TOWN OF LINCOLN

LINCOLN FIRE RESCUE ASSET MANAGEMENT PLAN

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TOWN OF LINCOLN

DRAFT

DATE: APRIL 2022

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1 GOVERNANCE AND LEADERSHIP

1.1 OVERVIEW

Lincoln Fire Rescue is a composite fire department that relies on four full time staff and paid on-call volunteer firefighters from the community.

The administration of Lincoln Fire Rescue is completed from Fire Station #61 and the service is covered from 4 locations throughout the Town.

The services provided by Lincoln Fire Rescue are:

Emergency Response - Lincoln Fire Rescue responds to approximately 900 emergency calls per year town-wide, with individual station responses ranging from about 100 calls to 500 calls annually per station. Emergency responses include:

- Fire suppression
- Medicals
- Rescues (MCV, high angle, other)
- False alarms
- Public hazards
- Hazardous materials
- Assistance (other)
- Open air burning
- Carbon monoxide
- Other (not found, human perceived)

Emergency Management - Lincoln's fire department plays a crucial role in the ongoing process of emergency management including:

- Planning, oversight and management of the Town's emergency plan
- Training Town staff in applicable incident management systems
- Conducting required legislative mock emergency exercises with Town staff, allied emergency services, other municipalities as well as utility and transportation providers

Fire Prevention - One of the main functions of the Town of Lincoln Fire Rescue is to actively promote fire prevention in the community. This is done by:

- Providing fire safety inspections and fire investigations to determine the origin and cause of fires and explosions
- Providing public fire safety education
- Overseeing the stations and fleet, and ensuring they are fully equipped and prepared
- Conducting fire safety inspections:
    - On a request basis for licensing, consultation, and other purposes on a fee-for-service payment
    - On a complaint basis where there are suspected Fire Code infractions and/or fire safety concerns

1.2 ROLES AND RESPONSIBILITIES

The **Chief Administrative Officer** (CAO) is responsible for oversight and administration of the Town's services. The CAO Implements the policies and direction approved by Council, and with support from the senior management team, develops strategic planning initiatives for the organization.

The **Fire Department** is responsible for the administration, fire prevention and public education, training of staff and volunteers, operations and emergency management. The department comprises of the following personnel:

- Fire Chief

- Deputy Fire Chief
- Two Fire Prevention Officers
- Emergency Management Coordinator
- Fire Coordinator
- Fire Training Officer (part time)
- 118 Firefighting staff which includes 26 officers.
- 12 Auxiliary special operations members.
- Auxiliary Chaplain

1.3 GOALS AND OBJECTIVES

The Town of Lincoln's strategic plan "A Future Fit Lincoln" describes its strategic priorities to build a welcoming, connected, vibrant and resilient community. The long-term vision statement for the Town is:

A place to grow:

Youth, aging in place, agriculture – growing crops, farming, greenhouse support, business growth, early childhood development (youth), proper planning and growing smart, growing your family here in Lincoln.

A place to prosper:

A place for small/medium businesses to succeed, opportunities, job creation, tourism, destination, local markets, festivals, beautification, industrial parks, prosperity, community vibrancy, innovation.

A place to belong:

Maintain community feeling, connectedness, more local events, support for families, history and heritage, local markets, local and unique festivals, moving around town, one community.

1.3.1 LINCOLN FIRE RESCUE SERVICE MISSION AND GOALS

Mission

The Lincoln Fire Rescue is an essential service to support achievement of the Town's vision (a place to grow; a place to prosper; and a place to belong).

The mission of the Lincoln Fire Rescue is to ***"Directly deliver fire suppression, public fire safety education, fire prevention, emergency rescue, and medical tiered response services to Town of Lincoln residents, property owners and the general public in order to minimize/prevent loss of life, injury and damage to property"***.

Goal

The ultimate goal of Lincoln Fire Rescue in alignment with its mission statement, is to prevent fire from occurring before it starts. The following three lines of defence are identified to achieve this and establish appropriate fire safety provisions in accordance with community needs:

1. **Public education**: Educating residents of the community on how 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 reduce the impact of fire.
2. **Fire Safety Standards and 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.
3. **Emergency Response**: Providing well trained and equipped firefighters directed by capable officers to stop the spread of fires once they occur and to protect the lives of residents for those times when fires occur despite prevention efforts.

1.4 CONTEXT FOR ASSET MANAGEMENT PLAN DOCUMENT

1.4.1 RELATIONSHIP WITH OTHER DOCUMENTS

The Town recognizes the importance of proactive and responsible management of the infrastructure that supports the effective and efficient delivery of the Lincoln Fire Rescue. **Error! Reference source not found.** shows the linkage and relationships between asset data and how it informs asset management plans, financial and master planning documents, corporate asset management plans, and policy statements, which in the Lincoln Fire Rescue Area Asset Management Plan will strive to meet the goals of a ***Future-Fit Lincoln***. These goals are to provide a reliable, effective, and supportive service in a financially responsible way that is aligned to the community vision.

1.4.2 *REFERENCE DOCUMENTS*

The following other plans and strategies were referenced in the preparation of this Asset Management Plan

- Town of Lincoln Official Plan
- Lincoln Fire Rescue Annual Report

1.4.3 *LIMITATIONS AND ASSUMPTIONS*

This asset management plan has been prepared based on the best information available regarding inventory and costs of providing the service, and an understanding of adequate maintenance and renewal of assets in a “whole of lifecycle” manner. Continuous improvement of Lincoln’s asset management practices is essential to collect accurate asset information that can be used to support ongoing quality planning and sustainable infrastructure management.

The limitations faced while writing this plan are summarized in Table 1. Recognizing these limitations will help inform the continuous improvement process for future versions of the AMP.

Table 1: Limitations of the asset management plan

Limitation	Impact
Asset Data	The Town's inventory is stored in multiple tables and databases and contains gaps and duplicates. A data management plan was developed in 2021 and recommends a centralized database be adopted for all asset inventory. This is still to be implemented.
State of the infrastructure	The state of the infrastructure is based on currently available inventory data.
Scope of Lincoln Fire Rescue asset management plan	Fire Halls form part of the Community Services and therefor are not within the scope of this Asset Management Plan

1.4.4 IMPLEMENTATION AND REVIEW

The Lincoln Fire Rescue asset management plan documents current practices and information on:

- The quantity, age, condition and value of the assets
- Current levels of service and performance measures
- Current practices for managing the assets
- Risks to service delivery
- Renewal plans and financial strategy

The asset management plan also documents improvement tasks that if addressed will increase the level of understanding of the service provided by Lincoln Fire Rescue. An up-to-date asset management plan will empower decision-makers with accurate and complete information in an easy-to-understand format that will support well-informed, evidence-based decisions to identify the right balance between level of service, risks and available funding, that is in the best interests of the Town. As such, the implementation of this asset management plan must include regular review and update to keep the plan up to date with the latest information, understanding and projections.

The asset management plan should be reviewed every five years at a minimum. Consideration must also be given in each asset management plan update to any changes in the Ontario Requirements 588/17: Asset Management Planning for Municipal Infrastructure.

2 KNOW YOUR ASSETS

2.1 CONTEXT FOR INFORMATION IN THIS SECTION

The following sections describe the current state of infrastructure for the Lincoln Fire Rescue assets maintained by the Town of Lincoln.

The state of infrastructure of the Lincoln Fire Rescue includes the following asset groups:

- Fleet: all apparatus
- Communications: radios
- Personal protective equipment: bunker gear and helmets
- Equipment: hose, self-contained breathing apparatus (SCBA), nozzle, jaws of life and thermal imagers

A summary of state of infrastructure statistics for each asset group is reported in the next section of this plan. These statistics include the quantity of assets in each group, their average age, the total replacement value, graphs showing the condition profile and age profile of the assets, and a long term financial forecast for replacing existing assets as they reach the end of their useful life.

2.1.1 INFRASTRUCTURE DATA SOURCE

The inventory data is kept in various sources including spreadsheets and tables.

2.1.2 MINIMUM DATA REQUIREMENTS

Currency and accuracy of asset data is critical to effective asset management, accurate financial forecasts, and informed decision-making. To produce the state of infrastructure section of the asset management plan, the following attribute data is required (where applicable):

- Unique asset identifier
- Asset owner
- Asset status (e.g. active, abandoned, not in use)
- Asset group
- Asset type
- Install date or Year
- Estimated useful life (EUL)
- Size 1 (e.g. diameter, width, height, power)
- Size 2 (e.g. length, width, height, quantity)
- Size 3 (e.g. area, quantity, depth)
- Material type
- Replacement cost or Unit rate

All assets currently have the minimum attribute information available.

2.1.3 ASSET REPLACEMENT COSTS

The asset replacement costs have been estimated based on unit rates developed from recent purchases and projects.

2.1.4 ASSET LIFESPANS

Most assets used to deliver Lincoln Fire Rescue are covered by regulations and have specific estimated useful lives. The lifespan of assets not covered by regulations are based on Town staff experience.

2.1.5 ASSET CONDITION

The condition of assets is estimated based on the assets' age and remaining lifespan following the scale shown in Table 2.

Table 2: Age-based condition rating

Score	Condition Rating	% of Remaining Useful Life (RUL)	Rating Description
1	**Very Good:** Fit for the future	RUL ≥ 75%	The infrastructure in the system or network has greater than or equal to 75% of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
2	**Good:** Adequate for now	75% > RUL ≥ 35%	The infrastructure in the system or network has less than 75% (and greater than or equal to 35%) of its remaining service life. It is in good condition.
3	**Fair:** Requires attention	35% > RUL ≥ 13%	The infrastructure in the system or network has less than 35% (and greater than or equal to 13%) of its remaining service life. It is in fair condition.
4	**Poor:** At risk	13% > RUL ≥ 3%	The infrastructure in the system or network has less than 13% (and greater than or equal to 3%) of its remaining service life. It is in poor condition and mostly below standard, with many elements approaching the end of their service life.
5	**Very Poor:** Unfit for sustained service	RUL < 3%	The infrastructure in the system or network has less than 3% of its remaining service life. It is in very poor, unacceptable condition and should be replaced or rehabilitated.

2.1.6 DATA ASSUMPTIONS AND LIMITATIONS

The information for all fire assets was complete.

The asset data used to produce the state of infrastructure has been sourced from multiple tables. While the information was complete, there were cases where two assets had the same asset ID, with one of the assets being removed from service and the other in service.

It should also be noted that recent updates to the assets may not have been captured in the inventory tables. Additionally, short-lived assets such as flashlights, pagers and tablets have been excluded from the asset management plan as the replacement of these assets is considered an operational expense.

2.2 STATE OF INFRASTRUCTURE

Table 3 shows a summary of the Lincoln Fire Rescue assets that are owned by Lincoln and are active and in service.

- **Quantity** - The numbers listed in the "quantity" column of Table 3. represent the length of linear assets (hoses) or the number of point assets (equipment, fleet, communication).
- **Average Asset Condition** - The average condition of the Lincoln Fire Rescue assets at the Town of Lincoln is Fair (3). The average condition is weighted for asset replacement cost. Therefore, even though many assets are in good condition, the value of the fleet assets in fair condition bring the overall average condition for Lincoln Fire Rescue assets down to fair rather than good.
- **Current Replacement Cost** - the replacement costs were calculated using the methodology detailed in Section 2.1.3.

Table 3: Current state of the infrastructure

Category	Asset	Quantity		Current avg asset age (yr.)	Avg expected useful life (yr.)	Average asset condition	Current replacement cost
Firefighting Equipment	Hose	6,218	m	9	15	Good	$94,400
	SCBA Mask	121	No.	4	10	Good	$140,400
	SCBA Regulator	81	No.	8	10	Good	$607,500
	SCBA Cylinder	263	No.	7	10	Fair	$473,400
	Nozzle	31	No.	1	15	Very good	$37,200
	Jaws of Life	13	No.	3	10	Very good	$240,500
	Thermal Imager	10	No.	7	10	Fair	$100,000
Personal Protective Equipment	Helmet	115	No.	5	10	Good	$46,000
	Bunker Gear	368	No.	5	7	Fair	$345,200
Fleet		22	No.	12	17	Fair	$8,813,300
Communications		71	No.	0	8	Very good	$285,700
Asset Total				**11**	**16**	**Fair**	**$11,183,600**

The total current estimated replacement costs for Lincoln Fire Rescue assets is estimated at $11.2M (in 2021 dollars).

Figure shows the condition and age profile for Lincoln Fire Rescue assets by replacement cost. Most of the assets are in very good or good condition (62%). 29% are in very poor condition however the majority of these assets are fleet due for replacement this year. The age profile graph shows that most of the Lincoln Fire Rescue assets fall into the 0 to 10-years age group.

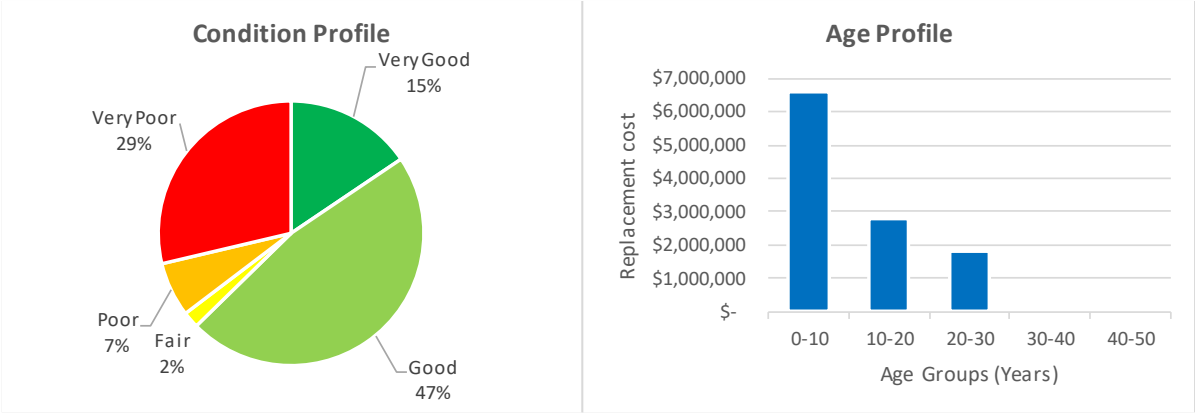


Figure 1: Condition and age profile

Figure 2 shows the 30-year renewal forecast based on asset age. Based on the current inventory, there are $3.2M worth of assets to be replaced in the first year of the forecast period. The renewals comprise of $2.9M of fleet, $114k of bunker gear, $164k of SCBA cylinders and $40k of thermal imagers. Over the 30-year forecast, there are some significant peaks in renewals costs including $2.4M in 2033 and $2.1M in 2041. The average annual cost to sustainably fund the current assets is approximately $621k per annum over the next 30 years. This information is intended to provide context to decision-makers on the overall level of investment required to sustainably fund asset renewals for the forecast period.

Note that more detailed analysis at the asset level and assessment of project options would be required for determining budgets for individual capital renewal projects.

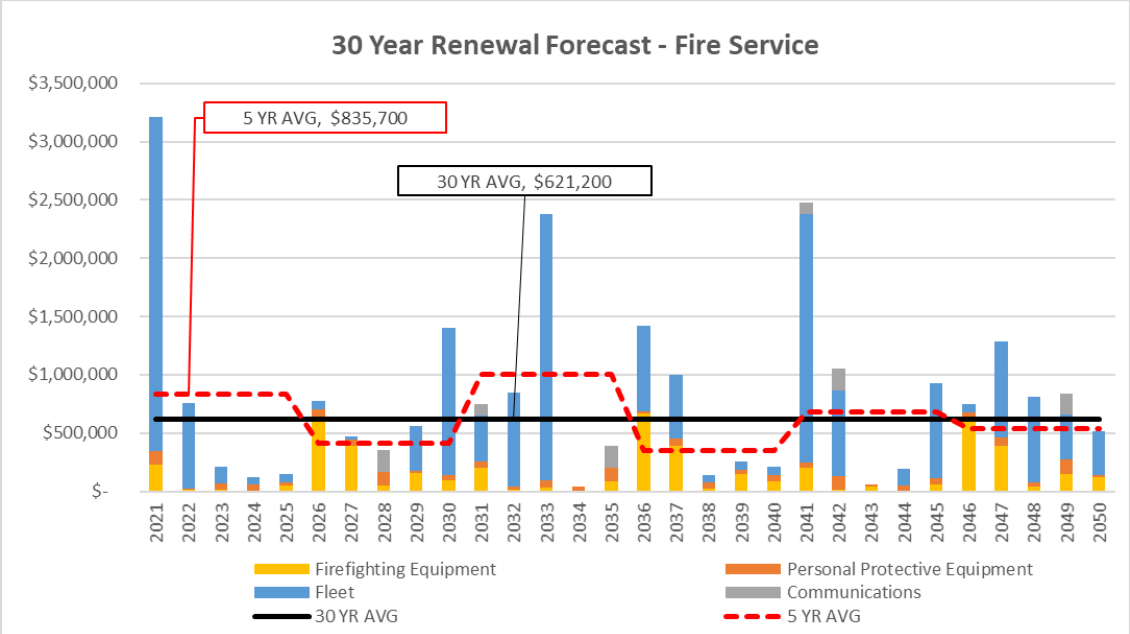


Figure 2: 30-year renewal forecast

2.3 IMPROVEMENT PRIORITIES

2.3.1 PRIORITIZED IMPROVEMENTS RELATING TO ASSET DATA AND SOI

Table 4: State of infrastructure improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
1	2	Asset Data	Address duplicate asset identifiers by either assigning a different asset identifier if the duplicate entries are in fact different asset or by removing the duplicate if they are the same asset	High
2	2	Asset Data	Retain asset attributes for assets that are out of service. This information can be used once sufficient historical data is accumulated to gain a better understanding of performance trends, in particular for assets where the timing for replacement is not regulated.	Medium
3	2	Asset Data	The Town have completed an assessment of their asset data across all service areas and developed a data management plan that contains recommendations including: • Developing a data standard and data hierarchy to ensure consistency • Develop a plan to populate missing asset attribute data • Develop roles and assign responsibility of the management of data • Adopt a database software to host data and have a single source of truth	High

3 MANAGE SERVICE DELIVERY

3.1 LEVEL OF SERVICE

The purpose of this section is to describe the Levels of Service (LOS) that the Town of Lincoln aims to provide with the Lincoln Fire Rescue.

LOS are the outcomes that an organization delivers. They are the key drivers for making decisions on future investment in the service and its infrastructure assets. As such, they need to be clearly articulated in terms that end users and decision makers can understand. Having well defined service levels will allow Lincoln to work with its ratepayers and other stakeholders to find the appropriate balance between affordability and community expectations for service level.

Performance measures indicate what the customers and stakeholders experience from the service that is delivered. Target values are set for performance measures to deliver the intended level of service. Comparison of performance delivered (measured results) to performance intended (target values) assists the Town in both strategic and operational decision making.

Table 5 presents a summary of the approach to describe LOS and performance measures.

Table 5: Levels of service and performance measure terminology

Concept	Definition	Example
Levels of service (LOS)	Specific attributes of the service that the Town intends to deliver from the **customer point of view**. LOS attributes provide the link between higher level corporate and asset management objectives and more detailed technical and operational objectives. They must all align to give the customer the intended experience of the service.	Adequate fire service that can attend calls within X minutes.
Performance measures	Criteria that can be measured and provide an indication of how the Town is doing in delivering the intended LOS. This can be defined as: Customer performance measures: Measures describing **how the customer receives or experiences the service**. Technical performance measures: Technical criteria **the Town can measure to indicate the service level being achieved**.	<u>Customer:</u> Number of valid complaints Customer satisfaction survey <u>Technical:</u> Maintenance records Age of assets Compliance with fire regulations
Performance targets	The required value (target) for each criterion that is being used as a performance measure. The expectation is that the intended LOS will be achieved if these targets are met.	<u>Customer:</u> >80% satisfaction (from survey) <u>Technical:</u> Percentage of assets that are less than Y years of age

Key staff from Lincoln Fire Rescue participated in a round-table workshop to:

1. Identify the stakeholder groups;
2. Identify the key expectation of the Lincoln Fire Rescue from the perspective of each stakeholder group;
3. Define the service criteria of most interest to each stakeholder group, and;
4. Identify performance indicators that are currently being measured.

The outcomes from the workshop are provided in Table 6.

Table 6: Service criteria and stakeholder key expectations

Stakeholder group	LOS statement	Service criteria
Council	Professional service and compliance with standards and regulations	Compliance
Internal staff (facilities)	Effective Coordination and safe environment	Coordination
		Risk & safety
Vulnerable sector	Safety and compliance with standards and regulations	Risk & safety
		Compliance
Developers	Guidance and coordination	Coordination
Residents, visitors and businesses	Well managed service that is available and reliable	Availability
		Service reliability
Families	Good stewardship, dependable and devoted services	Good stewardship
Service providers (e.g.Insurance providers, EMS, Police)	Effective Coordination, available and reliable service	Availability
		Service reliability
		Coordination
		Service reliability
FPPA, Ministry of Labor	Compliance with standards and regulations	Compliance
Neighboring communities (e.g. Grimsby, Wainfleet, West Lincoln)	Effective Coordination	Coordination

The performance measures associated with the service criteria are summarized in Table 7.

Table 7: Levels of service performance measures

Service criteria	Performance measures			
	Technical	**Target**	**Customer**	**Target**
Availability	Average response time	TBD	Average firefighter turnout	TBD
	Annual report	TBD	Training records	TBD
Compliance	PPE annual inspection	TBD	Firehouse statistics	TBD
			Inspection reports	TBD
Coordination	Call response time	TBD	Stakeholder feedback	TBD
Good stewardship	Cost per capita	TBD	Asset management plan	TBD
			Injury statistics	TBD
			# of fatality of staff	TBD
Risk & safety	# public education events	TBD	# inspections at locations with high risks	TBD
			# of fire	TBD
Service reliability	Arrival rate	TBD	Appropriate gear on site for event	TBD

3.1.1 LEVEL OF SERVICE IMPROVEMENT PRIORITIES

Table 8 show the improvement priority related to levels of service.

Table 8: Levels of service improvement priority

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
4	3.1	Levels of service	Collect and collate a minimum of one year of data for each performance measure that has been identified in Table 7.	High
5	3.1	Levels of service	Set targets for each performance measure based on measured results or regulatory requirements as appropriate.	High
6	3.1	Levels of service	Review levels of service and update as appropriate at a minimum when the asset management plan is updated.	Medium

3.2 LIFECYCLE STRATEGIES

Assets of different types have different lifecycle lengths, deteriorate at different rates, and require different strategies for optimum performance and cost-efficiency over their life cycle.

A lifecycle strategy sets out the planned actions and intended maintenance management methods for an asset throughout its life. The purpose of lifecycle strategies is to maintain assets in an appropriate way that will deliver the required level of service for the least overall cost, while keeping risk at a level acceptable to the Town.

3.2.1 MANAGEMENT APPROACH

An asset's lifecycle strategy typically includes the work categories shown in Table 9. However, not all assets have the same management approach. Most of the lifecycle strategies for Lincoln Fire Rescue assets' are driven by regulations and follow a set schedule. Early life interventions are usually only appropriate for a few asset types where reliability is a major factor. Other assets have a "run to fail" approach where relevant maintenance is completed as and when required and the asset is replaced at the end of its life.

3.2.1 LIFECYCLE STRATEGY TERMINOLOGY

The current business practices for lifecycle management have been identified under the following work categories;

- **Operations, Maintenance & Inspections (OMI)**
  - Preventive Maintenance
  - Inspections
  - Operations
  - Reactive Maintenance
- **Renewal and Rehabilitation (R&R)**
  - Early-life Intervention

- Mid-life Rehabilitation
- Later-life Rehabilitation
- End of life

Table 9 shows the definitions of the terminology used for the lifecycle strategy work categories

Table 9: Lifecycle strategy work categories

Terminology	Definition
Preventative maintenance	These are regularly scheduled activities, completed whilst the asset is still in an "operational" condition. The purpose of preventative maintenance (when they are required), is to ensure the asset achieves its expected life (i.e. does not fail early). Not all assets require or benefit from preventative maintenance activities.
Inspections	There are different types of inspections that can occur throughout the lifecycle of an asset. Some are for checking the asset is operating as planned – these provide early warning for any issues that can then be remedied quickly and less expensively than if the problem remained undetected for some time. Other inspections are for measuring or observing the condition of the assets, or for measuring performance. These provide information for planning renewals and determining if performance targets will be met. Inspections may also be required by legislation, departmental policy, or completed based an industry standard or manufacturers recommendation.
Operations	These are routine activities necessary for the correct operation of the assets. They differ from preventative maintenance activities in that they are operational tasks or activities that must occur, or the asset will cease to function as intended (i.e. cease to operate or operate inadequately), whereas an asset will usually continue to operate even if preventative maintenance tasks are not done, but the overall lifespan of the asset could be reduced and the asset may fail early.
Reactive maintenance	These activities are physical repairs to an asset that has broken down or is not functioning as required or expected. The repair reinstates the asset to its normal "operating" condition but does not significantly extend the overall life of the asset e.g. it is a repair not a full replacement nor is it an upgrade or major rehabilitation. Maintenance repairs are expected as assets age and are part of the overall lifecycle management to keep the asset operational for as long as physically and economically viable.
Early life interventions	These are treatment options that may be considered when an asset is in the first quarter of its lifespan. Typically, they are rare for most asset types, but some assets do require replacement of component parts at frequent intervals throughout the overall lifespan of the asset.
Mid-life interventions	These are treatment options that may be considered when an asset is in the second or third quarter of its lifespan. Most common forms of mid-life rehabilitation are the replacement or refurbishment of component parts that have a shorter lifespan than the overall asset.
Later Life Interventions	These are treatment options considered to be still viable even when an asset is in the fourth quarter of its lifespan. They can include replacement

Terminology	Definition
	or refurbishment of component parts the same as might be considered for mid-life rehabilitation. However, Later Life Rehabilitation should only be undertaken if it is cost-effective given the potentially short remaining life of the overall asset.
End of life	These are treatment options considered when an asset is approaching or at the end of its lifespan. Typical options include replacement (renewal) of the asset with an equivalent new asset, major rehabilitation that returns the asset to new or near new status, disposal (removal) of the asset without replacement, retirement of the asset (with or without disposal), divestment of the asset (sale or gift to another's ownership), or upgrade (replace with new asset that will provide an increase in level of service e.g. a bigger asset or higher specification).

The lifecycle strategies for the service assets are included in Appendix A:

3.2.2 LIFECYCLE STRATEGY IMPROVEMENT PRIORITIES

Table 10 shows the improvement priority related to lifecycle strategies.

Table 10: Lifecycle strategy improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
7	3.2	Lifecycle strategies	Update the lifecycle strategies with any new strategies identified as asset change or technology improves	High
8	3.2	Lifecycle strategies	Develop lifecycle strategies for any new assets that become part of the Lincoln Fire Rescue.	High

3.3 RISK PROFILE

Risk is evaluated at both the **service level** and the **asset level**. The importance of this is to provide early warning of all potential issues that could adversely affect delivering the level of service. When risks are known and have a rating, staff can prioritize activities to focus on assets with high-risk scores.

3.3.1 SERVICE LEVEL RISK

Service level risks are the risks that affect the delivery of the service to the Town's customers. In this case, the service provision by Lincoln Fire Rescue is to provide emergency response and management and fire prevention.

The service level risks are grouped into 5 categories. The categories and examples of the risks in each category are shown in Table 11.

Table 11: Service level risk categories and risk examples

Category	Description of Common Risk Events
Planning	Regulatory changes, Council changing strategic priorities, demand management, etc.

Category	Description of Common Risk Events
Management	Lack of resources (people) to implement or advance asset management, reputational risk, data security risk, etc.
Service delivery	Outdated or unsupported software or hardware failures, power outages, inadequate stakeholder communication/engagement, etc.
Assets (in general)	Security and safety of physical or information assets from theft/vandalism/cyberattacks, inadequate maintenance and rehabilitation programs to preserve asset value and longevity, etc.
Hazards and environmental	Extreme weather events, climate change, improper storage or usage of hazardous or toxic materials, etc.

3.3.2 CONNECTION OF RISK TO LEVEL OF SERVICE

The connection between risk and level of service starts with looking at how the potential risk events from each of the five categories affect the service commitments made in section 3.1, and defining a risk outcome (i.e. stating how the risk event would affect the service commitment). Figure 3 below shows the connection of risk to levels of service.

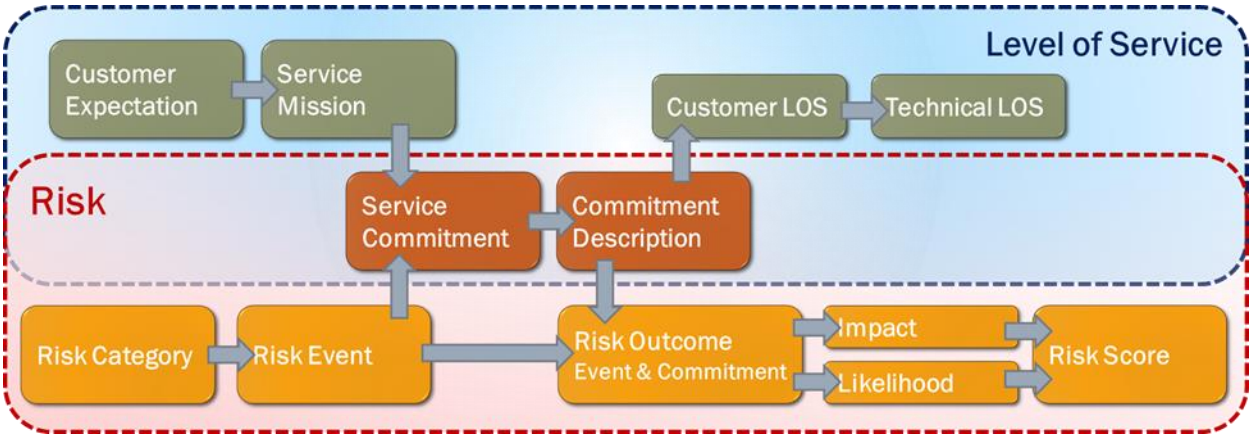


Figure 3: Connection of risk to level of service

3.3.3 SERVICE LEVEL RISKS

The service risks are characterized by the impact to service delivery and the likelihood of that impact event occurring. The Town has assessed the service level risks in each risk category that are relevant to the Lincoln Fire Rescue and identified an appropriate action for each risk, as shown in Table 12.

Table 12: Risk level and action

Risk level	Recommended action
Very low	Accept: These risks can be tolerated. They should be assessed annually to determine whether the level of risk has changed.
Low	Accept: These risks can be tolerated. They should be assessed annually to determine whether the level of risk has changed.

Risk level	Recommended action
Medium	Monitor: These risks require a balanced approach to management. They should be included in future risk mitigation plans and assessed at least annually to determine whether levels of risk have changed.
High	Mitigate: These risks should be prioritized. Existing mitigation programs and plans should be modified to include these risks, and where new risks are identified, update mitigation programs and plans. An assessment of the effectiveness of the mitigation programs and plans must be conducted annually and updated as appropriate.
Very High	Take action: These risks cannot be tolerated as they are critical to service delivery. Immediate corrective actions to mitigate risk should be taken. A risk level monitoring program should be developed to reduce or prevent potential reoccurrence of the risk.

The number of risks rated in each category and their respective scores are shown in Figure 4.

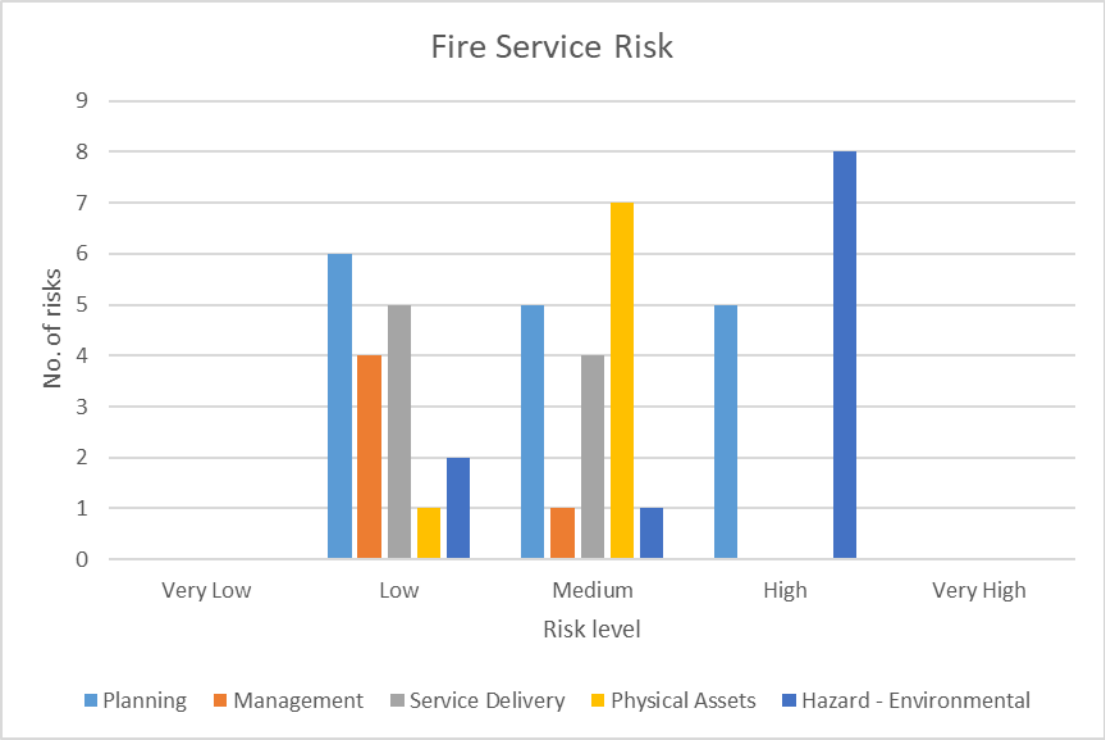


Figure 4: Service-level risk - Lincoln Fire Rescue

Planning Risks

The results of the risk ratings showed that 16 planning risks were identified and rated. Of the 16 risks, 11 were rated as low or medium and six were rated as high.

The risks that were rated medium relate to potential new developments or industry, decrease in revenue, and procurement strategy that could affect service availability and ability of the Town to maintain current service levels. The medium risks should be monitored, the Town is working on identifying a monitoring approach. Both the medium and high-scoring planning risks are mitigated through the Town's on-going

forecasting of future growth and regular review of legislation. The Town also currently considers forecasted growth when developing capital forecasts.

The high-scoring risks relate to potential for changes in legislation and increase in demand from population growth that could result in an increase of cost to deliver the service and affect reliability. High risks need to be mitigated, and the revised risk scoring post mitigation are described further in this section (refer to "Mitigation" below).

Management Risks

The results of the risk ratings showed that 5 management risks were identified and rated. Four of the management risks were rated as low and only one was rated as medium. The low risks do not require any monitoring or mitigation and can be accepted risks.

The medium risk relates to the potential of having insufficient resources to maintain fleet and equipment which would result in reduced reliability. The Town is in the process of identifying a monitoring approach.

Service Delivery Risks

The results of the risk ratings showed that 9 service delivery risks were identified and rated. Four risk out of the 9 were rated as a medium risk while the remaining risks were rated as low. The risks that rated low do not require any monitoring or mitigation actions and can be accepted by the Town. The risk rated as medium related to the potential of increases in costs to provide the service, increased vehicle downtime, and whether the service could be delivered through current budget levels. To mitigate the risk, the Town frequently monitors the costs to manage and operate the Lincoln Fire Rescue and revise their budgets accordingly.

Physical Asset Risks

The results of the risk ratings showed that eight physical risks were identified and rated. One risk out of the eight was rated as a low risk while the others were rated as medium. The risk that rated low do not require any monitoring or mitigation actions and can be accepted by the Town. The risks rated as medium related to the potential of the Town failing keep assets in appropriate condition or having under-designed assets. The Town is mitigating this by having forecasting and appropriate budgeting in place.

Hazard & Environmental Risks

The results of the risk ratings showed that 11 hazard and environmental risks were identified and rated. Out of the 11 risks, 8 risks were rated as high, 1 risk was rated as medium, and the remaining 2 risks were rated as low. The medium rated risk related to the potential of funds being diverted to managing emergency events and this adversely affecting maintenance budgets.

The high-scoring risks related to the potential for extreme heat waves, high winds, precipitation, ice storms, snowfalls and flooding events generating increased pressure on the service and causing traffic delays resulting in slower response time. As a mitigation for both medium risks and high risks, the Town has protocols in place to activate Lincoln Fire Rescue from neighbouring authorities to assist with service delivery in an extreme weather or other emergency event. There are however, two remaining high-risk events that require mitigation planning. These are related to flooding and extreme snowfall.

Mitigation

Figure 5 below shows the number of risks in each category after mitigation measures.

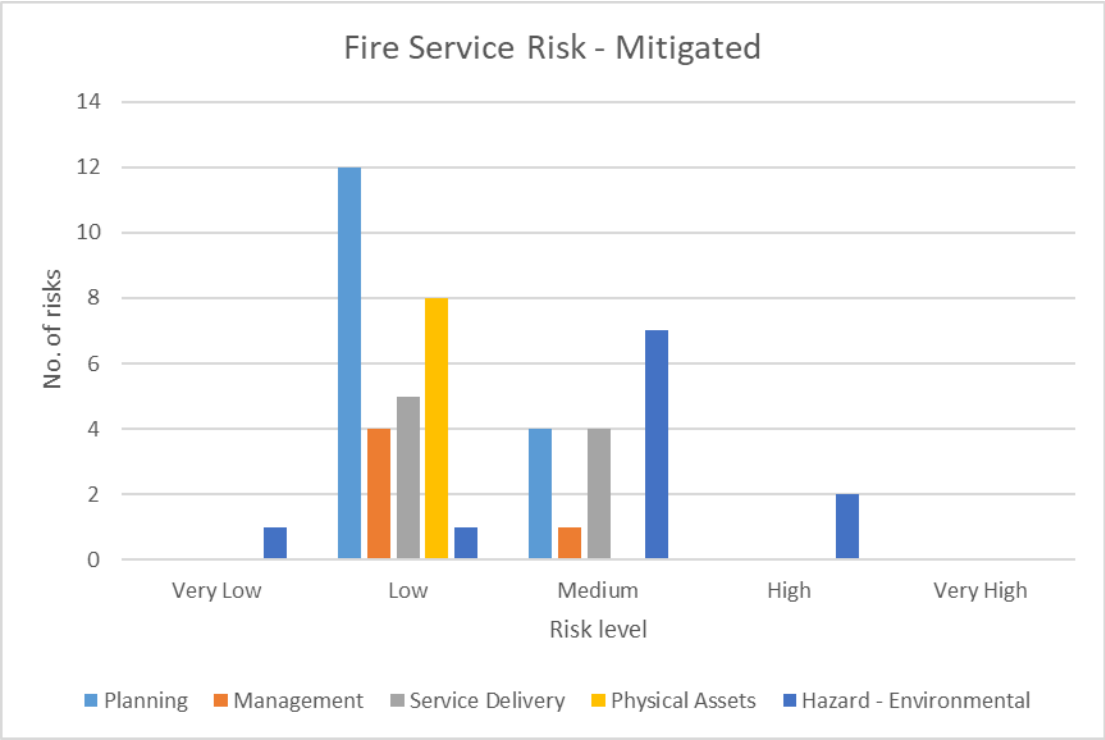


Figure 5: Mitigated service-level risk - Lincoln Fire Rescue

3.3.4 ASSET LEVEL RISKS

The results of **asset level risk** assessments are considered when reviewing lifecycle strategies to determine the most appropriate treatments, preventative maintenance, and inspection frequencies for a particular asset or group of assets. Both asset level risk and service risks are considered in prioritizing capital works projects and other funding decisions.

Asset level risks are calculated by multiplying the consequence of failure for each asset with the likelihood of that asset failing. For an initial assessment, the likelihood and consequence of failure for the assets are a 1-5 rating based on:

- Likelihood of failure: the 1-5 age-based condition rating or 1-5 measured condition state that is based on physical condition assessments (see Table 2).
- Consequence of failure: the 1-5 criticality rating for each asset (see criticality ratings in section 3.3.5).

The results from the asset level risk ratings are shown in Figure 6

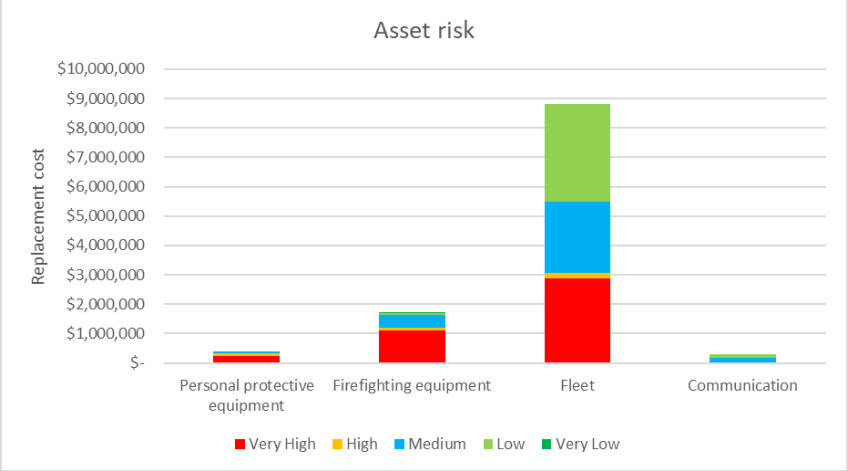


Figure 6: Asset risk

The asset risk results indicate that there are high risk assets in the firefighting equipment, personal protective equipment, and fleet assets. Almost all Lincoln Fire Rescue assets have the same criticality rating of very high (see ratings in section 3.3.5), so the high risk rating typically reflects assets that are nearing the end of their expected useful life and therefore have a higher likelihood of failure than other Lincoln Fire Rescue assets.

Mitigation

The assets at high risk are mitigated through a replacement program driven by regulation. However, highly critical assets that are in the last 1-3 years of their expected lifespan will always show as being high risk, even with the mitigation of the replacement program. This is appropriate as it promotes awareness and active management of those assets to prevent unexpected failure in those last few years before replacement.

3.3.5 ASSET CRITICALITY

The criticality of the asset or component of an asset is defined by its effect on the operation of an asset system if the asset failed. The assets in the scope of this asset management plan have been rated for criticality using the criteria in Table 13.

Table 13: Criticality criteria

Asset Type	Asset Criteria	Criticality Rating
Nozzle	Station P642	2 – Low
	All other stations	5 – Very high
Jaws of life	All	5 – Very high
Thermal imagers	Spare	1 – Very low
	All other thermal imagers	5 – Very high
SCBA (mask, cylinder, regulators)	All	5 – Very high

Asset Type	Asset Criteria	Criticality Rating
Communication (radios)	All	5 – Very high
Hose	All	5 – Very high
Personal protective equipment	All	5 – Very high
Fleet	All	5 – Very high

3.3.6 RISK IMPROVEMENT PRIORITIES

Table 14 shows the improvements priority related to risk.

Table 14: Risk improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
9	3.3	Risk	Add an attribute in the inventory to capture if an asset is a spare	Low
10	3.3	Risk	Consider an advanced risk framework that builds on the basic risk rating to consider other aspects of consequence in addition to service delivery and analyses failure likelihood in more detail including failure on functionality and capacity as well as physical failure, to derive a more detailed risk analysis	Low

3.4 RESOURCE NEEDS

This section compares available resource demand versus capacity and identifies whether there is enough capacity for the existing staff to take on new tasks or if additional resources are required.

3.4.1 EXISTING CAPACITY AND NEEDS

The first step in identifying resource needs is to understand the current available hours for all staff and volunteers and what tasks are currently completed as part of the Lincoln Fire Rescue. For reporting purposes, the activities are grouped into the following categories:

- Administration
- Operations
- Asset Management
- Contract Management
- Capital Projects

Table 15 shows the number of available hours for full-time employees and volunteer staff.

Table 15: Available hours for staff categories

Staff Type	Fire Chief	Deputy Fire Chief	Emergency Manager	Fire Prevention Officer	Firefighters (Volunteer)	Training Officer	Officers (Volunteer)
No. of Staff	1	1	1	2	92	1	26
Available Hours	1610	1610	800	3360	27324	500	7696

The next step is to record the hours spent for each of the activities that support the current levels of service in each category over a year

3.4.2 COMPARING RESOURCE NEEDS AND CAPACITY

A comparison was made between required resources to deliver the level of service and current resource availability.

The resource demand shown in Figure 7 indicates that resources for fire prevention and part time training officer are very close to requirements for current service levels. However, the other activities required to deliver service levels that are assigned to the Fire Chief, Deputy Chief, and Emergency Manager cannot be completed within the available hours (current capacity). There are several options that could be investigated to resolve this gap including;

- Reassess activities and reduce resource demand wherever possible
- Obtain additional resources and reassign activities
- Outsource some activities under contract
- Share activities with neighbouring authorities or agencies
- Reduce service level (usually this is not desired, and reduction is limited under legislation)

The Town is currently piloting a project to share fire services with Grimsby and a Fire Safety Master Plan will be developed that could address some or all of the estimated resource gap.

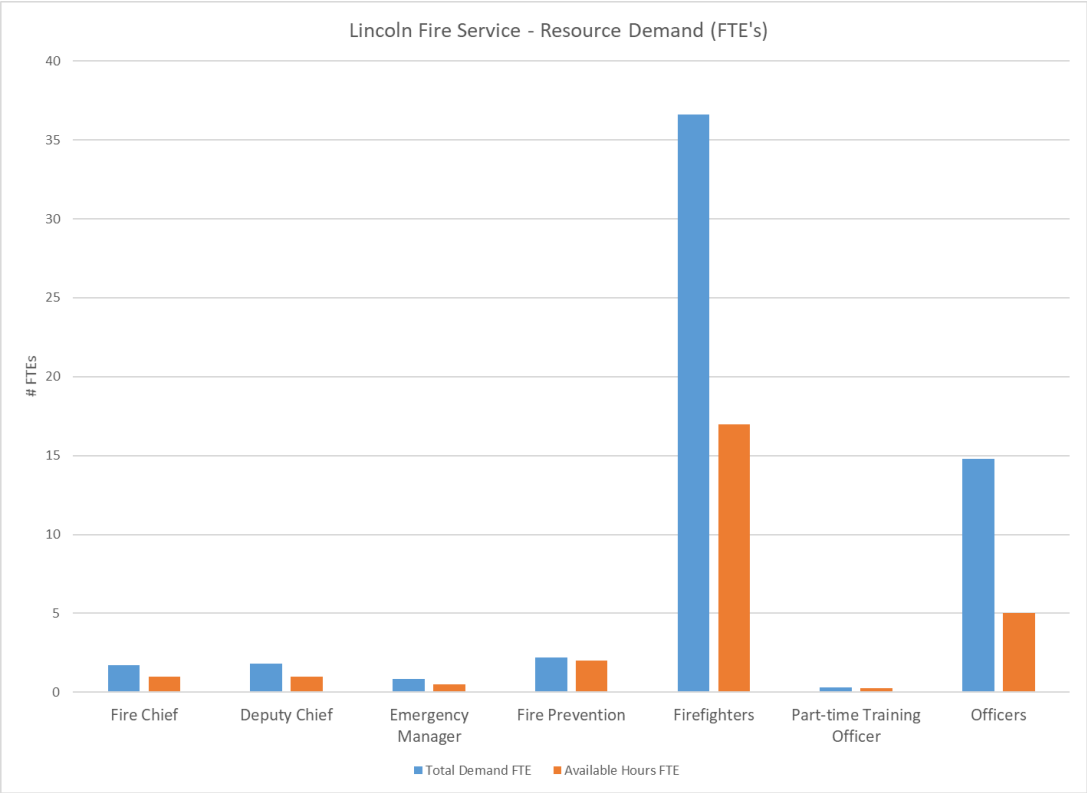


Figure 7: Resource demand compared to availability

Figure 8 shows the demand detail for each activity type. The majority of the resourcing needs is for operations (85%).

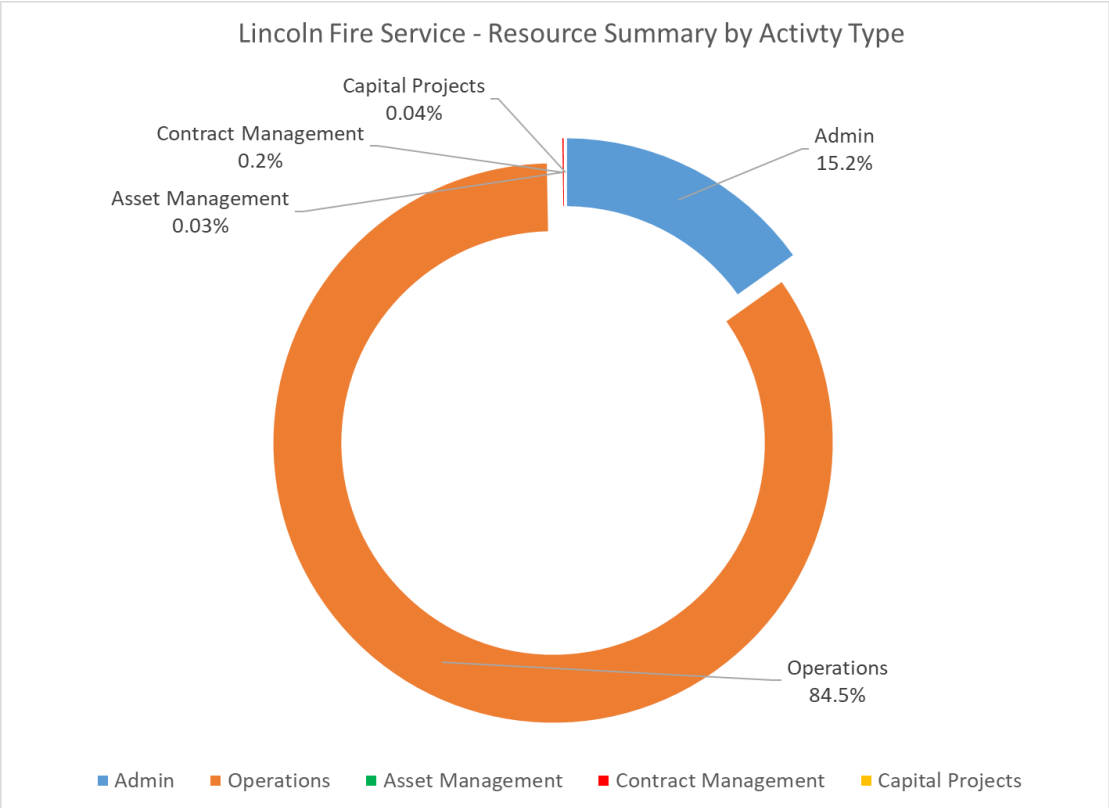


Figure 8: Summary of needs by activity type

3.4.3 RESOURCE IMPROVEMENT PRIORITIES

Table 16 shows the improvement priority related to resources.

Table 16: Resource improvement priorities

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
11	3.4	Resources	Compare the estimated hours allocation against actual recorded hours from recent years to confirm if the Fire Chief, Deputy Fire Chief and the volunteers are under-staff.	High
12	3.4	Resources	Add related task to the newly appointed Fire Coordinator and compare with available hours.	High

4 FUTURE READY

4.1 DEMAND MANAGEMENT

Drivers affecting demand include items such as population change, regulations, changes in demographics, climate change, and increase in commercial or industrial developments.

The main demands for new fire services are created by population growth and development. Growth is a critical infrastructure demand driver for most infrastructure services. As such, the Town must not only account for the lifecycle cost for its existing asset portfolio, but those of any anticipated and forecasted capital projects associated with increases in population and demographic changes. Figure 9 shows that there are currently 2 demand drivers that could pose a high impact on the Lincoln Fire Rescue. The high demand risks relate to aging population and increase in population. A new firehall is currently being designed to address the forecasted change in demand. Additionally, the Town is piloting a project to share fire services with Grimsby and a Fire Safety Master Plan will be developed. When this high-risk demand is mitigated, there are no other high demand impacts identified at this time.

However, Lincoln is one of the fastest growing municipalities in Niagara. During the 25 years between 1986 and 2011 the population of the Town increased by about 8,100 people or at an annual rate of 1.4%. Currently, the Town of Lincoln has a population of ~25,000 and is expected to grow by 50% by 2031. Therefore, the impact of population increase on service demand will continue to require monitoring for the foreseeable future.

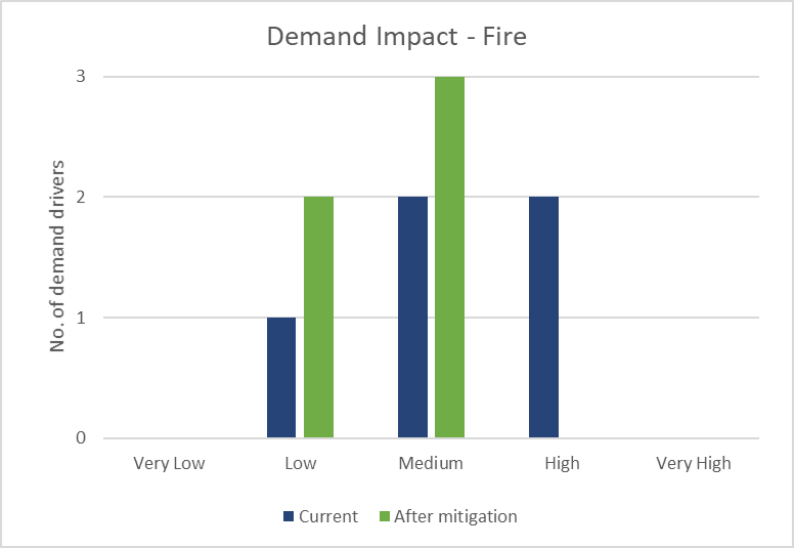


Figure 9: Mitigated demand impact

4.1.1 DEMAND MANAGEMENT IMPROVEMENT PRIORITIES

Table 17 shows the improvement priority related to resources.

Table 17: Demand improvement priorities

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
13	4.1	Demand management	Revise the demand risk as mitigation measures are implemented and at least annually to update for changes in demand drivers.	Low

4.2 RESILIENCY AND ADAPTATION

The resilience of our critical infrastructure is vital to our customers and the services we provide. To adapt to changing conditions and grow over time we need to understand our capacity to respond to possible disruptions and be positioned to absorb disturbance and act effectively in a crisis to ensure continuity of service. Resilience is built on aspects such as response and recovery planning, financial capacity and crisis leadership.

GROWTH:

Asset management planning must consider potential future impacts on the services being delivered. Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices can include non-asset solutions, insuring against risks and managing failures.

CLIMATE CHANGE:

The Town has completed a Corporate Climate Adaptation Plan (CCAP) as a guideline to support and inform climate adaptation at the Corporate municipal level. It outlines how the municipality will adapt its assets, operations, and services to the current and future impacts of climate change.

The development of a CCAP for the Town of Lincoln is supported by the 2016 Asset Management Plan which states, ***"infrastructure is inextricably linked to the economic, social and environmental advancement of a community"*** and that ***"broader environmental and weather patterns have a direct impact on the reliability of critical infrastructure services".***

The Town's 2014 Official Plan also affirms, ***"reviewing opportunities for reducing the impact of climate change, meeting the challenges of climate change and other environmental issues through integrated solutions, and incorporating low impact design and other site design strategies to mitigate environmental impacts".***

The development of a CCAP is also driven and supported by the 2017 Growth Plan for the Greater Golden Horseshoe, of which a guiding principle is to ***"integrate climate change considerations into planning and managing growth such as planning for more resilient communities and infrastructure – that are adaptive to the impacts of a changing climate".***

Climate projections in the CCAP for the Town of Lincoln are based on RCP 8.5 climate models from www.climatedata.ca which is a collaboration between:

- Environment and Climate Change Canada
- Computer Research Institute of Montréal
- Ouranos
- Pacific Climate Impacts Consortium
- Prairie Climate Centre, and
- Habitat Seven.

Table 18 sets out the historical average and the 2050 and 2100 projections for temperatures and precipitation.

Table 18: Historical weather averages and projections

Variable	Sub-Variable	Average (1976-2005)	2050 Projection	2100 Projection	Trend
Temperature	Hottest day °C	33	37	40	↑
	Mean Temp °C	9	12	15	↑
	Min. Temp °C	4	7	11	↑
	Max. Temp °C	13	16	19	↑
	Days Over 30 °C	11	47	91	↑
	Coldest Day °C	-20	-13	-8	↑
	Days Below -15°C	8	0	0	↓
	Days Below -25°C	0	0	0	↓
	Frost Days	124	85	46	↓
	Cooling Degree Days	328	670	1200	↑
	Growing Degree Days 10°C	1390	1996	2725	↑
	Growing Degree Days 5°C	2390	3096	3977	↑
	Cumulative Degree Days >0 °C	3657	4440	5526	↑
	Heating Degree Days	3402	2669	2011	↓
	Ice Days (below 0°C)	48	24	6	↓
	Tropical Nights >18°C	26	61	106	↑
	Tropical Nights >20°C	10	39	84	↑
	Tropical Nights >22°C	2	18	60	↑
Precipitation	Total Precipitation	864	1016	955	↑
	Max 1 Day Total mm	39	39	38	↓
	Wet Days >10mm	26	33	32	↑
	Wet Days >20mm	6	9	9	↑

The overall risk and vulnerability of the Town to 15 projected impacts (see Figure 10) were assessed to determine the priority of each and if action to address an impact should be taken. As a result, the following climatic threats were identified as top priority for the Town of Lincoln:

- Increased variability in temperature and precipitation
- More frequent and/or severe freezing rain events
- More frequent and/or severe extreme weather events
- More heavy rainfalls
- More frequent and/or severe drought events
- More days above 30C
- Increased annual temperatures
- More growing degree days
- More cooling degree days

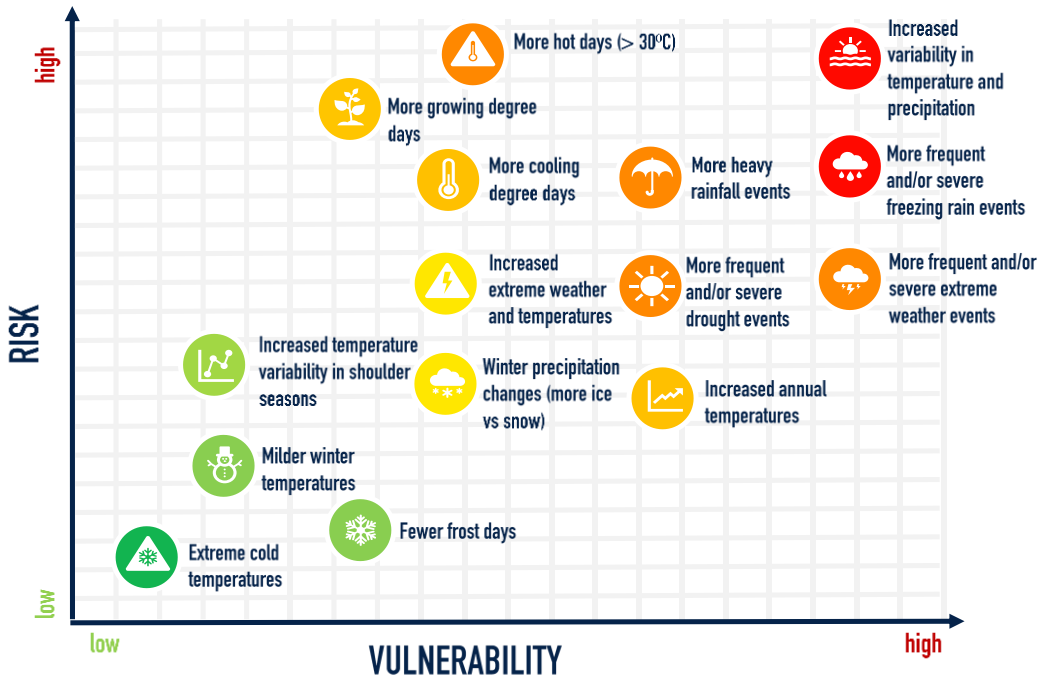


Figure 10: Risk and vulnerability

GROWTH:

In order to manage growth, the Town can investment more into service areas and/or reduce the need for investment by considering the following strategies:

- **Extending service lives of assets through better maintenance** – Targeted preventative maintenance, and operational practices that preserve the asset can extend an assets lifespan and reduce long term costs.
- **Earlier interventions with lower lifecycles costs** – Early, low cost interventions in an asset lifecycle may lengthen service lives. Failing to do early interventions (where they are appropriate, practical, and cost effective), and replacing assets only when they fail is generally more expensive.
- **Accept reduced service levels** – Lower levels of quality, availability, consistency, and/or reliability of service or less consistency of service may be acceptable in order to lower operational and capital costs.
- **Fewer services** – Eliminating non-essential services saves on operating and capital costs.
- **Alternative revenues** – Alternatives to tax increases may include development cost charges or user fees as examples.

CLIMATE:

The Town of Lincoln is committed to providing its community with an equitable, sustainable, and prosperous quality of life. In order to adapt, manage, and reduce the impacts of climate change, the Town has committed to 47 actions that the municipality will undertake to adapt to climate change. Adapting assets and the asset management process to anticipated climate change are included in the following goals:

Goal 1: Integrate climate change considerations into Town strategies, plans, policies, procedures, operations, & services

Goal 2: Increase resiliency & adaptive capacity within economic development, community services, parks, & recreation

Goal 3: Protect natural resources, promote ecosystem services, & minimize environmental degradation

Goal 4: Mitigate harmful consequences of extreme weather & emergency events

Goal 7: Consider climate change impacts in built infrastructure & asset management

Goal 8: Increase climate change literacy among staff & public

The trends from climate change that have been identified by Lincoln include rising lake levels and more frequent and prolonged high intensity storms. The main issue resulting from these trends will be potential road closure caused by flooding and increased erosion that could cause a delay in emergency response.

4.2.1 RESILIENCY AND ADAPTATION IMPROVEMENT PRIORITIES

Table 19 shows the improvement priority related to resiliency and adaptation.

Table 19: Resiliency and adaptation improvement priorities

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
14	4.2	Resiliency and adaptation	Review climate change forecasts regularly and modify adaptation plan if appropriate	Low

4.3 SUSTAINABILITY

For this inaugural asset management plan, Lincoln Fire Rescue is using the Service Sustainability Assessment Tool (SSAT) which was prepared by Asset Management BC (AMBC). This tool highlights where the service sustainability may be threatened and provides feedback on performance of business practices that contribute to service sustainability.

Service sustainability requires balancing service delivery with good governance and strong finances. Many communities have a strong understanding of service delivery itself, that is, how services are delivered, in what quantity, to whom, and where. In fact, much of the work of local government is in the delivery of services. Good governance provides consistent and transparent decision-making that takes a long-term view. Strong finances are key to being able to deliver a service affordably over time.

By assessing the three components of sustainable service delivery together, the SSAT provides clear feedback on strengths and gaps in each component.

4.3.1 ASSESSMENT AND CURRENT PERFORMANCE

Lincoln Fire Rescue completed the Service Sustainability assessment by rating statements that correspond to the current situation of the Lincoln Fire Rescue and to their level of future preparedness.

4.3.2 CURRENT PERFORMANCE

The results of the SSAT assessment show that the current level of sustainability of Lincoln Fire Rescue is 76% and that it's preparedness for the future is 83%.

		CURRENT PERFORMANCE	PREPAREDNESS FOR THE FUTURE	OVERALL SUSTAINABILITY
	Fire Protection	**76%**	**83%**	

The current performance is based on the following key themes:

- Training is up-to-date, equipment is well maintained, and stations are appropriately distributed
- Water supply is reliable
- Proactive approach to fire prevention is performed in the community
- The emergency communication system is reliable
- There is sufficient revenue and reserves to fund capital projects
- There is citizen engagement for major infrastructure projects with very few complaints

The preparedness for the future is based on the following key themes:

- There is a recruitment and retention strategy in place
- The Town follows a formal preventative maintenance program
- Comprehensive long-term financial plan based on up to date information
- Policies are in place to guide decision making

4.3.3 SUSTAINABILITY IMPROVEMENT PRIORITIES

Table 20 shows the improvement priority related to resiliency and adaptation.

Table 20: Sustainability improvement priorities

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
15	4.3	Sustainability	Lincoln Fire Rescue staff to annually re-assess service against AMBC Sustainable Service Assessment Tool (SSAT)	Medium

5 FINANCIAL SUMMARY

5.1 CONTEXT FOR INFORMATION IN THIS SECTION

This section provides an overview of the costs to provide the Lincoln Fire Rescue including the operations and maintenance forecasts, and the capital renewal and new asset forecasts. The information is based on the 2021-2030 Capital budget and the 2021 Operations Budget and includes current assets and future expansion assets.

5.2 FINANCIAL FORECASTS

5.2.1 FINANCIAL FORECAST – NEEDS-BASED BUDGET (CAPITAL PLAN)

The capital needs shown in Figure 11 for the Lincoln Fire Rescue have been forecasted over the next 10 years and includes replacement of equipment and vehicles, the acquisition of new assets and studies that align with strategic priorities in Fire Master Plan and the Development Charge Study.

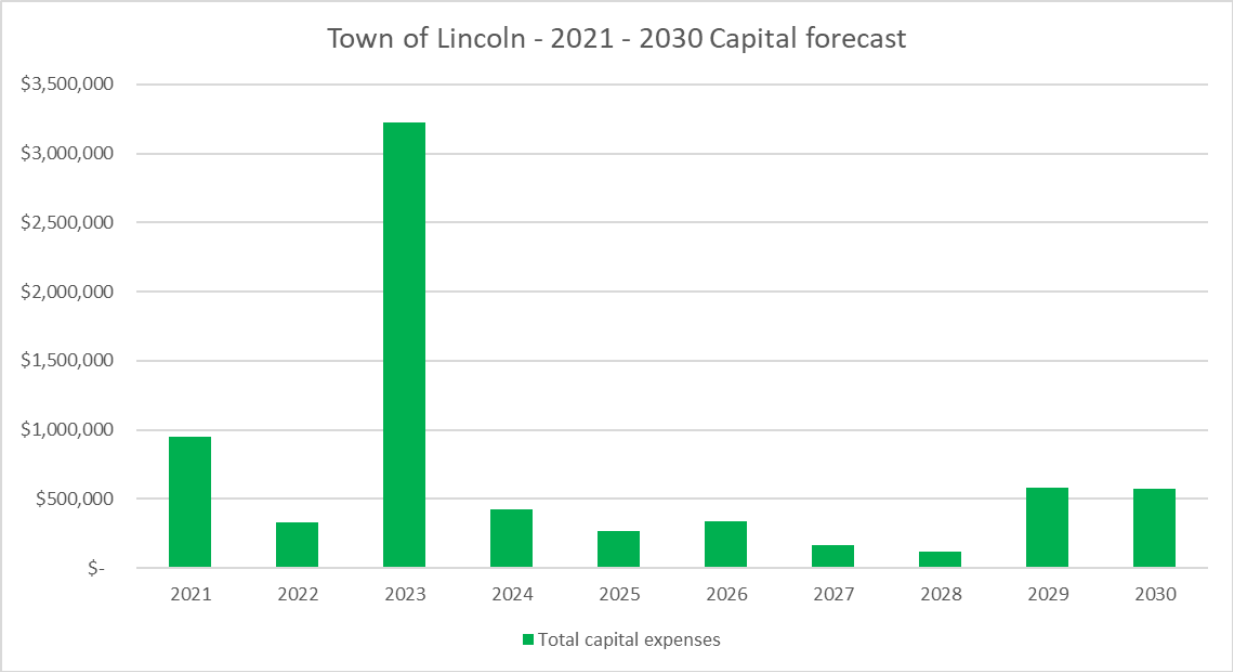


Figure 11: Lincoln Fire Rescue 10-year capital budget

The budget for the 10-year capital forecast period is $7 million. Figure 12 show the percentage of the budget allocated by category. The majority of capital projects are allocated for the replacement or new fleet acquisition.

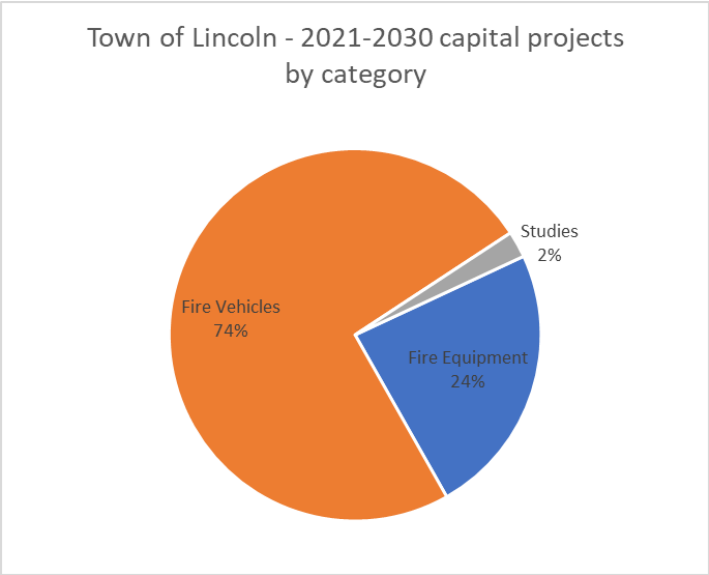


Figure 12: Distribution of capital projects for the 2021-2030 period

5.2.2 OPERATIONS AND MAINTENANCE

The operations forecast in Figure 13 shows the proposed funding allocated for operations and maintenance activities to be completed on Lincoln Fire Rescue assets over the next 10 years. The value for 2021 and 2022 are forecasted by the Town and the remaining years have been estimated using an escalation factor of 3% per annum to account for growth.

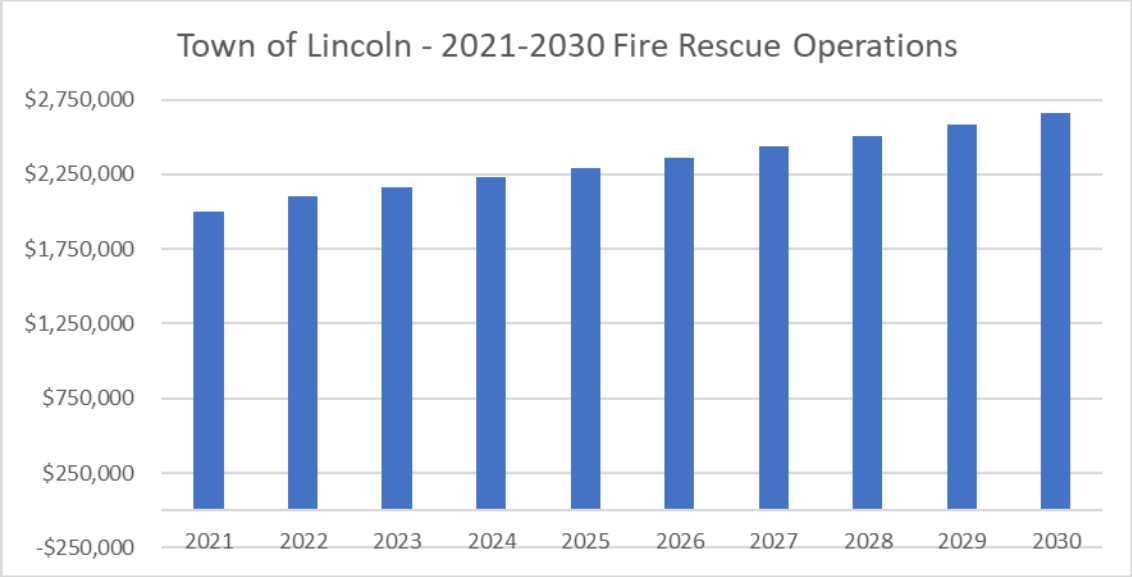


Figure 13: 10-year operations and maintenance budget – Fire Rescue

5.2.3 FINANCIAL FORECAST (STATE OF INFRASTRUCTURE)

Figure 14 shows the capital renewal forecast over the next 10 years informed by the state of infrastructure analysis which is based on actual asset condition ratings or an age-based condition rating as described in Table 3 in the state of infrastructure section of this plan.

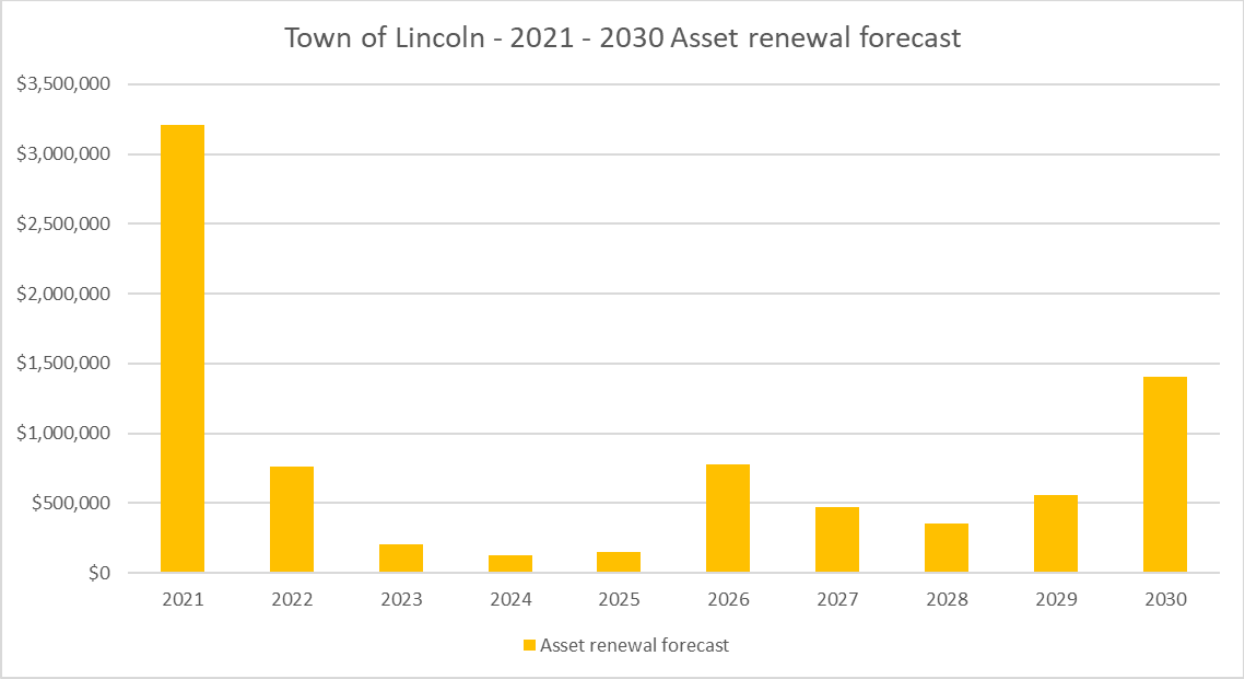


Figure 14: Fire rescue 10-year condition/age based renewal forecast

The costs of the capital renewals over the next 10-year period equate to $8 million. Most of the renewals being forecast to occur in 2021 and reflect mainly fleet that are at the end of their useful life.

Figure 15 shows a comparison between the renewals and rehabilitation projects in the 2021-2030 Capital budget and the State of Infrastructure renewal forecast.

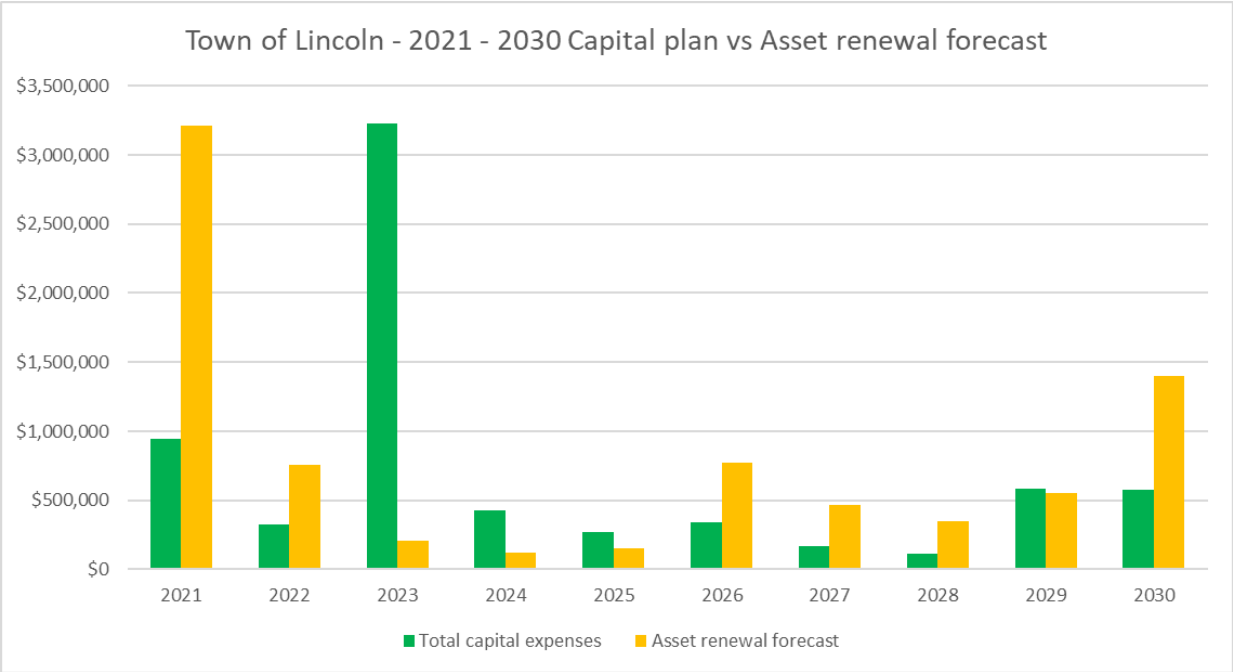


Figure 15: 10-year capital budget and condition/age-based renewal forecast comparison

The renewal forecast and capital plan are similar, with the exception of year 2021 and 2023. While the condition-based forecasts recommends renewals in 2021, the Town will actually replace those assets in 2023.

5.2.4 REVENUES FORECAST

The 2021 – 2030 capital budget in Figure 16 shows the anticipated funding sources for the capital projects for Lincoln Fire Rescue over the next 10 years.

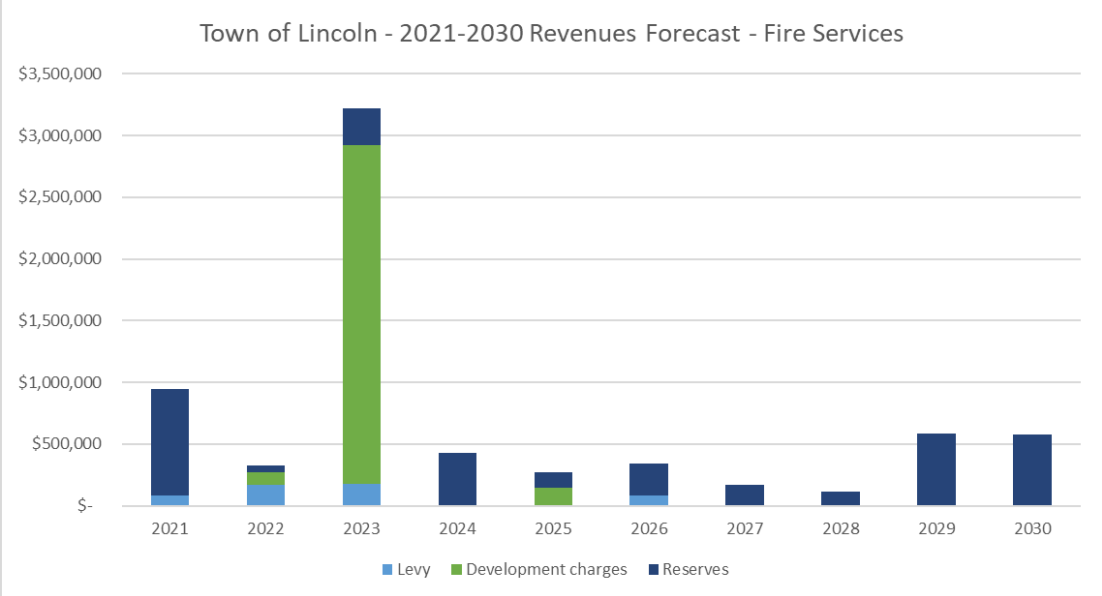


Figure 16: Lincoln Fire Rescue – 10-year capital budget revenues

The funding sources for capital projects are shown in Figure 17. It is anticipated that the majority of capital projects will be funded through reserves.

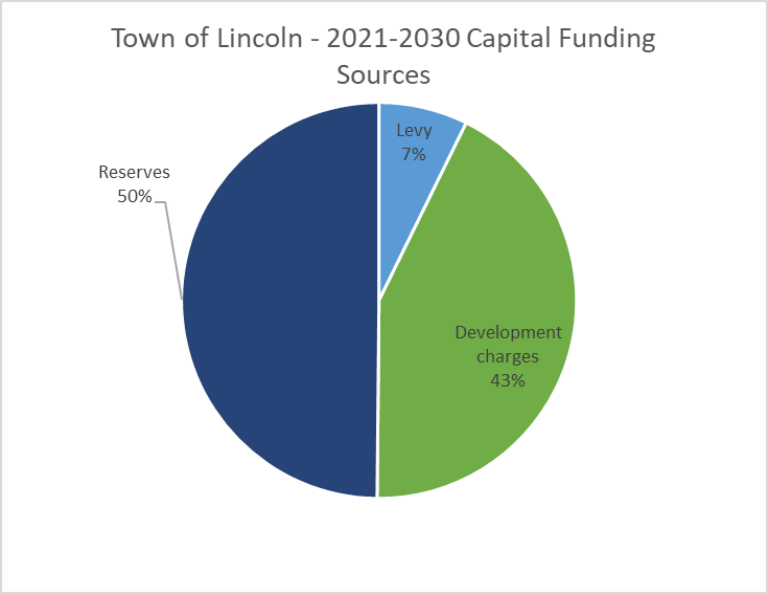


Figure 17: 10-year capital budget funding source

5.3 FUNDING STRATEGY

Figure 18 shows the expected capital expenses compared with the expected revenues. It is anticipated that the revenues will be sufficient to cover the capital projects however it is important to note that budgets are defined annually and are shared between services.

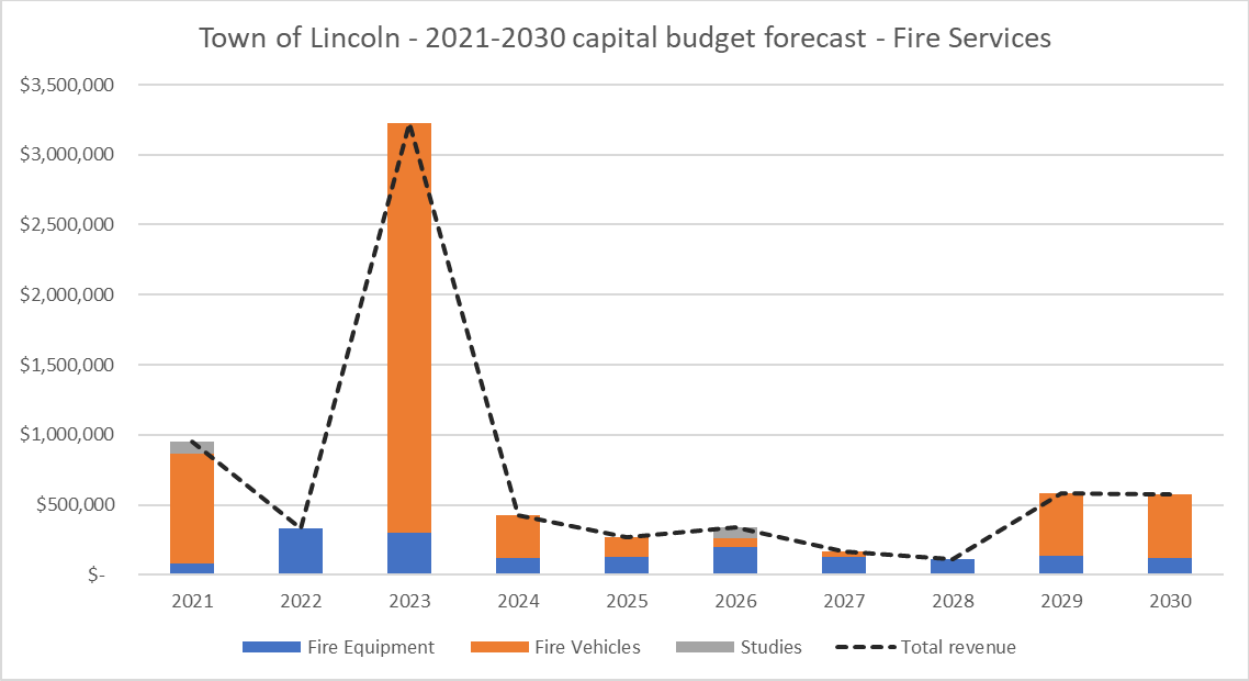


Figure 18: Comparison of revenues with capital expenses

5.4 FINANCIAL IMPROVEMENT PRIORITIES

Table 21 shows the improvement priority related to financial strategy.

Table 21: Financial improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
16	5	Finance	Develop a structured process for long-term budgeting decisions to be made considering costs of service delivery and meeting levels of service.	High
17	5	Finance	Develop a process to track and separate operations, preventative and reactive maintenance, and inspections costs.	Medium
18	5	Finance	Develop a process to track and separate capital renewals and rehabilitation costs from capital upgrades, improvements, and new assets.	Medium
19	5	Finance	Review unit rates at a minimum for each new iteration of the asset management plan and update replacement costs as appropriate	High

6 CONTINUOUS IMPROVEMENT

6.1 ASSET MANAGEMENT MATURITY ASSESSMENT

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, an assessment of the Lincoln Fire Rescue's asset management practices was completed. The results are scored from 0 to 4 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved. Figure 19 provides a radar chart completed in 2020 that shows the maturity scores of Lincoln Fire Rescue.

Figure 19: Maturity assessment - Lincoln Fire Rescue 2020

6.1.1 ASSET MANAGEMENT MATURITY IMPROVEMENT PRIORITIES

Improvements were identified following the assessment, some of which have been addressed in this asset management plan. Table 23 lists the improvements that were identified during the assessment in addition to the improvements identified in this asset management plan and that haven't been completed as of yet.

Table 22: Asset management maturity improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
20	6.1	Asset management maturity – governance	Identify the primary objectives of asset management for the Town and key goals (with measurable targets) that will help the Town achieve those objectives.	Medium
21	6.1	Asset management maturity – Procedures and decisions	Identify key decision processes that should have some controls or documentation to ensure they consider all relevant information, involve all the right people, and the decision made in a consistent way that can be explained.	Medium

6.2 IMPROVEMENT ACTIONS

Table 23 lists all improvement tasks collated from each section of the asset management plan and from the results of the Maturity Assessment. The Lincoln Fire Rescue team will continue to review and update this improvement plan as tasks are completed or as priorities change over time or as additional needs arise.

Table 23: Asset management plan improvement tasks

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
1	2	Asset Data	Address duplicate asset identifiers by either assigning a different asset identifier if the duplicate entries are in fact different asset or by removing the duplicate if they are the same asset	High
2	2	Asset Data	Retain asset attributes for assets that are out of service. This information can be used once sufficient historical data is accumulated to gain a better understanding of performance trends, in particular for assets where the timing for replacement is not regulated.	Medium
3	2	Asset Data	The Town have completed an assessment of their asset data across all service areas and developed a data management plan that contains recommendations including:	High

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
			• Developing a data standard and data hierarchy to ensure consistency • Develop a plan to populate missing asset attribute data • Develop roles and assign responsibility of the management of data • Adopt a database software to host data and have a single source of truth	
4	3.1	Levels of service	Collect and collate a minimum of one year of data for each performance measure that has been identified in Table 6.	High
5	3.1	Levels of service	Set targets for each performance measure based on measured results or regulatory requirements as appropriate	High
6	3.1	Levels of service	Review levels of service and update as appropriate at a minimum when the asset management plan is updated	Medium
7	3.2	Lifecycle strategies	Update the lifecycle strategies with any new strategies identified as asset change or technology improves	High
8	3.2	Lifecycle strategies	Develop lifecycle strategies for any new assets that become part of the Lincoln Fire Rescue.	High
9	3.3	Risk	Add an attribute in the inventory to capture if an asset is a spare	Low
10	3.3	Risk	Consider an advanced risk framework that builds on the basic risk rating to consider other aspects of consequence in addition to service delivery and analyses failure likelihood in more detail including failure on functionality and capacity as well as physical failure, to derive a more detailed risk analysis	Low
11	3.4	Resources	Compare the estimated hours allocation against actual recorded hours from recent years to confirm if the Fire Chief, Deputy Fire Chief and the volunteers are under-staff.	High
12	3.4	Resources	Add related task to the newly appointed Fire Coordinator and compare with available hours.	High
13	4.1	Demand management	Revise the demand risk as mitigation measures are implemented and at least annually to update for changes in demand drivers.	Low
14	4.2	Resiliency and adaptation	Review climate change forecasts regularly and modify adaptation plan if appropriate	Low

Task Ref	AMP Section	AM Practice Area	Task Description	Task Priority
15	4.3	Sustainability	Lincoln Fire Rescue staff to annually re-assess service against AMBC Sustainable Service Assessment Tool (SSAT)	Medium
16	5	Finance	Develop a process to long-term budgeting decisions to be made that consider costs of service delivery and meeting levels of service.	High
17	5	Finance	Develop a process to track and separate operations, preventative and reactive maintenance, and inspections costs.	Medium
18	5	Finance	Develop a process to track and separate capital renewals and rehabilitation costs from capital upgrades, improvements, and new assets.	Medium
19	5	Finance	Review unit rates at a minimum for each new iteration of the asset management plan and update replacement costs as appropriate	High
20	6	Asset management maturity – governance	Identify the primary objectives of asset management for the Town and key goals (with measurable targets) that will help the Town achieve those objectives.	Medium
21	6	Asset management maturity – Procedures and decisions	Identify key decision processes that should have some controls or documentation to ensure they consider all relevant information, involve all the right people, and the decision made in a consistent way that can be explained.	Medium

6.3 IMPLEMENTATION PLAN

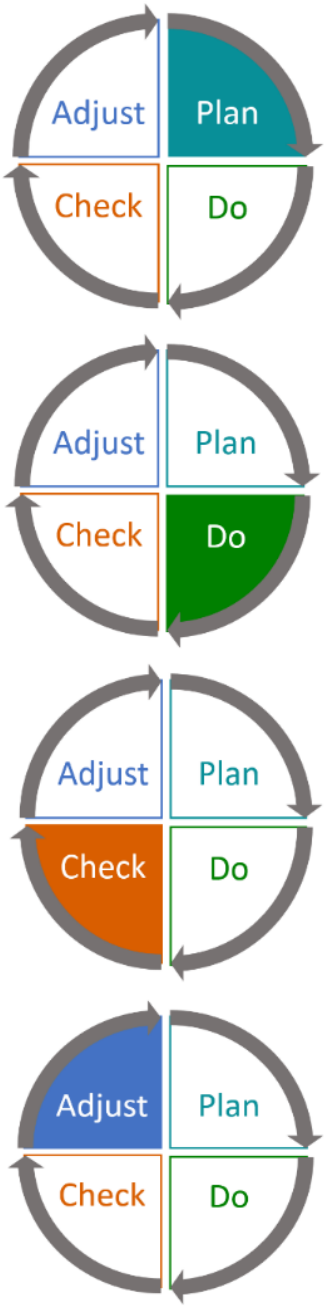
In addition to documenting current state and business practices for the management of Lincoln Fire Rescue, the asset management plan provides recommended improvement tasks as described in section 6.2. These improvement tasks will:

- increase the level of understanding of the assets and services provided;
- improve the accuracy of financial forecasts and risk assessments; and
- provide decision-makers with accurate and complete information in an easy to understand format to assist them with making evidence-based decisions for the best use of available funding and the best interests of the region and its communities.

6.3.1 CONTINUOUS IMPROVEMENT PROCEDURES

The Town will adopt a continuous improvement approach as shown in Figure 20. A continuous improvement approach includes a regular review and adjustment process to keep the asset management plan up to date with the latest information, understanding, and forecasts.

This can also be described as a 'Plan, Do, Check, Adjust,' process (based on the Deming Cycle).



PLAN

- Collate available data and analysis results
- Consider data and analysis results in relation to objectives
- Document outcomes and recommendations
- Update assessment of limitations and assumptions
- Update asset management plan, consult and confirm for implementation

DO

- Schedule, fund, and complete improvement tasks
- Improve asset and cost data
- Monitor, manage, and mitigate risk
- Manage assets and deliver required service
- Measure and record performance

CHECK

- Review performance results
- Analyze asset and cost data
- Re-assess state of infrastructure and risk ratings
- Re-assess state of asset management practice
- Report achievements

ADJUST

- Update improvement tasks and plan
- Adjust lifecycle strategies
- Adjust priorities and targets
- Update forecasts

Figure 20: Continuous Improvement Cycle

This four-step process can be used to generate on-going iterative improvements to the asset management plan and all business processes for the management of the assets and the delivery of the service, and to facilitate responsible adaptation to change. Each phase of the four-step process is described in Figure 20, starting with the implementation or 'Do' phase for this asset management plan as the development of this asset management plan was the first iteration of the ‘Plan’ phase.

The review cycle for implementing and updating the asset management plan should be done annually. However, it may be done every two years where little change has occurred. The timing for the asset management plan update is preferably prior to the annual budget process. This will facilitate consideration of outcomes and inclusion of updated forecasts into the financial planning process.

6.3.1 CHANGE MANAGEMENT STRATEGY AND ACTION PLAN

The Town currently doesn't have a change management strategy and action plan. Several improvements have been identified in the asset management plan, in addition to the data management plan and overall asset management process currently being considered. It is recommended that a formal change management strategy is developed to provide a clear path.

General Change Management Strategy

Relationships

Managing relationships within the Town is crucial for the successful implementation of asset management practices. Helping staff see the path, providing them with the resources they need to succeed, and clear communication will support the Town on its path to creating a cultural shift and ingraining asset management practices into all levels of the organization.

There are several strategies the Town can implement to increase the likelihood of effecting a change successfully. These strategies include:

Establishing a Clear Vision

Developing a clear and concise vision statement for how asset management will impact the organization is the first step toward general agreement on what the organization wants to achieve with the change. The vision will also support communicating the change to staff. Any communication should ultimately align with vision and will help staff to envision how their tasks align and support the organizational goal.

Mapping the Journey

One of the main reasons why implementing a change can fail is because an organization tried to implement too many change initiatives too quickly, and without prioritization. Being over ambitious can harm the process as people may need time to adjust to the change. Providing too many tasks without alignment to an objective can also confuse staff. Identifying areas of focus and mapping out the journey can help the team understand the steps needed to reach the end goal. Reviewing the implementation can provide a sense of how ambitious the Town intends to be in implement changes, what the changes are, which areas of the organization will be affected, and when. A strategy can then be prepared prior to rolling out the change to minimize staff resistance.

Prioritize People and Leverage the Champions

Change is not possible without its people and changing an organization's culture takes time. People have different tolerances for embracing change and by identifying champions for change and empowering them to deliver results can be an effective strategy for change. The Town can identify a sponsor and create an asset management working group which can be open to anyone who is interested in leading the change. Facilitating weekly or monthly meetings to provide updates on quick wins, and schedules can keep momentum. By creating this collective group of passionate people who have bought into the change can increase the Town's likelihood of success.

Anticipate and Manage Resistance to Change

Any change can be disruptive to a person's role, and a person may resist a change for various reasons. Being aware of the reasons why people may resist a change and having a set of prepared response strategies can help to communicate a change in a positive way. For example, some individuals may think that Asset Management practices create unnecessary work that provides little value. A strategy to counteract this claim is to help the individual treat it as a new challenge to be solved. One could also reiterate how the practices will support better decision making. Table 24 includes some sample reasons why people resist change, sample scenarios, as well as strategies to minimize staff resistance.

Table 24: Reasons why people resist change, and strategies to minimize resistance

Reasons People Resist the Change	Anticipated Scenario	Strategy to Minimize the Resistance
Parochial self interest – Individuals are concerned with the implications for themselves	Some individuals may become frustrated because they feel as though the new tasks will create unnecessary work.	It's a new challenge to be solved! Reiterate how the practices will support better decisions.
Misunderstanding due to miscommunication or inadequate information	Asset management can sound like a large undertaking and some may not understand it.	When communicating, keep it simple. Leverage subject matter experts
Low tolerance for change due to a sense of insecurity or lack of patience	People may fear that their jobs are being replaced by technology.	Highlight that it is an opportunity for development.
Different assessment of the situation – disagree over the need for change or the advantages.	May have a different understanding for the level of effort vs the benefit. If they don't understand the benefit, the level of effort may not seem worth the time.	Opportunity to participate and shape the outcome.
Individual challenges with implementing the change	Some field staff do not enjoy working with computers daily and may resist the requirement to input data into a computer or system.	Pairing up a senior person with a data manager will support succession planning while reducing the need for a person being forced to learn new systems.
Loss in momentum	A member may have been on-board, but over time change was not seen and interest and momentum are lost.	Submit an internal anonymous survey that asks question to gauge the level of engagement.

Assess the Town's Change Readiness

A change readiness assessment can be completed to understand how prepared an organization is to undertake a major change. The assessment can consider how an organization manages its assets, and how it adapts to change. An Asset Management change readiness assessment can evaluate the organization's context for change based on the components in Table 25.

Table 25: Sample change readiness assessment categories and components

Category	Component
Employee readiness	• Awareness and perception of change • Support for and commitment to change • Understanding the ability to implement the required skills and behaviours
Organizational context	• Goals and alignment • Leadership Support • Organizational structure and culture • Authority and initiative for decision-making

Category	Component
	• Communication and engagement • Residual of previous change efforts • Resources available for the change

The feedback from this assessment can then inform a change management strategy that can accompany an asset management implementation plan.

Communicate the Change

Before communicating a task to staff members, it is important to be clear on what you need them to do and how they'll succeed. Below are some considerations to help prepare and plan for discussions when implementing a change.

- **Consider who is involved** and why they may resist the change. Communicate what the AM benefits will be.
- **Align the task with the vision** to provide purpose to the change.
- **Does the team have what they need to be successful?** Do they need training, additional resources, or new software and tools?
- **Will their role change?** What do you think some of their fears will be? How can you support them through the change?
- **Be clear about the task** and communicate what is involved, what the proposed change is, why the change is needed, what the major effects will be, and how the process will be managed.

Develop a Change Management Team

Developing and implementing a change management team can support business process improvement initiatives and can help drive cultural transformation, focusing on building agility, accountability, and employee empowerment.

Provide Training to Support Staff

Implementing asset management can feel like a large undertaking to many. Providing training to introduce asset management concepts will allow staff to “speak the same language”. Training staff on what AM can do for them creates a personal connection as they now understand how AM will make their role more effective.

Monitoring

The Town should schedule a recurring monitoring schedule to review progress. It should include metrics on how the organization plans to measure success and review whether the organization is achieving its objectives. A process for receiving staff feedback should be established to determine focus areas for adjustment. Lastly, upon reflecting on the progress to date, the Town should review whether additional support is needed.

6.3.2 PERFORMANCE MEASUREMENT & EVALUATION

Performance Monitoring

To inform and support improvement, it is necessary to monitor current performance, and to review performance outcomes compared to the intended outcomes. Performance Monitoring & Evaluation (PME) is therefore an integral part of implementing robust Asset Management.

Monitoring and evaluating the performance of the assets and services will help to improve the reliability and consistency of service delivery.

The primary objective for performance measurement is not reporting performance; it is managing performance to achieve a specific target.

This section describes the three key performance measurement processes for asset management that will evaluate whether the Fire Rescue Service management team are:

- Completing the asset management improvement tasks;
- Achieving asset management and the maturity targets, and;
- Improving asset data that will support evidence-based decisions.

Reporting Progress on Improvement Tasks

Review, report and revise improvement program

At least annually review and report the percent complete for each improvement task. Compare results to the schedule of work planned for completion in that year. It would also be useful to compare the hours spent on each task and the total expenses for the year compared to budget hours and expenses. This will inform whether each task is on track for completion on time and to budget and identify areas of concern for any tasks that are not on track. However, the ability to do this detailed reporting will depend on whether records are kept of staff time and expenses for work done on each task throughout the year. The minimum requirement is to report annually on the overall percent complete for scheduled improvement tasks.

At least annually the schedule for asset management improvement tasks must be reviewed and revised. Completed tasks should be removed, and new tasks added where necessary. New completion dates should be agreed for tasks that are partially complete. All other tasks in the asset management improvement plan, including tasks that were scheduled for completion during the year but have not been started, should be reassessed for priority and where appropriate assigned new start and completion dates. Any tasks that are no longer required should be removed from the plan.

This annual review and updating of the improvement program should also consider the outcomes of re-assessment of asset management maturity and re-assessment of Asset Data quality.

Reporting progress on asset management maturity

The asset management maturity assessment process is described in section 6.1. To measure improvements of asset management maturity, staff should complete a re-assessment (at least annually) and compare the result from each year to the previous year. Where appropriate add a comparison to the first year of the program.

The step by step instruction for completing a re-assessment of asset management maturity using the assessment tool provided to the Fire Rescue Service team, in included in the “Notes” tab of that assessment tool. Each year a new copy of the analysis spreadsheet can be made so changes are easily tracked over time.

The AM Maturity assessment tool provides several automated infographics and tables for reporting current results and comparing results to previous results and to any future targets if these have been set. The following diagram is an example;

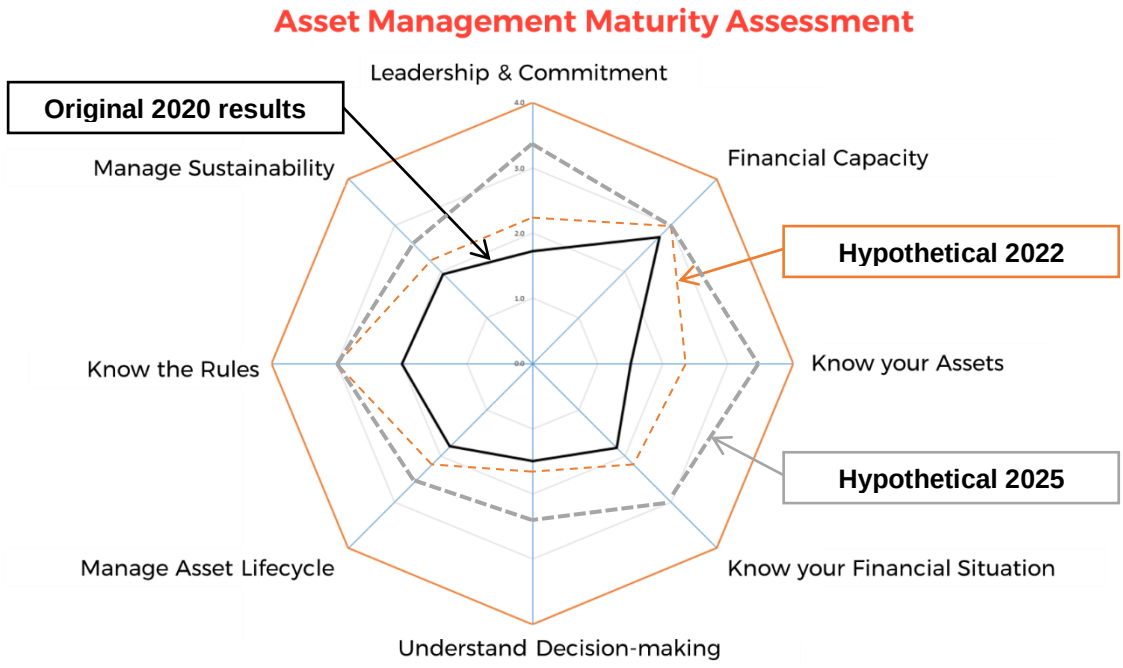


Figure *21*: – Reporting Progress on AM Maturity - Example

The assessment tool provides further detail if required, for the results within each of the categories summarized in the graph above.

The results of the annual asset management maturity re-assessment provide important input to decisions on the continued relevance and the appropriate priority for asset management improvement tasks. Asset management maturity results should therefore be considered in the annual review and revision of the asset management improvement plan.

Reporting on the quality of asset data

The currency and accuracy of asset data is critical to effective asset management, accurate financial forecasts, and informed decision-making. However, even more important than this is knowing what the reliability of the information is. Even data that is not highly accurate can be of benefit to decision-makers provided the accuracy is declared.

The Town has yet to develop a consistent data structure for recording asset information. A data management plan has been developed to support staff in understanding the attributes required to develop asset registers for all asset groups and locations, and understand the significant impact on the accuracy of assessments for when each asset may need replacing and how much it will cost to replace.

As staff build their asset register and collate available asset information, the accuracy of these key attributes can be recorded in the relevant columns for confidence rating. This will facilitate measurement of the asset data quality and reporting on improvements in data quality.

The confidence ratings for asset data are a numerical value between 1 and 5, as appropriate to each asset record and each key attribute. A score of 1 indicates high confidence and 5 indicates low confidence. An example of how this is used would be, if the size of an asset (such as a hose) is known but its material type is not known, and its install date is not certain but has been reasonably assumed from the age of other assets in the station, then its confidence ratings would be 1 for the size attribute, 4 or 5 for material type and a 2 or 3 for install date depending on how compelling the supporting data is.

The general description for each confidence level is;

1. Data is verified as factual (accurate)
2. Data is known with a high level of certainty, but it may not be verified as factual (there is a small possibility of error)
3. Data has been reasonably assumed or determined from other known facts. There is a moderate level of certainty and a moderate possibility for error.
4. Data has been assumed or determined from some indicator, but the opportunity for error (at an asset level) is high.
5. Data is a default value assigned as a temporary measure until better information is available, because at this time, the correct data is not known, nor can it be reasonably assumed from known facts or some indicator.

Annually, an assessment should be made to determine the quantity (and completeness) of recorded asset data and the confidence profile for the recorded information.

The process will include to;

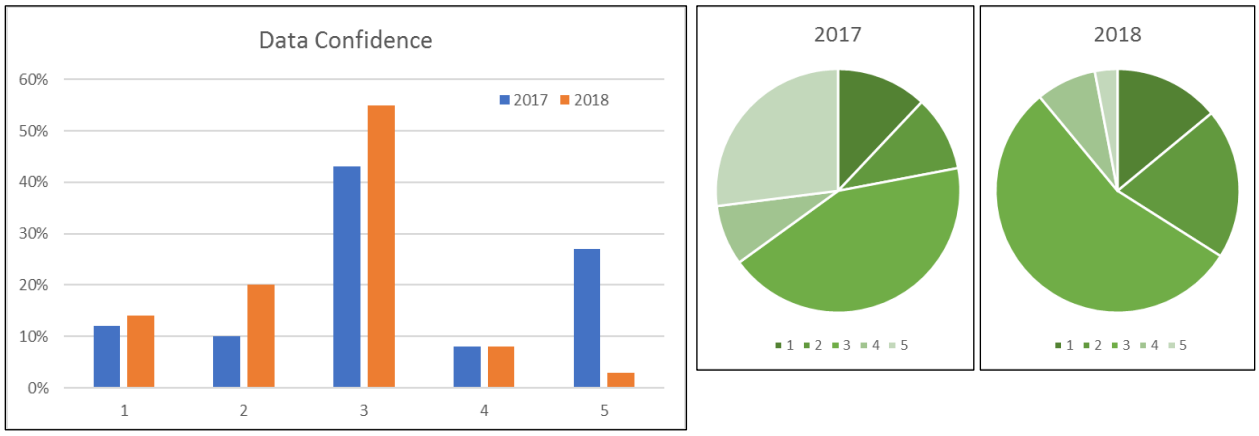
- Report the number of recorded assets
- Calculate the percent (by value) of asset records that have confidence ratings 1 to 5
- Graph results with comparison to the previous year's result

The change in the number of assets recorded in the asset register will advise decision-makers of how complete the asset data is and any analysis results that are based on current asset data.

The change in the confidence ratings for key attributes will advise decision-makers of how accurate the asset data is and therefore, how confident they can be in any analysis results that are based on that asset data.

The following are examples of data quality graphs.

Both examples quantify the change (improvement) in data confidence from one year to the next. The graphs show a reduction in very low confidence records (rating of 5) and an increase in moderate and good confidence records (ratings of 3 and 2).



While staff are building their asset register, and until confidence ratings for key attributes have been recorded in the data register, it is recommended that a high-level data quality assessment is done.

Table *26* describes a set of data confidence grades (class A to class E) that can be used by the Lincoln Fire Rescue management team for classifying data reliability at a high-level. This is different to the 1 to 5 confidence ratings that would be entered against each asset record in the asset register. The 1 to 5 ratings are for asset-level assessments whereas the A to E ratings are for an overall view when detailed data for asset-level assessments is not available.

The data quality assessment using the A to E ratings is a subjective assessment but based on knowledge of the accuracy and completeness of the data set (e.g. it is a judgement call made by a suitably experienced person or team who are very familiar with the dataset).

Table *26*: High-Level Data Confidence Ratings

Data Grade	Data Confidence	Description
A	Highly Reliable	An asset inventory exists and is appropriately structured with asset type and sub-type classifications; the inventory includes key attribute information* for every asset and this information is highly reliable.
B	Reliable	An asset inventory exists and is appropriately structured with asset type and sub-type classifications; the inventory includes reliable information for most key attributes of most assets; where information is missing or unreliable, a reasonable estimate can be made based on known values (i.e. based on values for similar assets connected to or located close to the asset, or an average of known values for assets of the same type etc.).
C	Some Uncertainty	An asset inventory exists but it may not be complete and it may or may not have an appropriate structure with asset type and sub-types, or these may not be fully populated; the inventory has a mixture of reliable and unreliable (or missing) information for key attributes for many assets; replacement costs may be based high-level average values or derived from purchase cost multiplied by an annual default percentage; useful life values may also be based on high-level average values or a default assumption.
D	Very Uncertain	An asset inventory exists but may not be complete and it may or may not have an appropriate structure; most key attribute information is missing or has low reliability; but some known, default, or assumed values do exist for some assets.
E	Unknown	An asset inventory does not exist, or it contains very little data.

* *Key attribute information includes asset type and sub-type classification, install date, relevant size information, material type, and estimated unit cost and useful life values. Table 27 is an example of a high-level data quality report for facilities;*

Table 27: Data Confidence Ratings example

Asset Group	Asset Type	Install Date	Relevant Size	Material	EUL	EUC
Fleet	B	B	D	D	B	D
SCBA	B	B	D	D	B	D
Personal protective equipment	B	B	D	D	B	D

The results for one year can be compared to previous year(s) and the change in data quality can be shown graphically (in the same way as reporting for asset-level data quality).

APPENDIX

A LIFECYCLE STRATEGIES

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Table 28: Fire fleet lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
	-Annual servicing	-Weekly walk around inspection -Inspection as part of Annual Safety	-Cleaning -Check fuel / oil -Tire pressure check	-Repairs as required	
NEW					REPLACE
R & R		-Engine overhaul		-Replace at end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 29: Communications lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
			- batteries charged weekly or after each use	-Repairs as required	
NEW					REPLACE
R & R				-Replace at end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 30: Fire equipment – SCBA masks lifecycle strategies

O MI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	O MI

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	-Annual flow testing	-Monthly inspection and after each use (training or response)		- Sent for repair, if deficiency is found	
NEW					REPLACE
R & R				-Replace at end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 31: Fire equipment – SCBA bottles lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
	-Hydrostatic testing every 5 years	-Weekly inspection and after each use (training or response)		- Sent for repair, if deficiency is found	
NEW					REPLACE
R & R				-Replace at end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 32: Fire equipment - SCBA lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
	-Recharge or air bottles semi-annually or as required	- Checked after each use - Annual inspection by outside agency - hydrostatic testing every 5 years		- Sent for repair, if deficiency is found	
NEW					REPLACE

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R&R				-Replace at end of life	R&R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 33: Fire equipment - nozzles lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
	- Exercise nozzle tip and bale - Visual Inspection	- Weekly inspection or after each use (response & Training)		- Sent for repair, if deficiency is found	
NEW					REPLACE
R&R				-Replace at end of life	R&R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 34: Fire equipment – Thermal imaging cameras lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
	-Visual Inspection - Battery replacement when required	-Weekly inspection and after each use (Training or Response)		- Sent for repair, if deficiency is found	
NEW					REPLACE
R&R				-Replace at end of life	R&R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 35: Fire equipment – Jaws of line lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI

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	- Greasing joints - Visual Inspection	- Weekly inspection or after each use (response & Training)	-cleaned after each use	- Sent for repair, if deficiency is found	
NEW					REPLACE
R & R				-Replace at end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

Table 36: Fire equipment – Fire PPE / Bunker gear lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
		- Monthly inspection form (all PPE) - Annual inspection and cleaning by secondary agency for bunker gear (industry standard) - Informal check after each use	- Wash PPE after use and as required	- Sent to provider for repair and inspection	
NEW					REPLACE
R & R				- If PPE is not repairable, it is replaced - According to NFPA standard, bunker gear and helmets replaced at end of lifespan	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	

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Table 37: Fire equipment – Fire hose lifecycle strategies

OMI	**Preventative maintenance**	**Inspections**	**Operations**	**Reactive maintenance**	OMI
		- Inspected after each use - Bi-annual routine inspections and pressure testing	'-cleaned and hung to dry after use	- Minor repairs if there is a leak at the end	
NEW					REPLACE
R & R				- Replace if damaged or it reaches end of life	R & R
	Early life intervention	**Mid-life rehab**	**Later life rehab**	**End of life**	