
Capital Asset Risk Management Policy

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Section: Capital Asset Management

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Implements: **By-law #5300 – City of Selkirk Capital Asset Management**

OBJECTIVES

SUPPORTING POLICY, PROCEDURES, AND TOOLS

Policy

CAM-001 City of Selkirk Asset Registry Policy

CAM-003 Capital Asset Life-Cycle Management Policy

Procedures

CAM-006-001 Procedure to Update the City of Selkirk Risk Register

CAM-006-002 Procedure to Monitor Service Area Operational Risk from Year to Year

Tools

CAM-001-000-01 City of Selkirk Asset Registry

CAM-006-000-01 City of Selkirk Risk Register

CAM-006-002-01 Annual Capital Asset Risk Report

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1 DEFINITIONS

“Administration” means all management and staff of the City of Selkirk as outlined within the City of Selkirk Organization Chart.

“Arterial Roads” means high capacity urban roads with the primary function being to deliver traffic from residential and collector roads to highways.

“Asset Registry” means the *CAM-001-000-01 City Of Selkirk Asset Registry* document.

“Capital Asset” means a Natural or Engineered Asset deemed material by the City and included in the City’s Asset Registry.

“Chief Administrative Officer” means the Chief Administrative Officer for the City of Selkirk as designated by by-law.

“City” means the City of Selkirk.

“Commercial District” – the area of Manitoba Avenue between PTH 9 and the Gaynor Family Library (806 Manitoba Avenue). This area also includes Morris Avenue, Superior Avenue, Manitoba Avenue, Clandeboye Avenue, Eaton Avenue, and Mclean Avenue between Eveline Street and Main Street.

“Critical Asset” means an asset having the potential to significantly impact service delivery to the standards established in the *Levels of Service Policy*.

“Criticality Score” means the sum of all Critical Asset Characteristic scores, that is equal to a value between 0 and 10. This number shall be accepted as the magnitude of consequence in the risk equation.

“Key Destination” means a destination that has been defined in Section 5 of this policy.

“Service Critical Assets” a select group of unique assets defined for each subclass that have been identified by service experts. These assets have inconsistent characteristics, but the function of the entire service depends on their function.

“Key Community Facility” means a facility that has been defined in Section 6 of this policy.

“Natural Asset” means a naturally occurring land, water, air or subservice feature which performs or supports the delivery of a municipal service.

“Operational Risk” means the risk associated with the reduction or elimination of service delivery due to unexpected asset failures.

2 SCOPE

- 2.1 This policy shall outline what risk is, and how the City of Selkirk defines risk for individual Capital Assets.
- 2.2 This policy shall define what characteristics makes one asset more critical than other assets within the same service area.
- 2.3 This policy shall provide direction on how the City determines asset criticality, risk levels, and manages infrastructure risks.
- 2.4 This policy shall guide Administration on how decisions are made around risk, and how risk levels are incorporated into the decision-making process when prioritizing infrastructure projects.

3 DEFINING RISK

- 3.1 Operational Risk, which is the potential for loss in service delivery, shall be the type of risk being measured by this policy.
- 3.2 Operational Risk is defined by the City of Selkirk as the Likelihood of Asset Failure multiplied by the Magnitude of Failure Consequence.
- 3.3 Each Capital Asset’s Operational Risk shall be determined using the following equation:

$$\text{Operational Risk} = \text{Magnitude of Failure Consequence} \times \text{Likelihood of Asset Failure}$$

- 3.4 An asset’s Criticality Score, as recorded in the *City of Selkirk Risk Registry*, shall be accepted as the Magnitude of Failure Consequence in the Operational Risk equation.

- 3.5** An asset's condition, as recorded in the *City of Selkirk Asset Registry*, shall be accepted as the Likelihood of Asset Failure in the Operational Risk equation.
- 3.6** When identifying Critical Asset Characteristics, the following general risk categories are considered:
- 3.6.1** Social Risk
 - 3.6.2** Environmental Risk
 - 3.6.3** Economic Risk
 - 3.6.4** Human Safety

4 MAGNITUDE OF FAILURE CONSEQUENCE

- 4.1** An asset's Criticality Score shall be determined by the Critical Asset Characteristic Table developed for each subclass.
- 4.2** A Critical Asset Characteristic Table shall be developed by asset subclass. This list shall associate all identified characteristic variations with a score; with higher scores representing more Critical Assets.
- 4.3** Overall Criticality Score for an individual asset shall be determined by summing the score of all Asset Criticality Characteristics.

Equation:

$$\textit{Criticality Score} = \sum_{i=1}^n C_i$$

5 KEY DESTINATIONS

- 5.1 Key Destinations have been identified by Administration and include Selkirk Park, Selkirk Regional Health Centre, Selkirk RCMP Detachment, and Selkirk Golf and Country Club.

6 KEY COMMUNITY FACILITIES

- 6.1 Key Community Facilities have been identified by Administration and include Betel Personal Care Home, Tudor House Personal Care Home, Extencicare Red River Place, Selkirk Regional Health Centre, Selkirk Mental Health, City of Selkirk Fire Hall, and the Selkirk RCMP Detachment.

7 CRITICAL ASSET CHARACTERISTIC TABLES

7.1 Transportation Services

7.1.1 Road Subbase, Road Base, and Road Surface Assets

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Traffic Count	3.5	Arterial Road	3.5
			Commercial Road	2.0
			Residential Road	1.0
C2	Commercial District	2.0	Yes	2.0
			No	0.0
C3	Primary Route to Key Destination	2.0	Yes	2.0
			No	0.0
C4	Bus Route	1.5	Yes	1.5
			No	0.0
C5	Truck Route	0.5	Yes	0.5
			No	0.0
C6	Redundancy	0.5	No	0.5
			Yes	0.0

Traffic Count shall be determined by whether the road segment is classified as an arterial road, commercial road, or residential road. The higher traffic flow, the more critical the road asset.

Commercial District is defined as the area of Manitoba Avenue between PTH 9 and the Gaynor Family Library (806 Manitoba Avenue). This area also includes Morris Avenue, Superior Avenue, Manitoba Avenue, Clandeboye Avenue, Eaton Avenue, and Mclean Avenue between Eveline Street and Main Street. These assets have been prioritized because they are in high importance area of the City.

Primary Route to Key Destination is defined as the road network segments that are part of the shortest and easiest way for an individual coming to a Key Destination within the City of Selkirk, if their origin was outside of the City boundaries. These assets have been prioritized because these are routes used frequently by those travelling to Selkirk from out of town.

The **Bus Route** shall be those road segments that are used for the City of Selkirk Bus Route, as per the current Selkirk Transit Website. These assets have been prioritized because the function of the Bus Service relies on the function of these specific assets.

The **Truck Route** is all roads in the City of Selkirk that allow access to trucks of 5 tonnes or heavier. These assets have been prioritized because services provided by various truck that use these routes, rely on the function of these road assets.

Redundancy in the road network means that there is an additional or alternate route that can be used to access areas of the City. A lack of redundancy increases the Criticality Score because the impact of a loss of service would be greater if there is no alternate route available.

7.2 Land Drainage Services

7.2.1 Storm Main

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Pipe Diameter	4.0	900-1650 ml	4.0
			600-750 ml	2.0
			200-525 ml	1.0
C2	Service Critical Assets	3.0	Yes	3.0
			No	0.0
C3	Current Over Capacity	2.0	Yes	2.0
			No	0.0
C4	Predicted Over Capacity	1.0	Yes	1.0
			No	0.0

Pipe Diameter is the diameter of each storm main pipe, as determined by the *City of Selkirk Asset Registry*. The larger diameters have been given priority as it implies that it services a larger area, and therefore would have a greater impact if the service was lost.

Service Critical Assets are a select group of assets that have been identified as critical by service experts. They are unique, but the entirety of the network depends on their function. For the Land Drainage Service Area, these assets are those outflow pipes that bring surface run off to the river.

Current Over Capacity is defined as an asset that is within an area that has been identified by City of Selkirk service experts as an area that floods frequently during rain events. These areas have been given increased weighting because they are currently failing or are providing service poorly during rain events, and due to climate change predictions in the City of Selkirk, this loss of service will occur more frequently and with greater intensity. Data to be collected.

Predicted Over Capacity assets are those that are not currently over capacity but based on the expected climate change trends in the City of Selkirk, these will be problem areas in the near future. In order to adapt to the changing climate, these assets have been prioritized. Data to be collected.

7.3 Wastewater Services

7.3.1 Wastewater Main

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Pipe Diameter	3.0	525-900 ml	3.0
			350-500 ml	1.5
			100-300 ml	0.5
C2	Combined/Separated Sewers	2.5	Combined	2.5
			Separated	0.0
C3	Service Critical Asset	2.0	Yes	2.0
			No	0.0
C4	Force vs Gravity Sewer	1.5	Force	1.5
			Gravity	0.0
C5	Critical Distance From Key Community Facilities	1.0	Yes	1.0
			No	0.0

Pipe Diameter is the diameter of each wastewater main pipe, as determined by the *City of Selkirk Asset Registry*. The larger diameters have been given priority as it implies that it services more customers, and therefore would have a greater impact if the service was lost.

Combined/Separated Sewers means that the land drainage and sewer mains have (or have not) been separated as a part of the City's Storm sewer separation project. Combined sewers have been given a higher priority due to the risk that they pose to the environment in times of high rainfall when there is potential for this material to be deposited in the river. In addition, the City has made it a priority to separate combined sewers in order to better manage the increased amount of storm water that is predicted by recent climate change data.

Service Critical Asset are a select group of assets that have been identified as critical by service experts. They are unique, but the entirety of the network depends on their function. In the Wastewater Service Area, these assets include the main directly after the Dufferin Lift Station.

Force vs Gravity sewer defines the way in which materials are transported through a sewer main. Where slope is not great enough, sewer mains are forced as opposed to gravity. Forced gravity sewer mains have been prioritized because they are responsible for the movement of more affluent than a pipe of its diameter that is a gravity main. This extra weighting ensures that the pipe is prioritized, despite the diameter of the pipe.

Critical Distance From Key Community Facility. Wastewater assets that are within a critical distance are all those assets from the Key Community Facility building to the first tee fitting in the main. These assets are prioritized because a break in these assets would result in immediate loss of service to the facility.

7.4 Water Services

7.4.1 Watermain

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Service Critical Asset	3.5	Yes	3.5
			No	0.0
C2	Pipe Diameter	3.0	325-400 ml	3.8
			250-300 ml	2.0
			150-225 ml	1.0
			38-125 ml	0.5
C3	Redundancy	2.0	Yes	0.0
			No	2.0
C4	Critical Distance from Key Community Facilities	1.5	Yes	1.5
			No	0.0

Service Critical Assets are a select group of assets that have been identified as critical by service experts. They are unique, and the entirety of the network depends on their function. For this Service Area, the Service Critical Assets are those that move water directly in or out of the Water Treatment Plant, or Reserve Tanks.

Pipe Diameter is the diameter of each water main pipe, as determined by the *City of Selkirk Asset Registry*. The larger diameters have been given priority as it implies that it services more customers, and therefore would have a greater impact if the service was lost.

Redundancy in the water network means that there is an additional or alternate watermain that services a specific area of the City. A lack of redundancy increases the Criticality Score because the impact of a loss of service would be greater if there is no alternate supply source.

Critical Distance from Key Community Facility. Water assets that are within a critical distance are all those assets from the Key Community Facility building to the first tee in the main. These assets are prioritized because a break in these assets would result in immediate loss of service to the facility.

7.5 Parks and Recreation Services

7.5.1 Parks

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Park Category	3.5	Regional Park	3.5
			Community Park	2.5
			Neighborhood Park	1.5
C3	Amenities	2.5	> X amenities present	2.5
			< X amenities present	0.0
C4	Natural Assets	2.5	Yes - The majority of surroundings are Natural Assets	2.5
			No - The majority of surroundings are not natural assets, they are groomed.	0.0
C5	Seasonal	1.5	Yes - This is open year-round	1.5
			No - This is open for only a specific season	0.0

Park Category is defined by the Selkirk Recreation Master . A regional park is defined as facilities and parks that are designed to serve a critical mass of participants, and people will travel throughout the region to visit. A Community park provides services to a smaller market than regional parks; they are multipurpose and multi-use in nature. Neighbourhood parks serve residents in close proximity to their home and provide access to basic recreation activities.

Amenities are defined as a desirable or useful feature in a park, such as benches, washrooms, picnic areas, recreation structures etc.

Natural Assets describe the assets that are present and surround the park. If the majority of the surroundings are Natural Asset such as wild grasses, trees and shrubbery as opposed to man made surroundings. Natural assets have a higher priority as they are much more difficult to replace where as areas that consist of a majority of groomed terrain is more difficult.

Seasonality of a park is defined by the seasons of operation; whether it is open year around or only during specific seasons.

7.5.2 Pathways

Characteristic # (C)	Criticality Characteristic	Total Weighting	Variable	Score
C1	Natural Assets	3.3	Yes	3.3
			No	0.0
C2	Number of Users	3.0	Regional	3.0
			Community	2.0
			Neighborhood	1.0
C3	Connectivity	2.0	> 5 Entry Points	2.0
			< 5 Entry Points	1.0
C4	Accessible	1.7	Yes, this park is accessible to all	1.7
			No, this park is not accessible to all	0.0

Natural Assets describe the assets that surround the pathway. If the majority of the surroundings are Natural Asset such as wild grasses, trees and shrubbery as opposed to man made surroundings. Natural assets have a higher priority as they are much more difficult to replace where as areas that consist of a majority of groomed terrain is more difficult.

Number of Users is defined by category of park that the pathways are located within. This can be either a neighbourhood park, a community park or a regional facility.

Connectivity of a pathway is defined by the number of entry points to the pathway. This is a measure of capacity for interconnection with the active transportation or sidewalk network, and a gauge of how easily accessible it is to users. Data to be collected.

Accessible is a pathway that is flat with no barriers for wheelchair mobility. Data to be collected.

8 LIKELIHOOD OF OCCURANCE

8.1 An assets' Likelihood of Occurrence is directly related to the condition of the asset. The poorer the condition of the asset, the greater the likelihood that the asset fails.

9 RISK SCORE

9.1 A risk score shall be determined for each asset in the *City of Selkirk Capital Asset Registry*

9.2 Risk score shall be calculated by using the following equation:

$$\text{Risk Score} = \text{Operational Risk} \times \text{Service Area Multiplier}$$

- 9.3 Due to differences between service areas, assets that belong to difference services areas cannot be compared directly using their operation risk values. A service area multiplier must be applied before comparing risk between assets of difference service areas.
- 9.4 The following table shall define the Service Area Multiplier to be applied to each Service Area when comparing risk.
- 9.5 The weighting for each service area takes into consideration climate change impacts, legislative requirements, as well as service delivery expectations.

Service Area	Service Area Multiplier
Water Services	10
Wastewater Services	8.0
Land Drainage Services	7.0
Transportation Services	6.0
Parks and Recreation Services	4.0

10 ACCEPTABLE RISK

- 10.1 There shall be risk associated with all City assets. There is not a condition of zero risk.
- 10.2 If a temporary loss of service in a service area is acceptable for the asset in question, that asset may be allowed to deteriorate to a point that represents a high probability of failure.
- 10.3 As the City of Selkirk continues to develop this tool, an acceptable risk level shall be established for each service area.

11 CLIMATE CHANGE CONSIDERATION

- 11.1 Opportunities to mitigate, adapt or increase resiliency to climate change were identified throughout the Critical Asset Characteristic weighting process, and those characteristics that increased the City's adaptation were weighted to reflect higher priority.
- 11.2 Consideration was given to climate change, and the City's Climate Change Adaptation Strategy in the following ways:
 - 11.2.1 The Land Drainage service critical asset characteristic identifying areas that are likely to be over capacity based on future precipitation predictions being prioritized over those assets that have sufficient capacity for future precipitation predictions

- 11.2.2 Prioritization of sewers that have the potential to be separated is built into the consideration by the level of weighting these assets receive. This is important for both the land drainage network, as well as the storm sewer network as the climate changes.
- 11.2.3 Prioritization of Natural Assets and recognizing the importance biodiversity, protection of environmental services such as storm water absorption, carbon sequestration and tree shading, through the increased score associated with parks and pathways that have Natural Assets.
- 11.3 As asset classes are added, climate mitigation, adaptation and resiliency will be prioritized throughout Critical Asset Characteristic weightings.

12 RISK MANAGEMENT DECISIONS / PRIORITIZING ACTIONS

- 12.1 All assets shall be managed according to *Capital Asset Life-Cycle Management Policy* to ensure assets are designed, managed and operated in a way that meets organizational objectives and minimizes operational risk.
- 12.2 Preventative maintenance schedules for each asset subclass as outlined by the *Capital Asset Life-Cycle Management Policy* shall be followed to reduce the risk of operational failure.
- 12.3 Infrastructure projects that have a high overall Risk Score shall be generally prioritized over infrastructure projects with a low Risk Score.
- 12.4 In the situation where more than one infrastructure project is being considered and both have a high Risk Score, the conflict shall be discussed among Administration and a decision will be made with considerations of the types of risks and consequences associated with each.

13 RISK REGISTRY

- 13.1 The City of Selkirk shall develop and maintain a digital *Risk Registry*, which contains an asset Criticality Score for each asset, based on that asset subclasses Critical Asset Characteristic Table.
- 13.2 All Capital Assets within an Asset Subclass that has a defined Critical Asset Characteristic table in this policy shall be included in the *Risk Registry*.

14 CURRENCY OF RISK REGISTRY

- 14.1 Administration shall ensure that the *Risk Registry* is maintained and kept current according to the provisions set out in this policy.

14.2 Capital Assets in the *Risk Registry* shall, as practicable, be recorded or updated in the *Risk Registry* within 30 days of their retirement, procurement, or completion of construction. Updates must be considered for assets being impacts by the procurement or construction of additional assets.

14.3 The Critical Asset Characteristics for all assets shall be reviewed annually to ensure the accuracy of the *Risk Registry*.

15 MONITORING RISK

15.1 The Service Area Operational Risk score for each service area shall be calculated using the following equation:

$$\text{Service Area Operational Risk Score} = \frac{\sum_{i=1}^n \text{Operational Risk Score}_i}{\sum_{i=1}^n \text{Worst Case Scenario Risk}_i}$$

15.2 At the end of each year, the Service Area Operational Risk score for each service area identified in the *City of Selkirk Asset Registry Policy*, shall be documented in the *Annual Capital Asset Risk Report* and compared to the previous years overall risk scores in order to monitor risk levels from year to year.

15.3 Worst Case Scenario Risk shall assume that all assets belonging to a service area have the greatest Likelihood of Failure (5).

15.4 Based on Service Area Operation Risk Score, the service areas level of risk shall be determined based on the following table:

Service Area Operational Risk Score Range	Service Area Risk Category
81-100	Very High
61-80	High
41-60	Medium
21-40	Low
0-20	Very Low

16 POLICY REVIEW

16.1 This policy shall be reviewed no less than every five years from the date it is effective.

17 EFFECTIVE DATE

17.1 This policy shall be effective as of January 30, 2019.

Duane Nicol, Chief Administrative Officer

Date Approved

Example:

This example will walk through how to determine a Criticality Score and the Operation Risk value for a specific asset. The asset that will be used for this example is a road asset. This road asset is a commercial road, that is located within the Commercial district, is a bus route, and has redundant roads that will take a user from point A to point B.

Step 1: Determine Criticality Score based on the Critical Asset Characteristic Table in Section 9 – the Criticality Score for this asset can be determined.

- C1 (Traffic Count) – Commercial Road – Score = 2.0
- C2 (Commercial district) – Yes – Score = 2.0
- C3 (Primary Route to Destination) – No – Score = 0.0
- C4 (Bus Route) – No - Score = 1.5
- C5 (Truck Route) – No - Score = 0.0
- C6 (Redundant) – Yes - Score = 0.0

$$\text{Criticality Score} = \sum_{i=1}^n C_i$$

$$\begin{aligned} \text{Criticality Score for Asset 1} &= 2.0+2.0+0.0+1.5+0.0+0.0 \\ &= \mathbf{5.5} \end{aligned}$$

Step 2: Determine Operational Risk. Use the following equation, and the Criticality Score determined in step one.

Operational Risk	=	Magnitude of Failure Consequence	X	Likelihood of Asset Failure
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Where Magnitude of Failure Consequence is equal to the Criticality Score, and the Likelihood of Asset Failure is equal to the condition of the asset. Assume that the condition of the asset being used for this example is Fair – or 3. The Operational Risk equation will then read:

$$\begin{aligned} \text{Operational Risk} &= 5.5 \times 3 \\ \text{Operational Risk} &= 16.5 \end{aligned}$$

Step 3: Using an Assets Operational Risk value, determine the Risk Score. The Risk Score is what will allow you to compare Risk between Service Areas.

Using the Service Area Multiplier Table in Section 9, we can determine that the road asset being used for this example has a multiplier of 6.0. Use the following equation to determine the Risk Score of this Asset:

$$\begin{aligned} \text{Risk Score} &= \text{Operational Risk} \times \text{Service Area Multiplier} \\ \text{Risk Score} &= 16.5 \times 6.0 \\ \text{Risk Score} &= 99 \end{aligned}$$