staff time, and overtime.

4.4.10 *Dispatch Services Agreement*

Dispatch and communications for LFES are provided by the Public Safety Communications Centre (PSCC), a separate municipal body that is responsible for emergency and non-emergency calls for LFES, as well as for Alberta Health Services, the Lethbridge Regional Police Service, and for 25 communities in the surrounding region. Alberta Health Services is currently in the process of consolidating ambulance dispatch services for the entire province, after which calls received for ambulance service will be directed to a dispatch centre in Calgary. There is no known timeline for when such changes will be affecting the operations of the PSCC.

The Support Services Manual for the Public Safety Communications Centre currently provides the service level agreement in place between LFES and the PSCC. The document, containing sections such as 'Fire IT Service Level Commitments' and 'PSCC Obligations,' was updated December 2011. A formal written agreement provides certainty that services will be consistently delivered and ensures continued communication between LFES and partner agencies such as the Lethbridge Regional Police Service.



The current agreement includes performance reporting and indicates that the PSCC Technical Service Committee is responsible to develop performance metrics and reporting requirements. Fire service best practices for the provision of emergency call taking and dispatching reflect the use of the National Fire Protection Association (NFPA) "1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems" as the guideline for provision of services. The agreement currently includes a performance measure to continually improve towards the NFPA 1221 standards.

4.4.11 *Fleet Services Agreement*

LFES has a defined service level agreement with the City of Lethbridge Fleet Services to maintain the LFES fleet and oversee related operations. The current agreement is dated July 27, 2006. The Deputy Chief of Support Services works with the Fleet Services Department to manage this agreement and the working relationship. The agreement and service appears to be meeting the needs of the department.

4.4.12 *Department Policies and Operating Guidelines*

Fire service best practices reflect the use of department policies as the appropriate tool to communicate specific direction to all staff. In comparison to operating guidelines which provide a framework to guide decision making, department policies reflect more stringent and defined practices that minimize variance from the directive given. An example of a fire department policy would be a “Respect in the Workplace Policy” where specific direction is given to all members of the department that reflects the policy of the department in consideration of relevant legislation governing the topic.

LFES currently has an extensive and well-developed policy manual with 225 individual policies that directs staff across all business lines. The manual’s policies are divided into the following sections:

- Medical Services;
- Communication Procedures;
- Vehicles and Equipment;
- Fire;
- Fire Prevention;
- General;
- Personnel;
- Training;
- Water Rescue; and
- Computers.

LFES master policy is for all policies to be reviewed at least once every three years by department administrators. More frequent reviews can be and are conducted for individual policies due to licensing or regulatory requirements. Active reviews of policies are evident, with many policies receiving updates in early 2013 just prior to the launch of the Fire Department Master Plan process. Policy review has resulted in the update of 225 department policies. Other individual policies remain unchanged since their original effective date, dating back to 1997 in many instances. A general update to these unchanged policies is recommended to assure staff and Council that the current policy manual meets current standards and best practices.

Standard operating guidelines (SOGs) are commonly used within LFES to direct the performance or behaviour of departmental staff, whether functioning alone or in groups. Operating guidelines differ from policies in that there is more room for interpretation and variance in outcomes. In general, the SOGs are intended to:

- Enhance safety;
- Increase individual and team effectiveness;
- Improve training efficiency;
- Improve orientation for entry-level staff;
- Improve risk management practices;
- Prevent / avoid litigation;

- Create objective post-incident evaluations; and
- Permit flexibility in decision making.

LFES' SOGs are broad and cover most of the department's business lines, with 86 individual guidelines. The SOGs are divided into the following sections:

- Ambulances
- Communications
- Safety
- Fire
- General
- Fire Prevention
- Motor Vehicle Accident
- Water-Ice Rescue
- Hazardous Materials
- Rope Rescue

Current trends in the fire service suggest that creating and empowering a committee of fire service staff to research, develop, and draft new standard operating guidelines and to update existing ones can be a successful model for administering these core documents. Reviewing and updating SOGs is an ongoing evolution within the fire service. Creating an SOG Committee to conduct regular reviews and updates is considered to be a best practice within the fire service.

Subject to Council consideration and approval of this Fire Department Master Plan, there will be a need to conduct a review of all existing SOGs and where necessary complete revisions or develop additional SOGs to reflect all levels of service approved by Council.

It is recommended that subject to the consideration and approval of this Fire Department Master Plan the department take the following steps regarding their internal standard operating guidelines:

- Establish and empower a standard operating guideline committee composed of fire service staff to research, develop, and draft new standard operating guidelines and to update existing standard operating guidelines; and
- Conduct a review of all existing standard operating guidelines and where necessary complete revisions or develop additional standard operating guidelines to reflect all levels of service approved by Council.

It is recommended that the department continues the on-going process of regularly reviewing and updating department policies, operational procedures and relevant by-laws.

4.4.13 Departmental Records Management

In an emergency services department, record keeping is an important part of managing overall operations, the provision of training, and fire prevention activities. LFES departmental records management systems and processes appear to be well-organized, updated and useable. In 2013, LFES made strides to ensure an even higher quality of documentation. The department uses Fire Data Management (FDM) software as the primary records management platform. This software is specifically designed to meet the needs of fire and emergency services and is serving LFES well. Fire IT supports the maintenance, configuration and upkeep of the LFES Records Management System (RMS).

The FDM is used to track information related to fire prevention and training such as:⁷

- Contact information for new properties (emergency and interview contact);
- Plans review information for new properties;
- Emergency and interview contacts while conducting annual fire inspections for existing properties as updated by Fire Prevention Office and Platoons;
- Administrative Assistant will enter the Platoon inspections contact changes;
- Banking information and school information will be entered into the FDM by the Communication’s Manager (forwarded to the PSCC);
- Hours spent for competency training and promotional training.

All types of training are recorded including core competency training and promotional requirements training. Fire Department members who provide training are responsible for submitting the training record for the group taught, and completed forms are returned to headquarters, as stated in Section 8.1.3 of the Policy Manual. Training is also recorded through Excel spreadsheets and the Blue Card Command site monitors modules and time. In 2013, the online portion of Blue Card Command was implemented at the officer level.

Integrgraph is the computer aided dispatch (CAD). It is an effective, efficient system in place for inter-service communications. The program stores emergency call data in a database and is useful for records management, enabling various queries.

4.5 Strategic Services Division (Long-term Strategic Planning)

The Strategic Services Division conducts long-range strategic planning and fiscal planning for the department and ensures operations are in conformance with legislation, standards, policies, guidelines and procedures. Department information technology and administrative support are included within this division.

⁷ Source: LFES Policy Manual section 5.1.11, and LFES – 2012 Annual Report

4.5.1 *Fiscal Planning – Capital and Operating Budgets*

As with any department the size of the LFES, the preparation and ongoing monitoring of capital and operating budgets is a significant activity. Ultimately, the Fire Chief is directly responsible to Council for its capital and operating budgets. Fiscal planning for the department is also included within the Fire and Emergency Services Business Plan 2015-2018.

The Deputy Chief Strategic Services provides assistance to the Fire Chief for department fiscal planning, budgeting and accountability. The Fire Chief and Deputy Chief Strategic Services receive further input from other senior staff within the department for monitoring and budgeting both capital projects and operating expenses. The lead of each division is responsible for providing a respective divisional budget. The LFES has a strategic and comprehensive capital replacement plan in place for apparatus, equipment and small vehicles for Fire and EMS, Emergency Operations and department information technology (IT) / Communications.

The Strategic Services Division is responsible for billing, collections and financial data records management. The processes in place for efficiently forecasting and implementing the LFES operating and capital budgets are supportive of the financial accountability and trust and integrity corporate pillars identified within the City’s Corporate Sustainability Plan.

4.5.2 *Fire Department Information Technology*



LFES embraces technology to provide efficient and effective services. The Strategic Services Division continues to investigate opportunities to upgrade existing technology and invest in and integrate new technology initiatives. These opportunities support LFES as a high-performing emergency service and improve the results achieved by the department. As an example, in 2012 the department incorporated integrated technology solutions within the Emergency Operations Centre.

Also in 2012, LFES completed a substantial information technology project to implement automated fire station alerting. This FDMP supports and recommends the department’s continued research and application of technology-based initiatives in order to improve the effectiveness and efficiency of the LFES and its operations.

It is recommended that the department continues to research and apply technology-based initiatives in order to improve the effectiveness and efficiency of the LFES and its operations.

4.5.3 *Strategic and Operational Projects*

The Strategic Services Division carries out strategic and operational projects for the LFES department. This includes annual projects such as preparing the department’s annual report as well as special projects, such as the Fire Department Master Plan study.

4.5.4 *Annual Report*

Ongoing evaluation and monitoring of the level of fire protection services is the foundation for sustaining an effective and appropriate level of service to meet community needs. Preparing an annual report is a best practice to inform corporate decision makers and Council on the performance of the department and new or evolving trends.

LFES currently compiles a comprehensive annual report for the Community Services Director and Council. The reports summarize the activities, operations and successes completed over the course of each year, and are organized by division, providing details on staff, programs, changes and accomplishments.

Preparation of an annual report provides a high degree of accountability and transparency on behalf of staff and Council in reporting to the community on the level of services provided. Maintaining the information within the Community Risk Assessment as part of the annual report to Council would enhance the level of information provided. This practice would ensure that the profile stays current and is available for regular review and monitoring of evolving trends within the community.

It is recommended that the department continues the current practice of preparing comprehensive and professional annual reports and that the Community Risk Assessment (contained within **Appendix C** be maintained on a regular basis and included within the annual reports to Council.

4.5.5 Community Risk Assessment Summary

The City of Lethbridge is surrounded by rural lands and is located in the south-west corner of Lethbridge County. The City is organized in three sections – West Lethbridge, South Lethbridge, and North Lethbridge. West Lethbridge sits West of Oldman River. The City offers a mix of residential, commercial and industrial occupancies, in addition to hosting a college campus and a university campus.

The City of Lethbridge faces considerable growth over the next twenty years, with the population growing by 25%. The recently completed Lethbridge Integrated Growth Management Strategy estimated population and job growth based on planning cells and for five phases of growth. The first phase of the Growth Scenario (2012-2032) focuses on accommodating demand within areas already planned whenever practical.

The majority (96%) of the City of Lethbridge property stock is Group C-Residential. Residential occupancies include a majority of single family residences as well as multi-unit residences and a mobile home park. The second largest percentage of property stock (2%) is industrial. The City's other occupancies include assembly, business and personal services, and industrial occupancies. The majority of commercial occupancies are located in the downtown core bound by 6th Avenue South and Highway 3. The majority of industrial occupancies are located in the northeast quadrant of the City bound by 28th Street North and 43rd Street North.

The Richardson Oilseed manufacturing plant poses the highest risk in the City of Lethbridge for potential fire and explosion. The manufacturing process involves the use of Hexane which is stored in large quantities on site in liquid form. This gas is highly volatile and in the event of an explosion it could be expected to affect a large geographic area. The site contains several separate buildings (i.e., a boiler, crushing facility, extraction/hexane plant, packaging, parts warehouse, refinery, and seed plant) all located within close proximity. The plant is very old and does not have up to date fire safety installations in some areas. There are plans to enlarge the site area to 5th Avenue North which will allow for a large increase in rail tanker car storage on site.

The demographic profile of the municipality is generally consistent with that of the Province of Alberta. It is a primarily English speaking community in which the population has a slightly lower level of income than that of other communities within the province. The percentage of senior population is slightly higher than the provincial average and should be considered a high priority in terms of their vulnerability in the event of a fire.

The number of fires by major property classification is quite consistent between the City of Lethbridge and Province of Alberta. The highest numbers of fires have occurred within the residential occupancies which is consistent with provincial statistics and their representation as the largest proportion of buildings within the community

Geographic Information Systems (GIS) information was used to prepare the 'Risk Assessment Model' which was developed for the study to translate the City's land use and related occupancies into risk categories of low, moderate, high and extreme. An example of a moderate level risk is a single-family, two-storey dwelling without a basement. The GIS model was used to approximate geographic coverage of the existing risk zone areas. The travel times were modelled against the initial response target of four firefighters arriving on-scene within four minutes of travel time and depth of response service level target of 14 firefighters arriving on-scene within eight minutes of travel (consistent with the analysis included in discussed in **Section 5.0**). The calculations indicate the percentage of the various risk zone categories that fall within the estimated travel time buffer and total staff able to arrive on scene.

Measured against these service level targets, 49% of the high risk areas, 45% of the moderate risk geography and 9% of the low risk geography is covered with four staff within four minutes of predicted travel time. This scenario also results in 30% of high risk, 17% of the moderate risk zones and 2% of the low risk geographic area able to be reached by 14 total staff within eight minutes of travel time.

4.5.6 *Community Emergency Management Program – Risk Assessment (April 2016)*

The Province of Alberta's Emergency Management Agency provides modules online to municipalities through its Community Emergency Management Program. This online tool provides authorized community emergency management staff to access four emergency management modules: community self-assessment, community risk assessment, community emergency management plan, and a document library. These modules are useful tools to assist municipalities as they complete, implement, and revise their emergency management plans.⁸

In April 2016, Lethbridge Fire and Emergency Services applied the community risk assessment tool to the City of Lethbridge. This tool utilizes the Hazard Identification and Risk Assessment methodology, and as such, identified a number of potential hazards with a set of questions whose responses inform the level of risk identified. High level considerations for each potential hazard include: frequency; factors that may impact the frequency; social impact; and consideration to factors that may impact the vulnerability of the respective hazard.

Through this exercise, LFES was able to prioritize 40 different hazards which were assigned to one of the following six categories based on its resulting risk score: Extreme, Very High, High, Moderate, Low, and Very Low Risk. The top twelve hazards (with a risk score of 40 or greater) along with the risk level identified through the exercise are shown in **Table 2**. The number one identified hazard was forest fires (wildfire) followed by human health emergency, water pollution/contamination, and floods related to rainfall/run-off at an extreme risk level.

⁸ Province of Alberta. (2015, October 8). Model Plan for Municipalities . Retrieved August 30, 2016, from Alberta Emergency Management Agency: <http://www.aema.alberta.ca/model-plan-for-municipalites>

Table 2: Top Twelve Potential Hazards for the City of Lethbridge as Identified Based on the Province's Risk Assessment Module

Priority	Hazard	Risk Level
1	Forest Fire (wildfire)	Extreme
2	Human Health Emergency	
3	Water Pollution / Contamination	
4	Floods (Rainfall / Run-off)	
5	Floods (Watercourse)	Very High
6	Hazmat (Transportation) – Rail	
7	Major Road Accident (Vehicular)	
8	Hazmat (Chemical Storage)	High
9	Hazmat (Gas / Bulk Stations & Card Locks)	
10	Hazmat (Transportation) - Road	
11	High Intensity Residential Fire	
12	Major Loss of Electrical Supply	

4.6 Operations - Fire and Medical Services Division

The Fire & Medical Services Division provides a range of services through a fully integrated model of fire suppression and emergency medical response. As described in the LFES job descriptions, firefighters are cross-trained as firefighter paramedics/emergency medical technologists (EMTs) to staff either fire apparatus or ambulances. This model has traditionally provided a cost effective and efficient fully integrated service delivery model. More recently the increasing demands for medical responses (including increased hospital wait times and patient transfers) are challenging the sustainability of this model. Firefighter paramedics/EMTs assigned to an ambulance were traditionally available to provide added support in the event of a fire, however, the increasing medical workload is negatively impacting the availability of this additional support on a daily basis. To address this challenge, LFES added three additional peak time ambulances on staggered twelve hour shifts.

For the remainder of the document the term 'firefighter' will be assumed to designate firefighter paramedic / EMT within LFES.

Firefighters assigned to fire apparatus provide emergency response to a wide range of incidents in addition to fires such as responding to motor vehicle fires and accidents, including patient extrication when required, and fire alarm investigation. This also includes participating in the medical tiered response agreement in support of the emergency medical response agreement.

In addition to the services identified above, firefighters also respond to incidents requiring technical rescues including confined space rescue, trench and structural collapse incidents and ice/water rescue. Technical rescues require staff within the division to train to a high level of proficiency in order to sustain the level of competency required to conduct these types of rescues.

For each of these technical rescues there are varying levels of service within the fire service. These typically include levels such as awareness, operational or technical. The amount of training required varies significantly in order to sustain an appropriate level of skills and competency. Occupational health and safety requirements also vary in relation to each level of service.

4.6.1 *Fire Stations and Staffing*

Lethbridge Fire and Emergency Services currently operate from four stations. The existing stations are strategically located throughout the City. The station fire response districts are defined in Subsection 4.28 of the LFES Standard Operating Guidelines.

Under the direction of the Deputy Chief of Fire and Medical Services the current total staff complement of this division is 144. This includes four platoons with a complement of 36 staff including “rovers” who can alternate on any of the platoons when required to maintain the required minimum complement of firefighters (firefighter paramedics / EMTs in LFES) on duty.

Firefighters are assigned to a shift schedule defined within the collective agreement. They provide 24 hour per day, seven days per week coverage for 365 days per year. The current minimum on-duty staff complement is 23 during the night-time (2400h to 0700h). Daytime minimum staffing varies from 25 to 31 as the twelve-hour shifts of peak-time ambulance units have staggered start times. The minimum staffing per station, including apparatus minimum staffing levels, are summarized in **Table 3**.

The utilization of rovers provides the department flexibility in sustaining the minimum complement of firefighters on duty per platoon to compensate for vacation time, banked time, workers compensation injuries, and sick time. In the event the staffing level on a platoon does drop below the minimum staffing complement the overtime call back system is used to maintain the minimum staffing levels.

Table 3: Current Stations, Apparatus & Minimum Staffing

Station	Station Address	Apparatus	Minimum Staffing	
			Daytime (staggered start shifts)	Night-time
1	207 – 4 th Avenue South	1 – Command Post	1 – Platoon Chief	1 – Platoon Chief
		1 – Engine	3 – Firefighter/paramedic	3 – Firefighter/paramedic
		1 - Rescue	2 – Firefighter/paramedic	2 – Firefighter/paramedic
		1 – Ambulance	2 – Firefighter/paramedic	2 – Firefighter/paramedic
		1 – Ambulance	2 – Firefighter/paramedic (0700h-1900h)	n/a
		1 – Ambulance	2 – Firefighter/paramedic (1000h-2200h)	n/a
2	10 Jerry Potts Blvd West	1 – Engine	3 – Firefighter/paramedic	3 – Firefighter/paramedic
		1 - Ambulance	2 – Firefighter/paramedic	2 – Firefighter/paramedic
3	2014 – 16 th Avenue South	1 – Engine	3 – Firefighter/paramedic	3 – Firefighter/paramedic
		1 - Ambulance	2 – Firefighter/paramedic	2 – Firefighter/paramedic
		1 - Ambulance	2 – Firefighter/paramedic (1200h-2400h)	n/a
4	2825 – 5th Avenue North	1 – Engine	3 – Firefighter/paramedic	3 – Firefighter/paramedic
		1 - Ambulance	2 – Firefighter/paramedic	2 – Firefighter/paramedic
		1 – Ambulance	2 – Firefighter/paramedic (0800h-2000h)	n/a
Total			25 to 29 (depending on time of day)	23

The existing stations and staffing are described in detail in **Section 6.0 Existing Stations, Staffing and Deployment Model**.

4.6.2 Fire Behaviour

Time is a critical component with respect to fire behaviour including the intensity and growth of a fire from the time of ignition. During the early stages of a fire, heat is transferred from the point of origin through convection, conduction or radiation. Within a confined area, such as a bedroom, a free burning fire will continue to produce heat at a much faster rate than the area can naturally ventilate. This rapidly escalating heat within the area can cause a condition called “flashover” which occurs when all of the combustible materials almost simultaneously reach their auto ignition temperature. Even though many of the combustible materials may have different ignition temperatures the heat within the area is increasing so rapidly that all of the combustible materials reach their ignition temperature at the same time.

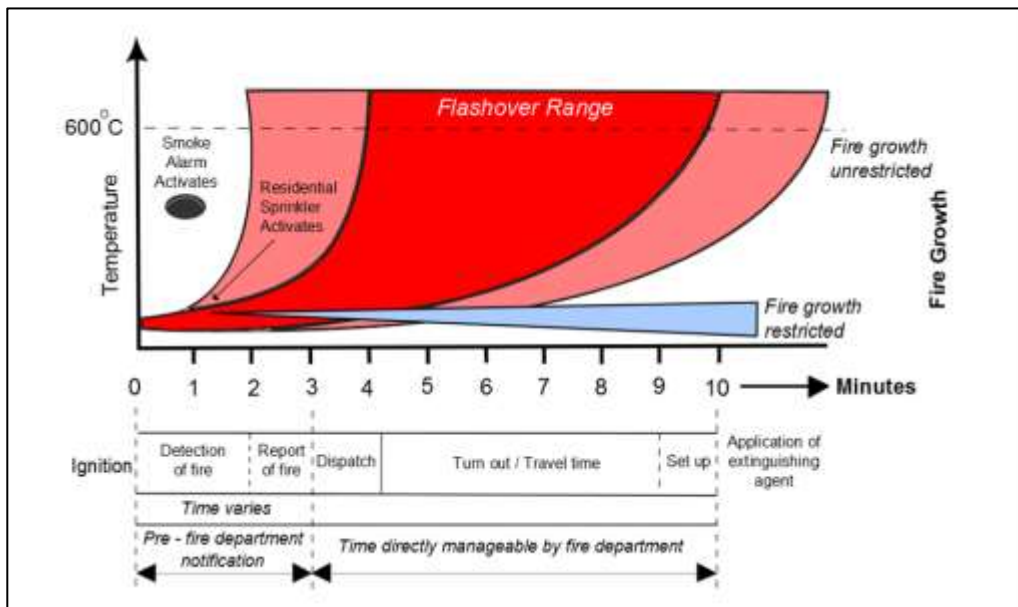
Under these conditions the combustible materials within the area that contain organic materials undergo a thermal decomposition releasing highly flammable vapours. This “flashover” condition occurs due to the release and spontaneous ignition of these highly flammable vapours within a confined area.

The evolution of construction materials and technology, particularly within new construction, is creating homes that are significantly more energy efficient than traditional construction. These advances in energy efficiency are primarily as a direct result of advances in insulation materials and vapour barrier design that have improved air infiltration into the home. Other improvements to window design and construction have further reduced the infiltration of outside air into the home.

The fire service industry is also recognizing that the design and construction of interior furnishings and combustibles that are exposed under fire conditions are also contributing to a more rapid fire growth, and release of highly flammable vapours. These design, construction and material factors are contributing to an even more rapid build-up of heat within a confined area resulting in flashover conditions being present much faster than in the past.

Fire propagation curves have been used by the fire service for many years to demonstrate the relationship between fire behaviour and growth in relation to temperature and time. **Figure 3** reflects an example of a fire propagation curve based on our review of current industry research and firefighting standards.

Figure 3: Example Fire Propagation Curve



Reference: Fire underwriters survey “Alternative Water Supplies for Public Fire Protection: An Informative Reference Guide for Use in Fire Insurance Grading “May 2009 and NFPA “Fire Protection Handbook” 2001

In comparison to historical propagation curves that reflected flashover occurring at some point within an eight to ten minute time period from the time of ignition, more recent analyses indicates that flashover can occur as early as within three to five minutes of the time of ignition.

Understanding factors such as “growth rate” and “time” in terms of how rapidly a fire can reach a critical stage such as “flashover” are important considerations in assessing programs and activities that focus on fire prevention, injury reduction and providing a safer community through an integrated strategy of community risk reduction.

One of the strategic priorities of this FDMP is the optimization of the three lines of defence including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment. This includes options to further enhance existing programs and activities and new initiatives targeting the pre-fire department notification including:

Home Smoke Alarm Program:

Research indicates that the presence of working smoke alarms within the home will increase the survival rate of occupants during a fire situation. Fire investigations indicate that occupants are most vulnerable when they are sleeping which is when the majority of fatal fires occur. The risk of a fire related death or injury could be significantly reduced with the presence of working smoke alarms on every floor of the home and adjacent to sleeping areas. Working smoke alarms and a home fire escape plan provide occupants with the time necessary to successfully escape a fire situation.

As a component of a proactive public education program targeting the pre-fire department notification phase of a fire, the provision of a pro-active Home Smoke Alarm Program is an effective strategy to enhance fire prevention education, and reduce the probability of a fire related injury or death.

Benefits to the provision of a pro-active Home Smoke Alarm Program include:

- ✓ Validate the presence of properly installed and working smoke alarms in all residential occupancies;
- ✓ Reduce the probability of fire related deaths and injuries as a result of fire;
- ✓ Provide valuable educational information to home owners about the importance of maintaining working smoke alarms;
- ✓ Inform occupants about the importance of having an effective home fire escape plan, and practicing the plan on a regular basis.

Home Fire Escape Planning:

A Home Fire Escape Plan will provide occupants of the home with a predetermined course of action in the event of a fire. Through advance planning and practice a Home Fire Escape Plan can enhance the occupant's fire prevention education and reduce the probability of injuries occurring as a result of a fire. In the event of a fire human behaviour suggests that you exit the room or building in the same manner that you entered. In a fire situation this exit path may not be available as a result of rising heat conditions, the presence of smoke and fire. Ensuring there are two exits from every room, which are easily accessible and functioning, is an important component of a Home Fire Escape Plan.

Providing public education including the process and benefits of preparing a Home Fire Escape Plan is also a critical component of the pre-fire department notification phase of a fire.

- ✓ Elements of a Home Fire Escape Plan should include:
- ✓ The identification of a secondary exit from all rooms;
- ✓ Floor plans of the home that identify alternate exits such as windows;
- ✓ Identify alternate exit paths such as porch or garage roofs;
- ✓ Recognize if there may be individuals with disabilities who may need assistance;
- ✓ Identify a meeting place outside of the home for all occupants;

Preparing the plan, and taking time on a regular basis to review the plan with all occupants of the home, and practicing using the alternative exits will further reduce the probability of a fire related injury or death.

Residential Sprinklers:

The installation of residential sprinklers is a further strategy towards the mitigation of a fire in a residential occupancy during the pre-fire department notification phase. Research conducted by the National Fire Protection Association indicates that residential sprinklers can have a significant impact on injury reduction including:

- ✓ Reduce civilian fire injury medical costs by 53%;
- ✓ Reduce civilian fire injury total costs by 41%;
- ✓ Responsible for an estimated 65% reduction in firefighter fireground injuries.

Residential sprinklers are designed to activate when the heat sensing element within the sprinkler head is activated by the presence of a fire. The sprinkler head activates releasing a fine mist of water to suppress or extinguish the fire, preventing the growth of the fire in relation to the fire propagation curve shown in **Figure 3**.

Research indicates that over 220 jurisdictions across North America have adopted requirements for the installation of residential sprinklers. Examples of these communities include Scottsdale Arizona, and Vancouver British Columbia. Both communities require the installation of residential sprinklers within all new residential occupancies.

LFES has been active in promoting the use of residential sprinklers with the Canadian Home Builders Association, Lethbridge Region, and the Office of the Fire Commissioner, Alberta. Requirements to install residential sprinklers in new residential occupancies would require revisions to the Alberta Fire Code.

The fire progression curve further emphasises the importance of time during the “pre-fire department notification” fire growth period. This is the time period not impacted by any actions by the fire department. The time period controlled by the fire department begins when the call is initially received by “dispatch” and includes several other components leading up to the initiation of “intervention” by fire suppression staff.

4.6.3 Time Directly Manageable by Fire Department

The time directly manageable by a fire department as identified within the fire propagation curve example is measured in the total response time. This can be defined by three primary components including: *dispatch time*, *turnout time*, and *travel time*. Together these three components make up the total response time it takes for a fire and emergency service to receive an emergency call either from someone at the scene or with knowledge of the fire, identify the location of the emergency, dispatch appropriate apparatus and staff, travel to the scene of the incident, and set up to begin fire suppression activities. The common definitions of these components are:

1. **Dispatch Time:** The time that it takes for the person responsible for “*alarm answering*”, and “*alarm processing*” to be able to receive the call, and dispatch the appropriate apparatus and staff to respond to the emergency.
2. **Turnout Time:** The time interval that begins from when the emergency response staff receives the required dispatch notification, and ends at the beginning point of travel time.

3. Travel Time: The travel time interval begins when the assigned emergency response apparatus begins the en-route travel to the emergency, and ends when the apparatus arrives at the scene.

4.6.4 *Fire Suppression Industry Best Practices*

Within Alberta there is currently no specific legislated standard that a community must achieve with regard to the type of firefighter (career/part-time/volunteer) or the number of firefighters and apparatus required to respond to any given incident.

Over the past decade there has been a transition within the fire service industry across North America to the utilization of community risk-based analyses to determine the appropriate level of firefighter deployment based on the critical tasks to be performed to effectively, efficiently and safely conduct fire suppression operations.

In our view the process for determining best practices within the fire service across Canada should consider the research and experiments conducted by the National Institute of Standards and Technology including their report on *Residential Fireground Field Experiments* and *Report on High-Rise Fireground Field Experiments*. The results of these field experiments contribute to expanding the knowledge and experience of the fire service in addition to providing the technical analyses that contributes to the development of the National Fire Protection Association standards.

4.6.5 *National Fire Protection Association (NFPA) 1710 Standard*

The NFPA 1710 “*Standard for the Organization and Deployment of Fire suppression Operations, Emergency medical Operations, and Special Operations to the Public by Career Fire Departments*” provides a “**benchmark**” for comparison purposes only to assess the number of firefighters required based upon recognized industry best practices.

NFPA 1710 is a standard that is designed for larger municipalities such as Lethbridge that as a result of many factors are operating their fire department utilizing substantially career firefighters. Relevant references from NFPA 1710 include the following:

- This standard applies to the deployment of resources by a fire department to emergency situations when operations can be implemented to save lives and property.
- The standard is a benchmark for most common responses and a platform for developing the appropriate plan for deployment of resources for fires in higher hazard occupancies or more complex incidents.

The NFPA references support the strategic priority of saving lives and property, as well as providing a recognized standard for comparing the existing fire suppression services levels of the LFES to service levels based on the complexity and level of risk present. In the case of NFPA 1710 this refers to a single family dwelling (moderate risk).

This standard identifies the minimum deployment of firefighters based on an “Initial Arriving Company” and an “Initial Full Alarm Assignment”.

4.6.6 Initial Arriving Company – “Initial Response”

Initial response is consistently defined in the fire service as the number of firefighters initially deployed to respond to an incident. Fire service leaders and professional regulating bodies have agreed that until a sufficient number of firefighters are assembled on-scene, initiating tactics such as entry into the building to conduct search and rescue, or initiating interior fire suppression operations are not safe practices. If fewer than four firefighters arrive on scene, they must wait until a second vehicle, or additional firefighters arrive on scene to have sufficient staff to commence these activities.

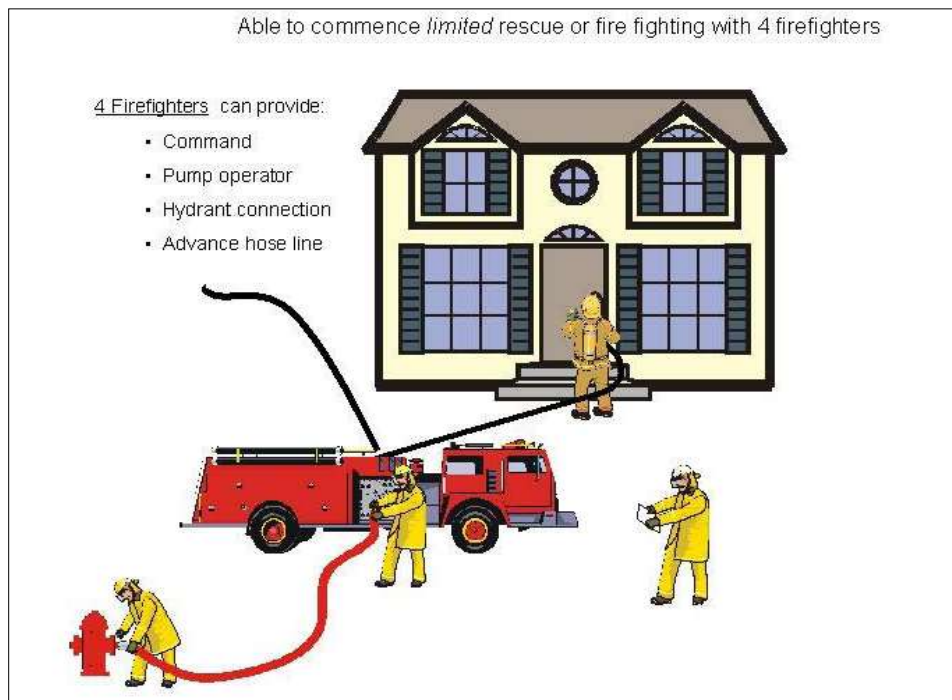
The NFPA 1710 refers to the Initial Arriving Company as an Engine Company and further defines the minimum staffing level of an Engine Company as four firefighters whose primary functions are to pump and deliver water and perform basic firefighting at fires, including search and rescue.

An initial response of four firefighters once assembled on-scene is typically assigned the following operational functions. The Officer in charge shall assume the role of Incident Command; one firefighter shall be designated as the pump operator; one firefighter shall complete the task of making the fire hydrant connection; and the fourth firefighter shall prepare an initial fire attack line for operation.

The assembly of four firefighters on the fire scene provides sufficient resources to safely initiate some limited fire suppression operations. This first crew of four firefighters is also able to conduct the strategic operational priority of “size-up” whereby the Officer in-charge can evaluate the incident and where necessary, request an additional depth of resources that may not have been dispatched as part of the initial response.

Fire scene responsibilities of an Initial Response are highlighted in **Figure 4** below.

Figure 4: Initial Response Fire Scene Responsibilities



The NFPA 1710 standard identifies an initial response deployment of four firefighters to effectively, efficiently and safely conduct initial fire suppression operations. The critical tasks with four firefighters on-scene include incident command, pumper operator, hydrant connection and advancing a hose line. This relates to a low-risk call response or an initial response for all calls.

4.6.7 Initial Full Alarm Assignment – “Depth of Response”

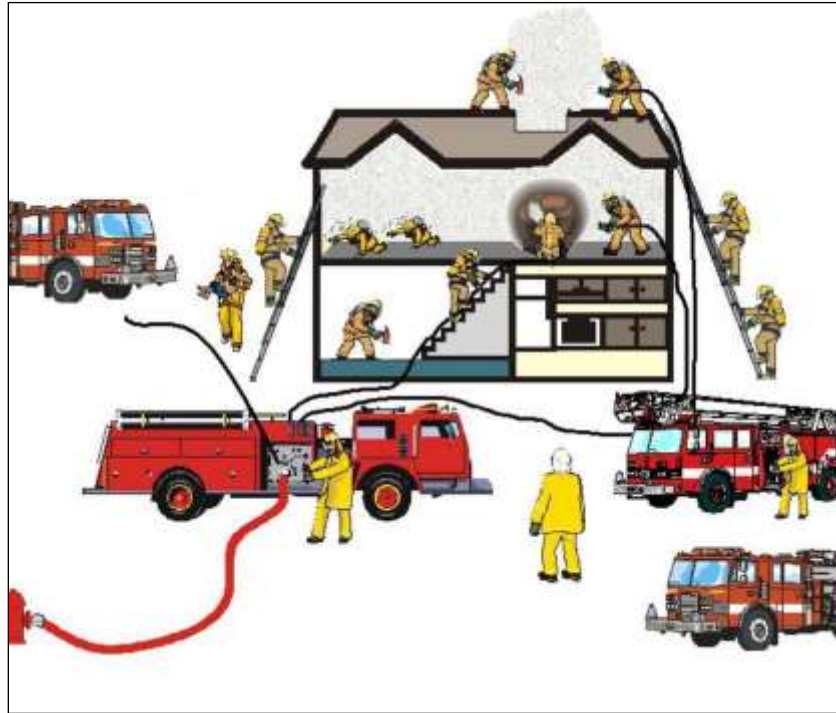
In comparison to the Initial Response the depth of response relates to the “total” number of firefighters initially assigned to an incident. Depth of response is also commonly referred to as “First Alarm” or “Full Response”. For example NFPA 1710 defines “Initial Full Alarm Assignment” as “Those personnel, equipment, and resources ordinarily dispatched upon notification of a structure fire.”

This standard utilizes the example of a fire risk scenario in a 2,000 square foot, two-story single-family dwelling without a basement and with no exposures present. This represents a typical home of wood frame construction located in a suburban neighbourhood having access to a municipal water supply including fire hydrants. Within this study this occupancy would be classified as a Group C - Residential Occupancy (moderate risk).

It is very important to recognize that depth of response is referring to the “total” number of firefighters **initially** assigned to an incident. The total number of firefighters assigned to an incident can vary based on the type of occupancy and the level of risk present. Fires involving occupancies that have been assigned a higher level of risk such as moderate, or high may require a larger number of firefighters as part of the initial depth of response.

The NFPA 1710 standard for depth of response to the fire risk scenario presented (moderate risk) is fourteen firefighters, fifteen if an aerial device is to be used. The NFPA 1710 fire scene responsibilities for depth of response including an aerial are highlighted in **Figure 5**.

Figure 5: Depth of Response Fire Scene Responsibilities



(Shown including an aerial device – 15 firefighters)

The NFPA 1710 standard identifies a depth of response deployment of 14 firefighters (with one additional firefighter with an aerial on-scene) to effectively, efficiently and safely conduct initial fire suppression operations in a fire risk scenario representing a single-family detached dwelling. Within this FDMP this occupancy would be classified as a Group C - Residential Occupancy (moderate risk). The critical tasks for a moderate level risk include:

- *Incident Command / Accountability (1 firefighter)*
- *Pump Operator (1 firefighter)*
- *Two Attack Lines (4 firefighters)*
- *Search and Rescue (2 firefighters)*
- *Forcible Entry (1 firefighter)*
- *Water supply (1 firefighter)*
- *Initial Rapid Intervention Team (2 firefighters)*
- *Ventilation (2 firefighters)*
- *Laddering - Aerial – (additional 1 firefighter, optional)*

4.6.8 LFES Current Mobilization Performance Benchmarks

In 2013 the LFES conducted research and testing into the development of mobilization performance benchmarks for chute times (turnout time) for both fire and EMS calls.

Table 4: Fire/EMS Turnout Time Service Level Objectives

Service	Time	Objective	Type of Response
EMS	110 Seconds	90%	All Medical Incidents excluding Transfers
Fire	130 Seconds	90%	All Bravo, Charlie, Delta, Echo Fire Incidents

¹Notice #063 published by LFES in April 2013, details mobilization performance benchmarks.

4.6.9 Emergency Medical Services (Ambulance)

LFES provides emergency medical services as a contracted provider to Alberta Health Services. The LFES fully-integrated Fire/EMS operating model has been serving the community for the past 100 years. This operating model includes the cross training of firefighter/paramedics to staff both fire apparatus and ambulances. As per legislation, and the agreement with Alberta Health Services the LFES is required to staff ambulances with a minimum of two paramedics. This is achieved by LFES using firefighters cross-trained to perform functions of both roles.

In addition to staffing ambulances the LFES and Council further support the fully-integrated fire/EMS operating model by staffing fire apparatus with trained firefighter paramedics/EMTs to provide Advanced Life Support (ALS). When responding fire apparatus with firefighter paramedics/EMTs (referred to as 'firefighters' in this report) arrive on scene prior to an ambulance they are able to initiate advanced life support patient care. This fire/EMS operating model significantly enhances the emergency medical services provided to the community.

4.6.10 EMS Staffing and Operations

The core function of EMS (ambulance) service is to provide emergency medical response in the field, arriving in a timely fashion to provide care that satisfies the contractual obligation with Alberta Health Services.⁹ Mobilization benchmarks for ambulance service are found in **Table 4**.

An important component of the staffing and operations model for the EMS division is the dispatch partnership in place with Alberta Health Services as described in **Section 4.4.10**. Increasing call volumes and new deployment strategies are putting increased pressure on the division and its resources.¹⁰ The cooperative service agreement with the County of Lethbridge (see **Section 4.4.9**) also influences the demands on EMS staff.

The LFES currently staffs four ambulances at all times and staffs four additional ambulances (peak time) during the daytime with staggered start times between 0700 hours and 1200 hours. **Table 5** presents the EMS calls responded to by LFES from 2012 to 2015, showing a steady increase in EMS calls for service year over year.

Table 5: LFES EMS Responses (2012 to 2015)

Year	Number of EMS Responses
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⁹ Source: Fire & Emergency Services Business Plan 2012 to 2014

¹⁰ LFES 2012 Annual Report

2012	11,953
2013	12,321
2014	13,329
2015	13,800

4.6.11 EMS Administrative Roles and Responsibilities

The two primary roles relating to the EMS core service are EMS Operations Officer and EMS Resource Officer. The positions and their responsibilities are outlined in **Table 6**.

Table 6: EMS Job Summaries

Staff Assigned	Position	Responsibilities / Assigned Duties
1	EMS Resource Officer	<ul style="list-style-type: none"> Assess, monitor, and continuously improve emergency medical services, processes, and programs. Participate, contribute, and advocate with internal and external stakeholders in order to build, enhance, and monitor programs and services. Advocate for the development and advancement of EMS for the community, stakeholders, and the Province of Alberta.
1	EMS Operations Officer	<ul style="list-style-type: none"> Supervised by the EMS Resource Officer, support in the provision and direction of EMS ambulance operations. Develop strategies, administer policies, and enhance the processes with resources, guidance and leadership. Advocate for LFES ambulance operations by working with all necessary internal and external stakeholder groups. Advocate for the development and advancement of EMS for the community, stakeholders, and the Province of Alberta.

4.7 Emergency Preparedness

Emergency preparedness and municipal emergency planning are overseen by the Emergency Preparedness Manager.

4.7.1 *Municipal Emergency Plan (MEP)*

Under the *Municipal Government Act* and the *Emergency Management Act*, Alberta municipalities are responsible for managing the initial response to an emergency event. The Alberta Emergency Management Agency (AEMA) coordinates provincial support and standardization for municipal emergency planning, and supports municipalities when an event exceeds local response capabilities. The AEMA also provides municipalities with Alberta Emergency Alert, a communications tool that allows municipal officials to quickly warn residents of emergency events. The City of Lethbridge is required to have qualified staff ready to operate Alberta Emergency Alert, should the need arise.

The AEMA provides a model emergency plan and self-assessment tool for municipalities that facilitate local risk assessment, responses, and coordination with other municipalities in the region. The model emergency plan is designed in a generic fashion that allows it to respond to situations that are unexpected and require a coordinated and effective response and recovery. The current emergency plan model and self-assessment tool are being revised and replaced by the AEMA, after which the City's plan, and all emergency plans across the province, will have to be updated.

The City of Lethbridge and LFES have a Municipal Emergency Plan (MEP), which is enacted under the authority of the *City of Lethbridge Emergency Management By-law No. 5679*. The MEP describes the duties, functions and actions for various staff with emergency management responsibilities. The MEP is put in place to protect human health, property, and the environment during an imminent or actual emergency.

The Emergency Advisory Committee is an appointed panel responsible for developing and managing the MEP, and for its annual reviews. The Committee is required to ensure the MEP is updated according to the revised AEMA model emergency plan once it is released.

The MEP is overseen by a Director of Emergency Management (DEM), whose role is currently assigned to the Fire Chief or designate.

The MEP includes the formation of the Lethbridge Emergency Management Agency (LEMA), which consists of all of the significant stakeholders from various City departments. LEMA reports to the DEM and is tasked with the preparation and execution of the MEP. LEMA's resources include the Emergency Operations Center, a protected site from which it can coordinate with other officials from the City and LFES to monitor the response and enactment of the MEP.

The most recent version of the MEP dates from May 2014. Following the completion of the planned revisions to the current emergency plan model and self-assessment tool by AEMA it is recommended that the City update the current MEP.

4.8 Support Services – Training Division

The Deputy Chief of Support Services oversees the LFES Training Division. The positions of EMS Training Officer and Fire Training Officer report to the Deputy Chief of Support Services. The Deputy Chief of Support Services is also the direct report for the EMS Resource Officer and the Equipment Technician.

Working collaboratively the training officers coordinate a broad spectrum of legislated and non-legislated training to sustain the required skills and competencies required for the delivery of firefighting and advanced care medical services.

LFES is committed to ensuring that department staff are well trained in relevant medical and safety procedures, applicable protocols, safety procedures, and patient care. LFES has developed carefully designed processes and training programs to meet these on-going needs.

This section examines the processes and details the programs currently in place. It covers: staffing and the training structure hierarchy for LFES; specialized training services; live fire training; succession planning; promotional/recruitment process; company officer training; and training facilities.

4.8.1 EMS Training

For EMS training, the department provides on-going annual medical training for its Basic Life Support and Advanced Life Support providers. It utilizes certification courses as well as interactions with other Alberta Health Services agencies and teaching Institutions to achieve its training goals.

4.8.1.1 EMS Training Staff

Under the direction of the EMS Training Officer emergency medical care training is facilitated on each of the fire suppression platoons through the utilization of EMS Field Trainers. The roles and responsibilities for emergency medical care training are outlined in **Table 7**.

Table 7: Emergency Medical Care Training Roles and Responsibilities

Staff Assigned	Position	Responsibilities / Assigned Duties
1	Medical Training Officer (MTO)	<ul style="list-style-type: none"> • Senior trainer responsible for overseeing and directing the training of EMS responders; • Operates under the direction of the Deputy Chief of Support Services and AHS Medical Director; • Develops and oversees implementation of monthly and annual training plans; • Responsible for the coordination, delivery and reporting of EMS training and ensures record keeping of training; • Responsible for directing and supervising the work of the EMS Field Trainers; • Regularly evaluate the EMS Field Trainers (assesses daily operations and carries out annual performance evaluation); • Takes refresher and additional training to maintain or obtain certification(s) as necessary; and, • Attends various EMS related workshops and conferences to maintain and enhance EMS skills and networking with other EMS trainers.
4	EMS Field Trainers (1 per Platoon)	<ul style="list-style-type: none"> • Operate under the direction of the MTO; • Deliver new or refresher training in a timely fashion to on-duty crews; • Audit patient care reports (Level 3 supervisory) as required by AHS; • Develop training modules and lesson plans; • Document and submit platoon medical training records; • Evaluate individual training performance and make recommendations for improvement; and, • Participate in refresher and supplemental training as required.

(Source: Lethbridge Fire and Emergency Services)

4.8.1.2 EMS Training Program

To be considered for employment with LFES, the candidate must be a registered Paramedic Emergency Medical Technician with the Alberta College of Paramedics.

Once employed by LFES, candidates enter into a ten-week training program. With respect to EMS training, candidates receive the following instruction:

- One week of extensive review of Alberta Health Services Medical Control Protocols.
- Introduction to all medical equipment:
 - Kits, EMS Supplies, Pharmacology Inventory, ZOLL Cardiac Monitors, Smart Bag BVM (Bag Valve Mask), and EZ Intraosseous.
- Ambulance unit familiarization.
- Alberta Ambulance Information Management System.
- Patient Care Report (PCR) and PCR Auditing training.
- City and County map training.
- Chinook Regional Hospital Familiarization:
 - Triage desk, triage scale, patching, emergency room orientation, tele-health, Labour and Delivery, Neonatal Intensive Care Unit/Intensive Care Unit, day procedures.
- Guest lectures (Provincial Stroke Strategy and Cardiac Rehab).
- Radio familiarization and operations.

For current members, LFES has a well-structured training program that is intended to provide both introductions to new equipment and techniques, as well as refresher training. All LFES staff (Fire and Emergency) are required to undergo annual training on both Basic Life Support (BLS) and Advanced Life Support (ALS). The annual BLS Training includes:

- Heath & Stroke Foundation's Basic Life Support for Health Care Provider
 - CPR Level C, airway maneuvers, ventilation, AED refresher

Annual ALS Training includes:

- Heath & Stroke Foundation's Basic Life Support for Health Care Provider
 - CPR Level C, airway maneuvers, ventilation, AED refresher
- American Heart Association's Advanced Cardiac Life Support Provider/Refresher course
 - Covers topics such as: BLS primary survey and ALS Secondary Survey, ACLS Team Dynamics, ACLS Cores (i.e. Asystole, PEA, V-Fib), pharmacology review, advanced airway review and demonstration, etc.

Monthly BLS Training is taking by all EMS staff, as outlined by the Medical Training Officer (MTO). This training is facilitated by the on-duty MTO and senior paramedic staff (eight years of service or more). The process by which this training is followed is that the MTO will receive training direction from Alberta Health Services to implement Medical Control Protocol training. All medical personnel are also required to take Disorders of Respiration and Heart and Circulation.

This review indicates that the current EMS training program is designed and delivered to meet the requirements of the Alberta Health Services including a stringent certification and re-certification process including a high degree of quality assurance. No recommendations for change or revision were identified by this review.

4.8.2 Firefighter Training

Based on our experience and knowledge of the fire service, firefighter training is an area that has come under a high level of scrutiny over the past decade. In contrast to the regulations and quality assurance requirements of EMS training the results of numerous inquests and investigations have concluded that firefighter training must be considered a strategic priority for municipalities in their role as employer and fire service leaders as supervisors.

There are three functioning bodies for recruitment training, and continued career training for firefighters in Alberta: the National Fire Protection Association (NFPA), the International Fire Service Training Association (IFSTA), and the International Fire Service Accreditation Council (IFSAC).

4.8.2.1 Firefighter Training Staff

Under the direction of the Fire Training Officer firefighter training is facilitated on each of the fire suppression through the respective Platoon Chiefs and Captains. The roles and responsibilities for the Fire Training Officer are outlined in **Table 8**.

Table 8: Fire Training Officer Roles and Responsibilities

Staff Assigned	Position	Responsibilities / Assigned Duties
1	Fire Training Officer (FTO)	<ul style="list-style-type: none"> • Schedule, facilitate, and set up Fire and EMS course; • Manage training facility, tower, classroom, and equipment; • Instruct, proctor and evaluation on fire courses through the Alberta Fire Commissioners Office; • Develop training on new equipment; • Operate propane props, facilitate live-fire scenarios with crews in coordination with Platoon Chiefs and Captains; and, • Officer development, command training, strategy tactics, and daily training needs of platoons.

The current fire training staffing model does not include the utilization of on duty field trainers assigned to each platoon as used for EMS training. The EMS field trainers provide a valuable depth of resource to support the Medical Training Officer.

Within the current model to coordinate and deliver training to all staff on each of the four platoons the current LFES organizational structure includes Platoon Chiefs, Captains, Fire Training Officer, and Medical Training Officer. This current model works well to develop and deliver the required training. Based on our review one of the most significant challenges the department faces is coordinating, or tracking the training that each individual receives.

Coordination is currently facilitated through a number of processes, however, due to vacation, sickness or for other reasons it is difficult for the department to remain current in tracking and scheduling the training each individual firefighter is required to receive. Assigning a Captain from each Platoon with the role and responsibility to coordinate training for all staff on that platoon would provide a single point of contact for tracking and scheduling training for all staff on that platoon.

It is recommended that the LFES consider appointing a Captain from each Platoon to oversee the coordination of training on that platoon.

4.8.2.2 Current Firefighter Training Program

Firefighter training begins at the recruit stage and requires commitment to an ongoing process of learning both the theoretical and practical job related tasks of a firefighter. Training also includes the development of future officers through the delivery of leadership and supervisory programs. Preparing and administering the promotional process is another important function of this division.

The current training program is prepared by the Fire Training Officer and delivered primarily by the on duty Captains at each station and overseen by their respective Platoon Chief. In contrast to the delivery of medical training that utilizes EMS Field Trainers, one of the major challenges of the Fire Training Officer is sustaining consistency in the delivery of the training program.

In the absence of a coordinated delivery program that includes ongoing competency evaluation, variances can occur on a crew or platoon level that are not consistent with the application of the required competencies across the department. Within the EMS Division, the EMS Field Trainers are integral to sustaining core competencies and consistencies across the department.

The current fire training program reflects the core competencies of firefighting based on best practices and legislated standards within the province. It also includes unique training initiatives such as the three-year initiative through the International Academy of Professional Driving. In addition to the challenges of coordinating training on each platoon as described in Section 3.8.2.1 facilitating and delivering the fire training program is challenging the current level of dedicated training staff. Developing a fire training staffing model that reflects the utilization of on duty field trainers similar to the EMS model is recommended.

Fire Field Trainers from each Platoon would provide an additional training resource. Coordinated by the Fire Training Officer the Fire Field Trainers would also provide the opportunity for the Fire Training Officer to be more active in the overall monitoring of the fire training program including quality assurance.

It is recommended that LFES consider the addition of Fire Field Trainers (equivalent to the existing EMS Field Trainers) to support firefighter training in the department.

4.8.2.3 Annual Training Hours

All training is tracked through a computerized training program; there was a total of 16,328 person hours of training recorded in 2015. Lethbridge Fire and EMS total training hours by year, from 2012 to 2015 are illustrated in **Figure 6** below.

Figure 6: LFES Training hours by year



4.8.2.4 Live Fire Training

The purpose of live fire training provides realistic practical fire training simulations under safe and controlled conditions. Live fire training exercises are intended to simulate the actual fire conditions that a firefighter may encounter and provide simulated heat, humidity, restricted vision and smoke conditions. This type of training is also very beneficial for firefighters and particularly Company Officers in learning to understand fire behaviour under certain conditions, and smoke conditions as they may relate to the potential for fire extension or conditions such as a “flashover.”

The LFES makes use of a newly renovated fire training facility located at 2825 5th Avenue North. Renovations to this facility included the removal of the original combustible material burning prop and installation of new technology that utilizes propane as the heat source. This results in faster turnaround times for creating training scenarios (therefore improving the efficiency of training sessions), and also results in a more environmentally friendly facility. Live fire training using propane props is available throughout the three-storey training centre live fire burn tower. Other amenities include a 25 seat classroom and a board room.

The importance of sustaining practical training utilizing live fire simulations is directly related to the department’s mission to reduce fires. The focus of this FDMP is the utilization of the “*three lines of defence*” in continuing to provide an effective fire protection plan within the community. Further improving the success that the LFES has achieved in reducing the actual number of fires that firefighters respond to increases the importance of regular training in live fire situations in order to sustain the required skills and competencies of today’s firefighters, and officers.

It is recommended that regular participation in live fire training be included within the proposed comprehensive annual training program for firefighters within the LFES.

4.8.2.5 Specialized Fire Training Services

In addition to basic firefighting training the department must also consider the training needs associated with responding to emergency calls requiring a high degree of technical skill and competency. This includes responses to incidents that may involve hazardous materials, rescues involving water and ice including the current dive team, and rescues requiring a high degree of skills in the use of ropes and rigging.

Communities such as Lethbridge do not typically have a high degree of probability of one of these incidents occurring. A review of the past five years of emergency response calls confirms that there has not been a large volume of these types of incidents. However, the Community Risk Assessment (included within **Appendix C - Fire Accreditation Report**) does identify the types of geography, road network, building stock, and growth that can be attributed to the occurrence of these types of incidents.

Our review identified that the following specialized services (technical rescues) are currently being provided through utilization of dedicated teams that are highly qualified within their area of response, and supported by on duty fire suppression staff.

- Hazardous Materials Response – NFPA 472 Technician Level - Hazmat Team
- Water/Ice Rescue – Water Rescue/Dive Team/Boat Training
- High/Low Angle Rope Rescue – Rope Rescue Team

The LFES model of utilizing dedicated teams for these responses is an effective operational strategy. It allows the department to identify and train a specific number of firefighters to a higher / more specialized training standard than what would be required of a typical firefighter. The challenge with the model is the high financial cost of sustaining this degree of training. This includes the fees associated with attending certification and re-certification courses, time for regular training by the teams to stay proficient, and the human resource costs of overtime when these staff are not performing their regular duties.

Fire services in general are looking at other more cost effective alternatives for providing specialized services such as those provided by the LFES. These services are low in probability but high in cost to deliver and sustain.

The analysis of the current LFES fire suppression staffing model reflects why other fire departments are assessing this service delivery model. The LFES model indicates that the current team based specialized services model affects the minimum number of on duty firefighters on a regular basis. Team members who are attending certification, re-certification or ongoing team training regularly reduce the number of firefighter’s available to staff front line fire apparatus. The delivery of specialized services utilizing the current team based model is impacting the day to day delivery of core fire suppression services.

During this review staff from the LFES identified a desire to enhance the current technical skills and competencies of the department in responding to incidents involving confined spaces such as trench rescues. This is a specialized service that the current Rope Rescue Team has experience in, however a higher degree of training and competency has been identified as being required. This is one specialized service that has the potential to benefit the community as well as having an internal benefit to the department as firefighters can become trapped in confined areas as a result of fighting a fire and require the technical skills associated with these types of rescues.

The need to sustain the current level of competency of the Water Rescue Team is another area that was discussed with members of the LFES (specifically sustaining the diving capabilities of the team). This is a service that has a very limited probability and one of the highest financial costs to operate. The regulations associated with diving require a significant commitment of staff time for certification and re-certification, as well as high operating costs to respond to an incident. There is no legislative requirement for the LFES to provide the service.

It is recommended that the LFES conduct a review of the current specialized services provided by the department. This analysis should consider the following:

- Financial operating costs of the sustaining the current team-based model;
- Partnership opportunities with other external agencies in the delivery of these services;
- Contracting these services to other agencies or the private sector;
- Enhancing the level of confined space, trench rescue capabilities of the department; and
- The need to sustain the diving capabilities of the Water Rescue Team.

4.8.2.6 Comprehensive Annual Firefighter Training Program

As a fully integrated provider of fire suppression and emergency medical services the LFES has been required to focus resources on the delivery of training related to sustaining the medical competencies required by the Alberta Health Services. The recent medical accreditation process that the LFES achieved acknowledges the department's commitment to training in this area.

The analysis of the current firefighter training program indicates areas where additional resources would benefit the quality and delivery of fire training.

It is recommended that the LFES develop a new comprehensive annual firefighter training program that responds to the relevant standards, curriculum and health and safety requirements, and include the following core functions:

- ✓ *Identification of training needs in relation to services provided;*
- ✓ *Coordination / scheduling of theoretical and practical training;*
- ✓ *Monitoring and evaluation in relation to outcomes achieved;*
- ✓ *Ongoing evaluation in relation to industry best practices and legislative requirements;*
- ✓ *Oversight of program objectives and records management; and*
- ✓ *Ongoing assessment of program delivery for efficiency and effectiveness.*

4.8.2.7 Succession Planning / Officer Development

Over the past decade fire departments and municipalities have recognized the value and importance of succession planning. Succession planning has not traditionally been a specific area of concern or consideration within the fire service in North America. An effective succession plan requires the implementation of strategies to ensure that opportunities, encouragement and additional training are available for those staff that may be considering further advancement within an organization. A comprehensive succession plan also supports the concepts of coaching and mentoring in support of staff considering future career opportunities.

In 2007, the LFES released a document titled “Enhancing Organizational Effectiveness through Leadership Development.” The document acknowledged a need to focus on technical training and a lack of focus on management and leadership skills development, of which succession planning is a component. The report highlighted important challenges that LFES faces in adhering to, and fitting in with, the administrative expectations of the City of Lethbridge.

The LFES has been responding to the findings of the 2007 report through a number of initiatives including:

Blue Card Incident Command Training:

This training and certification program is designed to provide staff who facilitate the role of “Incident Commander” at an emergency scene with the skills and knowledge to safely and effectively supervise and manage emergency and hazard zone operations. This program teaches officers how to command everyday incidents so when a major event happens they know how to react effectively.

Continuing Education:

The LFES is also supporting interested staff through a cost sharing formula to pursue a degree in fire service leadership/management. This includes the Bachelor of Public Safety Administration offered by the Justice Institute of British Columbia.

Leadership Training:

The LFES is currently working with Lethbridge College to develop a leadership program that is being targeted for delivery starting in the fall of 2014.

Officer development including those initiatives identified above are a core component of a departments overall focus towards developing a career path for staff and a succession plan for the department. Other components should support incremental growth and development and include a mentorship/coaching program as part of annual evaluation process.

It is recommended that the LFES consider the development of a comprehensive career development plan to support the succession planning needs of the department in the future.

4.8.2.8 Promotional Process

The Collective Agreement and department policies identify the eligibility and policies that inform promotions within the department.

Platoon Chief Training

Promotional training is requirement to move to the rank of Platoon Chief. Section 8.2.2 of the LFES Policy Manual establishes a standard for those who wish to prepare themselves for the promotion to Platoon Chief. Individuals are assessed based on Section 13.04(11) of their collective agreements and NFPA 1021 Level 1 is considered the standard for assessing adequate background for the position. Officers and firefighters are responsible for applying to a number of Fire ETC. courses.

Officer Evaluation

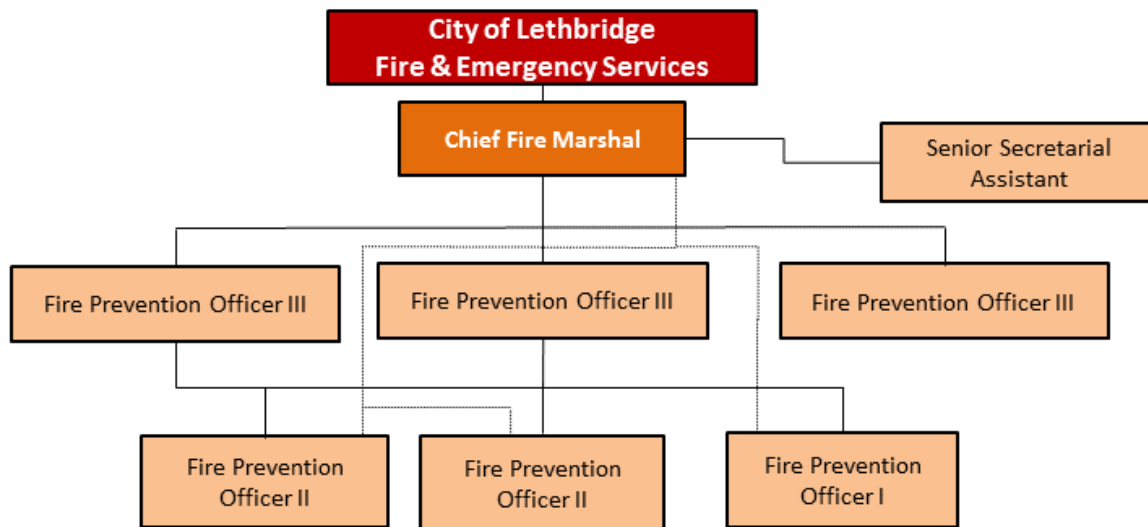
As a means of supporting and encouraging the continued success of employees, the LFES has a Performance Evaluation Guidebook recent to 2013. The Performance Evaluation program involves an annual performance evaluation and a review of employee objectives. The supervising officer coordinates the review and acts as a combination mentor/coach to the employee. The documents used for evaluation include: performance evaluation competencies; personal goals and objectives review; personal goals self-assessment; career development; goals for next year; and, an evaluation of the evaluator.

4.9 Office of the Fire Marshal Division (Fire Prevention and Public Education)

The Fire Prevention Bureau, whose organizational chart is seen in **Figure 7**, has eight employees total. All duties and positions are summarized in **Table 9**. The positions include a Chief Fire Marshal and Administrative Assistant and six Fire Prevention Officers (FPOs). ‘FPO IIIs’ are considered leaders within their divisions and closely monitor activities among certain portfolios that include: inspection and investigation; public education; and, development and planning.

The *Safety Codes Act* (SCA) and the department’s Quality Management Plan (QMP) require the designation of Safety Codes Officers (SCO’s) in conformance with Sections 31, 32, and 33 of the SCA. This designation can only be obtained when an individual member has obtained certification which involves completion of the required training. Currently, there are five Safety Codes Officers in LFES with both Group A and B Level 2 accreditation and two SCO’s with Group A and B Level 1 accreditation in Fire Prevention. Level 2 is the highest level of accreditation which enables LFES to administer all parts of the SCA and Alberta Fire Code.

Figure 7: Fire Prevention Organization Chart



(Source: Redesign of data from LFES)

Table 9: Fire Prevention Bureau Job Summaries

Staff Assigned	Position	Responsibilities / Assigned Duties
1	Chief Fire Marshal	<ul style="list-style-type: none"> Manages all activities of the Fire Prevention Bureau. Assigns regulatory and supervisory tasks as needed.
3	Fire Prevention Officer III	<ul style="list-style-type: none"> Report to Chief Fire Marshal. Act as leaders within division. Lead/assist in fire investigations and maintain inspection records. Read false alarm reports and identify issues within the community. Write orders under the AFC. Media relations. Quality Assurance of all fire investigation reports. Responsible for all public education. Acquires stats and maintains Fire Prevention website. Develops life safety training programs. Perform building plan reviews. Work with Building Safety and Infrastructure Services during construction and perform inspections. Supervise FPO I/III.
3	Fire Prevention Officer I/II	<ul style="list-style-type: none"> Report to FPO III and Chief Fire Marshal. Support and deliver all implemented fire prevention programs including fire investigation, inspections, and public fire safety education. Assist the public with fire safety information. Conduct routine inspections. Conducts fire origin and cause investigations. Conducts public education training. Responds to fire prevention inquiries, complaints, and requests from the public.
1	Administrative Assistant	<ul style="list-style-type: none"> Provide support as required.

(Source: Lethbridge Fire and Emergency Services)

Table 10 summarizes the fire prevention and public education activities undertaken by LFES and the time commitment required for each program or activity. Activities include fire extinguisher training, annual inspections, and various community programs. These programs are implemented for all types of audiences – children, seniors, general residents, industrial/commercial businesses, and university/college students.

Table 10: Fire Prevention and Public Education Activities

Activity / Program Name	Time Commitment (hours or days)
Annual Inspections	30 minutes to 3 days (per inspection) depending on size and property class of building
Fire Extinguisher Training	2 hours
Fire Safety	30 minutes
Fire Prevention Education	30 minutes
Fire Drills	30 minutes
Hazard House	1 hour
Community Heroes program	4 hours
Juvenile Fire-setter Program	1 hour
Children’s Festival	1 day
Station Tours	1 hour

(Source: Lethbridge Fire and Emergency Services)

4.9.1 Key Functions

The primary goal for fire prevention is to minimize the impact of fire risks and to decrease the threat of fire incidents. Under *Bylaw 5542 Establishment and Operation of a Fire and Emergency Services Department*, the Fire Chief is identified as responsible for “*all fire protection matters, including the enforcement of the Safety Codes Act and regulations thereunder.*”¹¹

Key functions of the Fire Prevention Bureau include the following:

- Inspections for compliance under the Alberta Fire Code;
- ‘Secondary Suites’ program to bring secondary residential suites up to fire safety standards;
- Permits for tank installations or removals, open burning, and the transportation of dangerous goods;
- Public education for a variety of citizens and businesses through lectures, class room visits, and involvement in community events (e.g. parades, trade shows, etc.);
- Investigations of select fire calls; and
- ‘False Fire Alarm’ program to attempt to reduce unnecessary responses in order to unnecessarily use resources.

4.9.2 Existing Fire Prevention and Fire Safety Programs

Utilizing the Community Risk Assessment (included as **Appendix C**) we assessed the current fire prevention and public safety programs provided by the fire department in relation to the municipality’s legislative responsibilities and our understanding of best practices within the fire service.

4.9.2.1 Fire and Life Safety Education Programs

Lethbridge Fire and Emergency Services acknowledge the benefits and importance of providing fire and life safety education programming to community residents. The department currently provides educational programs based on available resources. Fire safety education and awareness training programs currently in place include:

- “Three-minute Drill” ad campaign
 - Website, internet, radio and TV; and
 - Began in 2008 and used a short, provocative video to emphasize the importance of having a home fire safety plan.
- Fire Prevention Week
 - Includes a kit with fire statistics and fire safety tips; contest for children all across Alberta who complete an activity booklet.
- Winter Holiday Fire Safety

¹¹ Page 5

- Includes a kit with fire statistics and fire safety tips; there have been public service announcements that include bulletins, audio, and video.
- Summer Fire Safety and Burn Awareness Week
 - Both programs include a kit with fire statistics and fire safety tips.
- Smoke Alarm Program as part of the Home Safety Program.
- Fire Extinguisher Training
- Fire Safety Talks
- Fire Drills
 - Includes in schools and seniors residences.

The LFES also has a presence at the Home and Garden Trade Show, the Children’s Festival, Whoop-Up Day’s parade, and employs a program called “Fire Chief for the Day”

Table 11 shows the number and types of public education programs carried out from 2008 to 2015. From 2008 to 2015 there was a 112% increase in the number of public education classes taught by the Lethbridge Fire and Emergency Services. Nearly one-fifth of all public education classes taught over the eight-year period were a part of the Home Safety Program initiative. Fire extinguisher training was the second most active form of public education.

Table 11: Number of Public Education Classes Taught 2008 to 2015

Public Education Program	2008	2009	2010	2011	2012	2013	2014	2015
Fire Drills	41	44	26	60	78	85	72	54
Fire Drills - Schools	22	22	39	27	33	35	30	38
Fire Drills – Seniors Residences	7	15	9	11	14	6	4	12
Fire Extinguisher Training	72	109	83	91	108	70	33	78
Fire Prevention Education	23	16	20	15	42	66	71	118
Fire Safety	51	72	71	78	58	25	55	135
Fire Safety – Seniors	3	2	9	7	9	9	4	8
Fire Safety – Sparky	8	8	8	8	5	6	16	18
Hazard House	14	11	8	12	20	8	10	11
Home Safety Program	51	104	79	151	27	68	40	276
Juvenile Firesetter Program	5	10	11	5	7	3	1	2
Miscellaneous	33	43	68	63	53	40	19	16

Public Education Program	2008	2009	2010	2011	2012	2013	2014	2015
Party Program*	17	8	4					
Risk Watch*	1	0	0					
Station Tours	44	45	53	68	87	95	69	65
Total	392	509	488	596	541	516	424	831
<i>*discontinued in 2011</i>								

(Source: LFES)

Further analyses and recommendations for the delivery of fire prevention and public education services are contained within the Fire Prevention and Injury Reduction section of this review.

4.10 Core Business, Programs and Service Levels Summary and Recommendations

Our analysis of the Core Business, Programs and Service Levels of the LFES reflects a high degree of operational experience in managing a fully integrated fire/medical service. Through the collaborative leadership of the department management team the department provides a range of programs and services in response to the community’s needs.

The evolution of these programs and services in response to increasing legislative and regulatory requirements, as well as a community that is evolving through changing demographics, increasing population and overall community growth are challenging the department’s resources.

The LFES is a recognized leader in the delivery of basic and advanced medical care and has achieved accreditation acknowledging the effectiveness and efficiency of these services. Increasing demands for medical services over the past decade have required the LFES to focus dedicated resources and efforts on meeting the community’s needs in this area.

Sustaining the resources to match the degree of growth with the delivery of fire protection services, while sustaining the high degree of medical response, is currently challenging the department. This includes internal programs such as firefighter training as well as external services including fire suppression where resources have not increased to match service level delivery.

The recommendations within this division provide the first insight into the areas of the department where change should be considered to align with the increasing demands for both fire and medical services the department is facing.

The recommendations for Core Business, Programs and Service levels include:

1. That the LFES continues the current practice to review all by-laws and agreements affecting the department on a regular basis.
2. That the LFES continues to provide pro-active leadership in the utilization and application of mutual aid agreements.
3. That the LFES continues to monitor and update the current automatic aid agreements to ensure full cost recovery, including any consumables, staff time, and overtime.
4. That subject to Council's consideration and approval of this Fire Department Master Plan, there will be a need to conduct a review of all existing SOGs and where necessary complete revisions or develop additional SOGs to reflect all levels of service approved by Council.
5. That subject to Council's consideration and approval of this Fire Department Master Plan the department take the following steps regarding their internal standard operating guidelines:
 - Establish and empower a standard operating guideline committee composed of fire service staff to research, develop, and draft new standard operating guidelines and to update existing standard operating guidelines; and
 - Conduct a review of all existing standard operating guidelines and where necessary complete revisions or develop additional standard operating guidelines to reflect all levels of service approved by Council.
6. That the department continues the on-going process of regularly reviewing and updating department policies, operational procedures and relevant by-laws.
7. That the department continues to research and apply technology-based initiatives in order to improve the effectiveness and efficiency of the LFES and its operations.
8. That the department continues the current practice of preparing comprehensive and professional annual reports and that the Community Risk Assessment (**Appendix C**) be maintained on a regular basis and included within the annual reports to Council.
9. That the LFES continues to target a minimum initial response of four firefighters to provide sufficient firefighting resources to conduct initial fire suppression operations including the fireground critical tasks of:
 - Incident Command – 1 firefighter
 - Pump Operation – 1 firefighter
 - Attack Line - 2 firefighters (Confine and Extinguish)
10. That an appropriate **minimum depth of response** to the low, moderate and high risks occupancies within the City of Lethbridge to achieve the required critical fireground tasks includes four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies and 24 firefighters to high risk occupancies.
11. That following the completion of the planned revisions to the current emergency plan model and self-assessment tool by AEMA (Alberta Emergency Management Agency) it is recommended that the City update the current Municipal Emergency Plan (MEP).
12. That the LFES consider appointing a Captain from each platoon to oversee the coordination of training on that platoon.

13. That LFES consider the addition of Fire Field Trainers (equivalent to the existing EMS Field Trainers) to support firefighter training in the department.
14. That regular participation in live fire training be included within the proposed comprehensive annual training program for firefighters within the LFES.
15. That the LFES conduct a detailed review of the current specialized services provided by the department. This analysis should consider the following:
 - Financial operating costs of the sustaining the current team-based model;
 - Partnership opportunities with other external agencies in the delivery of these services;
 - Contracting these services to other agencies or the private sector;
 - Enhancing the level of confined space, trench rescue capabilities of the department; and
 - The need to sustain the diving capabilities of the Water Rescue Team.
16. That the LFES develop a new comprehensive annual firefighter training program that responds to the relevant standards, curriculum and health and safety requirements, and include the following core functions:
 - *Identification of training needs in relation to services provided;*
 - *Coordination / scheduling of theoretical and practical training;*
 - *Monitoring and evaluation in relation to outcomes achieved;*
 - *Ongoing evaluation in relation to industry best practices and legislative requirements;*
 - *Oversight of program objectives and records management; and*
 - *Ongoing assessment of program delivery for efficiency and effectiveness.*
17. That the LFES consider the development of a comprehensive career development plan to support the succession planning needs of the department in the future.

5.0 FIRE PREVENTION AND INJURY REDUCTION

The *Safety Codes Act (SCA)*, *Alberta Building Code (ABC)*, and *Alberta Fire Code (AFC)* are the legislating documents regarding fire safety in Alberta. These *Acts* provide some express requirements for the provision of fire prevention and public education initiatives.

The *Safety Codes Act* allows for the Lieutenant Governor in the Safety Codes Council to make regulations governing fire protection and the safe design, manufacture, construction, sale, installation, etc. of buildings, electrical systems, fire protection systems and equipment, among others. The *Alberta Fire Code* allows for the inspection of various facilities, and outlines specific fire prevention measures required at different facilities such as process plants, child care facilities, distilleries, etc.

In terms of public education, the Safety Codes Council, as stated in the *Safety Codes Act*, “may recommend to the Minister that it undertake to provide the Minister with advice on safety information, barrier-free design and access information, [and] programs and services”.¹²

The SCA Section 26(1) allows for the local authority to become an Accredited Municipality under the Act. To become accredited, a quality management plan must be submitted and approved. The plan outlines the scope and method of service provision. Becoming accredited allows for the municipality to administer parts of or all of the regulations in compliance with the SCA. The regulations that are applicable to LFES are the Alberta Fire Code (AFC). This is administered under the department’s Quality Management Plan (QMP).

5.1 Three Lines of Defence

As referenced previously within this report utilization of the “*Three Lines of Defence*” identified within the Ontario Comprehensive Fire Safety Effectiveness Model has proven to be an effective strategy in improving an overall community fire protection plan. In our view the “*Three Lines of Defence*” strategy aligns well with the current legislation and regulations within Alberta. This strategy is also consistent with the desire of the LFES to become more proactive in delivering public education and fire prevention programs.

The first two lines of defence including Public Education and Prevention, and Fire Safety Standards and Code Enforcement are defined as follows:

I. Public Education and Prevention:

Educating residents of the community on means for them to fulfill their responsibilities for their own fire safety is a proven method of reducing the incidence of fire. Only by educating residents can fires be prevented and can those affected by fires respond properly to save lives, reduce injury and reduce the impact of fires; and

II. Fire Safety Standards and Code Enforcement:

Ensuring that buildings have the required fire protection systems, safety features, including fire safety plans, and that these systems are maintained, so that the severity of fires may be minimized.”

¹² Source: Safety Codes Act, Section (18)i.

It is recommended that the LFES adopt the “*three lines of defence*” including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment as a “*strategic priority*” in the development and delivering of fire protection services.

5.2 Community Risk Assessment

Community risk assessment is an integral component of the Commission on Fire Accreditation International accreditation process and is an area receiving increased focus within the fire protection industry in North America. The community risk assessment is included as the “Community Risk Assessment” located within **Appendix C**. It is based on both physical and theoretical risk factors. Consideration was given to the community risk impacts of property stock, building height and area, building age and construction, building exposures, demographics, geography / topography / road infrastructure, fire loss statistics and fuel load. The analyses within the Community Risk Assessment utilize the major occupancy classifications of the Alberta Building Code (ABC) and Alberta Fire Code 2006 (AFC) to define the fire risk scenarios within the City of Lethbridge.

Integrating risk analyses into the process to determine the level of fire protection services to be provided by a municipality recognizes that there are alternatives to simply providing fire suppression services and emergency response. The introduction of sprinkler system is an example of integrating alternatives to managing the inherent risks of a building rather than simply developing a larger emergency response deployment plan.

5.3 Community-Based Fire Protection Model

The concept of a Community-Based Fire Protection Model comes from the evolution of a strategy based on the co-location of fire prevention / public education staff resources and fire suppression resources (firefighting crews) under one roof (e.g. at a fire station). This initiative was initially designed to achieve a consolidated, team-based and customer-focused approach to managing fire risks within a particular area of a community.

In larger communities, such as Lethbridge, this community-based strategy often aligns with many of the other strategic service level objectives of the municipality. Some examples of communities similar in size to Lethbridge that have initiated this type of model include the City of Markham and the City of Burlington in Ontario. The City of Oshawa, Ontario also recently approved the concept of the model and is moving forward with implementation. In our discussions with these and other municipalities that have implemented this concept, they have experienced evidence of significantly improved interaction and relationships between these two traditional functions (suppression and prevention) within the fire service. The impact of this has been more effective service delivery in both areas. It helps prepare fire suppression staff as they are advised regularly by the in-house Fire Prevention Inspector of building risks within their assigned response area. It also assists in pre-planning and expands public education and prevention activities through enhanced working relationships, cooperation, and assistance between the two divisions.

In our view adopting a community-based strategy does not necessarily require the co-location of staff from prevention/suppression in all stations, but more importantly a commitment to delivering services based on a community or district need that can be very distinctive across larger communities.

Benefits of a Community-Based Fire Protection Model that other municipalities have identified include:

- Access to expertise from all areas of fire safety

Similar to “a one stop shop” the Community-Based Fire Protection Model offers the opportunity to contact a local station and receive prevention and public education information at the local level, with a wide range of expertise available from both prevention and suppression staff.

- Local access to public education programs and learning opportunities.

Public education must be a major driver within the fire and emergency service. Access to programs at the community level through delivery at local stations would enhance the effectiveness of both the programs and the commitment to meet the needs of each community.

- Targeted risk management designed to address specific local needs.

The opportunity for both suppression and prevention staff to work together in addressing the fire risks within each district or community at the local level would enhance the ability to ensure proactive inspections and preplanning efforts are coordinated.

- Greater opportunity for input from stakeholders (i.e. residents)

A community-based program will provide the local communities with an opportunity for enhanced input into the specific programs required, as well as provide direct feedback to the staff delivering the services and programs.

- Improved visibility and openness of the fire stations as public resource buildings

The use of fire stations as a local meeting place for groups such as Neighbourhood Watch, offers the opportunity to enhance the use of the existing resources within the community. It also enhances the ability for staff to become familiar with the needs of the community through partnerships.

- Cross training opportunities

The opportunity to further develop suppression staff in areas of prevention and public education by working together with prevention staff will assist in providing a focus on public education and prevention.

The implementation of a Community-Based Fire Protection Model in the City of Lethbridge is consistent with the strategic priority of this FDMP to optimize the “*three lines of defence*”. Based on our analyses the LFES would benefit from further optimization of the Community-Based Fire Protection Model identified within this FDMP to enhance the overall level of services provided to the community and prioritization of the “*three lines of defence*”.

Expanding on the cross training opportunities for fire suppression staff (firefighters) in the role of fire prevention and inspection utilizing the current example of the dual role of fire/medics is one example of how the current LFES prevention/education initiatives could be enhanced. Assigning the roles and responsibilities of a basic Safety Codes Officer to a member of the fire suppression division on each platoon would significantly enhance the fire prevention initiatives and programming capacity of the department.

It is recommended that the LFES assign the roles and responsibilities of a basic Safety Codes Officer to one member of each of the four platoons.

5.3.1 Programs and Services

In our view priority should be given to implementing and expanding fire safety educational programs that address the vulnerable population identified within the Community Risk Assessment (Included in Appendix C).

Seniors (over 65) currently represent 15.2% of the community population. This is a somewhat higher percentage of population in comparison to the Provincial average of 11.1%. Identifying and implementing fire and life safety education programs targeted at seniors and other vulnerable groups such as children are recommended.

Programs that include information regarding cooking equipment and mitigating arson (which represented 24% and 15% of the ignition sources identified within the Community Risk Assessment) should also be considered a priority. As a result, it is recommended that a Home Safety / Home Smoke Alarm Program be reinstated.

The department is currently delivering programs targeted to several of the age groups noted with the Community Risk Assessment. In addition, there are a wide variety of educational programs and resource tools to facilitate the delivery of these programs available through the Office of the Fire Commissioner for Alberta. These include such programs / topics as:

- ✓ *Fire Escape Planning (general, children, seniors, apartments, disabled)*
- ✓ *The Arson Prevention Program for Children (TAPP-C)*
- ✓ *Smoke Alarms / CO Alarms*
- ✓ *NFPA Arson Presentation*
- ✓ *Fire Safe Cooking*

These programs effectively respond to the findings of the current Community Risk Assessment and together provide an appropriate level of fire and life safety education service delivery for the City of Lethbridge.

5.3.1.1 Fire Prevention Inspection Program

The primary roles of Lethbridge’s fire prevention inspectors are legislated by the *Safety Codes Act* whereby Safety Code Officers ensure compliance with codes and bylaws such as the Alberta Fire Code and complete inspections in a timely fashion. *Section 5.1.04* of the LFES Policy Manual states that “*designated Fire Prevention Officer III shall track outstanding inspections in FDM [Fire Data Management], and the Administrative Assistant will process billing for the second and subsequent inspections.*” The Safety Codes Officer (SCO) is also required to “*make every reasonable effort to educate and inform building owners about the code requirements, and explain in clear and understandable language the intent of the codes, etc. Further, the SCO will make every effort to help the owner, occupant, or others in a position of authority to correct the deficiencies.*”

In 2014, LFES Fire Prevention Branch completed 1,392 inspections, 515 re-inspections and three orders to comply with the Alberta Fire Code. In 2015, 1,441 inspections were carried out resulting in a second inspection of 372 businesses. As an exciting move forward, LFES plans to implement mobile inspections as a means of streamlining inspections and reporting.

Prevention and inspection programs include the Public Safety Unit and the Fire Safety Information Centre. The multi-agency Public Safety Unit began investigating Group A – Assembly Occupancies such as nightclubs in 2006. The purpose of the program is to ensure that codes such as access to emergency exits and number of occupants are in compliance. In 2015, operating on average once a month, the LFES made 44 night club visits throughout the year. Out of these 44 inspections, no charges or convictions were made for exceeding posted occupant load.

It is recommended that the LFES continues to support and participate in multi-agency inspections of Group A - Assembly Occupancies.

The Fires Safety Information Centre (FSIC) was developed in 2010 by the Fire Prevention Bureau. The program is designed to assist fire crews during incidents at “high-occupancy” or “high-risk” facilities. The program allows suppression crews to participate and facilities in on-site pre-plans. This program provides invaluable foresight in identifying possible dangers that may be encountered when fighting a fire. By 2012, 84 buildings had a FSIC box on site and there is currently an initiative underway to convert the information to an accessible, electronic format.¹³ In 2013, this program was expanded to City of Lethbridge facilities and a number of key industrial structures identified as high risk. After 2015, a total of 124 Pre Plans now exist throughout the city.

It is recommended that the LFES prioritize the utilization of the Fires Safety Information Centre targeting high-risk and high occupancy buildings in developing pre-planning information for firefighters.

A third program, called ‘Secondary Suites’, focused on legalizing secondary suites (a secondary residence) that were built in single-detached houses in low-density residential zones built prior to January 1, 2007. After passing a final inspection, the home owner was eligible to get back 50% of their cost for remodelling up to \$2,500. The program, which began in 2009, has resulted in a total of 162 suites that have been updated to comply with the AFC. With 18 completed in 2014 and 20 completed in 2015.

It is recommended the LFES continues to support the delivery of the “Secondary Suites” program targeting the legalization of residential secondary suites.

Establishing performance measures for each of the fire inspection activities provided by the department would be an effective tool for Council and the fire department to monitor the effectiveness of these activities. Utilizing the Community Risk Assessment, included in **Appendix C**, to prioritize these activities would be considered an appropriate practice in setting the goals and objectives for the City’s fire inspection program.

Based on our review of the Community Risk Assessment and the City’s legislated responsibilities, the performance measures for fire inspection services identified within **Table 12** reflect an appropriate level of fire protection (fire inspections) for the City of Lethbridge.

¹³ Source: Lethbridge Fire and Emergency Services – 2012 Annual Report, p 14

Table 12: Lethbridge Fire and Emergency Services Fire Inspection Services

Occupancy Classification (ABC)	Buildings	Performance Measure
Group A – Assembly	Schools, Recreation Centres (Arenas), Curling/Golf Centres	Annually
Group A – Assembly	Licensed Properties, Nursery/Day Care Facilities, Churches, Special Occasion Permits	Upon Request
Group B – Care or Detention	Hospital, Nursing Homes, Homes for Special Care	Annually
Group C – Residential	Apartments and multi-unit residential Hotels and Motels Home Inspection Program	Annually Annually Upon Request
Group D – Business & Personal Services	Business and Personal Services Occupancies	Upon Request
Group E - Mercantile	Mercantile Occupancies	Upon Request
Group F - Industrial	Factories and Complexes	Annually

The fire inspection cycle recommended above reflects the findings of the Community Risk Assessment that indicated that a large portion of the property stock (97%) represents Group C - Residential Occupancies and focuses the need for dedicated staff resources in this area. The priority of addressing the residential fire risk is supported by the historic data provided by the Office of the Fire Commissioner, Alberta that reports in 2012 residential fires accounted for 82% of all structure fire losses.

5.3.1.2 Alberta Fire Code Enforcement

In addition to the fire inspection service levels listed above the fire department is further required by legislation to respond to requests for inspections (to assist with code compliance) or complaints. The recommended procedure is to address these responsibilities by:

- *Conducting Fire Prevention Inspections for all complaints received by the fire department containing reports of potential Fire Code violations and/or potential fire hazards, and for all requests for inspections to assess fire safety*

- *Inspecting any premise or building in the municipality for which a complaint is received as a priority and conducted as soon as practical under authority of the Safety Codes Act regardless of the frequency established in the City's inspection cycle / performance measure*
- *Conducting targeted Fire Prevention Inspections of any occupancy or building as deemed necessary to address the needs and circumstances of the community or a targeted risk*

In our view these strategies reflect effective levels of service in addressing the legislated responsibility of the municipality. Considering the addition of further wording to emphasize the department's commitment to responding to request for inspections (to assist with code compliance) would provide further clarity of the strategies.

It is recommended that LFES review the current department procedures for the enforcement of the Alberta Fire Code related to requests for inspection or complaints and implement the procedures recommended with the FDMP.

5.3.1.3 Fire Investigation and Cause Determination

Investigating the origin and cause of a fire is a municipal fire department responsibility. As stated in LFES Policy Manual Section 5.4.1, the department will determine the origin and cause of fire occurrences in order to comply with *Safety Codes Act* Section 48 (1). The Fire Chief, as a Safety Codes Officer, is responsible for the investigation of all fires by the Officers under his command.

If the cause/origin of the fire is evident, the cause is reported in the incident report by the Officer in command. If an accidental cause is unknown, the Fire Prevention Department is informed that further investigation may be required. Investigation by a member of the Fire Prevention Bureau is required for scenarios such as: undetermined cause/origin; loss of life; and a large fire loss.

Policy Manual *Section 5.4.8* states a 'Cause and Origin Investigation form' must be completed. This captures information related to the fire fighters' activities during the incident. The Station Captain (or designate) shall draw a sketch of the incident and collect the collected forms to forward them to the Platoon Chief, who then forward them to the Fire Prevention Bureau.

In 2013, LFES investigated 29 fires (2% of all calls) and found that ten were accidental, nine were arsons, and ten causes could not be determined. The number of investigations carried out annually has had little fluctuation over the last five years.¹⁴ In 2015, LFES fire prevention personnel investigated 26 fires.

5.3.1.4 Fire Safety Plans / Pre-Plans

Another area of work for the Fire Prevention Bureau is reviewing and providing support for the creation of fire safety plans and /or pre-plans. Section 5.1.10 of the LFES Policy Manual states that information should be collected in the following order:

1. Index with photo of property.
2. Site plan
3. Main floor plan.

¹⁴ Source: Lethbridge Fire and Emergency Services, 2013 Annual Report, p 28

4. All subsequent floor levels.
5. Roof and basement showing pertinent fire suppression.
6. Special hazard areas.
7. Evacuation plans.
8. MSDS – data sheets for dangerous goods/products.
9. Water flow.
10. Information sheets.

Other requirements, as stated in Policy Manual Section 5.1.10, include:

- Pre-plan numbers entered into the FDM upon completion.
- Platoon Chiefs review all completed plans prior to them being put into service.
- Pre-plan list will be maintained by the Fire Prevention Office.
- Plans shall be revised at five-year intervals.
- Each plan will be archived by Information Technology.
- Copies of plans to be sent to each station, fire dispatch, command post vehicles and one kept in the master file at Fire Prevention.

It is recommended that the LFES conduct the following to enhance the department's initiatives targeting Fire Safety Plans and Pre-Plans:

- Identify annual targets for the number of Fire Safety Plans to be completed for each occupancy group type; and
- Identify resource strategies to meet the annual targets, including an enhanced role of on-duty suppression staff, including the proposed on duty basic Safety Codes Officer.

5.3.1.5 Smoke Alarm Program

As part of the first three lines of defence, the LFES Smoke Alarm program began in 1994. Each platoon within the fire suppression division was responsible for identifying which residences to visit within their designated response zone. Home inspections were carried out by on duty firefighters to confirm the use and maintenance of smoke alarms, and general home fire safety.

As part of the program, a Home Fire Safety booklet was provided to residents. The booklet included a safety checklist for smoke alarms and fire escape plans, as well as fire prevention tips. Supporting information on topics such as flammable liquids, home fire escape planning, and the use of fire extinguishers was also included in the booklet.

Over a period of six years from 2002 to 2007, 29% of the 4,141 homes visited were inspected which resulted in the donation of 1,584 smoke alarms and 2,270 batteries sponsored by a local business partner. Between 2010 and 2015 an additional 635 homes were visited in the Home Safety Program and 366 smoke detectors were replaced.

The department faced a number of challenges in sustaining the program including the need for on duty firefighters to respond to an emergency while conducting a home inspection that resulted in complaints from the public, and difficulties in delivering a consistent program. In 2007 the smoke alarm program was revised and replaced with the current Home Safety Program that is managed by the Fire Prevention Division.

The current Home Safety Program continues to provide replacement batteries and smoke alarms, however the program is based on a request basis instead of the previous pro-active community engagement program.

A Home Smoke Alarm Program a pro-active public education program targeting the pre-fire department notification phase of a fire, the provision of a pro-active Home Smoke Alarm Program is an effective strategy to enhance fire prevention education, and reduce the probability of a fire related injury or death.

In our experience one alternative approach to delivering a pro-active program could include the use of summer students (college or university) who are trained to deliver the education components of the program, as well as the skills and competency to replace batteries and smoke alarms. Other communities have successfully utilized this strategy and accessed provincial funding to support the financial requirements of hiring two of four students to deliver this program.

Another alternative is the use of firefighters who may not be able to fulfill their normal duties but are able to perform modified duties. These firefighters have the pre-existing skills and competencies to perform all elements of the previous pro-active Home Smoke Alarm.

It is recommended that the LFES investigate alternative approaches for reinstating a pro-active Home Smoke Alarm Program as identified within the FDMP.

5.3.2 Home Escape Planning

Public education including the process and benefits of preparing a Home Fire Escape Plan is also a critical component of the pre-fire department notification phase of a fire. The LFES supports the importance of Home Escape Planning and includes education through traditional pamphlets and during community events and educational seminars.

The previous pro-active Home Smoke Alarm Program was another important tool in promoting Home Escape Planning. This should be considering as an important factor in reassessing the alternative approaches for re-instating the pro-active Home Smoke Alarm Program.

Other initiatives that have been successful in promoting Home Escape Planning have included targeting children through school programs, and the use of social media tools such as Facebook, Instagram and U-tube.

An element of the proposed Community-Based Fire Protection Plan could include fire suppression crews adopting a number of schools within their respective emergency response zones. On duty fire suppression crews would be able to visit schools and through meeting with children in a classroom setting deliver a number of educational programs including how to create, and practice Home Escape Planning.

It is recommended that the LFES investigate alternative approaches to the enhanced delivery of Home Escape Planning as contained within the FDMP.

5.3.3 Residential Sprinklers

The installation of residential sprinklers is an effective strategy towards the mitigation of a fire in a residential occupancy during the pre-fire department notification phase. In response to the objective of this FDMP to identify strategies for injury reduction, and providing a safer community through an integrated strategy of community risk reduction, residential sprinklers provide one of the most effective tools.

Research conducted by the National Fire Protection Association that supports the effectiveness of residential sprinklers indicates that residential sprinklers can have a significant impact on injury reduction including their ability to:

- ✓ Reduce civilian fire injury medical costs by 53%;
- ✓ Reduce civilian fire injury total costs by 41%; and
- ✓ Responsible for an estimated 65% reduction in firefighter fireground injuries.

LFES has been active in promoting the use of residential sprinklers with the Canadian Home Builders Association, Lethbridge Region, and the Office of the Fire Commissioner, Alberta. However, for the City of Lethbridge to consider requirements for the installation of residential sprinklers permission would be required for the City to be exempt from the current Alberta Safety Codes Act to allow the municipality to implement a higher level of fire safety mitigation.

It is recommended that the City of Lethbridge prepares the necessary research and documentation to apply for exemption from the Alberta Safety Codes Act to implement regulations for the installation of residential sprinklers.

5.3.4 Fees for Service

Table 13 displays current fees charged for services provided by the Bureau. The Fire Prevention Bureau charges a fee for file searches and reports, inspections, fire extinguisher training, special function attendance, and false alarms.

Table 13: Fees for Service

Description	Amount	GST
Tank Plan Review	\$ 150.00	No
Each Additional Review	\$ 75.00	
Tank Install / Remove Permit 1st Tank	\$ 87.00	No
Each Additional Tank	\$ 50.00	
Dangerous Goods Permit	\$ 112.00	No
Open Burning Permit - Special Event	\$ 112.00	No
Construction / Demolition	\$262.00	
File Search & Report <i>Up to 2 hours research then \$25 for every 30 min thereafter</i>	\$ 100.00	Yes
Fire Report <i>Up to 2 hours research then \$25 for every 30 min thereafter</i>	\$100.00	Yes
Hard Copy of Photos	\$10 - 1st photo \$5 each additional	Yes
Digital Copy of Photos	\$2 no editing \$5 with editing	
Demolition Permit	\$112.00	No
Fire Safety Plan Review		
Occupant Load Posting - New	\$ 137.00	No
Temporary Posting – Special Event	\$112.00	No
Replacement Posting	\$ 77.00	No
1st Re-Inspection	\$ 100.00	No
2nd Re-Inspection	\$225.00	No
Inspections required for licensing by Other Agency	\$100 per hour (min 1 hour)	Yes
After Hours Inspections	\$100 per hour (min 2 hours)	Yes
Inspection – Out of Town	\$100 per hour \$0.52 / km	Yes
Home Inspections	N/C	
Pyrotechnics - High Level Fire Works	\$112.00	No
Special Effects (Indoor)	\$150.00	
Standby during an Event	\$100 per hour (min 2 hours)	No
Request for Attendance at Special Functions (outside regular office hours)	\$100.00 per hour	Yes

Description	Amount	GST
Fire Extinguisher Training (During regular office hours)	\$10 per person/Under 10 people - \$100 \$5 per individual certificate	Yes
Fire Extinguisher Training (Outside regular office hours)	\$100 per hour \$10 per person – minimum \$100	Yes
Fire Extinguisher Training -- Out of Town	\$100 per hour \$10 per person – minimum \$100 \$0.52 / km	Yes
Evacuation Planning Training -- (plan review, On-site training, fire drills)	\$200/plan	Yes
Investigation – Out of Town	\$95 per hour \$0.52 / km	Yes
False Alarms:		
1st Response	No Charge	No
2nd Response	\$75.00	
3rd Response	\$350.00	
4th Response and Subsequent Responses	\$675.00	

(Source: Lethbridge Fire and Emergency Services)

As part of developing performance measures for this division consideration should be given to completing a full review of all current fees charged. It is recommended that all fees for service be reviewed and revised on an annual basis to ensure that they accurately represent the fiscal realities of the services provided.

5.4 Fire Prevention and Public Education Summary and Recommendations

The effective delivery of activities and programs targeting fire prevention and public education are priorities of the LFES. The analyses within this FDMP supports this strategy and suggests identifying the “three lines of defence” including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment as a “strategic priority” in the development and delivering of fire protection services.

This strategic priority includes enhancing the current LFES operating model in optimizing the delivery of fire protection services targeting:

I. Public Education and Prevention:

Educating residents of the community on means for them to fulfill their responsibilities for their own fire safety is a proven method of reducing the incidence of fire. Only by educating residents can fires be prevented and can those affected by fires respond properly to save lives, reduce injury and reduce the impact of fires; and

II. Fire Safety Standards and Code Enforcement:

Ensuring that buildings have the required fire protection systems, safety features, including fire safety plans, and that these systems are maintained, so that the severity of fires may be minimized.

III. Emergency Response (Fire Suppression):

Providing well trained and equipped firefighters directed by capable officers to stop the spread of fires once they occur and to assist in protecting the lives and safety of residents. This is the failsafe for those times when fires occur despite prevention efforts.

The effective delivery of programs and activities through the application of the first two lines of defence represents a strategy to focus the resources of the LFES on fire prevention, injury reduction and providing a safer community through an integrated strategy of community risk reduction.

The recommendations provided support the optimization of the first two lines of defence and the enhanced delivery of fire prevention and education service by the LFES. In order to support this strategy, it is recommended:

18. That the LFES adopt the “three lines of defence” including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment as a “strategic priority” in the development and delivering of fire protection services.
19. That the LFES assign the roles and responsibilities of a basic Safety Codes Officer to one member of each of the four platoons.
20. That the LFES continues to support and participate in multi-agency inspections of Group A - Assembly Occupancies.
21. That the LFES prioritize the utilization of the Fire Safety Information Centre targeting high-risk and high occupancy buildings in developing pre-planning information for firefighters.
22. The LFES continues to support the delivery of the “Secondary Suites” program targeting the legalization of residential secondary suites.
23. That the LFES prepare and present to Council performance measures, such as those recommended within this FDMP, for each of the fire prevention inspection activities provided by the department as a tool for Council and the LFES to monitor the effectiveness of these activities.
24. That LFES review the current department procedures for the enforcement of the Alberta Fire Code related to requests for inspection or complaints and implement the procedures recommended with the FDMP.
25. That the LFES conduct the following to enhance the department’s initiatives targeting Fire Safety Plans and Pre-Plans:
 - Identify annual targets for the number of Fire Safety Plans to be completed for each occupancy group type; and
 - Identify resource strategies to meet the annual targets, including an enhanced role of on-duty suppression staff including the proposed on duty basic Safety Codes Officer.
26. That the LFES investigate alternative approaches for reinstating a pro-active Home Smoke Alarm Program as identified within the FDMP.

27. That the LFES investigate alternative approaches to the enhanced delivery of Home Escape Planning as contained within the FDMP.
28. That the City of Lethbridge prepares the necessary research and documentation to apply for exemption from the Alberta Safety Codes Act to implement regulations for the installation of residential sprinklers.

6.0 EXISTING STATIONS, STAFFING AND DEPLOYMENT MODEL

The analysis within this section presents the existing fire station location model, apparatus assignments and staffing deployment model. This analysis was used in developing a summary that represents the existing conditions emergency response service levels and service level benchmarks for the LFES and City of Lethbridge.

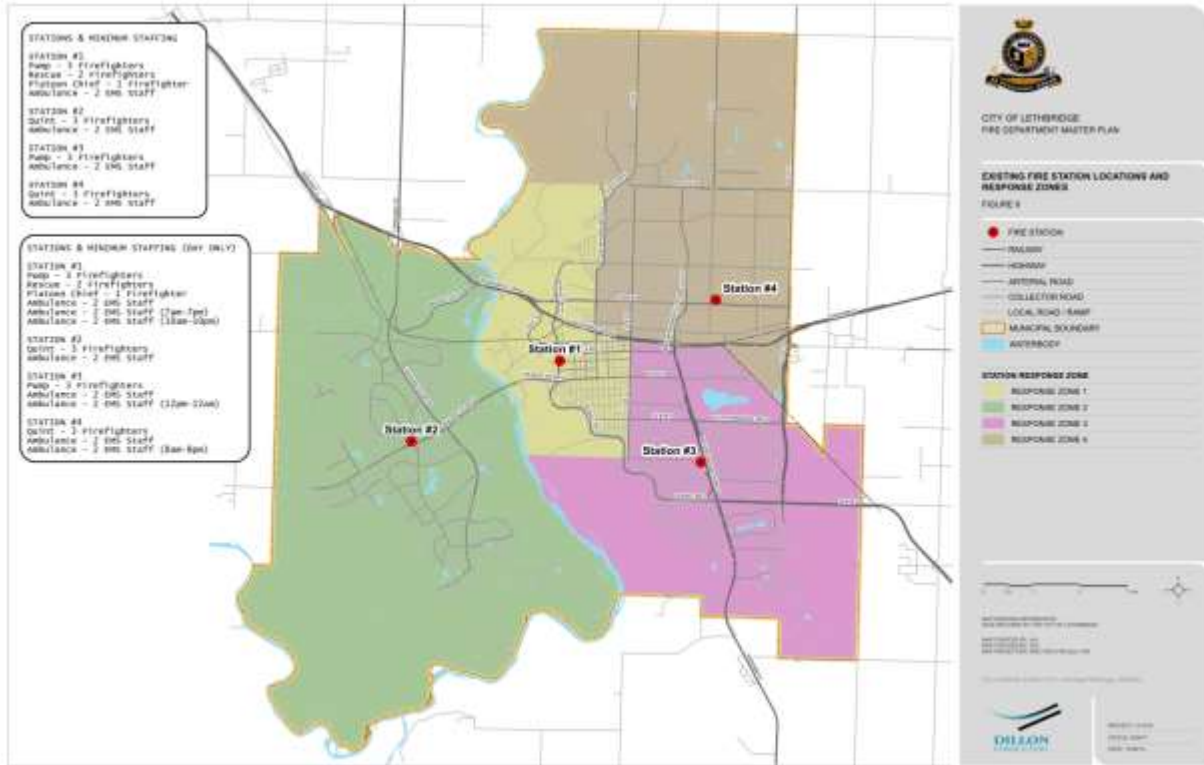
6.1 Existing Station Locations

Lethbridge Fire and Emergency Services currently operate from four stations strategically located throughout the City. The existing stations and minimum staffing assigned to station apparatus are shown in **Figure 8**.

Also illustrated in the figure is the municipal boundary for the City of Lethbridge and the station response districts for each station. The station response districts are defined in Subsection 4.28 of the LFES Standard Operating Guidelines. Response districts for fire calls within the City boundaries are defined as follows:

Fire Station 1: South Lethbridge (Headquarters)	Provides back-up response to all areas. As a single station response, the boundaries are all areas north of the Crowsnest Trail between the Oldman River and Stafford Drive up to 26 th Avenue North and all areas south of the Crowsnest Trail between the Oldman River and 13 th Street to 16 th Avenue South.
Fire Station 2: West Lethbridge	All areas west of the Oldman River.
Fire Station 3: South Lethbridge	All areas east of 13 th Street, north to the Crowsnest Trail and CP Rail line and all areas south of 16 th Avenue South.
Fire Station 4: North Lethbridge	All areas north of the CP Rail line and east of Stafford Drive.

Figure 8: Existing Fire Station Locations and Response Zones



6.2 Existing Staffing and Deployment Model

Under the direction of the Deputy Chief of Fire and Medical Services the current total staff complement of this Division is 144. This includes four platoons with a complement of 36 staff including “rovers” who can alternate on any of the platoons when required to maintain the required minimum complement of firefighters (firefighter paramedics / EMTs in LFES) on duty.

The current minimum on-duty staff complement is 23 during the night-time (2400h to 0700h). Daytime minimum staffing varies from 25 to 31 as the twelve-hour shifts of peak-time ambulance units have staggered start times.

The utilization of rovers provides the department flexibility in sustaining the minimum complement of firefighters on duty per platoon to compensate for vacation time, banked time, workers compensation injuries, and sick time. In the event the staffing level on a platoon does drop below the minimum staffing complement the overtime call back system is used to maintain the minimum staffing levels.

6.2.1 Initial Response Deployment

Based on our analyses of fire suppression industry best practices, and our experience in working with other municipalities across Canada there is an appropriate initial response to effectively, efficiently and safely conduct initial fire suppression operations. We recommend that the LFES continues to target a minimum initial response of four firefighters to provide sufficient firefighting resources to conduct initial fire suppression operations including the fireground critical tasks of:

- Incident Command – 1 firefighter
- Pump Operation – 1 firefighter
- Attack Line - 2 firefighters (Confine and Extinguish)

In comparison to the current industry best practices for initial response of deploying four firefighters on an engine company the current LFES operating model typically relies upon the simultaneous dispatch and response of a pump/quint (engine company) staffed with three firefighters and the ambulance staffed with two firefighters (deployed from the same station) to assemble the LFES initial response.

This operating model relies on both the pump/quint (engine company) and the ambulance being staffed and readily available to respond simultaneously from the same station. Although current demands for emergency medical services are impacting the availability of the ambulance crew, this deployment model, when available, is able to exceed the best practices minimum suggested staffing for initial response of four firefighters on scene. This integrated response model of fire/EMS resources provides a deployment of five firefighters on scene as suggested by the NIST field experiments as being more effective than a four person response.

6.2.2 Depth of Response Deployment

Current best practices within the fire service for depth of response reflect the principles that also utilize critical fireground tasks for determining the appropriate number of firefighters to be deployed based on the associated fire risk within a specific occupancy type.

Residential occupancies and specifically single family residences provide an example of the type of fire risk present and the fireground critical tasks required to effectively, efficiently and safely mitigate an incident. This is particularly relevant to Alberta where residential occupancies have historically accounted for 55% of all major property fire loss and 70% of all fire related deaths¹⁵.

The fireground critical tasks for depth of response identified within NFPA 1710 standard utilize the following definition of a typical residential occupancy:

“The fire risk scenario in a 2,000 square foot, two-story single-family dwelling without a basement and with no exposures present. This represents a typical home of wood frame construction located in a suburban neighbourhood having access to a municipal water supply including fire hydrants.”

For comparison purposes the NFPA 1710 standard minimum staffing deployment for depth of response to this residential fire (moderate risk) is 14 firefighters, 15 if an aerial device is deployed.

The identification of fire risk classifications (e.g. low, moderate, high and extreme) is determined based on analyses of all available information that defines the characteristics of a community. The Community Risk Assessment included within the Accreditation Final Report provides these analyses for the City of Lethbridge.

The fire suppression resources necessary to complete the fireground critical tasks can vary based on the type of occupancy. High risk occupancies such as a nursing home where higher risks are present such as on older demographic (seniors) that may become disoriented or unable to evacuate themselves present a different challenge for responding firefighters. The nature of these occupancies to have more residents than a single family home also present further challenges for conducting search and rescue and conducting evacuation activities.

To determine the appropriate firefighter deployment for low, moderate, high and extreme risks occupancies within the City of Lethbridge an assessment of the Community Risk Assessment and industry best practices was completed.

These analyses identified a best practices firefighter deployment to complete the fireground critical tasks associated with each occupancy risk level. For low risk occupancies this reflects a minimum deployment of four firefighters. This represents the appropriate fire suppression resources to complete the following fireground critical tasks similarly to the initial response deployment:

- ✓ Incident Command - 1 firefighter
- ✓ Pump Operator – 1 firefighter
- ✓ Initial Attack Line – 2 firefighters

¹⁵ Source: Based on analysis of the Office of the Fire Commissioner, Interactive Fire Data Analysis

For moderate risk occupancies including Group C - Residential occupancies (Single – Family Dwelling) a minimum deployment of 14 firefighters is required to complete the additional fireground critical tasks based on the fire risks present. The additional fireground critical tasks include activities such as providing an additional fire attack line requiring two firefighters, and providing a Rapid Intervention Team (RIT) comprised of two firefighters who are assigned the specific task of being prepared to respond quickly in the event one of the fire attack teams or other firefighters on scene require immediate assistance.

In comparison to the low and moderate risk occupancies, high risk occupancies such as the nursing home require additional fireground critical tasks to be completed and a higher minimum deployment of firefighters. The additional fireground critical tasks include activities such as providing a dedicated crew of two firefighters for positioning ladders on the building to support fire suppression and rescue activities, and the provision of an Incident Safety Officer to oversee and ensure all firefighting activities are conducted safely.

It is recommended that an appropriate **minimum depth of response** to the low, moderate and high risks occupancies within the City of Lethbridge to achieve the required critical fireground tasks includes four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies and 24 firefighters to high risk occupancies. It should be noted that the LFES minimum on-duty staffing level is 23 firefighters, however, in the event of a high-risk occupancy fire the on-call Chief Officer could be the 24th on-scene.

The recommended minimum depth of response firefighter deployment is identified in **Table 14** below:

Table 14: Recommended Minimum Depth of Response – City of Lethbridge

Fireground Critical Tasks		Low Risk	Moderate Risk	High Risk
Incident Response	Incident Command	1	1	1
	Pump Operator	1	1	1
	Additional Pump Operator	0	0	1
	Initial Attack Line (Confine & Extinguish)	2	2	2
	Additional Attack Line (Confine & Extinguish)	0	2	2
	Search and Rescue	0	2	2
	Initial Rapid Intervention (RIT)	0	2	2
	Ventilation	0	2	2
	Water Supply- pressurized	0	1	1
	Forcible Entry Team	0	1	2
	Laddering	0	0	2
	Exposure Protection	0	0	2
	Incident Safety Officer	0	0	1
	Accountability	0	0	1
	Rehabilitation	0	0	2
Minimum firefighter deployment	4	14	24	

6.3 Apparatus Availability versus Deployment

The integrated deployment model of LFES relies on a combined response from both fire and medical apparatus. The deployment practices for fire related responses assume the fire and ambulance units are both available to respond from their assigned stations. The following section identifies trends and highlights challenges relating to availability and the impact on deployment and responses.

6.3.1 Volume of Emergency Responses – Fire and Medical Apparatus

Our analysis of emergency incident statistics in Lethbridge during the period 2011 through 2015 indicates the volume of emergency calls responded to by fire apparatus and ambulances.

Figure 9 shows the fire and medical calls responded to by fire apparatus from 2011 to 2015. These call volumes have remained relatively stable over the five year period with medical calls increasing and fire calls decreasing between 2011 and 2015. From 2011 to 2015 there LFES experienced a net increase of 352 medical calls responded to by fire apparatus, an increase of approximately 12.0%.

Figure 9: Volume of Fire Apparatus Responses (2011-2015)

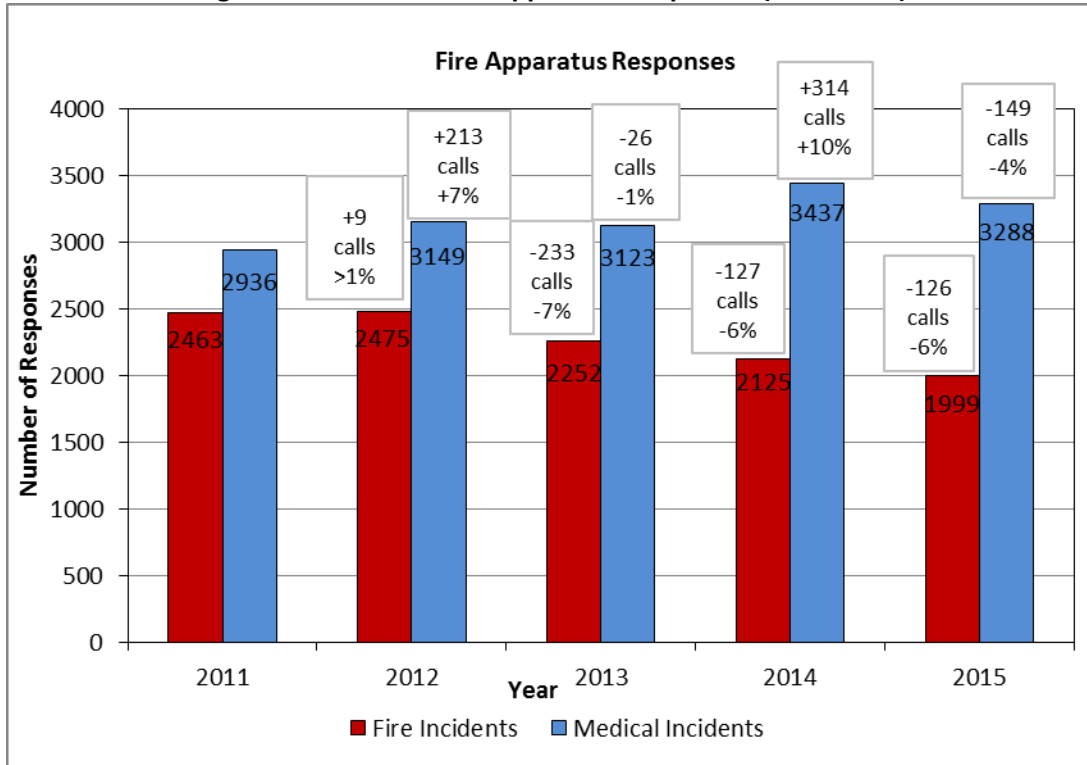
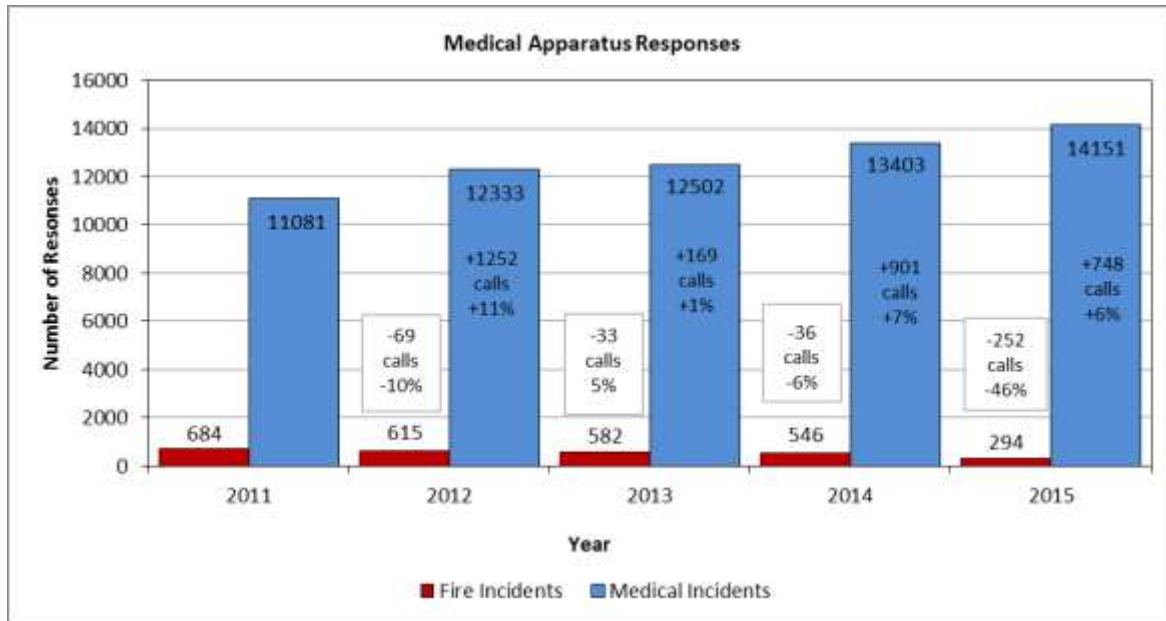


Figure 10 shows the increasing medical calls responded to by medical apparatus (ambulances), from 11,081 in 2011 to 14,151 in 2015, representing a 27.7% increase over this period, and the decreasing response to fire related calls, from 684 in 2011 to 294 in 2015, representing a 57.0% decrease. LFES procedures for deploying medical units to fire calls remained stable from 2011 to 2014. During this time period it is assumed that this decrease in calls is a result of the ambulance units not being available to attend these fire calls. 2015 included the addition of three twelve hour day-support units, which responded to the increased medical calls. Based on the number of ambulances attending fire calls in 20-15, it is assumed that the ambulance units were also unavailable in 2015 to respond to fire calls.

Figure 10: Volume of Medical Apparatus (Ambulance) Responses (2011-2015)



6.3.2 Apparatus Time on Task

This analysis calculated time on task by subtracting the amount of time the apparatus was committed to emergency incidents (unavailable to respond to another emergency) from the total hours the apparatus is staffed. As emergency call volume increases, the probability that the apparatus is deployed when another emergency call is received increases.

Increasing emergency call volume results in a larger portion of time within a 24 hour period that a fire apparatus, or ambulance is committed (time on task) and not available to respond to another emergency call. Within the current LFES fully-integrated fire/EMS operating model this is a very important factor relating to the department’s ability to achieve a consistent level of service and deployment model for both initial response and depth of response within the urban boundary of the community.

For fire related incidents the current LFES deployment model relies on the simultaneous dispatch and arrival of the fire apparatus and ambulance from the closest station to assemble both the industry best practices model of deploying a minimum staffing of four firefighters, and the actual current LFES minimum staffing level of five firefighters. One of the most significant factors affecting the LFES’ ability to sustain this model is the increasing time on task commitment of ambulances.

Increasing call commitments and therefore time on task by ambulances within the current LFES fully-integrated fire/EMS operating model results in the ambulance assigned to a specific response zone (fire station) not being available to respond as part of the current simultaneous deployment model. In these instances a fire apparatus or ambulance assigned to another response zone must be deployed in order to assemble the department’s initial response deployment.

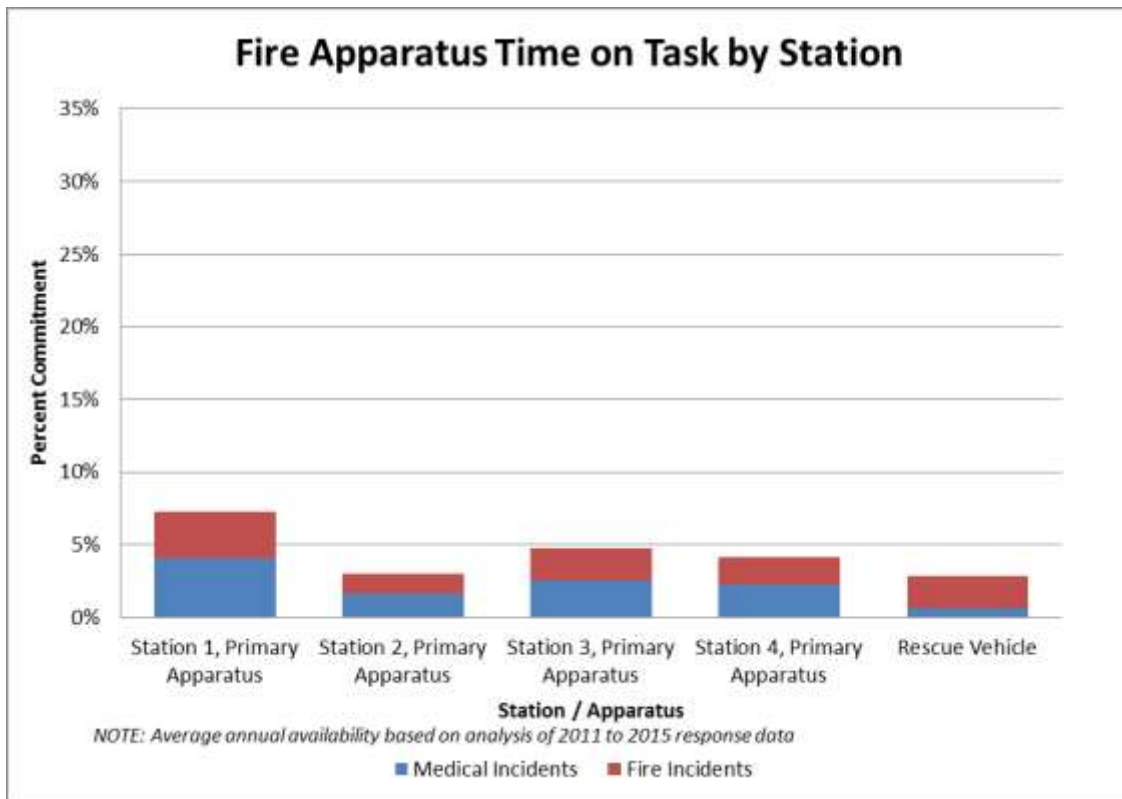
The methodology within this report factors time on task related to emergency incidents. It does not include times when the apparatus, fire or EMS, may be assigned to training, prevention, or educational activities.

6.3.2.1 Fire Apparatus Time on Task

The percentage of time on task for the primary fire apparatus at each station was calculated for the period 2011 to 2015. The primary fire apparatus is defined as the engine or quint assigned to each of the stations and deployed as the primary firefighting apparatus within the station response zone.

Figure 11 illustrates the percentage of time on task that the primary fire apparatus was committed to medical and fire incidents for this period. This analysis indicates that for all primary fire apparatus the commitment to time on task ranges from approximately 3% to 7% and has remained relatively stable over the past five years (as reflected in the responses by fire apparatus).

Figure 11: Fire Apparatus Time on Task by Station



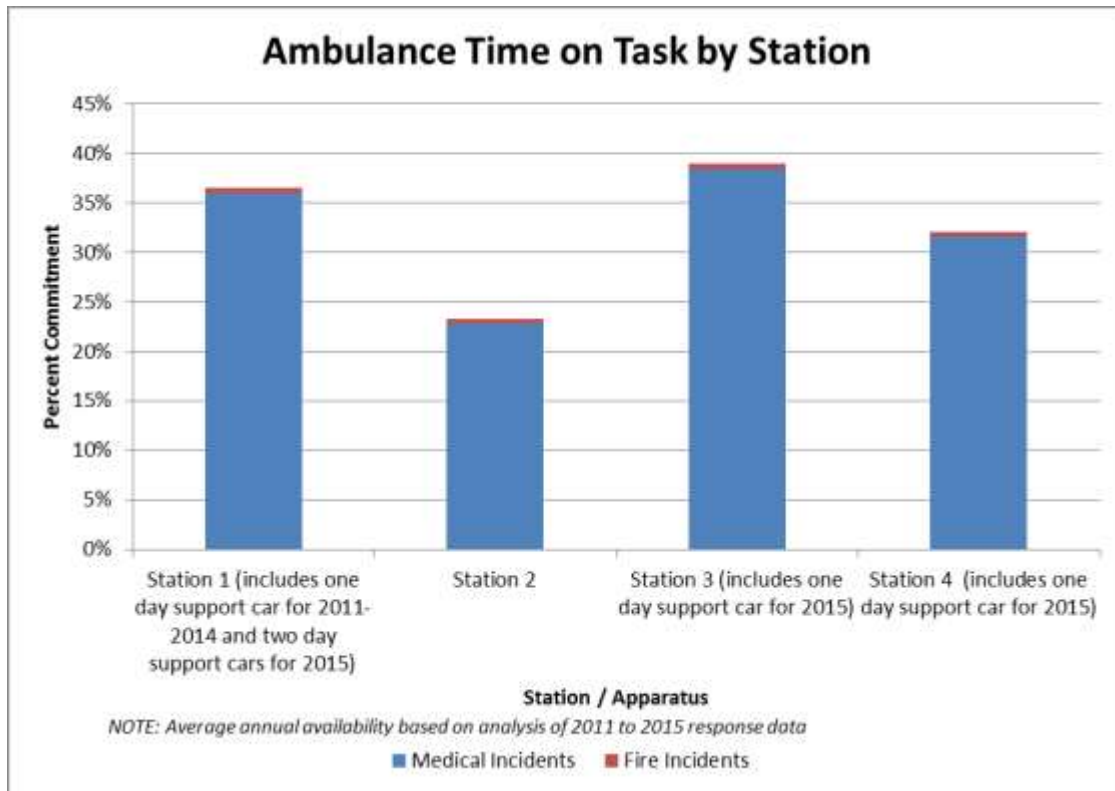
6.3.2.2 Ambulance Apparatus Time on Task

The percentage of time on task for the ambulances at each station was also calculated for the period 2011 to 2015. For each station the analyses identifies the primary ambulance assigned to that station and response zone. For Station 1 the analysis also included the day support car for 2011-2014 and two day support cars for 2015. Station 3 and Station 4 also added a day support car in 2015. The day support cars are ambulances that are available for 12 hours each day.

In comparison to the primary fire apparatus, ambulance time on task has increased significantly over this period. This is as a direct result of the increasing emergency medical call volume occurring within the community. Other factors such as the time spent on patient care, time spent on patient transfers, and time spent to transfer patients at the hospital may also be contributing to the increased time on task.

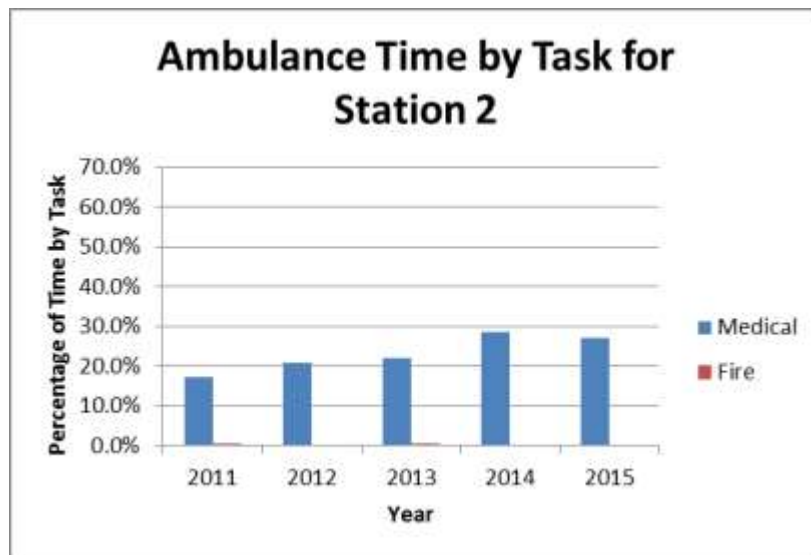
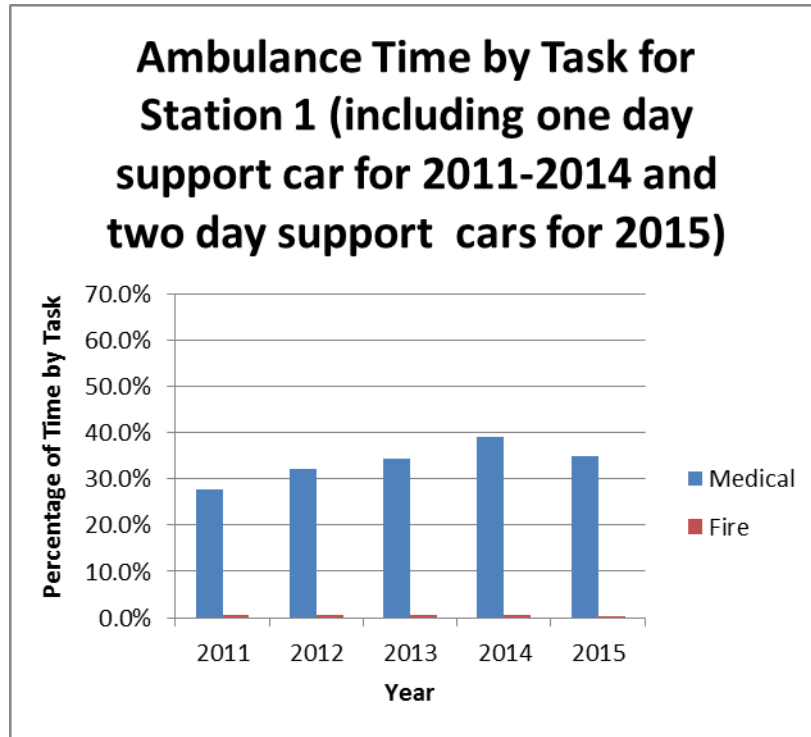
Figure 12 illustrates the percentage of time on task that the four primary ambulances were committed to medical and fire incidents for this period. This includes one day support car at Station 1 for 2011-2014 and two day support cars at Station on for 2015 as well as one day support car at Station 3 and Station 4 for 2015. This analysis indicates that for all ambulance apparatus the commitment to time on task ranges from just over 20% to just over 40%. This has been increasing over the past five years as a result of the increasing workload, responding to more medical calls.

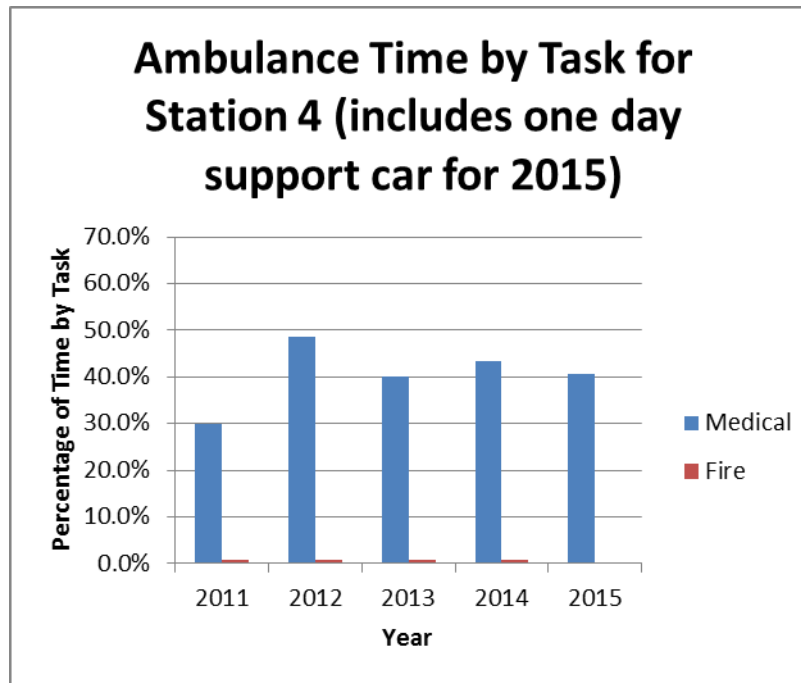
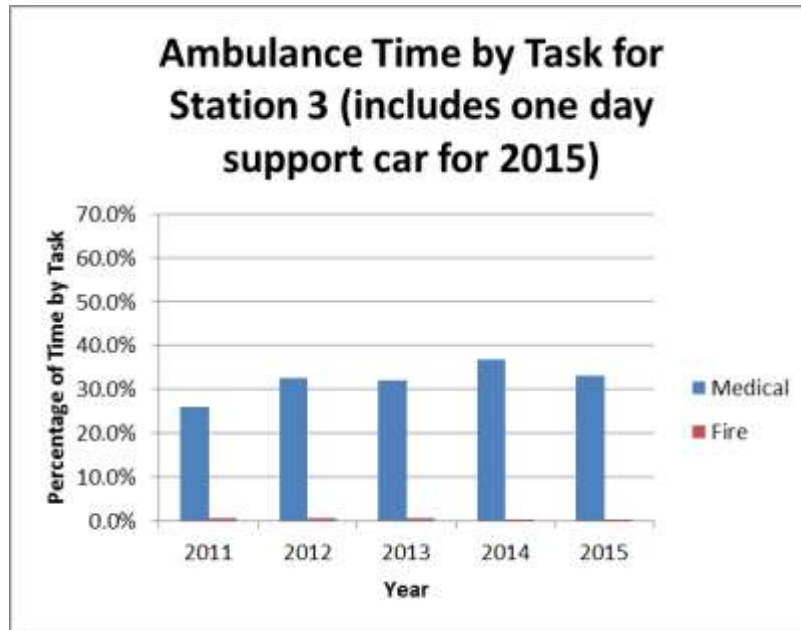
Figure 12: Ambulance Time on Task by Station



The increases in medical calls responded to by the ambulances over time are shown per station in Figure 13. This figure also shows the decrease in fire calls responded to by ambulances per station over the past five years.

Figure 13: Ambulance Time by Task, By Station by Year





6.4 Modelled Deployment and Existing Service Level Assessment

This section provides an outline of the metrics used to assess the existing fire suppression services and the methodology used to model and assess these metrics. Analyses were conducted using ESRI's Network Analyst, a GIS tool developed specifically for the purpose of assessing networks, to create a model of the current City of Lethbridge road network and simulate the response coverage of the LFES navigating this road network.

For the analysis, minimum staffing levels were assumed for the fire/EMS apparatus available for responding to fire related incidents from all fire stations. The deployment of apparatus was based on the road network, for the shortest travel time. The staffing and apparatus assignments are identified within each of the figures for ease of reference.

The existing conditions were based on the existing urban service area. This includes all areas that are currently serviced with fire hydrants. For analysis purposes, fire-hydranted service areas were defined as all areas within 200 metres of a fire hydrant.

6.4.1 Network Modelling

Digital copies of GIS layers were provided by the City of Lethbridge for the existing road network. Relevant base road information, such as road length and road classification, was extracted from the GIS data. This information, combined with the station locations, was used to build graphical "response polygons" around each station. These polygons represent the coverage each station can provide in the specified amount of travel time. The model was calibrated to reflect historic travel times using the following two data sources:

- High-Intensity Residential Fires (HIRF) trial run travel time mapping; and
- Historic call locations and travel times.

LFES conducted trial travel runs from each station to various locations throughout the city to determine an approximate seven minute travel time boundary, relating to the 10 minute total response time requirements of HIRF. The total response time is comprised of dispatch time, turnout time and travel time. Dispatch and turnout are assumed as a total of three minutes, leaving seven minutes remaining for travel time. This seven minute travel time boundary has historically been used for defining the ten minute response time HIRF boundary throughout the community. This trial run data and travel time boundary information was incorporated into the calibration process.

Historic delta and echo level fire and medical calls (the two highest priorities from a scale of five) were plotted. The road network was then calibrated so that the model predicted percent of total calls reached in a given travel time closely matched the historical percent of total calls reached within the same amount of travel time.

An iterative process was used to adjust the speeds throughout the road network and calibrate the model to accurately reflect historic travel times of initial responding units. **Table 15** shows the calibrated speeds assigned to the road network.

Table 15: Calibrated Speed

Road Classification	Posted Speed (kilometres per hour)	Modelled Speed Calculation (kilometres per hour)
Arterial	>= 80	Posted speed -25
Arterial	< 80	Posted speed -20
Collector	all	Posted speed -19
Local	>= 50	Posted speed -30
Local	< 50	Posted speed -10
Ramp	>= 50	Posted speed -20
Ramp	< 50	Posted speed -10
Gravel	all	Posted speed

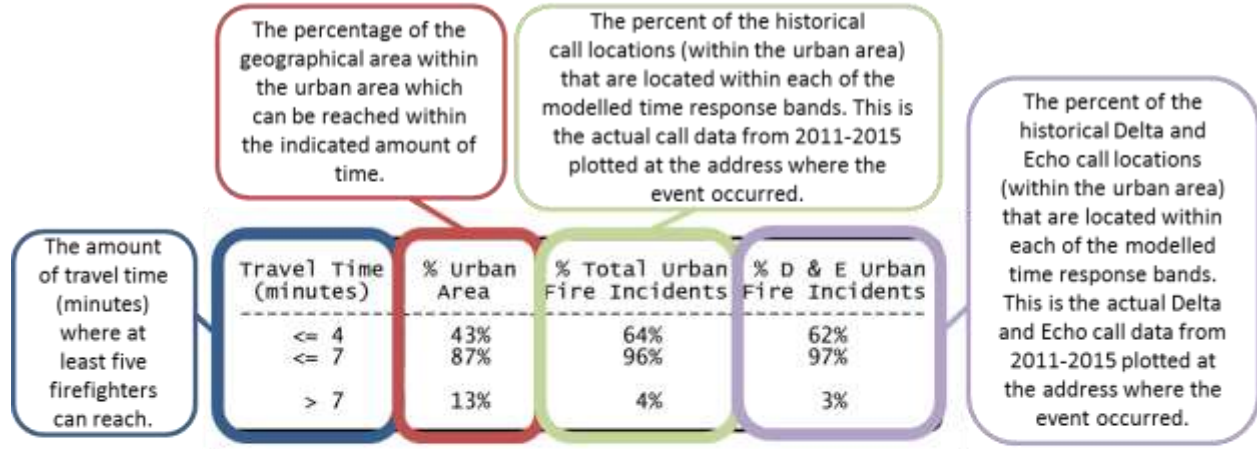
6.5 Initial Response Assessment

6.5.1 Initial Response Methodology

The initial response modelled assessment measures the theoretical response of four firefighters arriving on-scene within a four minute travel time on the same apparatus (NFPA) or simultaneously. The LFES deployment model currently exceeds this benchmark by deploying the primary fire apparatus (three firefighters) and the ambulance (two firefighters) from the closest fire station to achieve a minimum deployment of five firefighters, assuming both the fire apparatus and ambulance are available. This strategy represents one of the most significant benefits of the fully-integrated fire/EMS operating model. On each of the initial response figures this is illustrated by “travel time response bands” that include four minutes or less, five minutes or less, and greater than five minutes. The initial response modelled analysis assesses the minimum staffing deployment.

The statistics table, illustrated in **Figure 14**, included on each initial response coverage figure includes the percent of calls that the model predicts would be reached within the initial response time, shown as the ‘% urban area’. The fire incidents and delta and echo historic calls (response calls from 2011 to 2015) are then overlain on the model and shown as ‘% D & E Calls Covered’.

Figure 14: Explanation of Initial Response Statistics Tables



This statistic table can be interpreted as the following:

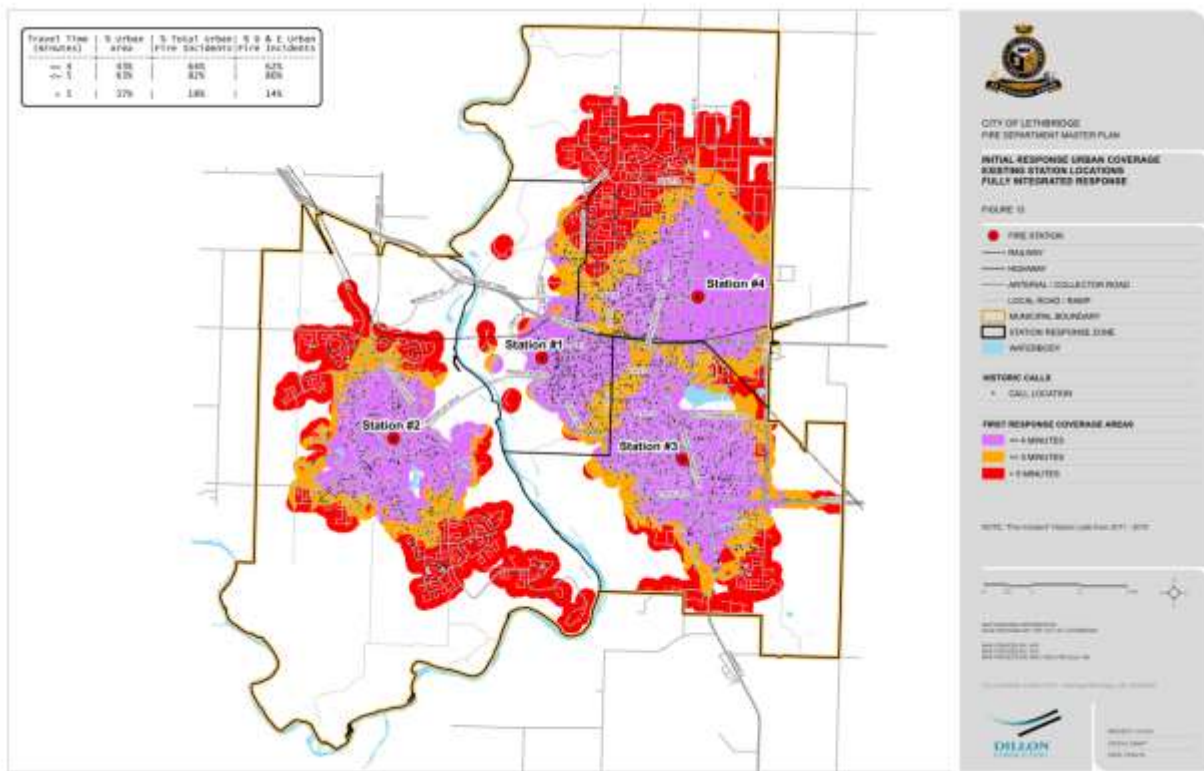
- Within four minutes or less of travel time at least five fighters can reach 43% of the City's urban area.
- Historically, 64% of the calls have occurred within the urban area which can be reached in four minutes or less of travel time.
- Historically, 62% of the Delta and Echo calls have occurred within the urban area which can be reached in four minutes or less of travel time.
- The greater than seven minutes is the remaining % of area / calls which are not covered by the seven minutes or less category

6.5.2 Initial Response – Time on Task Analyses

In addition to travel time, initial response analyses also assess the minimum staffing deployment. **Figure 15** illustrates the current initial response coverage based on the fully-integrated fire/EMS operating model and assuming that all of the fire and EMS apparatus and minimum staffing are available to respond from their respective stations. This analysis indicates that the LFES is currently able to deploy a minimum of five firefighters (when available) within a four minute travel time to 43% of the urban area emergency response zones of the current fire stations.

Based on the historical fire related call response locations (delta and echo) for the period 2011 to 2015 the LFES has been able to deploy a minimum of five firefighters to 62% of the incidents in four minutes or less travel time.

Figure 15: Existing Initial Response – Fully Integrated Model



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6.5.3 Initial Response – Actual Coverage

In order to assess the actual historic service levels of LFES and the time on task impacts, a statistical assessment of the actual delta and echo fire related call data was completed for the period of 2011 to 2015. This analysis was utilized to determine the percentage of calls that four or more firefighters arrived at within four minutes of travel or less, based on actual call responses, by station response zone. Minimum staffing assignments were assumed, as the call data includes the time each apparatus arrives on-scene, without details of staffing arriving on-scene. It is recommended that the department initiates measures to track and monitor the arrival of staff on-scene, to better measure response coverage (both initial and depth of response).

The City-wide actual initial response coverage over the past five years (2011-2015) combined is 58% of delta and echo calls.

The findings of this analyses represent the actual initial response level of service for the past five years based on the historical location of calls responded to by the LFES. These are summarized by station response zone in **Table 16**.

Table 16: LFES Historic Initial Response Level of Service by Station Response Zone

Response Zone	LFES Actual Initial Response Service Level (4 firefighters in 4 minutes travel time)
	<i>% of 2011-2015 delta and echo fire incidents covered</i>
Station 1	68%
Station 2	52%
Station 3	75%
Station 4	56%
City-wide	58%

Table 17 presents the City-wide actual initial response service level, based on historic call data from 2011 to 2015 by year. This indicates that the actual initial response coverage of achieving four firefighters on a scene within four minutes of travel time has been decreasing over the past five years. It is assumed this is a result of the primary station ambulance not being readily available to respond with the primary fire apparatus.

Table 17: Actual Initial Response Service Levels (2011-2015)

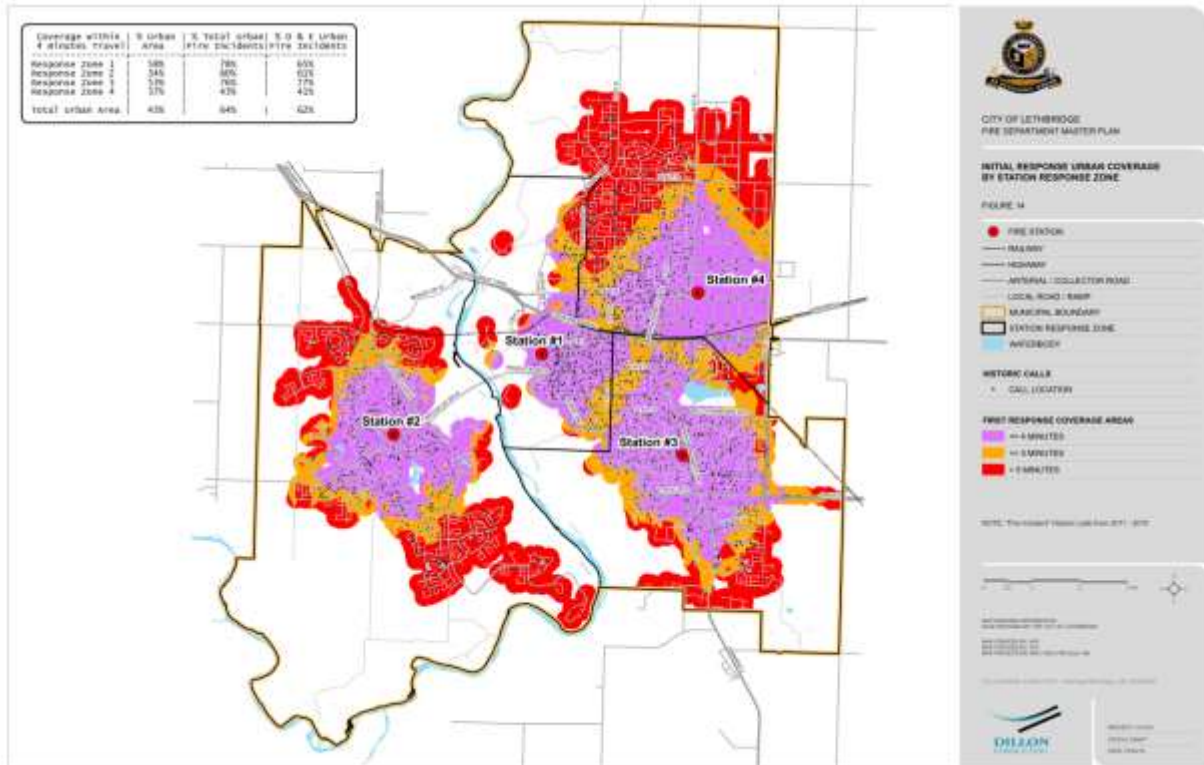
Response Area	Initial Response Service Level – Actuals by Year (4 firefighters in 4 minutes travel time)				
	% of delta and echo fire incidents covered				
Year	2011	2012	2013	2014	2015
City-wide	60%	47%	55%	34%	63%

6.5.4 Modelled Initial Response by Station Response Zone (Existing Baseline)

As a comparison to the actual service level assessment, a modelled assessment of initial response by station zone was completed. **Figure 16** illustrates the modelled initial response coverage by station zone of at least four firefighters arriving on-scene within a four minute travel time. The service level is measured as a percentage of urban area covered within each of the station response zones as well as a percentage of historical delta and echo fire incidents (2011-2015) covered.

In comparison to the analysis of actual initial response, the *modelled* analysis assumes that all fire and ambulances apparatus are available 100% of the time within their assigned station and staffed with the minimum staffing level. Under historical conditions, the ambulance units have estimated 60-80% availabilities (depending on the station response zone) and are subject to time on task simultaneous call challenges.

Figure 16: Modelled Initial Response by Station Response Zone



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The summary of the *modelled* analysis is presented in **Table 18**. The results indicate that for Station 1 a minimum of four firefighters are able to respond within four minutes or less travel time to 58% of the urban area response zone and 65% of the locations where delta and echo incidents occurred over the period from 2011 – 2015. Station 3 reflects the highest percentage of coverage where delta and echo incidents occurred at 77% respectively.

Table 18: Modelled Existing Initial Response Level of Service by Station Response Zone

Response Zone	Modelled Initial Response Service Level (4 firefighters in 4 minutes travel time)	
	% Urban Area Covered	% Delta & Echo Calls Covered (2011-2015)
Station 1	58%	65%
Station 2	34%	61%
Station 3	53%	77%
Station 4	37%	41%
City-wide (Total)	43%	62%

These modelled initial response service levels show an improvement from the actual service levels assessed in **Section 6.5.3**. These are compared in **Table 19**.

Table 19: Comparison of Actual and Modelled Initial Response Service Levels by Station Response Zone

Response Zone	Initial Response Service Level Comparison (4 firefighters in 4 minutes travel time)		
	% of 2011-2015 delta and echo fire incidents covered		
	Actual Service Level	Modelled Service Level	Difference
Station 1	68%	65%	-3%
Station 2	52%	61%	+9%
Station 3	75%	77%	+2%
Station 4	56%	41%	-5%
City-wide (Total)	58%	62%	+4%

In our view the reduced availability and “time on task” of the ambulances due to the increasing volume of medical related incidents is impacting the ability of the LFES to achieve a fire related service level of attaining four firefighters on scene within four minutes or less. The comparative analyses of *actual* and *modelled* initial response indicates that the effectiveness of the integrated fire/EMS operating model relies significantly upon the availability of the primary ambulances assigned to each fire station to be available to respond simultaneously with the fire apparatus from that station.

The comparative analyses indicates that if ambulance availability to respond to fire related incidents was improved, especially in Station Response Zone 2, the ability of the LFES to achieve a higher percentage of effectiveness in achieving an initial response deployment of a minimum of four firefighters responding within a four minute travel time for delta and echo related fire incidents could be attained. Station Response Zones 1 and 4 attained actuals service levels slightly above the modelled results. The availability of more vehicles to respond in the Station 1 zone as well as the Station 4 zone, allow for actual performance that is more consistent with modelled performance.

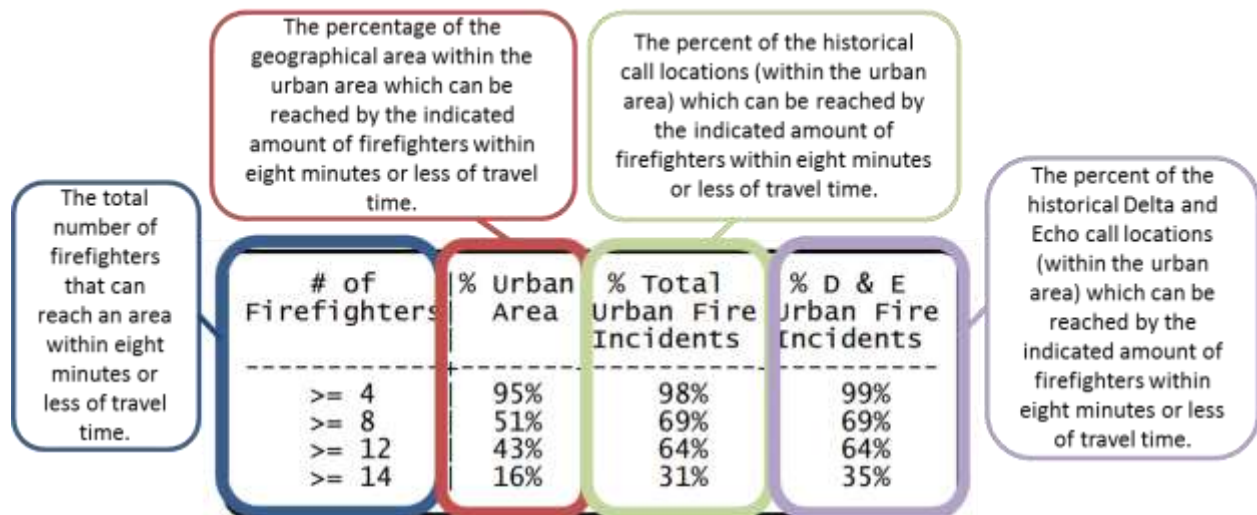
6.6 Depth of Response Assessment

6.6.1 Depth of Response Methodology

Depth of response was measured as the number of staff assembled on-scene within a travel time of eight minutes. This is consistent with the travel time component in NFPA 1710 for depth of response. The statistics table, illustrated in **Figure 17**, included on each depth of response coverage figure includes the percent of calls that the model predicts would be reached within the eight minutes travel time, shown as the percentage of urban area covered. The delta and echo historic calls (response calls from 2011 to 2015) are then overlain on the model and shown as a percentage of calls covered.

The analysis of industry best practices within the FDMP indicates a depth of response of 14 firefighters should be deployed to a Delta or Echo fire related incident in a moderate risk occupancy (e.g. single family dwelling). For illustrative purposes “staffing bands” for 4, 8, and 12 firefighter responses are also shown to provide insight into the current depth of response deployment capabilities of the LFES.

Figure 17: Explanation of Depth of Response Statistics Tables



This statistic table can be interpreted as the following:

- Within eight minutes or less of travel time at least 14 fighters can reach 16% of the City’s urban area.
- Historically, 31% of the calls have occurred within the area which can be reached by 14 firefighters within eight minutes or less of travel time.
- Historically, 35% of the Delta and Echo calls have occurred within the area which can be reached by 14 firefighters within eight minutes or less of travel time.
- The eight firefighters category includes all areas where at least eight firefighters can reach within eight minutes or less.

6.6.1.1 Depth of Response – Time on Task

Similarly to initial response, the time on task of the ambulances is having an impact on the current depth of response deployment of the LFES.

Figure 18 illustrates the current depth of response coverage based on the fully-integrated fire/EMS operating model and assuming that all of the fire and EMS apparatus and minimum staffing are available to respond from their respective stations. This model assesses the minimum staffing level of 23 firefighters (without the day support ambulances).

Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 16% of the urban area and 35% of the historic locations where urban delta or echo fire related calls (the two highest priorities from a scale of five) historically occurred.

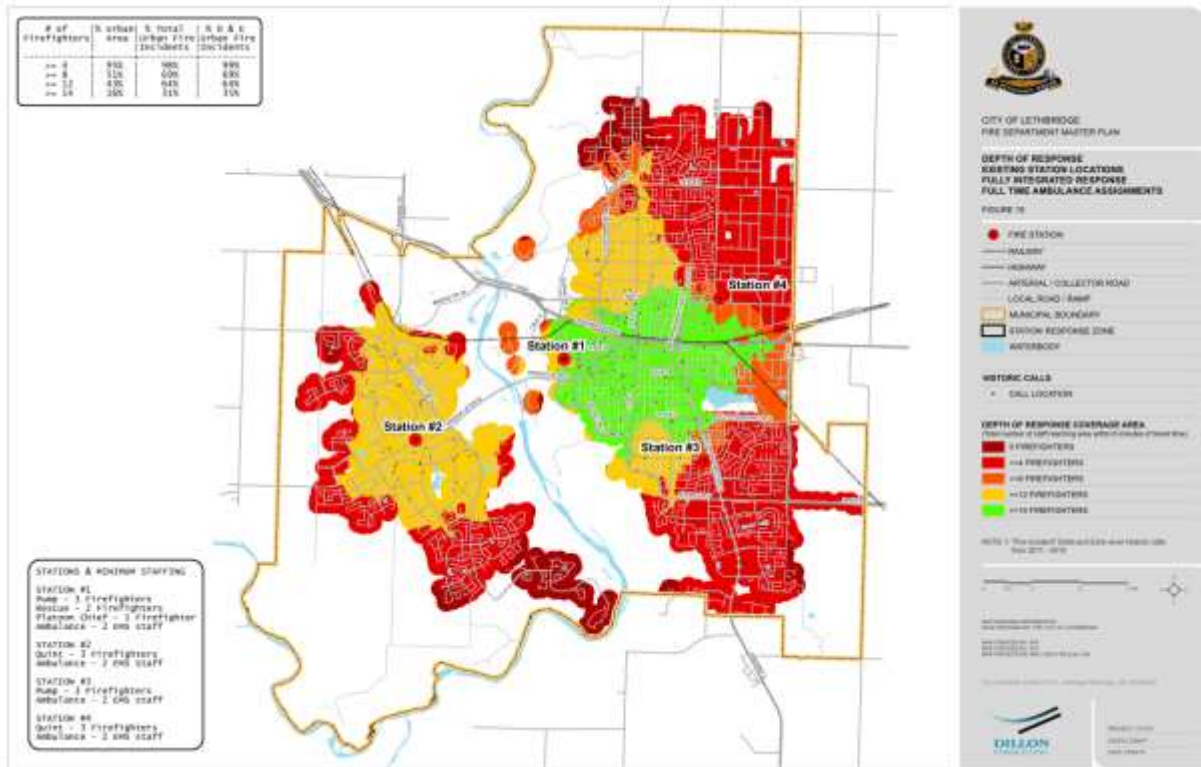
6.6.1.2 Day Support Ambulances Model (Minimum Staffing 31)

In late 2014, LFES added three day support ambulances, in addition to the previous one ‘peak time’ day unit, for a total of four day-support units, staffed with two firefighter-paramedics / EMTs. These units operate on twelve hour shifts, with staggered start times at 0700 hours, 0800 hours, 1000 hours and 1200 hours. These units were added to meet peak demands for calls during daytime hours. The day-support units are capable of responding to fire events, but their primary purpose is to enhance the ability of the front-line (core) ambulance units to provide for adequate fire response resources.

Figure 19 illustrates the current depth of response coverage of this new staffing model for the time period when all four peak ambulances are in service (e.g. 1200 hours to 1900 hours). It is based on the fully-integrated fire/EMS operating model and assumes that all of the fire and EMS apparatus and minimum staffing are available to respond from their respective stations. This model assesses the minimum staffing level of 31 firefighters (with the four day support ambulances).

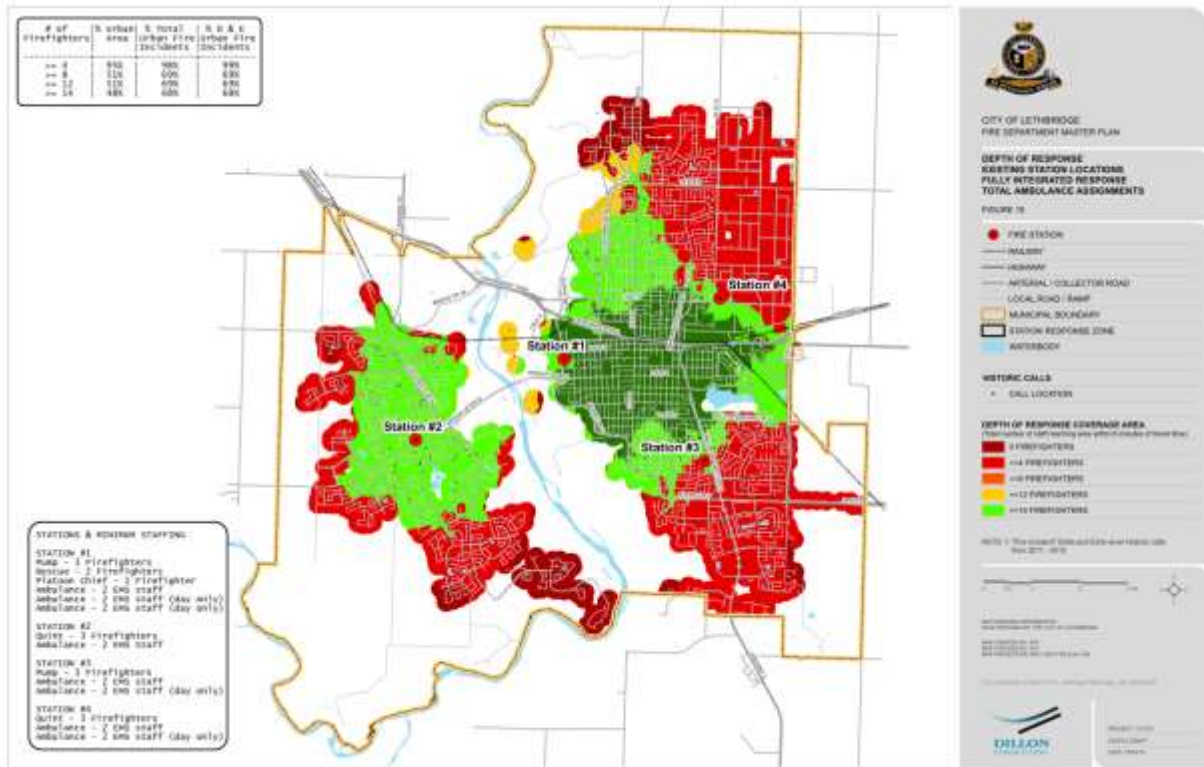
Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 48% of the urban area and 68% of the historic locations where urban delta or echo fire related calls (the two highest priorities from a scale of five) historically occurred.

Figure 18: Existing Depth of Response – Integrated Response (Minimum Staffing of 23)



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Figure 19: Existing Depth of Response – Integrated Response (Minimum Staffing of 31)



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6.6.2 Depth of Response - Actual Coverage

To consider the actual historic LFES level of service for depth of response and the impact of time on task, based on the location of actual calls, a statistical assessment of the delta and echo fire related calls for the period of 2011 to 2015 was completed. This analysis assessed, based on the available data, the percentage of actual call responses that 14 or more firefighters arrived at within eight minutes of travel or less.

The results shown below in **Tables 20** and **21** represent the assessment of all calls received and coded as either delta or echo fire-related calls from 2011 to 2015. LFES, by procedure, dispatches a minimum of 12 firefighters to all such call types. The dataset includes calls which are initially dispatched as a delta or echo call, but are either downgraded (and additional staff called off before arriving on-scene) after the first truck arrives on-scene and determines the call to be a lower priority or may be cancelled enroute (and staff called off before arriving on-scene) if the dispatcher provides additional information to downgrade the call priority. As a result, these percentages are considered to be much lower than what the LFES’ true on-scene performance for depth of response would be. However, detailed data indicating the arrival time of and numbers of staff arriving on-scene and details of call downgrades / cancellations are not currently tracked.

It is recommended that LFES initiate a process to record into the call data details the number of staff arriving on-scene, with a corresponding timestamp of on-scene arrival of each staff member, in order to better represent, track, monitor and assess this metric. Call downgrades and cancellations should also be coded as such, as opposed to true delta and echo calls.

Based on the available call data, the actual City-wide depth of response coverage over the past five years combined was estimated as 10 firefighters arriving on-scene within eight minutes of travel time to 29% of delta and echo calls, 12 firefighters arriving on-scene within eight minutes of travel time to 12% of delta and echo calls and 14 firefighters arriving on-scene within eight minutes of travel time to 4% of delta and echo calls.

The findings of this analysis represent the actual historic depth of response level of service of the LFES as summarized by station response zone in **Table 20**.

Table 20: LFES Actual Depth of Response Level of Service by Station Response Zone

Response Zone	LFES Actual Depth of Response Service Level (number of firefighters on-scene within 8 minutes of travel time)		
	<i>% of 2011-2015 delta and echo fire incidents covered (statistical assessment)</i>		
	10 firefighters	12 firefighters	14 firefighters
Station 1	29%	15%	5%
Station 2	24%	6%	1%
Station 3	31%	14%	4%
Station 4	32%	12%	4%
City-wide	29%	12%	4%

Table 21 shows the City-wide actual depth of response coverage by year for delta and echo calls. These results indicate a decreasing trend from 2011 to 2015. This decrease is assumed to result from the reduced availability of the ambulance units to respond as part of the fully integrated response to these calls.

Table 21: Actual Depth of Response Service Levels (2011-2015)

Response Area	Depth of Response Service Level – Actuals by Year (14 firefighters on-scene within 8 minutes of travel time)				
	<i>% of delta and echo fire incidents covered</i>				
Year	2011	2012	2013	2014	2015
City-wide	5%	3%	2%	1%	0%

LFES provided an extracted portion of the dataset for confirmed structure fires from 2011 to 2015, with a total of 455 records. This required manual review of the overall call data set. This data included the total number of staff (firefighters) on-scene, however, time details were not available to assess calls where 14 firefighters arrived on-scene within eight minutes of travel time. The summary of the total staff on-scene, by percentage of these structural fire calls, are shown in **Table 22**. This indicates that historically, LFES has assembled 14 or more firefighters on-scene to an average of 24% of the 455 confirmed structure fire calls from 2011 to 2015. This does not reflect a time restriction, however, of arriving on-scene within eight minutes of travel time.

Table 22: Confirmed Structure Fire Call Data, Total On-Scene Staffing (2011-2015)

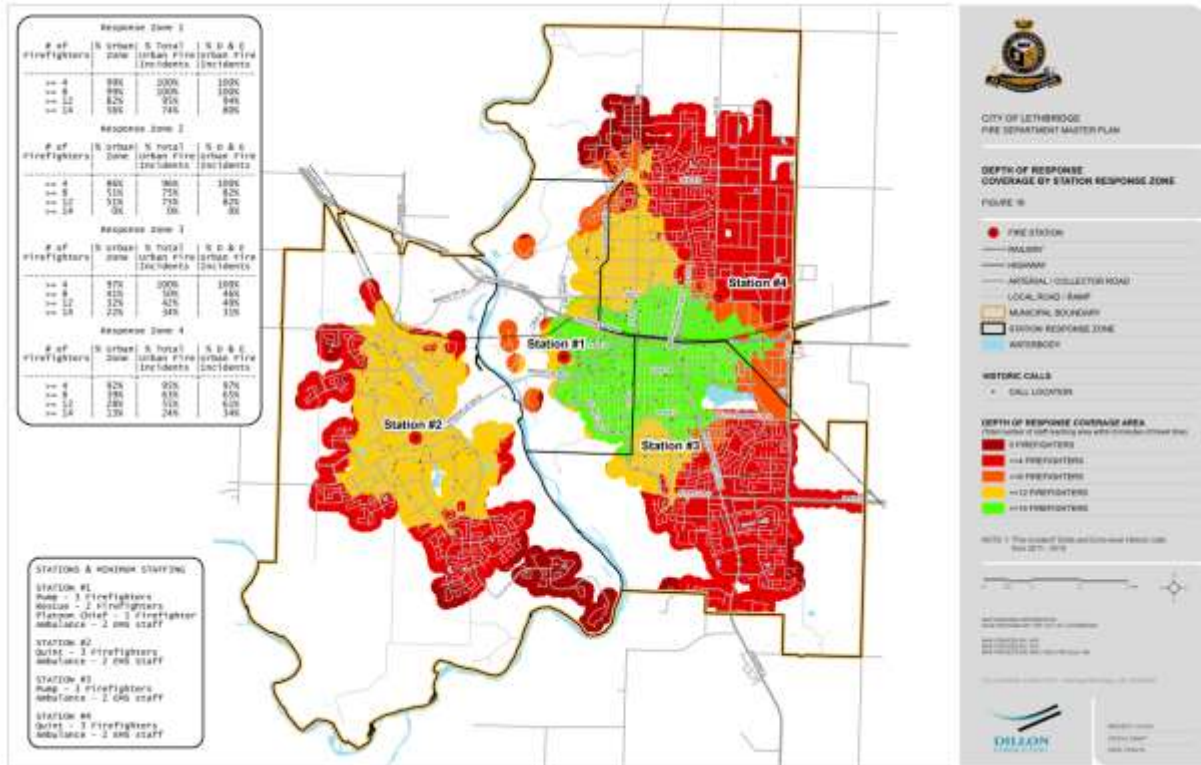
Total On-Scene Staffing	Total On-Scene Staffing, Confirmed Structure Fires – Actuals by Year (no travel time benchmark available in data set)				
	<i>Number of staff on-scene at % of confirmed structure fire incidents (City-wide)</i>				
	2011	2012	2013	2014	2015
>=8	67%	63%	59%	66%	53%
>=10	65%	56%	56%	63%	41%
>=12	51%	43%	43%	45%	27%
>=14	29%	28%	28%	26%	17%

6.6.2.1 Modelled Depth of Response by Station Response Zone

As a comparison to the actual service level assessment, a *modelled* assessment of depth of response by station zone was completed. **Figure 20** illustrates the *modelled* depth of response coverage by station zone identifying the number of firefighters arriving on-scene within an eight minute travel time. The service level is measured as percentage of urban area covered within each of the station emergency response zones and the historical locations of delta and echo fire related incidents (2011-2015) covered.

In comparison to the *actual* analysis of depth of response, the *modelled* analysis assumes that all fire and ambulances apparatus are available within their assigned station and staffed with the minimum staffing level.

Figure 20: Modelled Depth of Response by Station Response Zone



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The summary of the *modelled* analysis is presented in **Table 23**. The results indicate that for Station 1, 14 firefighters are able to respond within eight minutes or less travel time to 56% of the urban area response zone, and 80% of the locations where delta and echo fire related incidents occurred over the same period.

Table 23: LFES Modelled Depth of Response Level of Service by Station Response Zone

Response Zone	Depth of Response Service Level – Modelled (number of firefighters on-scene within 8 Minutes of Travel Time)			
	% Urban Area Covered		% Delta & Echo Calls Covered (2011-2015)	
	12 firefighters	14 firefighters	12 firefighters	14 firefighters
Station 1	82%	56%	94%	80%
Station 2	51%	0%	82%	0%
Station 3	32%	22%	40%	31%
Station 4	28%	13%	61%	34%
City-wide	43%	16%	64%	35%

The *modelled* depth of response service levels show improvement from the *actual* depth of response assessment. As with initial response performance, this translates to the availability of the ambulance units to respond in the integrated model. If the ambulance units and the primary fire apparatus can respond from all stations simultaneously, as well as the rescue unit and Platoon Chief from Station 1, the depth of response service level performance improves significantly. The comparison between the depth of response of 12 and 14 firefighters arriving on-scene within eight minutes of travel time, *actual* versus *modelled*, is presented in **Table 24**. This is the theoretical improvement in the level of depth of response that could be achieved with the fully integrated response model.

It is expected that the *modelled* levels of service could be achieved if the ambulance unit availability was improved and all units were available for depth of response to fire incidents (delta and echo calls).

Table 24: Comparison of Actual vs. Modelled Depth of Response Service Levels by Station Response Zone

Response Zone	Depth of Response Service Level Comparison (number of firefighters on-scene within 8 minutes of travel time)			
	% Delta & Echo Calls Covered (2011-2015)			
	Actual Statistical Assessment		Modelled Assessment	
	12 firefighters	14 firefighters	12 firefighters	14 firefighters
Station 1	15%	5%	94%	80%
Station 2	6%	1%	82%	0%
Station 3	14%	4%	40%	31%
Station 4	12%	4%	61%	34%
City-wide	12%	4%	64%	35%

6.6.3 Existing Service Level – Fully-Integrated Fire/EMS Operating Model

The efficiency and effectiveness of the current LFES fully-integrated fire/EMS operating model relies on the availability of ambulances and fire apparatus to support the integrated response to both fire related and medical emergencies. The analyses within this FDMP reflects that the increasing volume of medical related calls and the resulting increasing “time on task” of the ambulances, and specifically the four primary ambulances assigned to each of the fire stations, is impacting the current effectiveness of the initial response and depth of response capabilities of the LFES.

It is recommended that LFES implement strategies to reduce the “time on task” of the four primary ambulances to sustain the efficiency and effectiveness of the LFES fully-integrated fire/EMS operating model.

6.6.4 Lethbridge Performance Benchmarks

As part of the Fire Department Master Plan study, the City of Lethbridge requested the identification and development of Performance Benchmarks for the Lethbridge Fire and Emergency Services. Through discussions with the management of LFES the benchmark was identified as the ‘best existing station response zone’ service level.

The following factors have been applied in determining these existing service level performance benchmarks:

- The existing station locations;
- All current fire apparatus and primary ambulances (four) are available to respond to all fire related incidents (delta and echo); and

- Minimum staffing of 23 firefighters on duty.

Based on these factors Station 1 has the current highest percentage of “modelled” initial response representing 58% of the station urban area response zone. Station 1 also has the highest percentage of “modelled” depth of response representing 56% of the station urban area response zone. For ease of reference, these numbers were rounded to 60% to apply as performance benchmarks.

The existing service level performance benchmarks of the LFES are summarized in **Table 25**.

Table 25: LFES Performance Benchmarks for Delta and Echo Fire Incidents

Performance Measure	% of Urban Area Coverage Performance Benchmarks
Initial Response (minimum of 4 firefighters arriving on scene in 4 minutes of travel time or less)	60%
Depth of Response (minimum of 14 firefighters arriving on scene within 8 Minutes of travel time or less)	60%

For comparative purposes within the remainder of this FDMP these existing LFES service level performance benchmarks for both initial response and depth of response are applied.

6.7 Summary of Existing Stations, Staffing and Deployment

This FDMP recognizes the sustainability of a fully integrated Fire/EMS operating model for the delivery of fire protection and emergency medical response as a strategic priority. This strategy is also consistent with the Fire Safety Effectiveness Model presented within this plan including the “three lines of defence” that identifies fire suppression as the ‘fail safe’ (last line of defence) for when incidents occur despite all efforts towards optimization of the first two lines of defence.

As a result of research and testing the LFES introduced performance objectives for chute times (turnout times) in 2015. The analyses within this FDMP presents further existing service level performance benchmarks for both initial response and depth of response based on the percentage of urban area response zone coverage of Station 1.

Delta and echo fire related calls remain the highest priority for assembling an initial response and depth of response deployment. Ensuring the deployment to these incidents includes the required minimum staffing and apparatus to safely, and effectively mitigate the emergency is a priority of the LFES.

The analyses within this plan identifies the increasing emergency call volume for medical related incidents as a primary factor in increasing the “time on task” for all ambulances and specifically the four primary ambulances assigned to each of the four fire stations.

As such the provision of additional ambulance resources to reduce the “time on task” of the four primary ambulances should be considered a priority of this FDMP. In our view the implementation of this strategy targets improving the availability of the primary ambulance assigned to each station in supporting the fully-integrated fire/EMS operating model.

In order to incrementally strive for continuous improvement, and sustainability of the fully-integrated fire/EMS operating model it is recommended that the existing service level performance benchmarks for both initial response and depth of response based on the percentage of urban area response zone coverage of Station 1 be utilized as the LFES performance benchmarks for initial response and depth of response. The results in **Table 26** present the City-wide existing conditions responses with the fully integrated model and the LFES performance benchmarks for initial and depth of response. The fully integrated model can be achieved by improving the availability of the primary ambulance units at each of the four existing stations.

Table 26: Existing Conditions Response Summary

Scenario	% Urban Area Initial Response Coverage	% Urban Area Depth of Response Coverage	% of Historical Call Initial Response Coverage	% of Historical Call Depth of Response Coverage
<i>Comparison to LFES Performance Benchmarks</i>				
LFES Performance Benchmark	60%	60%	----	----
Existing Conditions – Fully Integrated Model	50%	24%	71%	46%
Service Level Gap (benchmark – scenario)	10%	36%	----	----

Under existing conditions, the service levels improve when the primary station ambulances are available to respond to initial and depth of response calls as a fully integrated model. Applying the LFES Service Level Benchmarks, based on the existing performance of Station 1’s response area, the existing service level gap is 10% for initial response and 36% for depth of response.

Recommendations:

- 30. That LFES prioritize the deployment of a minimum of four firefighters arriving on scene staffing an engine/quint, or alternatively arriving on scene simultaneously in order to safely and effectively initiate the critical fireground tasks for initial response identified within the FDMP.
- 31. That the LFES implement automatic deployment protocols to confirmed delta and echo fire incidents assigning a minimum of four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies, and 24 firefighters to high risk occupancies in order to safely and effectively initiate the critical fireground tasks for depth of response identified within the FDMP.
- 32. That the department initiates measures to track and monitor the arrival of staff on-scene (time of arrival and numbers of firefighters), to collect data to monitor and review actual depth of response coverage.





7.0 STATIONS, STAFFING AND FUTURE DEPLOYMENT OPTIONS


The analyses within this section reviews the current and future challenges of the LFES in sustaining the fully-integrated fire/EMS operating model in response to existing station conditions and the impacts of future community growth over the next 20 year planning horizon. This section provides options with the emphasis on strategies that support the delivery of fire protection and emergency medical services that provide the most cost effective and efficient level of services resulting in the best value for the community.

7.1 Existing Station Conditions

Lethbridge Fire and Emergency Services currently operate from four stations. The stations are strategically located throughout the City. These are described in **Table 27**.

Table 27: Existing Stations and Facilities

Station	Description
<p>Station 1 (Headquarters) - 207 4th Avenue South</p> 	<p>Station 1 is the newest facility built in 2010.</p> <p>The primary response zone for this station is the core area of the City.</p> <p>This station houses Fire Suppression and Emergency Medical staff in addition to Administration, Public Safety Communications Centre, Emergency Operations Centre, Fire Prevention and Fire Investigations.</p>
<p>Station 2 - 10 Jerry Potts Blvd West</p> 	<p>Station 2 was constructed in 1978.</p> <p>The primary response zone for this station is the west side of the Oldman River Valley.</p> <p>This station houses Fire Suppression and Emergency Medical staff in addition to the LFES Rescue Boat.</p>
<p>Station 3 – 2614 16th Avenue South</p> 	<p>Station 3 was built in 1963 and represents the oldest station.</p> <p>The primary response zone for this station is South Lethbridge.</p> <p>This station houses Fire Suppression and Emergency Medical staff.</p> <p>This station has surpassed its life expectancy and has been identified for replacement by LFES staff.</p>
<p>Station 4 – 2825 5th Avenue North</p> 	<p>Station 4 was built in 1972 and substantially renovated in 2010.</p> <p>The primary response zone for this station is North Lethbridge.</p> <p>This station houses Fire Suppression and Emergency Medical staff. And is adjacent to the LFES Training Centre.</p>

<p>Training Centre – 2825 5th Avenue North</p> 	<p>The Training Centre is located adjacent to Station 4</p> <p>The training tower recently was upgraded / renovated including the installation of propane fired fuel props for live fire training evaluations.</p> <p>The centre includes one 25 seat classroom and a board room on-site and a large paved surface for exterior training operations (e.g. auto-extrication props & training)</p>
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Station 3 is the oldest and smallest of the four stations and has reached the end of its useable life cycle, requiring either substantial renovation or reconstruction. From previous facility assessments conducted by LFES, reconstruction of the facility is recommended. Due to the size of the existing site and the operational challenges of rebuilding on an existing site while maintaining service to the station response zone, consideration for a new site location is assessed within this FDMP.

Station 2 is the only station serving the west side of the Oldman River Valley. As it approaches the end of its life cycle, this station will require consideration for renovation or reconstruction. This station response zone is also anticipated to experience significant future growth. As a result, options for new and relocated stations in West Lethbridge are assessed within this FDMP.

7.1.1 Existing Workspace

Table 28 summarizes the existing workspace conditions of the department.

Table 28: Existing Workspace Conditions

Core Business Program	Workspace Location	Evaluation
Administration Team	Headquarters (Station 1)	Administration / management of the LFES operate from department headquarters at Station 1. The facility is new and provides sufficient office space and meeting room space for the current team size, with some capacity for future growth. The facility was designed and constructed to meet the present-day needs of the LFES. The building also contains the Public Safety Communications Centre.
Fire Prevention Bureau	Headquarters (Station 1)	Offices for the Fire Prevention Bureau Staff are located on the first floor of Station 1 (Headquarters). Office space is sufficient for the current staff size, with some availability for expansion / growth.
Training	Station 4	Training operates from the Training Centre located at Station 4. Offices are provided for Training Division staff.
Suppression / EMS	Stations 1-4	Office space is provided at each station for Platoon Chief (Station 1) and Captains (Station 1-4) Each station is equipped with all the amenities of a modern, full-time fire station. This includes kitchen, day room, dorms, lockers, washrooms / showers, fitness facilities, apparatus bay, storage areas, laundry facilities, etc. Diesel emission management systems are in place at all stations.

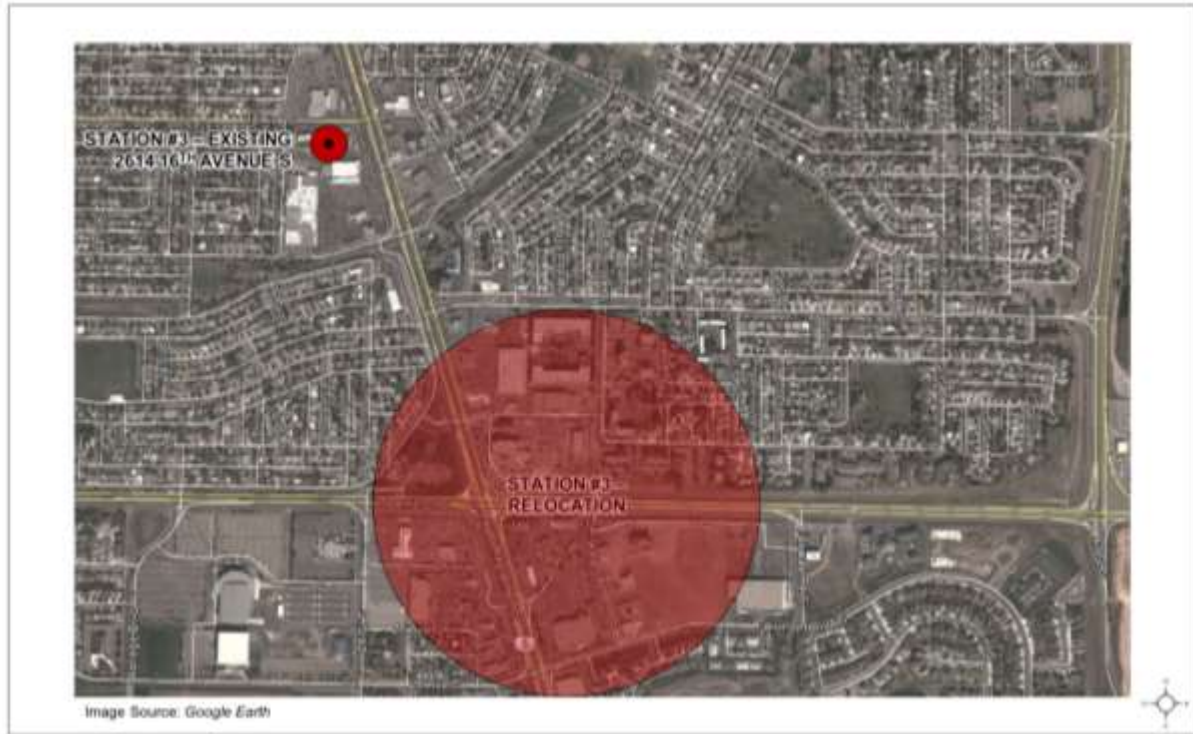
7.1.2 Station 3 Renewal/Relocation

Station 3 was constructed in 1963 to serve South Lethbridge. The station is located adjacent to the intersection of 16th Avenue South and Mayor Magrath Drive South, and currently staffed with an engine with a crew of three and an ambulance with a crew of two.

Situated on a site of approximately 0.6 acres (2400 square meters) previous assessments have concluded that the station has reached its life expectancy. The current site has limited parking capacity and flexibility to accommodate exterior training exercises similar to other stations. The current site provides no opportunity for expansion of the station for additional staff/apparatus to respond to future community growth.

Based on discussions with LFES staff, the preferred option to relocate the station was assessed. Two candidate relocation sites in the vicinity of Scenic Drive and Mayor Magrath Drive South were identified and evaluated. **Figure 21** illustrates the approximate location for the replacement of Station 3.

Figure 21: Station 3 Relocation



LFES has indicated that approximately 1.2 acres (5,100 sq. metres) of land would ideally accommodate the new station. This is consistent with our experience in developing community fire stations that typically require 1 to 2 acres of property depending on site configuration, setbacks and parking requirements.

The analyses of options to consider relocating Station 3 assessed both the existing LFES performance targets, and a more detailed analysis of the current future urban growth and road network related to the Station 3 response zone. Relocation options were evaluated based on their ability to achieve the existing LFES service level performance benchmarks for initial response and depth of response.

The detailed comparison of the proposed Station 3 site options were assessed in a separate report: *“Fire Hall No. 3 Relocation Options Preliminary Findings”* submitted in February 2014. This assessment was conducted early in the fire department master planning process, as the replacement of Station 3 is a priority due to the existing condition of the current Station 3 facility.

The results of the Station 3 options analysis are summarized in **Table 29**.

Table 29: Station 3 Relocation Options Analysis Summary

Station Location Option	Urban Area Initial Response Coverage		
	% Area	% Total Fire Incident Call Locations	% Level D & E Fire Incident Call Locations
Existing Location - 2614 16 th Avenue South	50%	74%	70%
Option 1	51%	72%	68%
Option 2	45%	66%	61%

As identified in the preliminary findings report and based on the results displayed in the table above, Option 1 is the recommended location for the future Station 3 location. The service levels of the LFES station model including the relocated Station 3 at the Option 1 location are included in the future conditions analysis in the following sections.

7.2 Community Growth and Development

Table 30 indicates the historic populations within the City of Lethbridge, as provided by Statistics Canada, Census Profiles. Historic household numbers are also included, where available.

Table 30: Historic Growth in Population and Households for City of Lethbridge

Year	Population	% Change in Population	Number of Households	% Change in Households
1991	60,974	-	-	-
1996	63,053	3.4%	24,500	-
2001	67,374	6.9%	27,130	10.73%
2006	74,637	10.8%	30,700	13.16%
2011	83,517	11.9%	34,140	11.21%

Source: Analysis of Statistics Canada – 1996, 2001, 2006, and 2011 Community Profiles

The City of Lethbridge has seen significant population growth over the past twenty years with an increase of 37% or 1.8% annually. Commensurate with this population growth was an increase in 39% of the number of households (2.6% annually).

Proportionate to the economic boom being experienced in Alberta, the population continues to grow rapidly compared to some communities elsewhere in Canada.

7.2.1 Integrated Growth Management Strategy

The City of Lethbridge faces considerable growth over the next twenty years, with the population growing at an average annual rate of 1.4%. The recently completed Lethbridge Integrated Growth Management Strategy estimated population and job growth based on planning cells and for five phases of growth. The first phase of the Growth Scenario (2012-2032) focuses on accommodating demand within areas already planned whenever practical. **Figure 22** illustrates the conceptual planning cells that are recommended in the study as priorities for planning within the next 20 years. In a number of cases, these areas are already being planned.

Table 31 summarizes the growth projections for the City from 2012 to 2052. Over the 40 year period, the population is projected to grow by 67% to 148,398 people and employment is projected to increase at an average annual rate of 1.1%. The total number of households is expected to grow at a rate to meet the needs of the growing population resulting in an increase of 65%, or an average annual growth rate of 1.3%.

Table 31: Population and Employment Growth Projections

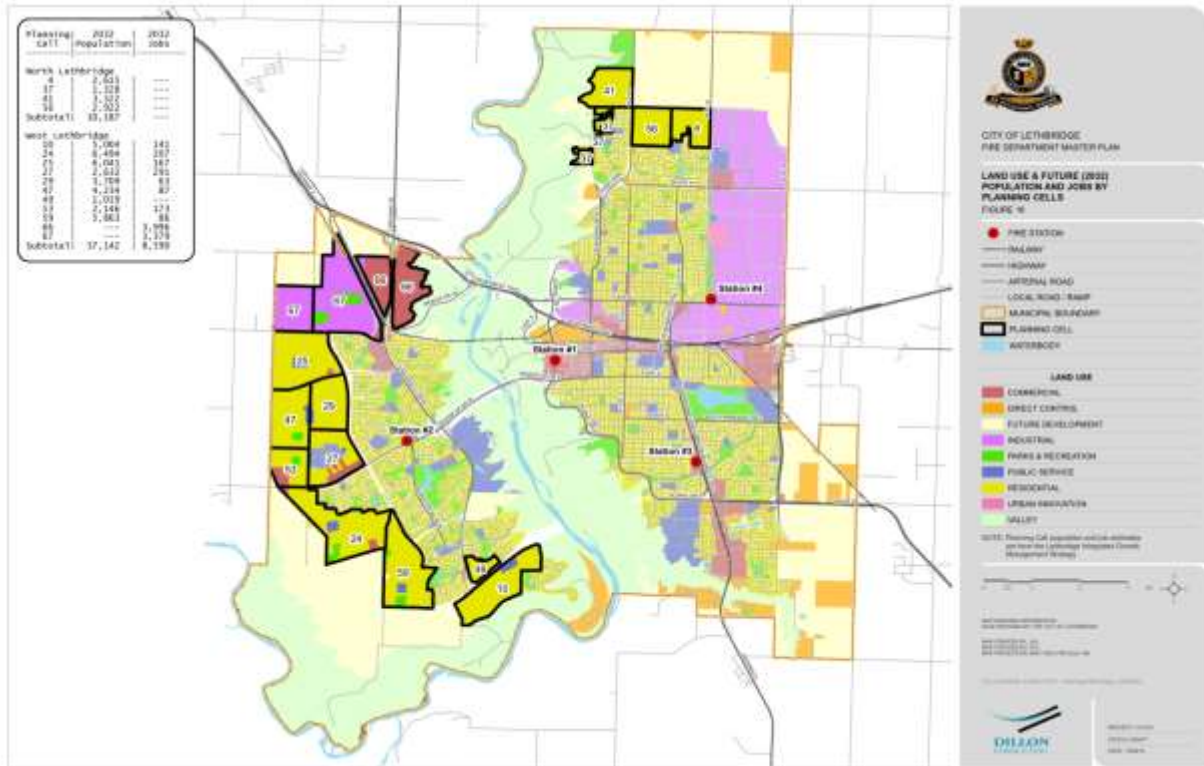
Year	2012	2015	2032	2052
Population	89,120	94,804	118,279	148,398
Household	37,396	40,143	49,631	61,668
Employment	42,492	45,626	54,920	66,261

Source: Lethbridge Integrated Growth Management Strategy, October 2013

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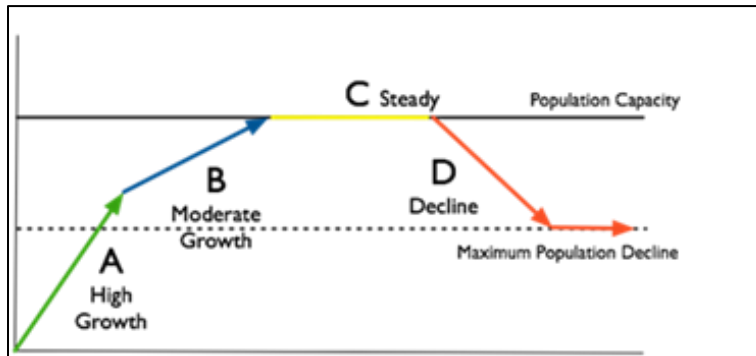
Figure 22: Land Use & Future (2032) Population and Jobs by Planning Cells



7.2.2 Population Employment Forecasting Model (PEFM) Tracts

A second source of forecasted growth is from the City’s Population and Employment Forecasting Model (PEFM). Within this model, the City of Lethbridge has been disseminated into 273 geographic regions called PEFM tracts. For each of these PEFM tracts the City has defined the growth status of the tracts and predicted the future growth by year.

Figure 23: Neighbourhood Growth Status



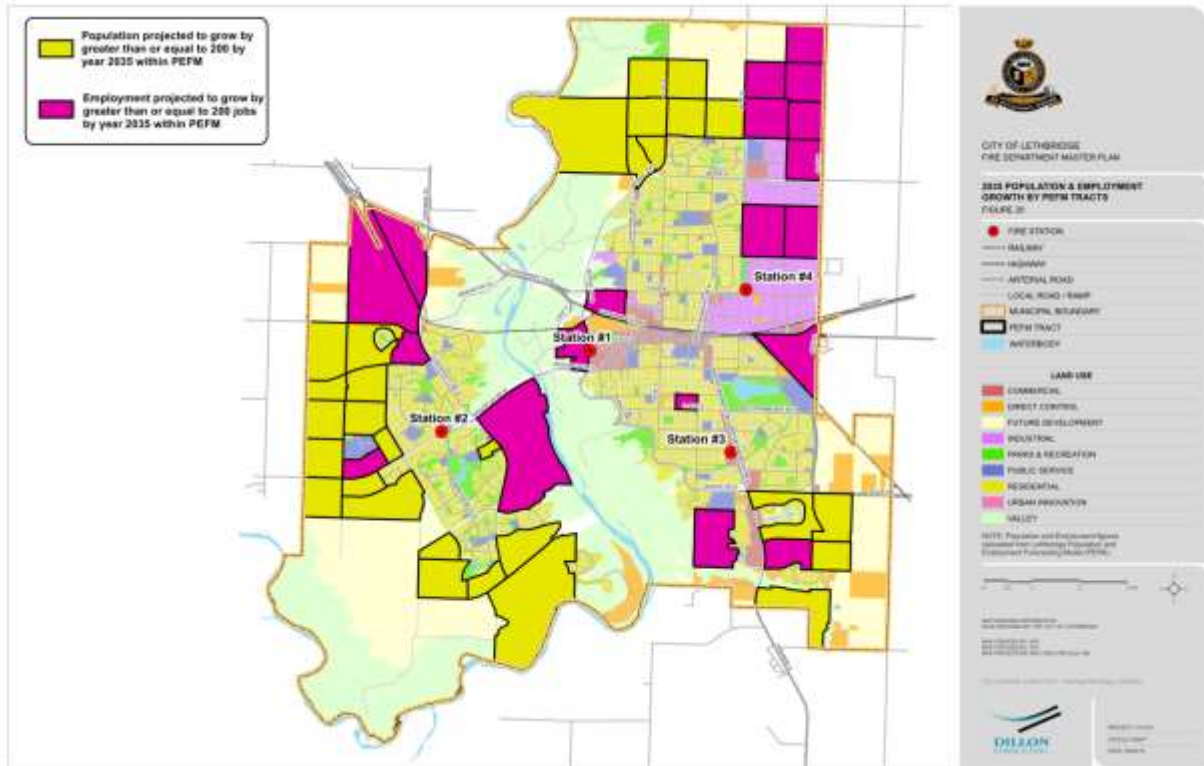
Depicted in **Figure 23**, ‘Type A’ growth occurs in greenfield development tracts or newly developing tracts. These areas display the fastest growth. ‘Type B’ tracts have nearly reached capacity and their growth has slowed. Usually once a tract has reached 90 percent of its capacity it will switch from a ‘Type A’ to ‘Type B’ tract. ‘Type C’ tracts are fully developed and will remain at capacity until children have grown. This also applies to much older tracts which have achieved equilibrium after a decline in population (Type D). ‘Type D’ tracts occur where children are generally leaving neighbourhoods and family sizes are shrinking after the ‘Type C’ Phase. These decline to a certain amount then generally return to ‘Type C’ tract after a certain threshold has been reached.

Figure 24 illustrates the PEFM tracts that are anticipated to have a population growth of at least 200 people within a future 5, 10, 20, and 30 year time horizon.

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Figure 24: Land Use and Future Population by PEFM Tract



7.2.3 Growth Summary

Input from the City of Lethbridge Planning and Development Services Department aided in the development of the defined future urban boundary. Although the IGMS and PEFM data estimate future growth with somewhat different methodologies they both provide valuable input to predicting future growth.

The IGMS utilizes a servicing ability approach but does include some qualitative factors, such as a developers desire to develop a specific portion of land or political will to develop a certain area of the City over another. The PEFM tracts place greater emphasis on the qualitative factors that are not included in the IGMS, however over longer time periods these qualitative factors are more likely to change.

To integrate the two data sources and define the future urban boundary for a 20 year time horizon the following criteria were developed:

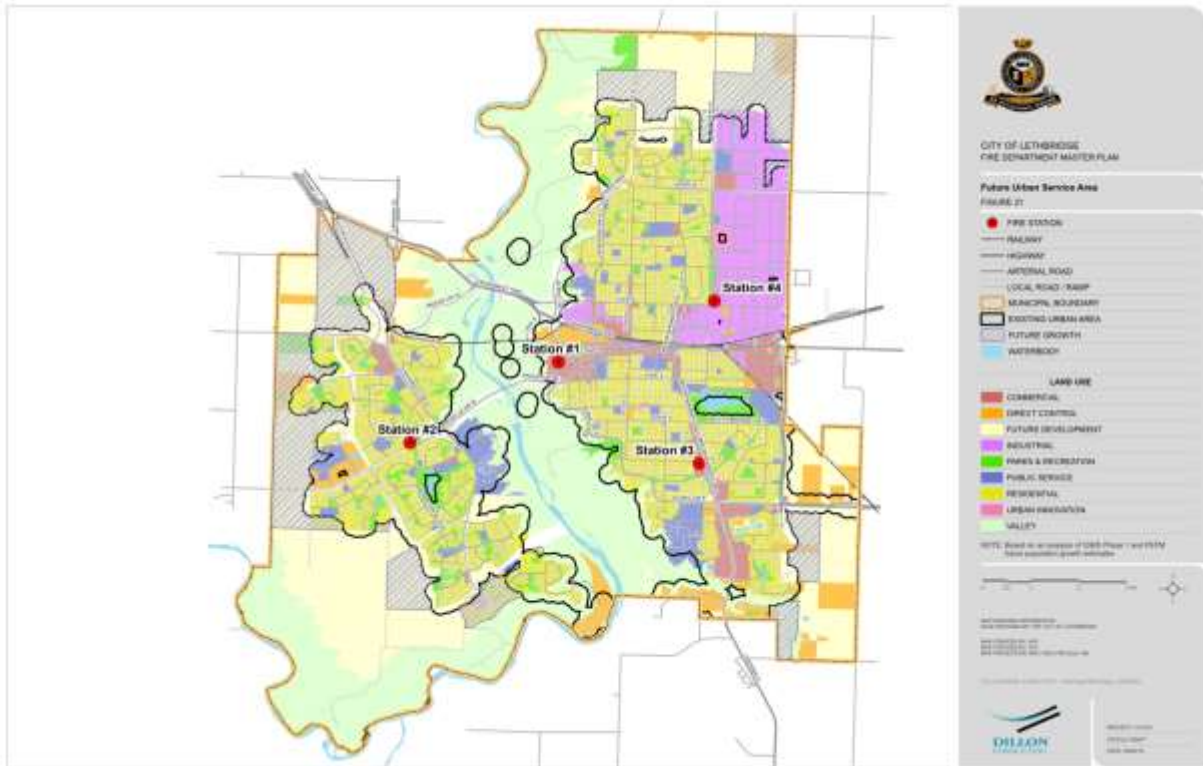
- All PEFM tracts with at least 200 population growth within a 20 year time horizon are included.
- All IGMS planning cells with at least 200 employment growth within a 20 year time horizon are included.
- Areas identified within the IGMS planning cells as having growth within a 20 year time horizon and identified by the PEFM tracts as having at least 200 population growth within a 30 year time horizon are included.
- City of Lethbridge Planning and Development Services Department staff provided final input.

This methodology integrates data from both sources (PEFM and IGMS) to provide an estimate of expected geographic growth boundaries for a 20-year time horizon. The future urban service area is defined as the combination of the existing fire-hydranted service area and the addition of the predicted 20 year geographic growth areas. **Figure 25** illustrates the future urban growth boundary used throughout the analysis of future fire station locations.

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Figure 25: Future Urban Service Area



7.3 Assessment Methodology

The same methodology as described in **Section 6.4** is used to assess options under the impact of future growth on the existing station model and relocating / increasing the number of proposed future stations. This methodology applies the initial response performance benchmark of four firefighters arriving at the scene of an incident with in four minutes of travel time and a depth of response performance benchmark of 14 firefighters arriving on the incident scene within eight minutes of travel time. Service levels in the future conditions are assessed based on urban area coverage, as the call locations represent existing conditions, and do not account for future growth areas.

The results of the assessment will be compared against the service level benchmarks (based on the existing best station response zone coverage) developed in **Section 6.6.4**. For reference, these service level benchmarks are provided in **Table 32**.

Table 32: LFES Existing Service Level Performance Benchmarks for Delta and Echo Fire Incidents

Performance Measure	% of Urban Area Coverage Performance Benchmarks
<p>Initial Response (minimum of 4 firefighters arriving on scene in 4 minutes of travel time or less)</p>	<p>60%</p>
<p>Depth of Response (minimum of 14 firefighters arriving on scene within 8 Minutes of travel time or less)</p>	<p>60%</p>

Future options will strive to achieve and improve these service level benchmarks on a City-wide basis.

The staffing assumptions propose enhancing the fully integrated fire/EMS model with minimum staffing at all existing stations, as discussed in previous sections. Each additional station is assumed to be staffed with a primary fire apparatus (minimum staffing of four firefighters to sustain the fully integrated fire / EMS service operating model).

7.4 Future Growth and Existing Stations

This scenario is presented to provide an understanding of what could be expected with the future growth of the community but no change to the fire suppression services. This scenario evaluates the coverage that would be expected within the future 20 year horizon by incorporating the estimated future urban boundary. This scenario is presented solely as a baseline to measure future improvements against. The future model includes the future road network, provided by the City. The future roads include the assumption that Metis Trail is paved between Walsh Drive and Whoop Up Drive (estimated for completion by 2024). This is reflected in the modelled network speed for this section of the future roads system.

7.4.1 Initial Response – Future Baseline Conditions

The performance benchmark for initial response was measured as a percentage of the total geographical urban area of the City that four firefighters could reach within four minutes of travel time or less. On each of the initial response figures this is illustrated by “travel time response bands.”

Figure 26 illustrates the baseline for modelling the existing station locations, including the future urban growth areas, and the future road network. The results indicate that based on the future urban growth and road network the initial response coverage of the urban area will decrease from the existing fully integrated model service level of 43% to 35%. This represents a reduction of 8% as a result of future growth and moves the City-wide service level farther from the initial response service level benchmark of 60%. This indicates that with continued urban growth, the initial response level of service will decrease if no new stations are added.

This figure also highlights the existing initial response challenges in the northern portion of Station 4’s primary response zone and to the north and south of Station 2’s primary response zone. These gaps were evident under the current conditions model, however, they are further enhanced when growth considerations are applied.

7.4.2 Depth of Response – Future Baseline Conditions

The performance benchmark for the depth of response was measured as 14 responding firefighters within eight minutes of travel time. This is warranted for all delta and echo fire-related calls because of the community and building fire risk in the City of Lethbridge. For illustrative purposes “staffing bands” for 4, 8, and 12 firefighter responses are also shown. These help illustrate the deployment capabilities of the LFES in comparison to the deployment of 14 firefighters.

Figure 27 illustrates the baseline for modelling the existing staff/apparatus deployment model, including the future urban growth areas, and the future road network. The results, as shown in **Table 33**, indicate that based on the future urban growth and road network the depth of response coverage of the urban area will decrease from the existing LFES integrated model service level of 16% to 13%. This is a reduction of 3% as a result of future growth, and moves the service level farther from the target of 60% coverage. This indicates that with continued urban growth, the depth of response level of service will decrease if no additional staff/apparatus are added.

The figure shows that the Station 1 response area is well covered by the depth of response of 14 firefighters within eight minutes of travel or less, however to the west, north and south there are existing gaps in depth of response which are further enhanced by future growth considerations.

Table 33: LFES Existing Service Level Performance Benchmarks Future Baseline

Response Summary

Scenario	% Urban Area Initial Response Coverage	% Urban Area Depth of Response Coverage
<i>Comparison to Existing Scenario</i>		
Existing Conditions – Fully Integrated Model	43%	16%
Future Conditions – Existing Stations (Baseline)	35%	13%
Service Level Impact	-8%	-3%
<i>Comparison to LFES Performance Benchmark</i>		
LFES Performance Benchmark	60%	60%
Future Conditions – Existing Stations (Baseline)	35%	13%
Service Level Gap (benchmark – scenario)	25%	47%

Figure 26: Initial Response, Future Network, Existing Stations

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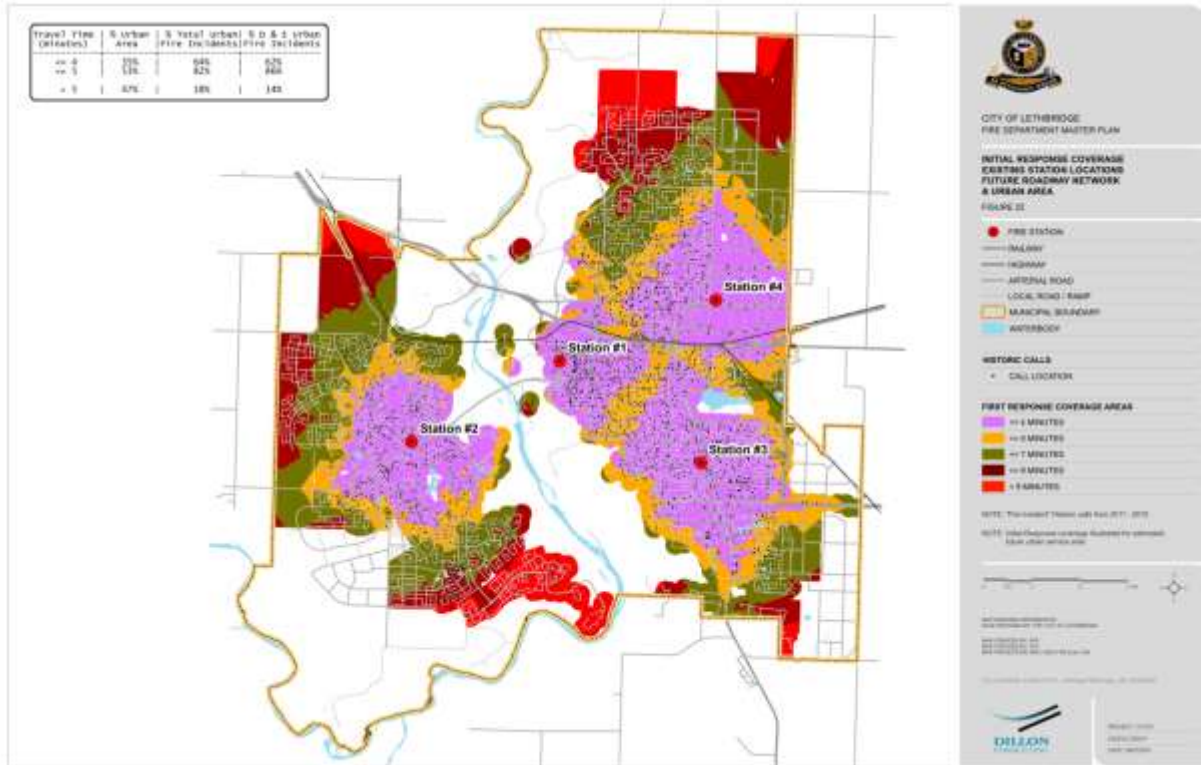
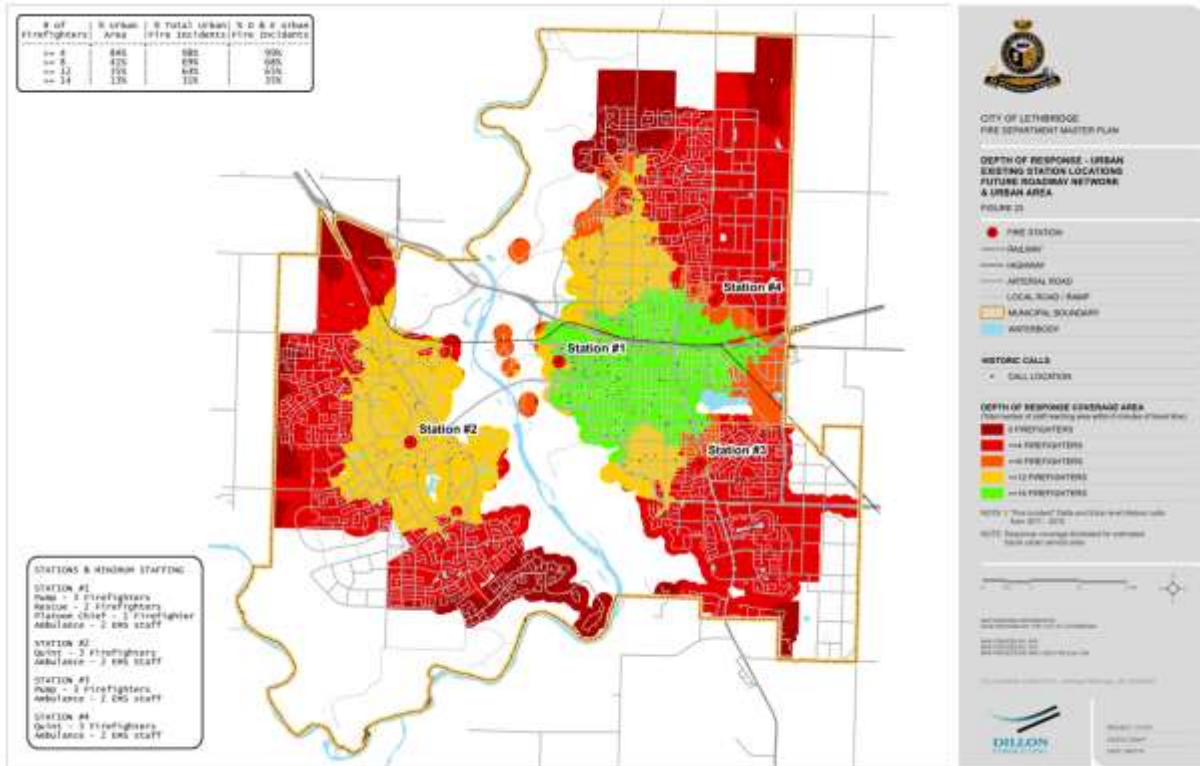


Figure 27: Depth of Response, Future Network, Existing Stations

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7.5 Future Service Levels – Relocated Station 3

As discussed at the start of **Section 6.0**, a new location for Station 3 is recommended near the intersection of Scenic Drive South and Mayor Magrath Drive South. This location is assessed and presented in future conditions for initial response and depth of response.

7.5.1 Initial Response –Relocated Station 3, Future Conditions

Figure 28 illustrates the initial response coverage for the relocation of Station 3 to the Chinook Tourist lands. The initial response coverage of four firefighters arriving on-scene within four minutes of travel time is 37% of the geography within the defined urban area. This is an improvement of 2% area coverage from the Future Baseline scenario.

7.5.2 Depth of Response – Relocated Station 3, Future Conditions

Figure 29 illustrates the expected depth of response coverage for the relocation of Station 3 to the Chinook Tourist lands. Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 12% of the urban area, where 31% of the Delta and Echo incidents have historically occurred.

7.5.3 Summary of Future Service Levels – Relocated Station 3

Table 34 summarizes the initial response coverage provided by each of the three staffing scenarios.

Table 34: Future Relocated Station 3 Response Summary

Scenario	% Urban Area Initial Response Coverage	% Urban Area Depth of Response Coverage
<i>Comparison to 'Future Baseline' Scenario</i>		
Future Conditions – Existing Stations (Baseline)	35%	13%
Future Conditions – Relocated Station 3	37%	12%
Service Level Impact (benchmark – scenario)	+2%	-1%
<i>Comparison to LFES Performance Benchmark</i>		
LFES Performance Benchmark	60%	60%
Future Conditions – Relocated Station 3	37%	12%
Service Level Gap (benchmark – scenario)	23%	48%

As shown above, the relocation of Station 3 will improve the initial response in future conditions by 2% and slightly reduce the depth of response coverage by 1% from the future baseline scenario. When compared to the LFES performance benchmark, the relocated Station 3 and existing Stations 1, 2 and 4 result in an initial response gap of 23% and a depth of response gap of 48%.

Figure 28: Initial Response, Future Network, Station 3 Option 1 Relocation

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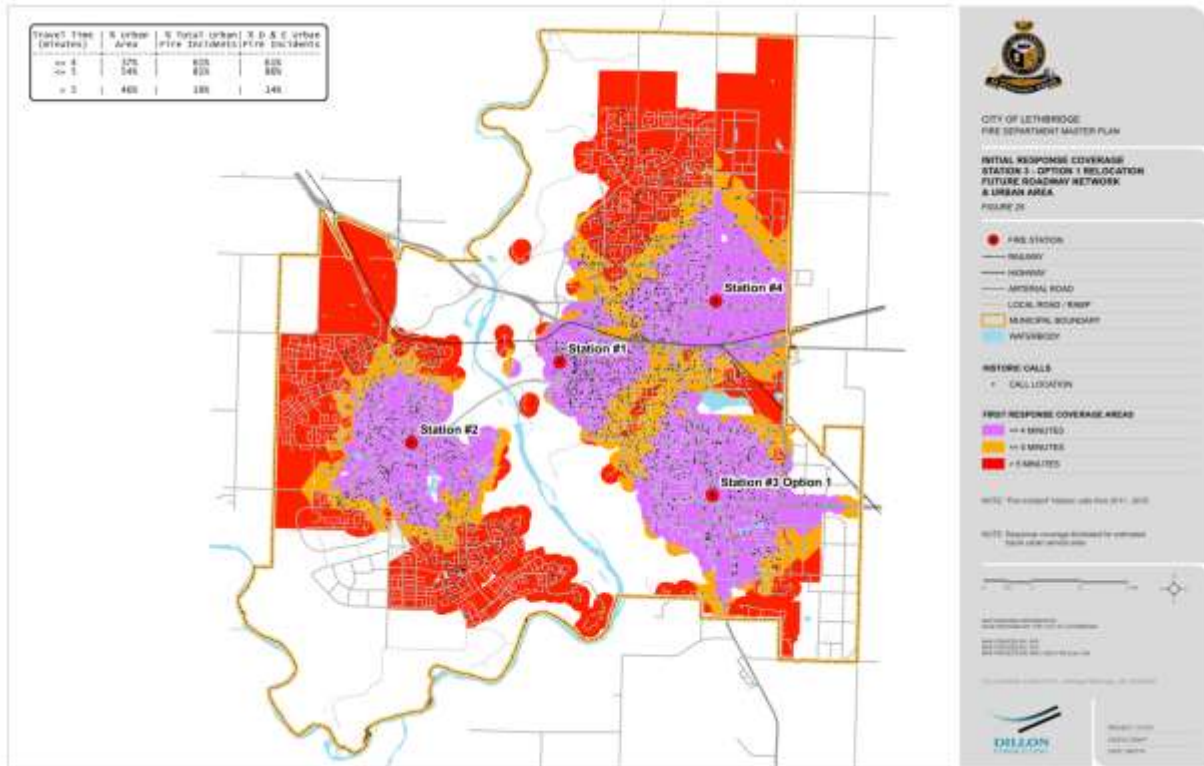
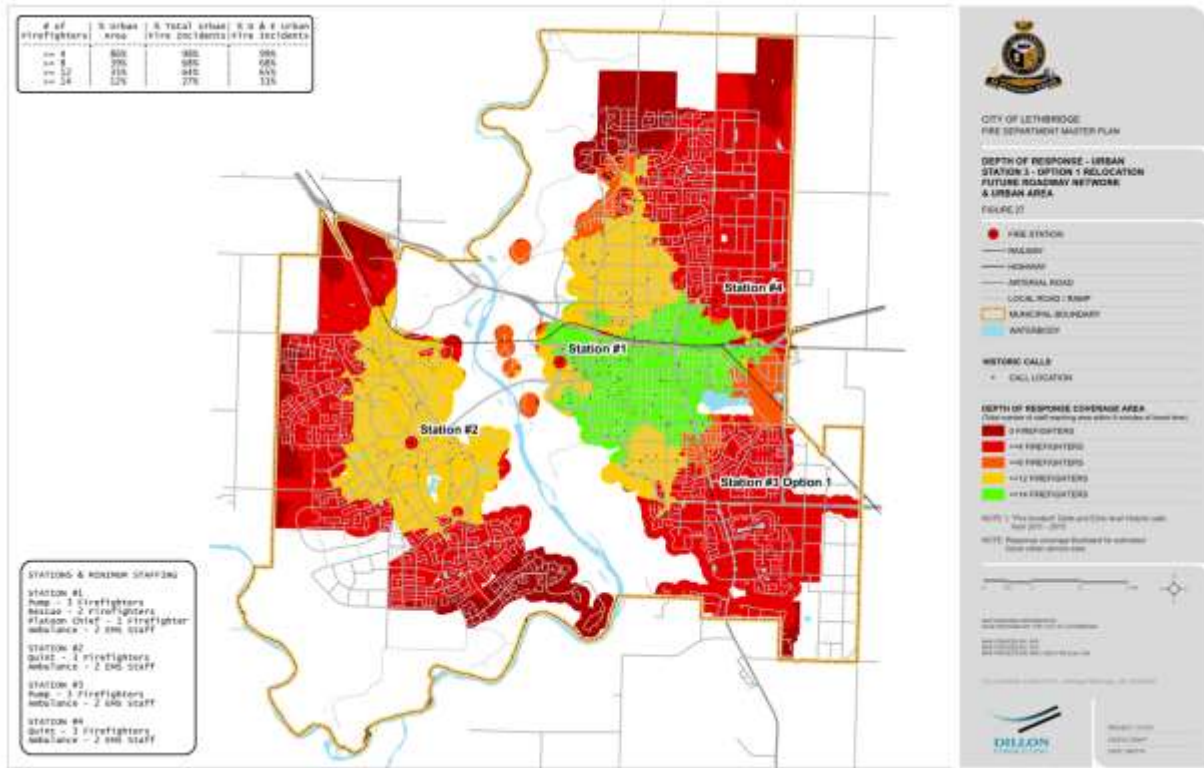


Figure 29: Depth of Response, Future Network, Station 3 Option 1 Relocation

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7.6 West Lethbridge – Proposed Two Station Model

The existing gap in response coverage in the west side of the City, both north and south of existing Station 2, is furthered during the future growth scenario with the growth in West Lethbridge. In the future, an additional station will be required on the west side to provide increased initial response and depth of response coverage. Station 2 is currently located in a central location in West Lethbridge. With significant growth expected to occur in both the south and north part of West Lethbridge the existing location is not ideally situated to form part of a two station model on the west side. Therefore this section provides options for an ultimate two station model in the west side of the City.

The future arterial road network has limited major east-west and north-south connectors. The residential developments in West Lethbridge are serviced by local streets primarily in a curvilinear and cul-de-sac pattern, unlike the grid pattern in North and South Lethbridge. This lack of grid pattern road structure increases the importance of placing stations next to major through roadways. Existing plans indicate major north-south arterials are Metis Trail West and University Drive West. Major east-west arterials are Garry Drive West, Whoop Up Drive, and Macleod Drive West. Based on these major arterial, three potential “two Station West Lethbridge” scenarios were evaluated:

- Option 1 – Stations located approximately at the intersections of (1) University Drive West and Macleod Drive West, and (2) University Drive West and Garry Drive West;
- Option 2 – Stations located approximately at the intersections of (1) University Drive West and Macleod Drive West, and (2) Metis Trail West and Garry Drive West;
- Option 3 – Stations located approximately at the intersections of (1) Metis Trail West and Macleod Drive West, and (2) University Drive West and Garry Drive West; and
- Option 4 – Stations located approximately at the intersections of (1) Metis Trail West and Macleod Drive West, and (2) Metis Trail West and Garry Drive West.

Specific property locations were not investigated, rather this evaluation focuses on the ideal general location. Further investigation should be completed once available land parcels are determined. Staffing was assumed as a primary fire apparatus, staffed with three firefighters and a primary ambulance unit staffed with two firefighters at one of the two West Lethbridge stations (as per existing conditions at Station 2), with the second West Lethbridge Station staffed with a primary fire apparatus and four firefighters.

7.6.1 Initial Response and Depth of Response

Figure 30 through **Figure 33** illustrates the initial response coverage for the four ultimate options of a “two Station West Lethbridge” scenario.

Figure 34 through **Figure 37** illustrates the depth of response coverage for the four ultimate options of a “two Station West Lethbridge” scenario.

Table 35 summarizes the initial response coverage provided by each of the four scenarios.

Table 35: Suppression Comparison Summary, West Lethbridge Options

Scenario	% Urban Initial Response Coverage Area	% Urban Depth of Response Coverage Area
Future Baseline Conditions (Existing Four Stations)	35%	13%
Option 1	41%	23%
Option 2	44%	22%
Option 3	40%	21%
Option 4	43%	19%

Option 1 model for two future stations in West Lethbridge provides the most improvement to both initial response and depth of response performance at 41% initial response and 23% depth of response urban area coverage. Option 2 provides very comparable coverage at 44% initial response and 22% depth of response coverage. Option 2 provides advantages for potential development on greenfield sites, as opposed to the built-out areas in Option 1. As well, Option 2 provides better coverage to residential areas, which are most at risk for fire fatalities. Therefore Option 2 is recommended.

The incremental implementation would begin with a new station being constructed at approximately at the intersection of University Drive West and Macleod Drive West (labelled as Station 6 in the model figures). Existing Station 2 and this new station would both be operational to serve West Lethbridge for the years until the station near Metis Trail West and Garry Drive West (labelled as Station 2 Relocated in the model figures) is constructed. This initial response and depth of response performance of this scenario is presented **Figures 38 and 39**. The initial response performance in this interim model results in an area coverage of 42% and a depth of response coverage of 24%.

Figure 30: Initial Response, Future Network, West Lethbridge Ultimate Option 1

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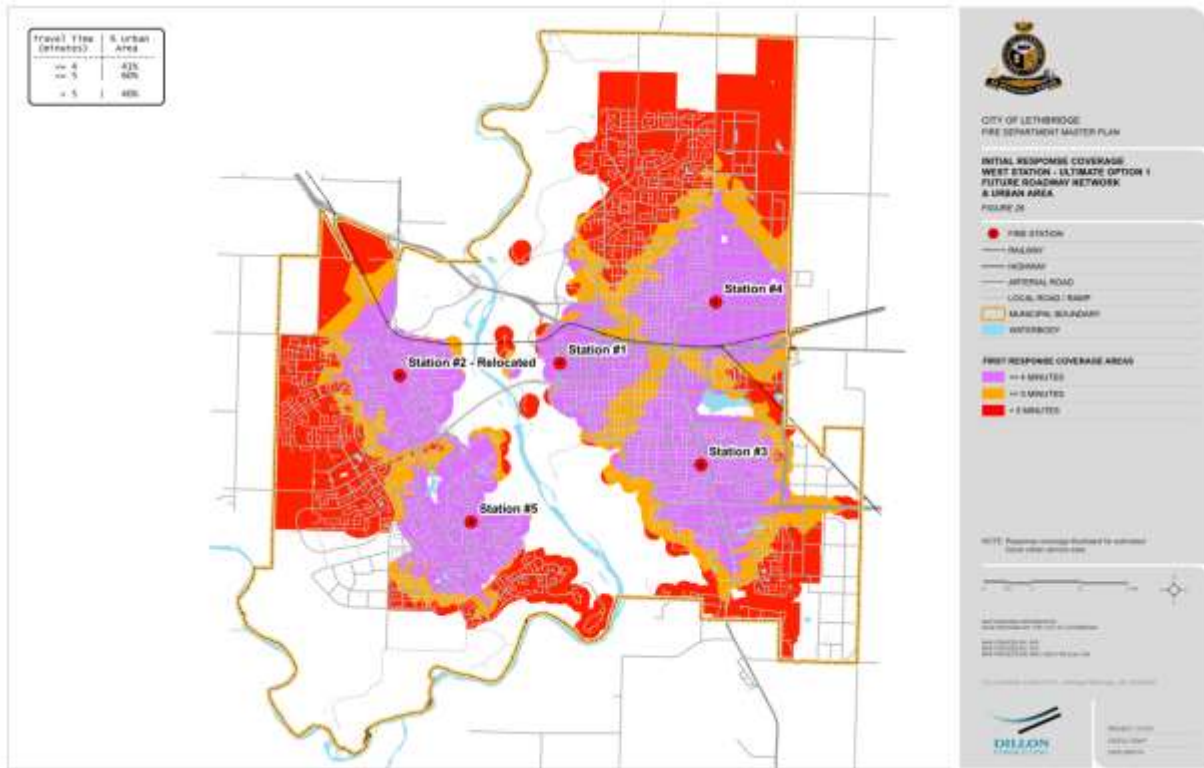


Figure 31: Initial Response, Future Network, West Lethbridge Ultimate Option 2 (preferred)

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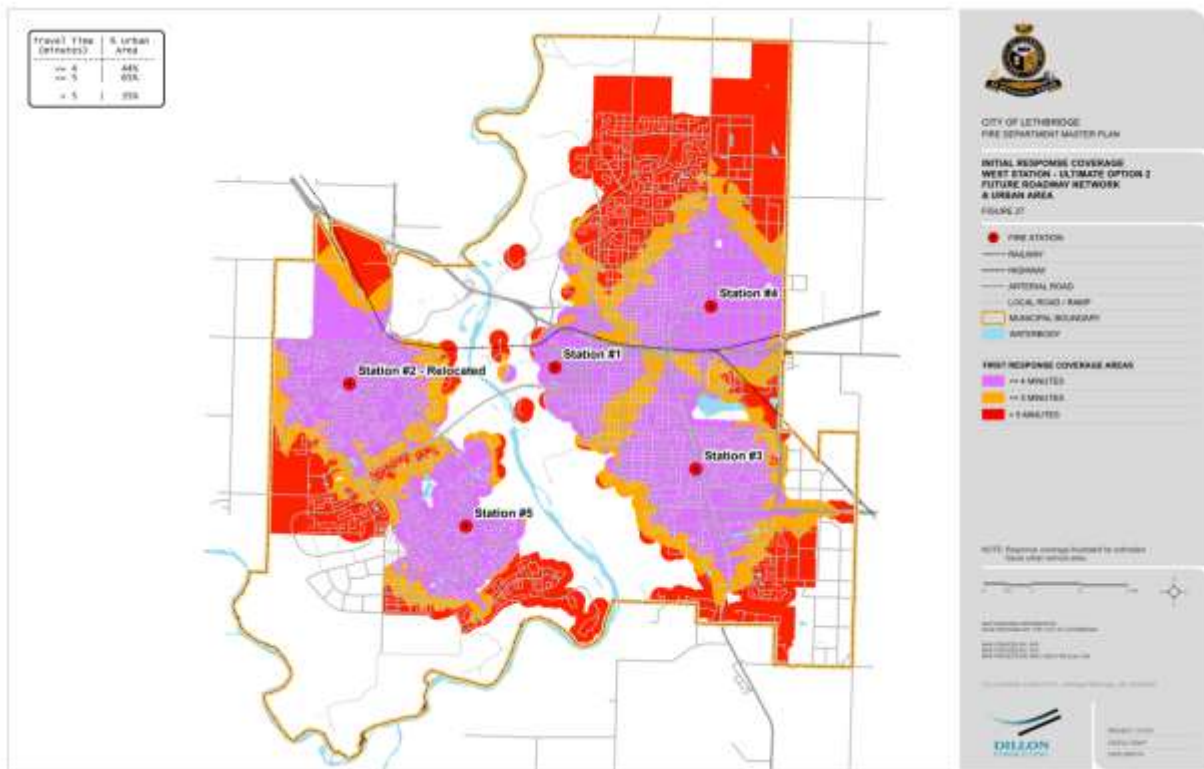


Figure 32: Initial Response, Future Network, West Lethbridge Ultimate Option 3

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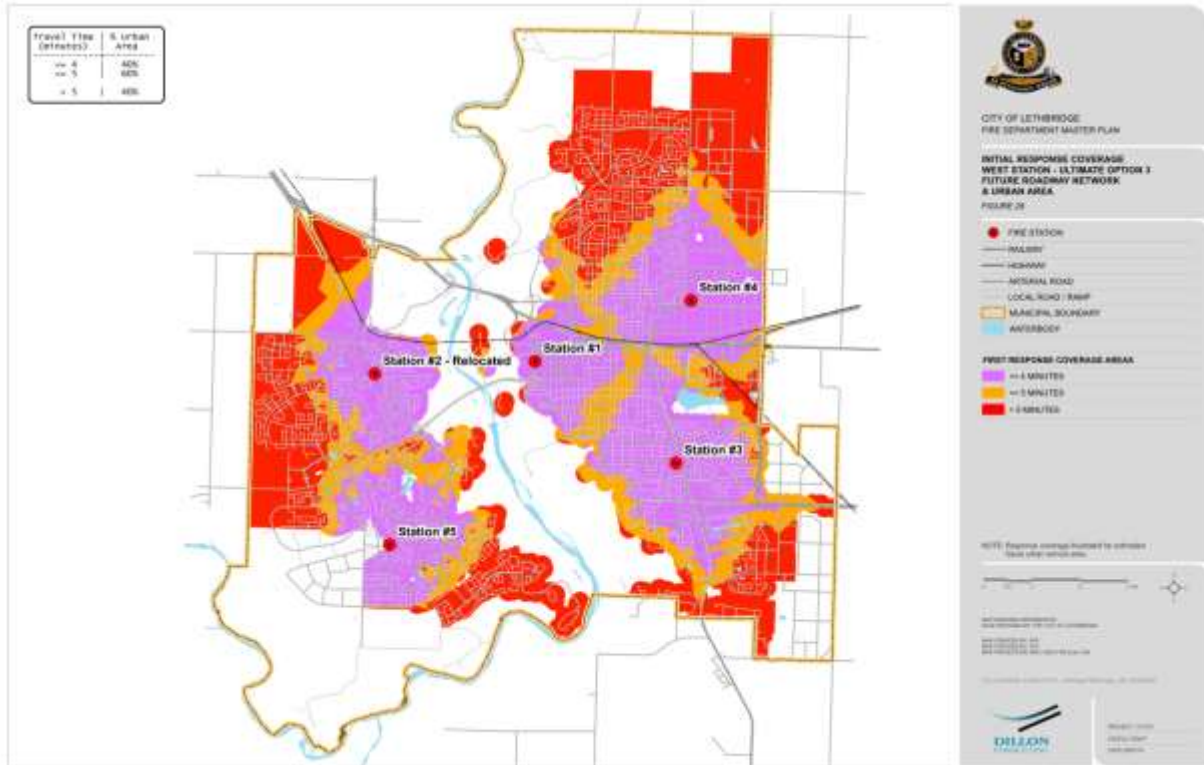


Figure 33: Initial Response, Future Network, West Lethbridge Ultimate Option 4

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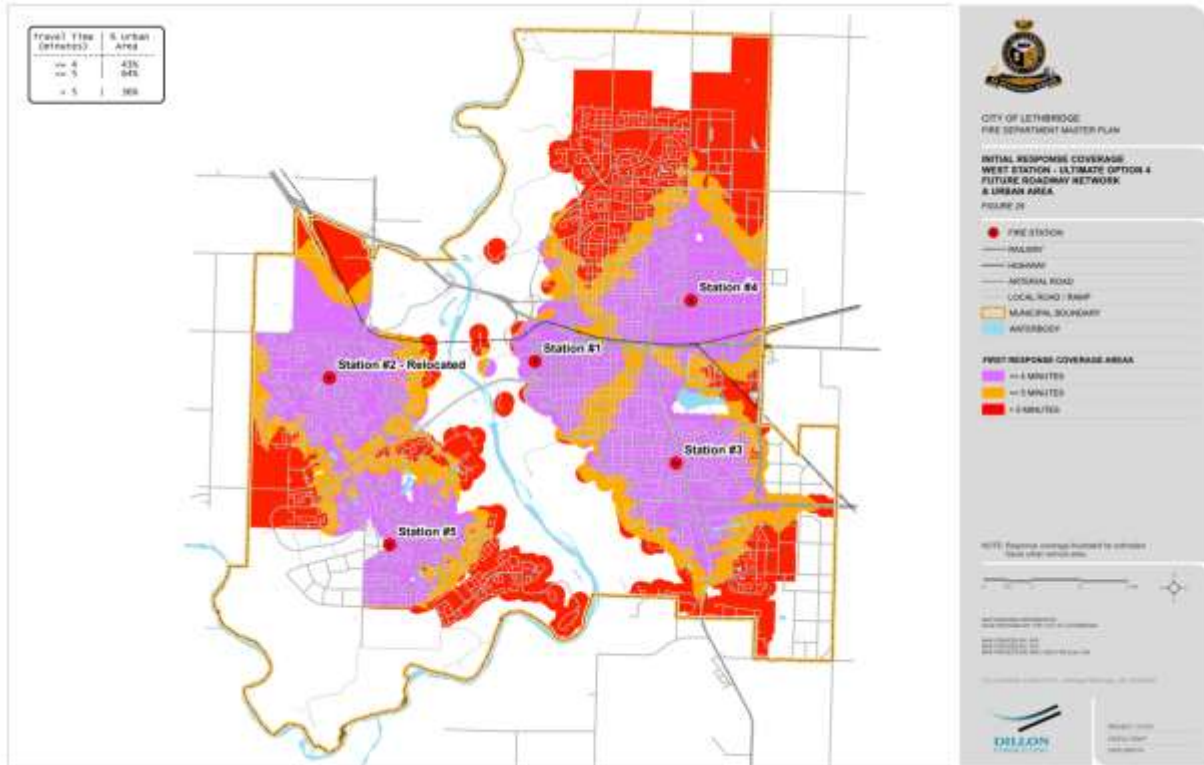


Figure 34: Depth of Response, Future Network, West Lethbridge Ultimate Option 1

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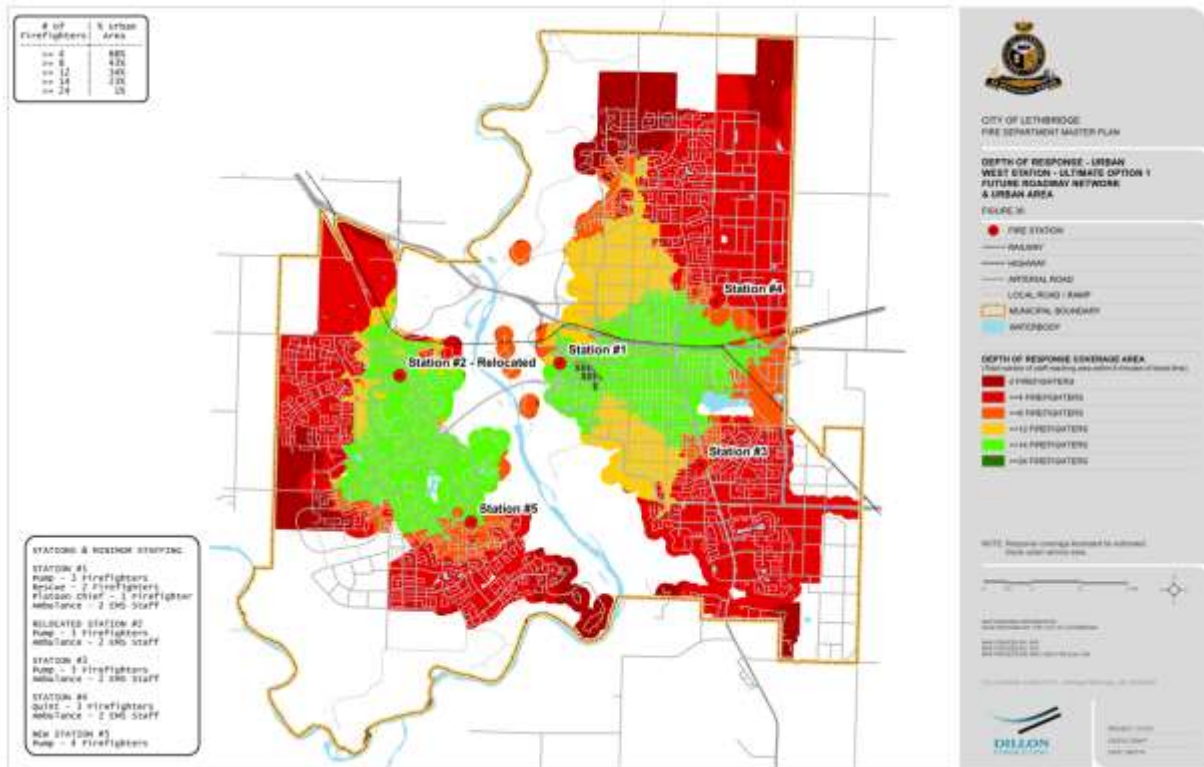


Figure 35: Depth of Response, Future Network, West Lethbridge Ultimate Option 2 (preferred)

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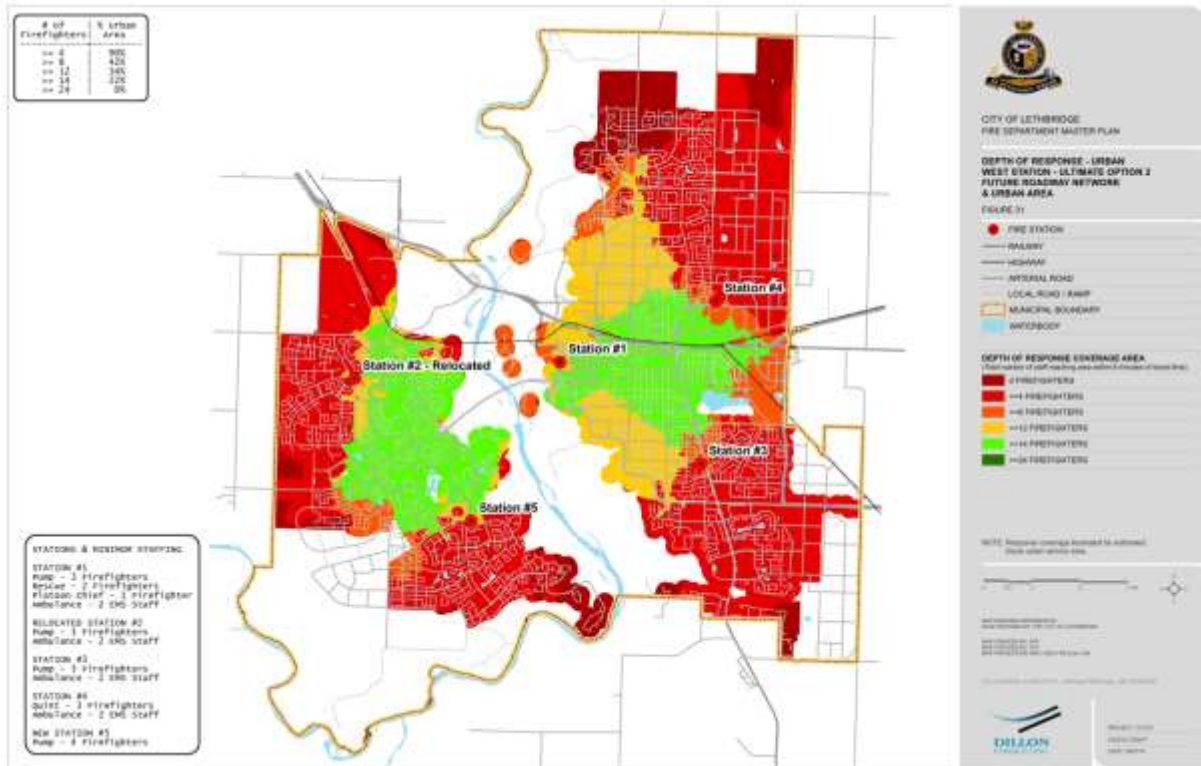


Figure 36: Depth of Response, Future Network, West Lethbridge Ultimate Option 3

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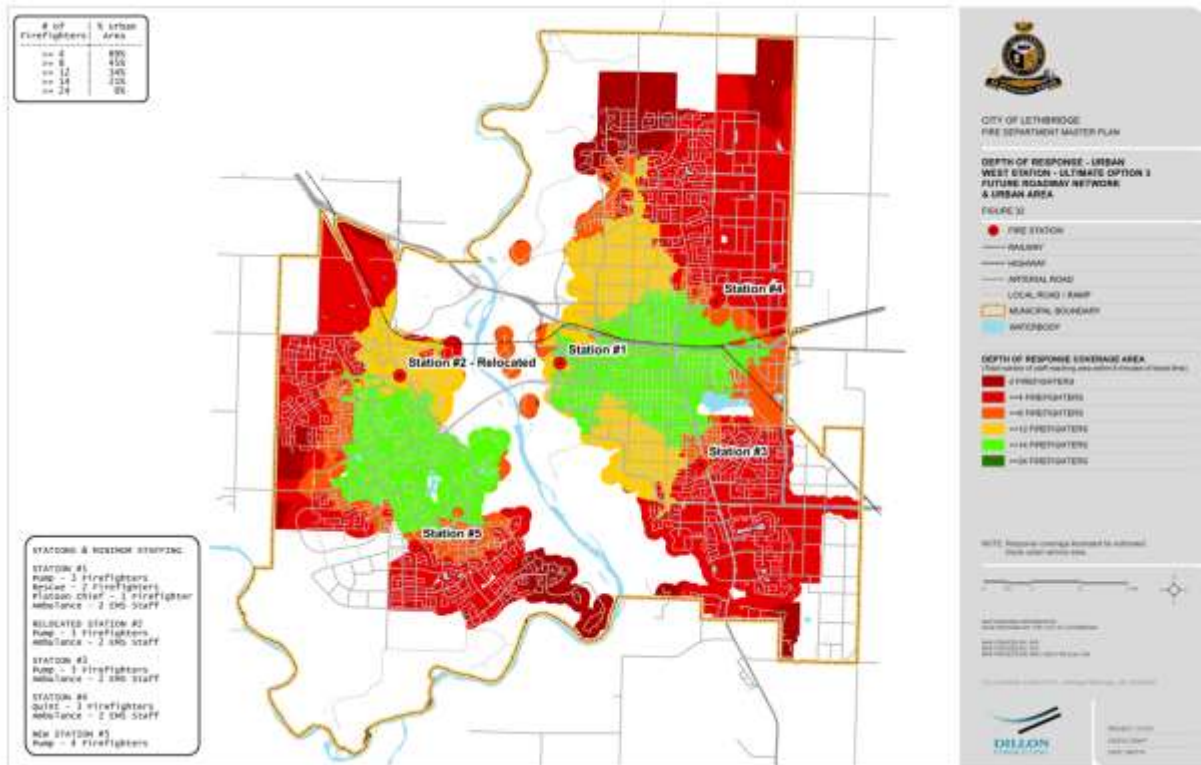


Figure 37: Depth of Response, Future Network, West Lethbridge Ultimate Option 4

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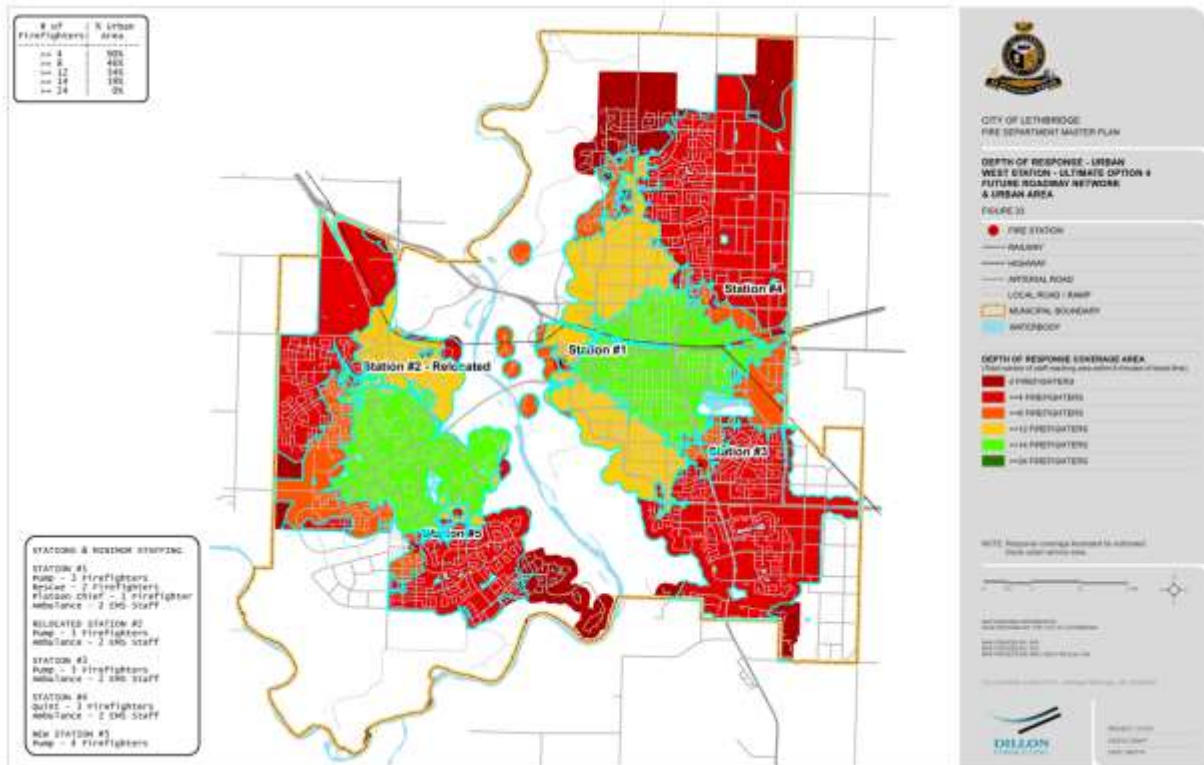


Figure 38: Initial Response West Lethbridge Interim Model

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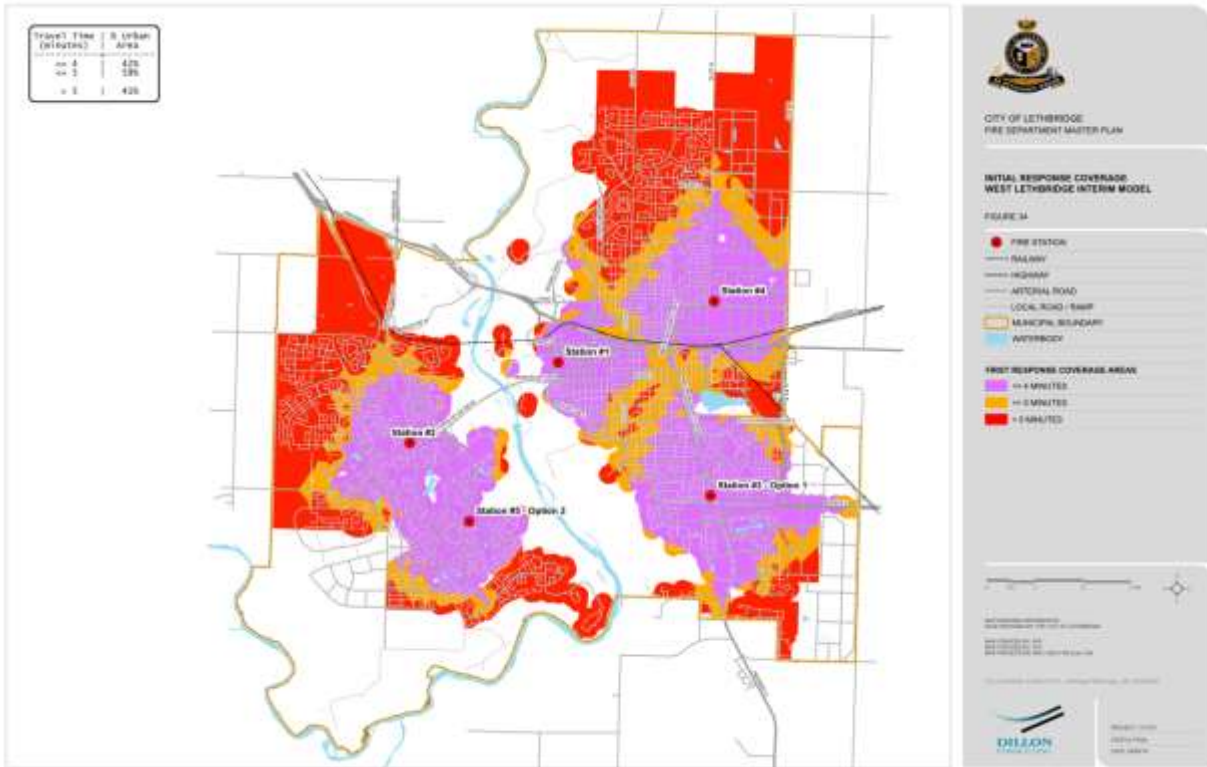
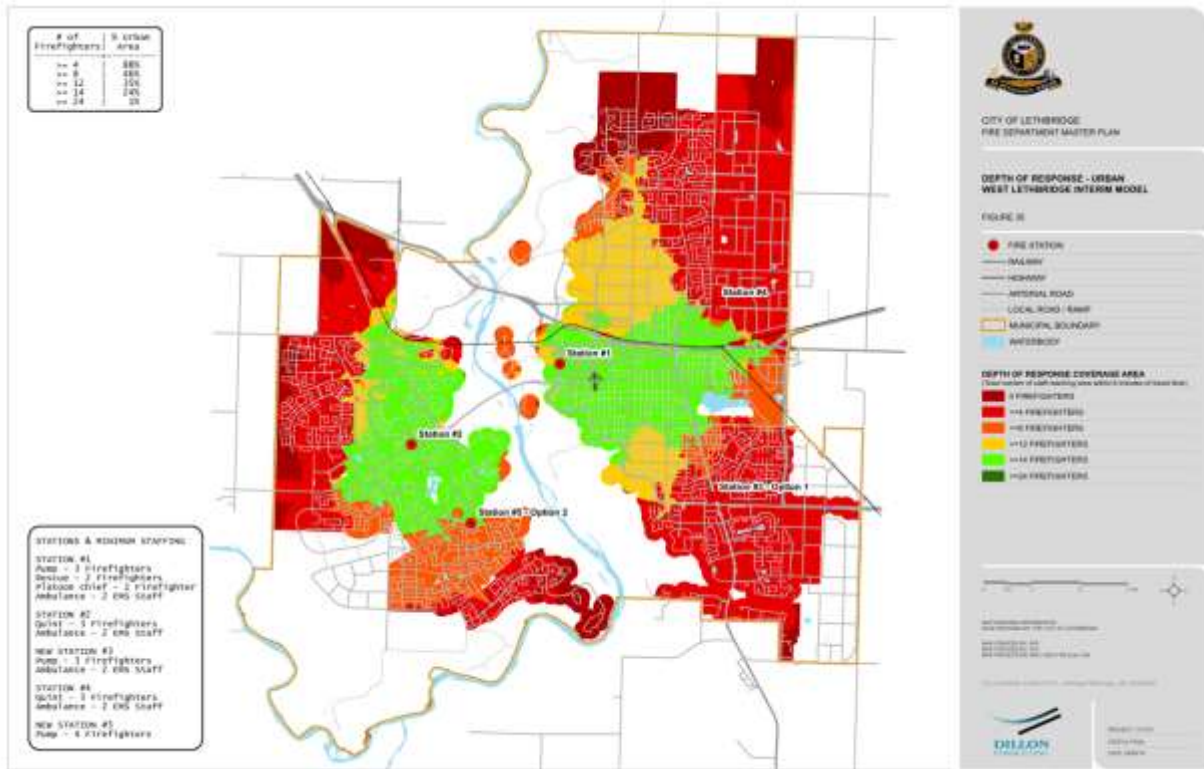


Figure 39: Depth of Response West Lethbridge Interim Two Station Model

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7.6.2 Summary of West Lethbridge – Proposed Two Station Model

In order to address existing gaps in service and serve future development areas, a two station future model is recommended for West Lethbridge. The two station model, assessed as ‘Option 2’ is the recommended scenario. This involves two stations located approximately at the intersections of (1) University Drive West and Macleod Drive West, and (2) Metis Trail West and Garry Drive West. The incremental implementation would begin with a new station being constructed at approximately at the intersection of University Drive West and Macleod Drive West (labelled as Station 6 in the model figures). Existing Station 2 and this new station would both be operational to serve West Lethbridge for the years until the station at Metis Trail West and Garry Drive West (labelled as Station 2 Relocated in the model figures) is constructed. The results of this analysis are summarized and compared to the performance benchmarks in **Table 36**.

On a City-wide basis the two station West Lethbridge model improves initial response (four firefighters in four minutes) from 35% urban area coverage in the future baseline condition to 44% and improves depth of response (14 firefighters in eight minutes) from 13% urban area coverage in the future baseline scenario to 22%. Calculations of future performance by station response zone indicate that the two station West Lethbridge model will increase initial response coverage in the Station 2 response zone from 34% of the existing urban area (existing conditions) to 49% future urban area coverage (future conditions). As the future urban area in the west is significantly larger than the existing urban area, this improvement is even better than indicated by percent coverage numbers. The depth of response of 14 firefighters arriving on-scene within eight minutes of travel time for the Station 2 response zone improves from 0% existing urban area coverage to 31% future urban area coverage. Again, as the future urban area in the west is significantly larger than the existing urban area, this improvement is even better than indicated by percent coverage numbers.

Table 36: Future West Lethbridge Two Station Model Response Summary

Scenario	% Urban Area Initial Response Coverage	% Urban Area Depth of Response Coverage
<i>Comparison to Future Baseline Scenario</i>		
Future Conditions – Existing Stations (Baseline)	35%	13%
Future Conditions – West Lethbridge Two Station Model, Option 2	44%	22%
Service Level Impact	+9%	+9%
<i>Comparison to LFES Performance Benchmarks</i>		
LFES Performance Benchmark	60%	60%
Future Conditions – West Lethbridge Two Station Model, Option 2	44%	22%
Service Level Gap (benchmark – scenario)	16%	38%

Targeting the initial response performance benchmark of 60% area coverage and depth of response area coverage of 60% Option 2 will improve the gap in service level to 16% area for initial response and 38% area for depth of response.

7.7 North Lethbridge – Additional Station Consideration

Modelling of existing conditions illustrated the existing gap in service coverage in North Lethbridge (north of Station 4). This gap is further enhanced as a result of future growth planned within North Lethbridge. Based on the arterial road network and the existing location of Station 4, an additional station location in North Lethbridge, to address this service gap, would ideally be situated along 13 Street North. Two potential locations were evaluated:

- Option 1 - The vicinity of the intersection of 13 Street North and Grace Dainty Road North; and
- Option 2 - The vicinity of the intersection of 13 Street North and 26 Avenue North.

Specific property locations were not investigated, rather this evaluation focuses on the ideal general location. Further investigation should be completed once available land parcels are determined.

7.7.1 Initial Response and Depth of Response

Figure 40 illustrates the initial response coverage for the addition of a fifth station near the intersection of 13 Street North and Grace Dainty Road. The initial response coverage of four firefighters arriving on-scene within four minutes of travel time is 43% of the geography within the defined urban area.

Figure 41 illustrates the initial response coverage for the addition of a fifth station near the intersection of 13 Street North and 26 Avenue North. The initial response coverage of four firefighters arriving on-scene within four minutes of travel time is 43% of the geography within the defined urban area.

Figure 42 illustrates the expected depth of response coverage for the addition of a fifth station near the intersection of 13 Street North and Grace Dainty Road. Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 18% of the urban area.

Figure 43 illustrates the expected depth of response coverage for the addition of a fifth station near the intersection of 13 Street North and 26 Avenue North. Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 19% of the urban area.

Table 37 summarizes the initial response and depth of response coverage provided by each of the scenarios.

Table 37: Suppression Comparison Summary, North Lethbridge Options

Scenario	% Urban Initial Response Coverage Area	% Urban Depth of Response Coverage Area
Future Baseline Conditions (Existing Four Stations)	35%	13%
Option 1 – 13 Street North and Grace Dainty Road North	43%	18%
Option 2 – 13 Street North and 26 Avenue North	43%	19%

Adding a new station in North Lethbridge at the Option 2 location provides the most improvement to both initial response and depth of response performance.

Figure 40: Initial Response, Future Network, North Lethbridge Option 1

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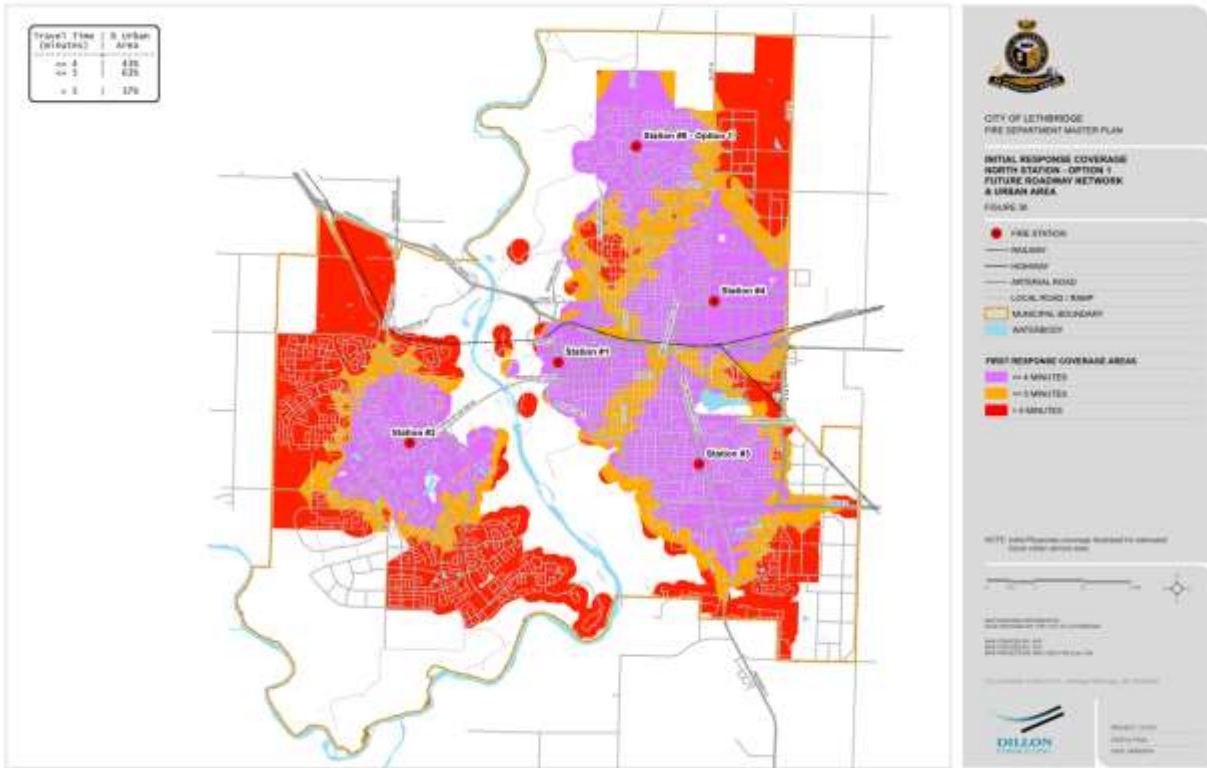


Figure 41: Initial Response, Future Network, North Lethbridge Option 2 (preferred)

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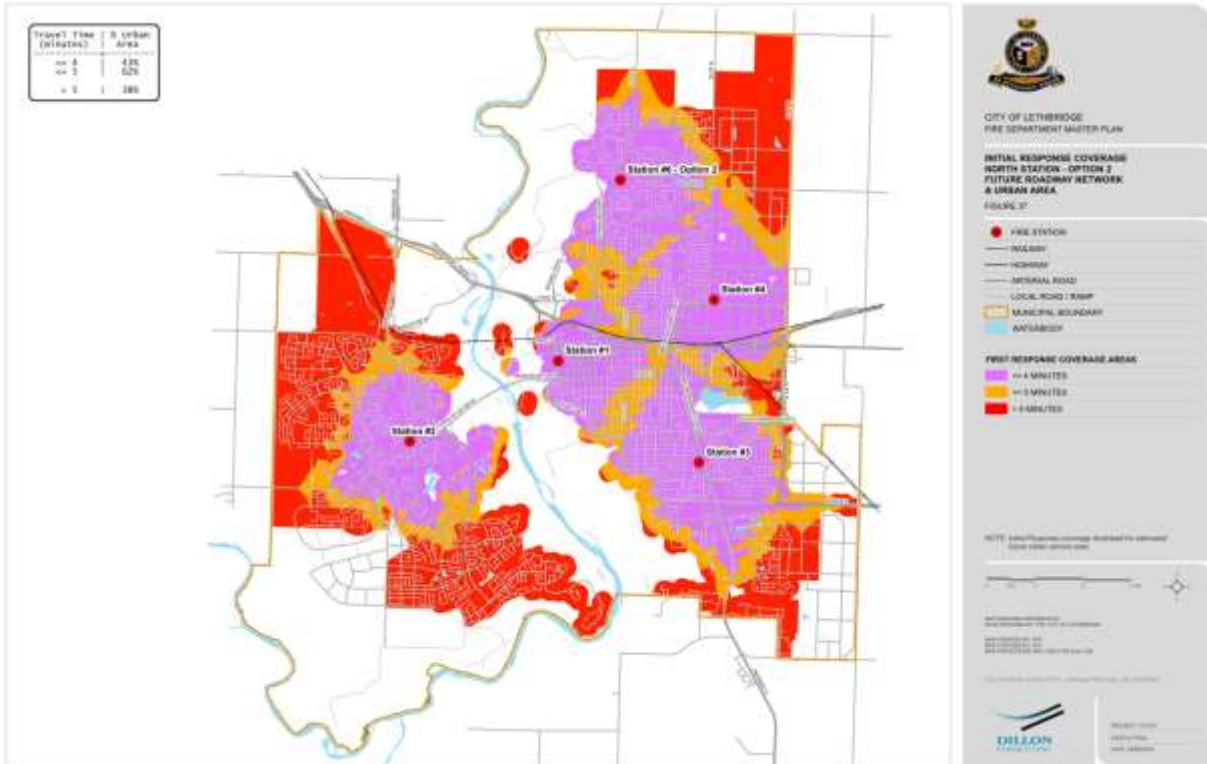


Figure 42: Depth of Response, Future Network, Station 3 Option 1 Relocation

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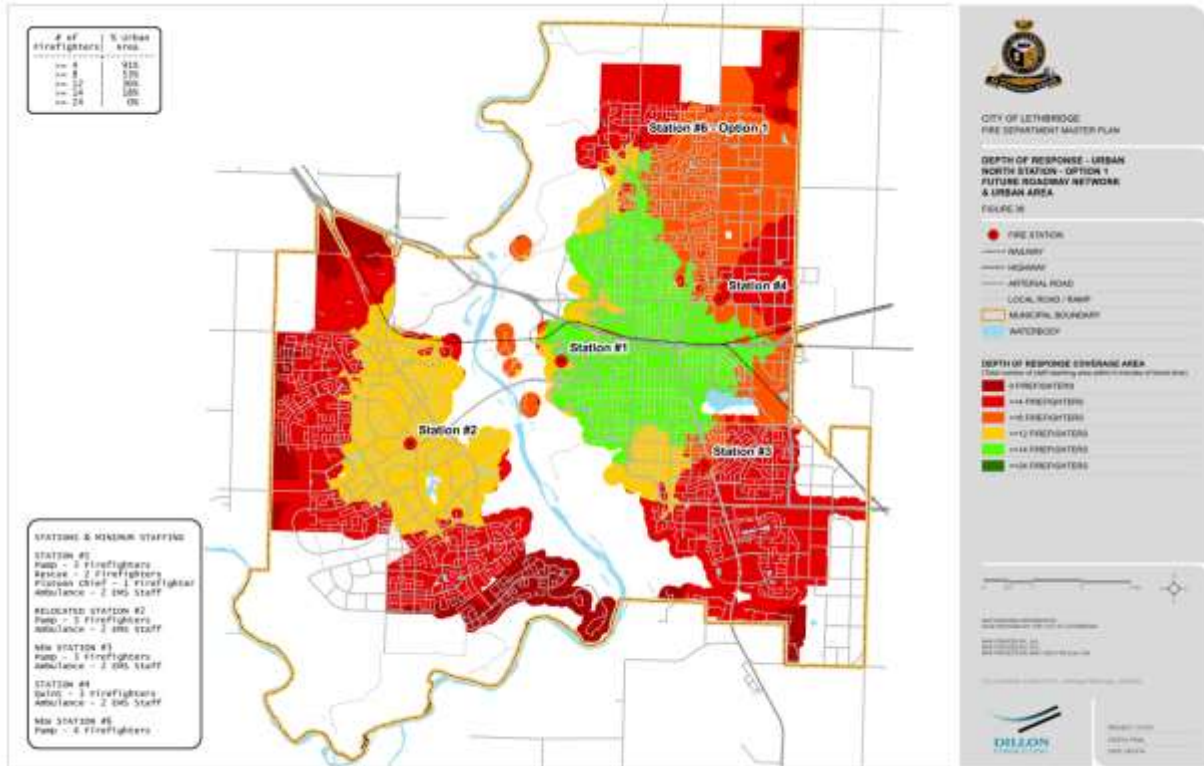
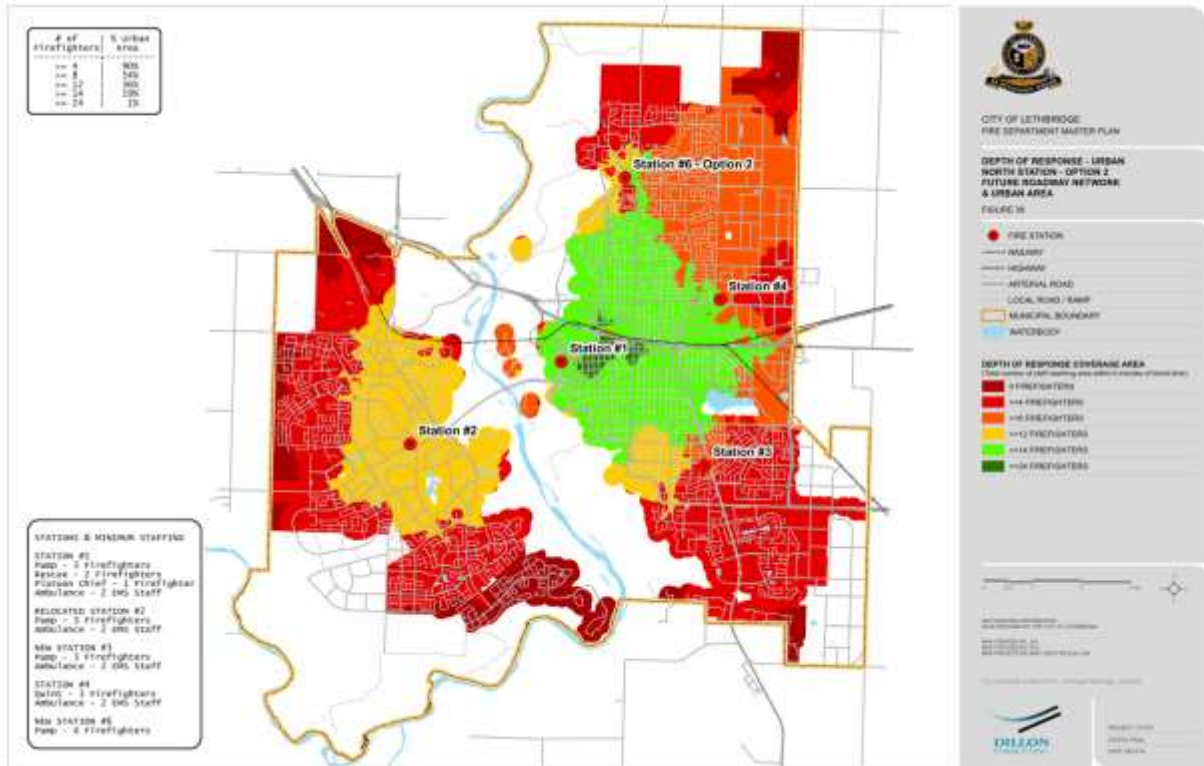


Figure 43: Depth of Response, Future Network, Station 3 Option 2 Relocation (preferred)

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7.7.2 Summary of North Lethbridge – Additional Station Consideration

In order to address existing gaps in service and serve future development areas, a new future station is recommended for North Lethbridge, north of existing Station 4. It is further recommended that this new station be located in the vicinity of the intersection of 13 Street North and 26 Avenue North (assessed as Option 2). The results of the analysis for adding this station are summarized and compared to the performance benchmarks in **Table 38**.

Table 38: Future North Lethbridge Two Station Model Response Summary

Scenario	% Urban Area Initial Response Coverage	% Urban Area Depth of Response Coverage
<i>Comparison to 'Future Baseline' Scenario</i>		
Future Conditions – Existing Stations (Baseline)	35%	13%
Future Conditions – North Lethbridge Option 2	43%	19%
Service Level Impact	+8%	+6%
<i>Comparison to LFES Performance Benchmark</i>		
LFES Performance Benchmark	60%	60%
Future Conditions – North Lethbridge Option 2	43%	19%
Service Level Gap (benchmark – scenario)	17%	41%

Targeting the initial response performance benchmark of 60% area coverage and depth of response area coverage of 60%, Option 2 location will improve the gap in service level to 17% area for initial response and 41% area for depth of response.

7.8 Recommended Future Six Station Model

7.8.1 Initial Response and Depth of Response

Figure 44 illustrates the initial response coverage for the recommended future six station facility plan. The initial response coverage of four firefighters arriving on-scene within four minutes of travel time is 54% of the geography within the defined urban area.

Figure 45 illustrates the expected depth of response coverage for the addition of a fifth station near the intersection of 13 Street North and Grace Dainty Road. Within an eight minute or less travel time the LFES is able to provide a depth of response of 14 or more firefighters to 28% of the urban area.

Table 39 summarizes the initial response and depth of response coverage provided by each of the scenarios.

Table 39: Suppression Comparison Summary, Future Six Station Scenario

Scenario	% Urban Initial Response Coverage Area	% Urban Depth of Response Coverage Area	Total Minimum Staffing
Future Baseline Conditions (Existing Four Stations)	35%	13%	23
Future Six Stations	54%	28%	33

Relocating Station 3 to Option 1 near the intersection of Scenic Drive South and Mayor Magrath Drive South (labelled as Station 3 relocated in the model figures), adding a new station in West Lethbridge (approximately at the intersection of University Drive West and Macleod Drive West, labelled as Station 6 in the model figures), adding new Station in North Lethbridge at the Option 2 location (in the vicinity of the intersection of 13 Street North and 26 Avenue North, labelled as Station 5 in the model figures) and relocating the Station 2 to the Option 2 location (Metis Trail West and Garry Drive West, labelled as Station 2 relocated in the model figures) and decommissioning the existing Station 2 site results in the future six station model recommended within the horizon of this FDMP. The two new stations are proposed to be staffed with a primary fire apparatus staffed with a minimum of four firefighters. This station and staffing model provides significant improvement to both initial response and depth of response performance.

Figure 44: Initial Response, Future Network, Future Six Station (Recommended)

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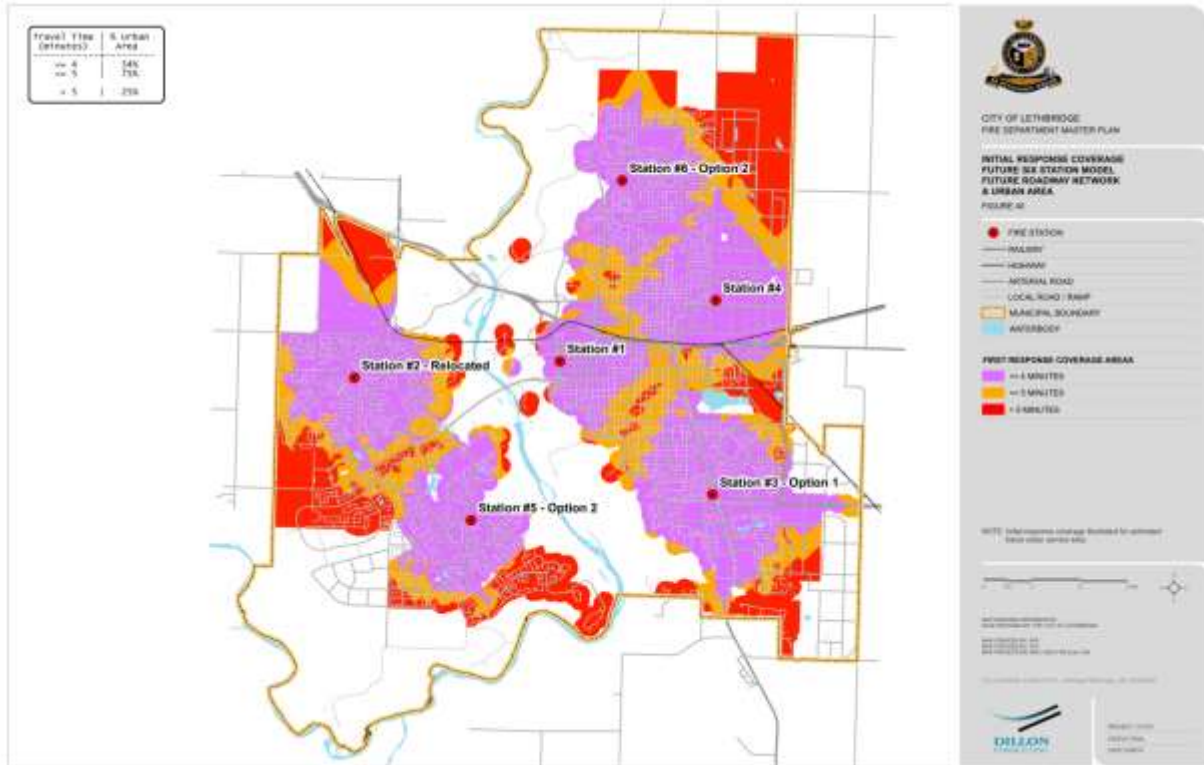
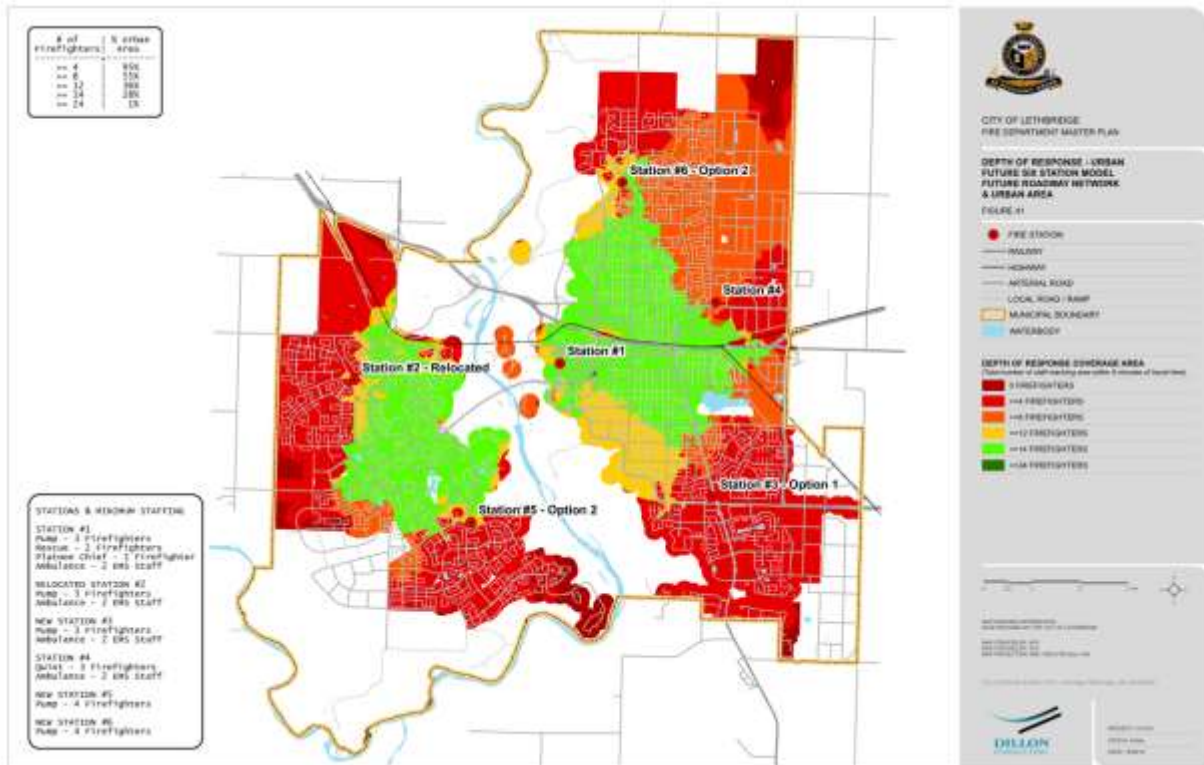


Figure 45: Depth of Response, Future Network, Future Six Station (Recommended)

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7.8.2 Summary of Recommended Future Six Station Model

Combining the recommendations to increase the availability of the primary ambulance units at each station, relocating Station 3, adding a new station to West Lethbridge and relocating existing Station 2 and adding a new station in North Lethbridge results in the future recommended six station model.

The results of the analysis for this combined model and each incremental phase are summarized and compared to the performance benchmarks in **Table 40**.

Table 40: Future Six Station Model Response Summary

Scenario	% Urban Area Initial Response Coverage	Service Level Gap Compared to LFES Performance Benchmark – Initial Response 60%	% Urban Area Depth of Response Coverage	Service Level Gap Compared to LFES Performance Benchmark – Depth of Response 60%
Existing Conditions – Fully Integrated Model	43%	17%	16%	44%
Future Conditions – Existing Stations (Baseline)	35%	25%	13%	47%
Future Conditions – Relocated Station 3	37%	23%	12%	48%
Future Conditions – West Lethbridge Incremental Two Station Model, New Station Near University Drive West and Macleod Drive West	42%	18%	24%	36%
Future Conditions – West Lethbridge Two Station Model, Option 2	44%	16%	22%	38%
Future Conditions – North Lethbridge Option 2	43%	17%	19%	41%
Future Six Station Model (Recommended)	54%	6%	28%	32%

Targeting the initial response performance benchmark of 60% area coverage and depth of response area coverage of 60%, the future six station model recommended will improve the gap in service level to 6% area for initial response and 32% area for depth of response.

7.8.3 Modelled Initial Response by Station Response Zone (Future Six Station Model)

As a comparison to the existing baseline modelled service level assessment, a modelled assessment of future initial response by station zone was completed for the recommended six station model. **Figure 46** illustrates the modelled future initial response coverage by existing station zone area of at least four firefighters arriving on-scene within a four minute travel time. The service level is measured as percentage of urban area covered within each of the station emergency response zones.

Figure 46: Future Initial Response – Six Station Model, by Station Response Zone

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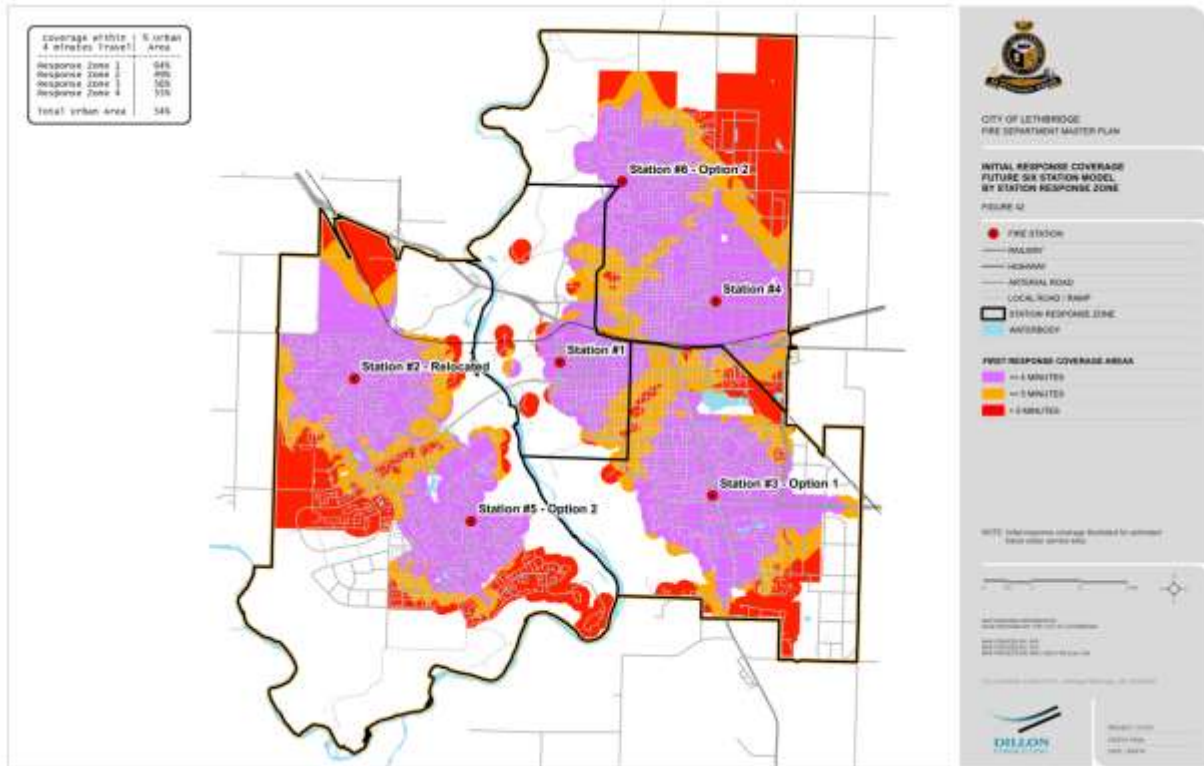


Table 41: Modelled Future Initial Response (Six Station Model) by Station Response Zone

Response Zone	Modelled Initial Response Service Level Comparison (4 firefighters in 4 minutes travel time)		Existing Four Station Model vs. Future Six Station Model Coverage
	% Urban Area Covered Existing Four Station Model (Existing Conditions)	% Urban Area Covered Future Six Station Model (Future Conditions)	% improvement
Station 1	58%	64%	+8%
Station 2	34%	49%	+15%
Station 3	53%	56%	+3%
Station 4	37%	55%	+18%
City-wide (Total)	43%	54%	+11%

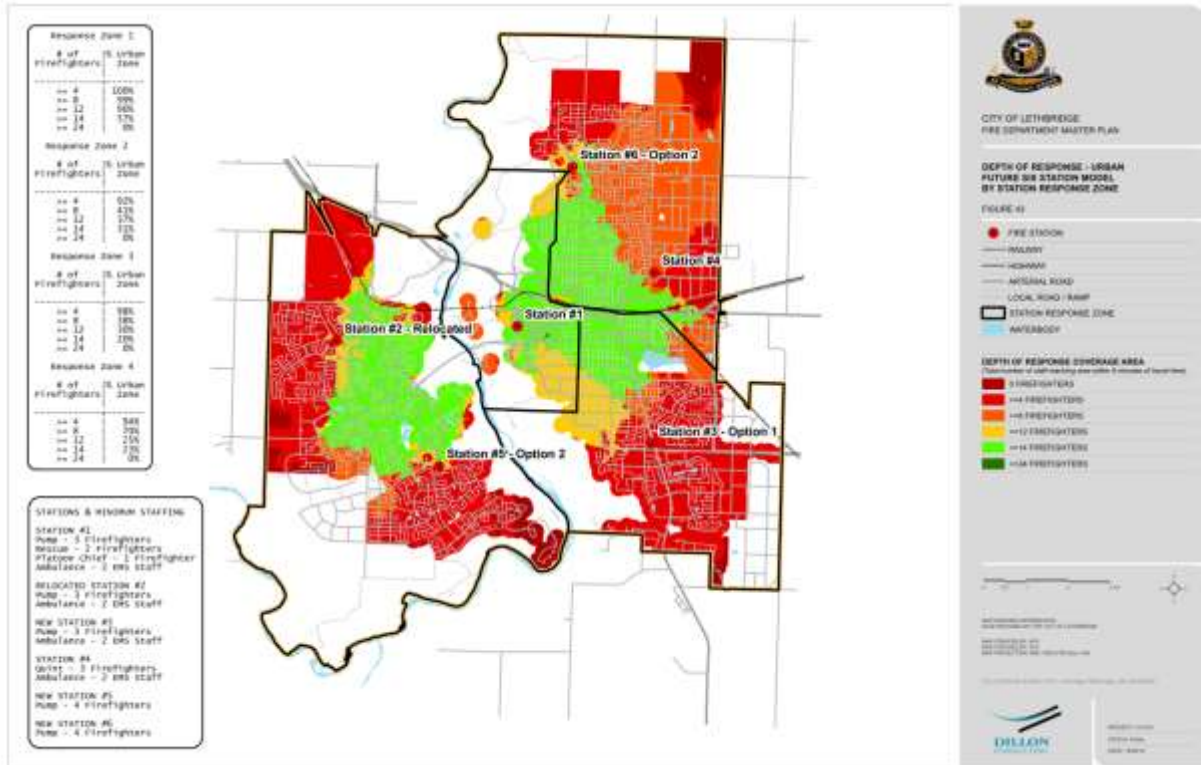
These modelled future initial response service levels (six station model) show significant improvement from the modelled existing four station model service levels. These are compared in **Table 41** above.

7.8.4 Modelled Depth of Response by Station Response Zone (Future Six Station Model)

As a comparison to the existing depth of response modelled service level assessment, a modelled assessment of depth of response by station zone for the future six station model was completed. **Figure 47** illustrates the future six station modelled depth of response coverage by existing station zone identifying the number of firefighters arriving on-scene within an eight minute travel time. The service level is measured as percentage of urban area covered within each of the station emergency response zones.

Figure 47: Modelled Depth of Response by Station Response Zone

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The summary of the existing depth of response (achieving 14 firefighters on-scene within eight minutes of travel time) performance verses the future six station depth of response performance, modelled by station response zone, is presented in **Table 42**. The future scenarios include a larger service area, as a result of growth. Therefore the future coverage is measured over a larger area than the existing conditions.

Table 42: LFES Modelled Depth of Response Level of Service by Station Response Zone

Response Zone	Depth of Response Service Level – Modelled (number of firefighters on-scene within 8 Minutes of Travel Time)		
	% Urban Area Covered Existing Four Station Model (Existing Conditions)	% Urban Area Covered Future Six Station Model (Future Conditions)	% Improvement Existing Four Station Model vs. Future Six Station Model Coverage
	14 firefighters	14 firefighters	14 firefighters
Station 1	56%	57%	+1%
Station 2	0%	31%	+31%
Station 3	22%	20%	-2%
Station 4	13%	23%	+10%
City-wide	16%	28%	+12%

The depth of response coverage with the future six station model show significant improvement from existing conditions in the Station 2, Station 4 and Station 1 response zones. A slight decrease is projected in Station 3’s response area as a result of the relocation of the facility.

It is expected that these *modelled future* levels of service could be achieved with the fully integrated fire / EMS model with the future six station model in place.

7.9 Future Stations, Staffing and Deployment Recommendations

As a result of the review of the LFES facilities, the following is recommended:

33. That the future facility plan be a six station model for the City of Lethbridge which includes a relocated Station 3, additional station in North Lethbridge, two new stations in West Lethbridge and decommission of the existing Station 2 with implementation as follows:
 - Station 3 be replaced within the short term (2018-2021) through rebuilding near the intersection of Scenic Drive South and Mayor Magrath Drive South and the existing Station 3 decommissioned.

- Within the short to medium term (2018-2021) construct a new station in West Lethbridge located approximately at the intersection of University Drive West and Macleod Drive West staffed with a primary fire apparatus (minimum staffing of four firefighters).
- Within the medium term (2026-2029) construct a new Station in North Lethbridge located approximately at the intersection of 13 Street North and 26 Avenue North staffed with a primary fire apparatus (minimum staffing of four firefighters).
- Over the long term (2030-2033 years), timed to match growth and development, construct a new station in West Lethbridge located approximately at the intersection of Metis Trail West and Garry Drive West. Once the new station is constructed the existing Station 2 should be decommissioned.


8.0 FLEET AND EQUIPMENT



LFES Fleet is managed by the Deputy Chief of Support Services and by the City's Fleet Services Department through a service agreement. This includes the small vehicle fleet as well as the heavy, specialty fire apparatus and ambulance fleet. LFES also has a dedicated Equipment Technician.

8.1 Existing Front Line Apparatus

The front-line fire apparatus, model years, replacement years and apparatus descriptions are summarized in **Table 43**. All front-line apparatus are considered to be in excellent condition.

Table 43: Front-Line Fire Apparatus

Apparatus	Description
	<p>Station 1 – Engine 1 (E1) LFES Unit # 08305 Description:</p> <p>Apparatus Minimum Staffing: 3 Purchase Year: 2009 Replacement year: 2024</p>
	<p>Station 1 – Rescue 1 (R1) LFES Unit # 07304 Description:</p> <p>Apparatus Minimum Staffing: 2 Purchase Year: 2007 Replacement year: 2022</p>
	<p>Station 2 – Quint 2 (Q2) LFES Unit # 11309 Description:</p> <p>Apparatus Minimum Staffing: 3 Purchase Year: 2011 Replacement year: 2026</p>
	<p>Station 3 – Engine 3 (E3) LFES Unit # 12304 Description:</p> <p>Apparatus Minimum Staffing: 3 Purchase Year: 2012 Replacement year: 2027</p>
	<p>Station 4 – Quint 4 (Q4) LFES Unit # 10302 Description:</p> <p>110' Platform</p> <p>Apparatus Minimum Staffing: 3 Purchase Year: 2011 Replacement year: 2026</p>

	<p>Station 1 – Command Post (CP1) LFES Unit # 08303 Description: Apparatus Minimum Staffing: 1 Purchase Year: 2009 Replacement year: 2029</p>
	<p>All Stations – Primary ambulance units Station 1 – Day ambulance Unit Ambulance Minimum Staffing: 2</p>

Currently Station 2 and Station 4 operate quint apparatus as front line vehicles. It is recommended that this practice be revised to operate engines as the front-line apparatus, especially in the case of Station 4 where the Quint is a 110 foot platform which often experiences service / maintenance / repair issues. These specialized vehicles should be deployed only for the calls where the operations and functions of an aerial / quint are required.

8.2 Fleet Replacement Plan

Life cycle planning is a core component of the capital planning process for the LFES. The current replacement cycle in place for LFES is six years for ambulances, 15 years for engines and quints, 10 years for small vehicles (e.g. cars or vans) and 15 years for utility vehicles. The long range apparatus replacement strategy was last updated in May 2011. The current LFES life cycle plan is consistent with best practice in the fire service. Our review of apparatus replacement plans for municipalities with similar types of use and wear reflect a best practice strategy of 15 years of service as front-line apparatus and a further five years of service in a reserve capacity reflecting a 20 year overall life cycle for major apparatus such as engines and quints. **Tables 44 through 47** shown below summarize the purchase years, purchase costs, planned replacement dates and associated replacement costs for existing apparatus and light vehicles.

Table 44: Fire Apparatus Replacement Plan

Fire Apparatus	Purchase Year	Purchase Price (CAD)	Replacement Years	Future Replacement Funds Required (CAD)
Command Post	2009	258,000	2029	466,000
Engine 2 (engine/tender)	2009	615,000	2024	958,000

Engine 1	2009	498,000	2024	775,000
Engine 5	2004	409,000	2019	637,000
Engine 6	2016	275,000	2030	429,000
Engine 3	2012	519,000	2027	809,000
Quint 4	2011	1,309,000	2026	2,401,000
Quint 2	2011	931,000	2026	1,708,000
Rescue 1	2007	456,000	2022	710,000

Table 45: EMS Apparatus Replacement Plan

Ambulances	Purchase Year	Purchase Price (CAD)	Replacement Years		
			2018	2023	2028
Ambulance 1	2011	182,000	2018	2023	2028
Ambulance 2	2011	184,000	2018	2023	2028
Ambulance 3	2011	184,000	2018	2023	2028
Ambulance 4	2011	184,000	2019	2024	2029
Ambulance 5	2011	184,000	2019	2024	2029
Ambulance 6	2013	184,000	2019	2024	2029
Ambulance 7	2013	174,000	2020	2025	2030
Ambulance 8	2013	174,000	2020	2025	2030
Ambulance 9	2014	174,000	2020	2025	2030
Ambulance 10	2015	168,000	2021	2026	2031
Ambulance 11	2015	168,000	2021	2026	2031

Table 46: LFES Small Vehicle Replacement Plan

Vehicles	Purchase Year	Purchase Price (CAD)	Replacement Years	
			2015	2025
Car 1- Explorer	2005	\$62,000	2015	2025
Car 2- Jimmy	2004	\$39,000	2014	2024
Car 3 Dodge Journey	2009	\$27,000	2019	2029
Car 4 Dodge Journey	2009	\$23,000	2019	2029
Car 5 Chiefs Vehicle	2015	\$50,000	2025	2035

Table 47: Specialized Apparatus Replacement Plan

Water Rescue	Purchase Year	Purchase Price(CAD)	Replacement Years		Future Replacement Funds Required (CAD)
20' Cargo Trailer	2003	9,000	2018	2033	20' Cargo Trailer
Inflatable Boat c/w Trailer	2005	17,000	2015	2025	Inflatable Boat c/w Trailer
Riverboat 18' c/w Trailer	2006	45,000	2016	2026	Riverboat 18' c/w Trailer
Rescue Deck /c Trailer	2010	42,000	2020		

8.3 Maintenance

Fleet maintenance is completed by the City of Lethbridge Fleet Services, through a service agreement with LFES. LFES staff fax paper work orders from the fire stations to Fleet Services for completion. The completed work orders are scanned and emailed back to LFES. SOGs exist for maintenance and operations procedures.

8.4 Equipment

The Equipment Technician deals primarily with purchasing of new small, firefighting equipment, clothing, Self-Contained Breathing Apparatus (SCBA) and personal protective equipment. The Equipment Technician is qualified as the technician to service and maintain the LFES' inventory of SCBA. Some of the smaller technical equipment can be maintained by on-duty suppression staff for regular maintenance and repairs. Other equipment is serviced by the manufacturer, outsourced locally or completed by the City's Fleet Services. The job summary of the Equipment Technician is presented in **Table 48**.

Table 48: Fleet and Equipment Job Summaries

Staff Assigned	Position	Responsibilities / Assigned Duties
1	Equipment Technician	<ul style="list-style-type: none"> • Provides support to EMS & Fire • Purchases equipment / supplies • Maintains inventory records, maintenance schedules and budgetary information • Reports to Deputy Chief of Support Services

8.5 Emergency Vehicle Pre-emption System

Traffic signal pre-emption is an intelligent transportation system technology used to manipulate traffic signals to give select vehicles priority when travelling through signalized intersections. This technology can be used for railways, transit and emergency vehicles. They are commonly based on line-of-sight technologies whereby an emitter within a vehicle sends a signal to a receiver mounted at a traffic light. In the context of fire service, these systems provide travel time and public safety advantages. Traffic signal pre-emption technology can assist in clearing intersections and/or controlling surrounding traffic signals that are equipped with the technology. Such systems can allow emergency vehicles to pass through intersections more efficiently and more safely, and can mitigate the impacts of congestion on response performance.

Traffic signal pre-emption has been in effect in the City of Lethbridge for over 25 years. In Lethbridge, all emergency vehicles are equipped with optical strobe emitters. These emitters instruct the traffic signals to change to a particular green light sequence to favour an approaching Fire and Emergency Service vehicle and give the vehicle signal priority. This occurs only in the absence of a railway.

The system assists with clearing the intersection of any vehicle queues in advance of emergency vehicles. Based on past industry experience, by clearing the intersection ahead of time and momentarily pausing traffic from other directions, traffic signal pre-emption can improve response times by an average of eight to ten seconds per intersection. On a typical four minute initial response, this translates to reducing the initial response by approximately one minute. Additionally, traffic signal pre-emption can reduce the intersection collision rate of emergency vehicles by approximately 70%.

The existing technology is now 25 years old, and is experiencing challenges. The existing system is based on circuit boards, which have been experiencing intermittent break downs, and for which spare parts are becoming difficult to secure. The circuit boards are scheduled to be replaced with new solid state technology in 2017. The City of Lethbridge has approved the replacement of traffic control electronics and the emergency vehicle pre-emption system (EVP).

A lifecycle replacement program for emergency vehicle pre-emption has also been planned. The replacement is intended to modernize the existing system with GPS (Global Positioning System) coordinated technology. This project is currently underway with some intersections receiving upgrades as traffic signals are replaced or added to intersections. At present, this new technology is not yet compliant with the emitters onboard the existing fire apparatus.

8.6 Summary of Fleet and Equipment

The type of apparatus, condition of the fleet, equipment management and maintenance procedures of LFES reflect best practices within the fire service in Canada. LFES conducts long range life cycle planning for the replacement of speciality apparatus and small vehicles. The condition of the fleet and replacement planning reflects the dedication and efforts of the Deputy Chief of Support Services the City's Fleet Services Department and the LFES Equipment Technician. Throughout the City of Lethbridge traffic signal preemption allows the changing of traffic lights at intersections to allow emergency vehicles to travel more safely and quicker through the City. The City will be replacing the pre-emption equipment in 2017.

9.0 IMPLEMENTATION AND RECOMMENDATIONS

This FMP includes an implementation strategy that categorizes the recommendations of this plan into those that can be implemented by the Fire Chief within the boundaries of his current authority delegated by Council; these are presented as **Operational Recommendations**. Recommendations that require direct Council approval related to policy decisions, or financial commitments are presented as **Council Recommendations**. This implementation plan also includes a table outlining phasing and implementation for future stations and staffing.

9.1 Future Stations and Staffing

Table 49 provides a timeline for the stations, staffing and apparatus plan within this FDMP. The recommended future facility plan is a six station model for the City of Lethbridge which includes a relocated Station 3, two new stations in West Lethbridge (decommission of the existing Station 2) and additional station in North Lethbridge.

Table 49: Phasing and Implementation Plan

Timeframe	Action
<5 years	The City has identified Station 3 as a high priority for replacement. Of the investigated replacement site options, near the intersection of Scenic Drive South and Mayor Magrath Drive South is recommended. Once the new station is constructed the existing Station 3 should be decommissioned. The existing staffing model of Station 3 should be maintained.
5 – 10 years	<p>Construction of a new station in West Lethbridge located approximately at the intersection of University Drive West and Macleod Drive West. This new station should be staffed with a primary fire apparatus with minimum staffing of four firefighters. This will require the addition of 20 firefighters on complement to maintain an additional four positions as minimum on-duty staffing. Adding a station will require the addition of a primary fire apparatus unit to operate from the new facility.</p> <p>Construction of a new station in North Lethbridge located approximately at the intersection of 13 Street North and 26 Avenue North. This new station should be staffed consistently with Station 4 (a primary fire apparatus with minimum staffing of four firefighters. This will require the addition of 20 firefighters on complement to maintain an additional four positions as minimum on-duty staffing. Adding a station will require the addition of a primary fire apparatus unit to operate from the new facility.</p> <p>Both of these station locations provide enhanced service coverage to gaps in the existing network coverage. Both of these stations locations also provide enhanced coverage to areas where growth is expected to occur within a 5 to 10 year time horizon.</p>

Timeframe	Action
10 – 20 years	Construction of a new station in West Lethbridge located approximately at the intersection of Metis Trail West and Garry Drive West. Once the new station is constructed the existing Station 2 should be decommissioned and the staff & apparatus relocated to the new station location.

9.2 Recommendations

9.2.1 Categorization and Prioritization

The recommendations have been categorized in the sections below into ‘Operational’ and ‘Council’ recommendations. Each recommendation has been assigned a prioritization level of ‘immediate’, ‘short-term’ or ‘strategic’, based on the definitions in **Table 50**.

Table 50: Definitions of Prioritization Levels

Immediate	Identified for immediate action within the first three to six months from approval of the Fire Department Master Plan by Council. These recommendations do not require further reporting or decision making prior to full implementation.
Short-term	Identified for additional investigation or research within the first six to 12 months from approval of the Fire Department Master Plan by Council. These recommendations may require further reporting or decision making prior to full implementation.
Strategic	Identified for consideration and direction of Council. These recommendations are intended to inform longer term strategies that will require further reporting and approval of Council prior to implementation.

9.2.2 Operational Recommendations:

Table 51 summarizes the recommendations of this FMP that have been deemed as **Operational Recommendations** that can be administered and implemented by the Fire Chief within his current authority. In some cases this may require additional work by the Fire Chief in preparing further documentation and reporting to Council for approval.

Table 51: Operational Recommendations

Recommendation No.	Priority Level	Operational Recommendations
1	Immediate	That the LFES continues the current practice to review all by-laws and agreements affecting the department on a regular basis.
2	Immediate	That the LFES continues to provide pro-active leadership in the utilization and application of mutual aid agreements.
3	Immediate	That the LFES continues to monitor and update the current automatic aid agreements to ensure full cost recovery, including any consumables, staff time, and overtime.
4	Short-term	That subject to Council's consideration and approval of this Fire Department Master Plan, there will be a need to conduct a review of all existing SOGs and where necessary complete revisions or develop additional SOGs to reflect all levels of service approved by Council.
5	Short-term	That subject to Council's consideration and approval of this Fire Department Master Plan the department take the following steps regarding their internal standard operating guidelines: <ul style="list-style-type: none"> ○ Establish and empower a standard operating guideline committee composed of fire service staff to research, develop, and draft new standard operating guidelines and to update existing standard operating guidelines; and ○ Conduct a review of all existing standard operating guidelines and where necessary complete revisions or develop additional standard operating guidelines to reflect all levels of service approved by Council.
6	Immediate	That the department continues the on-going process of regularly reviewing and updating department policies, operational procedures and relevant by-laws.
7	Immediate	That the department continues to research and apply technology-based initiatives in order to improve the effectiveness and efficiency of the LFES and its operations.
8	Immediate	That the department continues the current practice of preparing comprehensive and professional annual reports and that the Community Risk Assessment (contained within Appendix C) be maintained on a regular basis and included within the annual reports to Council.

Recommendation No.	Priority Level	Operational Recommendations
11	Short-term	<i>That following the completion of the planned revisions to the current emergency plan model and self-assessment tool by AEMA (Alberta Emergency Management Agency) it is recommended that the City update the current Municipal Emergency Plan (MEP).</i>
12	Short-term	<i>That the LFES consider appointing a Captain from each platoon to oversee the coordination of training on that platoon.</i>
13	Short-term	<i>That LFES consider the addition of Fire Field Trainers (equivalent to the existing EMS Field Trainers) to support firefighter training in the department.</i>
14	Short-term	<i>That regular participation in live fire training be included within the proposed comprehensive annual training program for firefighters within the LFES.</i>
15	Short-term	<p><i>That the LFES conduct a detailed review of the current specialized services provided by the department. This analysis should consider the following:</i></p> <ul style="list-style-type: none"> <i>○ Financial operating costs of the sustaining the current team-based model;</i> <i>○ Partnership opportunities with other external agencies in the delivery of these services;</i> <i>○ Contracting these services to other agencies or the private sector;</i> <i>○ Enhancing the level of confined space, trench rescue capabilities of the department; and</i> <i>○ The need to sustain the diving capabilities of the Water Rescue Team.</i>
16	Short-term	<p><i>That the LFES develop a new comprehensive annual firefighter training program that responds to the relevant standards, curriculum and health and safety requirements, and include the following core functions:</i></p> <ul style="list-style-type: none"> <i>○ Identification of training needs in relation to services provided;</i> <i>○ Coordination / scheduling of theoretical and practical training;</i> <i>○ Monitoring and evaluation in relation to outcomes achieved;</i>

Recommendation No.	Priority Level	Operational Recommendations
		<ul style="list-style-type: none"> ○ Ongoing evaluation in relation to industry best practices and legislative requirements; ○ Oversight of program objectives and records management; and ○ Ongoing assessment of program delivery for efficiency and effectiveness.
17	Short-term	That the LFES consider the development of a comprehensive career development plan to support the succession planning needs of the department in the future.
19	Short-term	That the LFES assign the roles and responsibilities of a basic Safety Codes Officer to one member of each of the four platoons.
20	Immediate	That the LFES continues to support and participate in multi-agency inspections of Group A - Assembly Occupancies.
20	Short-term	That the LFES prioritize the utilization of the Fire Safety Information Centre targeting high-risk and high occupancy buildings in developing pre-planning information for firefighters.
22	Immediate	The LFES continues to support the delivery of the “Secondary Suites” program targeting the legalization of residential secondary suites.
24	Short-term	That LFES review the current department procedures for the enforcement of the Alberta Fire Code related to requests for inspection or complaints and implement the procedures recommended with the FDMP.
26	Short-term	That the LFES investigate alternative approaches for reinstating a proactive Home Smoke Alarm Program as identified within the FDMP.
27	Short-term	That the LFES investigate alternative approaches to the enhanced delivery of Home Escape Planning as contained within the FDMP.
31	Short-term	That the department initiates measures to track and monitor the arrival of staff on-scene (time of arrival and numbers of firefighters), to collect data to monitor and review actual depth of response coverage.

9.2.3 Council Recommendations

Table 52 summarizes the recommendations of this FMP that have been deemed as **Council Recommendations** which includes those that require a policy decision or financial commitment on behalf of the City.

Table 52: Council Recommendations

Recommendation No.	Priority Level	Council Recommendations
9	Immediate	<p>That the LFES continues to target a minimum initial response of four firefighters to provide sufficient firefighting resources to conduct initial fire suppression operations including the fireground critical tasks of:</p> <ul style="list-style-type: none"> ○ Incident Command – 1 firefighter ○ Pump Operation – 1 firefighter ○ Attack Line - 2 firefighters (Confine and Extinguish)
10	Short-term	<p>That an appropriate minimum depth of response to the low, moderate and high risks occupancies within the City of Lethbridge to achieve the required critical fireground tasks includes four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies and 24 firefighters to high risk occupancies.</p>
18	Short-term	<p>That the LFES adopt the “three lines of defence” including prioritizing public education and prevention, and the utilization of fire safety standards and enforcement to provide a comprehensive fire protection program within the municipality based on the results of the Community Risk Assessment as a “strategic priority” in the development and delivering of fire protection services.</p>
23	Strategic	<p>That the LFES prepare and present to Council performance measures, such as those recommended within this FDMP, for each of the fire prevention inspection activities provided by the department as a tool for Council and the LFES to monitor the effectiveness of these activities.</p>
25	Strategic	<p>That the LFES conduct the following to enhance the department’s initiatives targeting Fire Safety Plans and Pre-Plans:</p>

Recommendation No.	Priority Level	Council Recommendations
		<ul style="list-style-type: none"> ○ Identify annual targets for the number of Fire Safety Plans to be completed for each occupancy group type; and ○ Identify resource strategies to meet the annual targets, including an enhanced role of on-duty suppression staff including the proposed on duty basic Safety Codes Officer.
28	Short-term	That the City of Lethbridge prepares the necessary research and documentation to apply for exemption from the Alberta Safety Codes Act to implement regulations for the installation of residential sprinklers.
29	Immediate	That LFES prioritize the deployment of a minimum of four firefighters arriving on scene staffing an engine/quint, or alternatively arriving on scene simultaneously in order to safely and effectively initiate the critical fireground tasks for initial response identified within the FDMP.
30	Short-term	That the LFES implement automatic deployment protocols to confirmed delta and echo fire incidents assigning a minimum of four firefighters to low risk occupancies, 14 firefighters to moderate risk occupancies, and 24 firefighters to high risk occupancies in order to safely and effectively initiate the critical fireground tasks for depth of response identified within the FDMP.
32	Strategic	<p>That the future facility plan be a six station model for the City of Lethbridge which includes a relocated Station 3, additional station in North Lethbridge, two new stations in West Lethbridge and decommission of the existing Station 2 with implementation as follows:</p> <ul style="list-style-type: none"> ○ Station 3 be replaced within the short term (2018-2021) through rebuilding near the intersection of Scenic Drive South and Mayor Magrath Drive South and the existing Station 3 decommissioned. ○ Within the short to medium term (2018-2021) construct a new station in West Lethbridge located approximately at the intersection of University Drive West and Macleod Drive West

Recommendation No.	Priority Level	Council Recommendations
		<p>staffed with a primary fire apparatus (minimum staffing of four firefighters).</p> <ul style="list-style-type: none"> ○ Within the medium term (2026-2029) construct a new Station in North Lethbridge located approximately at the intersection of 13 Street North and 26 Avenue North staffed with a primary fire apparatus (minimum staffing of four firefighters). ○ Over the long term (2030-2033 years), timed to match growth and development, construct a new station in West Lethbridge located approximately at the intersection of Metis Trail West and Garry Drive West. Once the new station is constructed the existing Station 2 should be decommissioned.

