Committee of Council Agenda

Tuesday, October 22, 2024
2:30 p.m.
Council Chambers
3rd Floor City Hall, 2580 Shaughnessy Street, Port Coquitlam, BC

Pages

1. CALL TO ORDER

2. ADOPTION OF THE AGENDA

2.1 Adoption of the Agenda

Recommendation:
That the Tuesday, October 22, 2024, Committee of Council Meeting Agenda be adopted as circulated.

3. CONFIRMATION OF MINUTES

3.1 Minutes of Committee of Council — 4

Recommendation:
That the minutes of the following Committee of Council Meetings be adopted:

- *August 14, 2024*
- *September 24, 2024*
- *October 1, 2024*
- *October 8, 2024.*

4. RESOLUTION TO CLOSE

4.1 Resolution to Close

Recommendation:
That the Committee of Council Meeting of Tuesday, October 22, 2024, be closed to the public pursuant to the following subsections(s) of Section 90(1) of the Community Charter:

Item 5.1

l. discussions with municipal officers and employees respecting municipal *objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].*

Item 6.1

l. discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].

Item 6.2

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public.

Item 6.3

e. the acquisition, disposition or expropriation of land or improvements, if the council considers that disclosure could reasonably be expected to harm the interests of the municipality.

Item 6.4

e. the acquisition, disposition or expropriation of land or improvements, if the council considers that disclosure could reasonably be expected to harm the interests of the municipality;

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public;

l. discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].

5. REPORTS

5.1 Asset Management Plans - Final Reports 16

Recommendation:
None.

5.2 Departmental Update - Finance (verbal report)

Recommendation:
None.

6. COUNCILLORS' UPDATE

7. MAYOR'S UPDATE

8. CAO UPDATE

9. ADJOURNMENT

9.1 Adjournment of the Meeting

Recommendation:
That the Tuesday, October 22, 2024, Committee of Council Meeting be adjourned.

Special Committee of Council Minutes

Wednesday, August 14, 2024
Virtual Meeting

Council Present:	Chair - Mayor West Councillor Darling Councillor McCurrach Councillor Petriw Councillor Pollock Councillor Washington (arrived during item 5.1)
Absent:	Councillor Penner
Staff Present:	R. Bremner, CAO K. Grommada, Deputy CAO C. Deakin, Corporate Officer J. Frederick, Director Engineering & Public Works B. Irvine, Director Development Services D. Long, Director Community Safety & Corporate Services G. Mitzel, Director Recreation

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1. CALL TO ORDER

The meeting was called to order at 9:30 a.m.

2. ADOPTION OF THE AGENDA

2.1 Adoption of the Agenda

Moved-Seconded:

That the Wednesday, August 14, 2024, Special Committee of Council Meeting Agenda be adopted, as circulated.

In Favour (5): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Petriw, and Councillor Pollock

Absent (2): Councillor Penner, and Councillor Washington

Carried

3. REPORTS

None.

4. RESOLUTION TO CLOSE

4.1 Resolution to Close the Meeting

<u>Moved-Seconded:</u>

That the Special Committee of Council Meeting of Wednesday, August 14, 2024, be closed to the public pursuant to the following subsection(s) of Section 90(1) of the Community Charter:

<u>Item 5.1</u>

(g) litigation or potential litigation affecting the municipality; and

(i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose.

In Favour (5): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Petriw, and Councillor Pollock

Absent (2): Councillor Penner, and Councillor Washington

<u>Carried</u>

5. ADJOURNMENT

5.1 Adjournment of the Meeting

<u>Moved-Seconded:</u>

That the Wednesday, August 14, 2024, Committee of Council Meeting be adjourned. (9:31 a.m.)

In Favour (5): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Petriw, Councillor Pollock and Councillor Washington

Absent (2): Councillor Penner

<u>Carried</u>

Mayor	Corporate Officer

Committee of Council Minutes

Tuesday, September 24, 2024
Council Chambers
3rd Floor City Hall, 2580 Shaughnessy Street, Port Coquitlam, BC

Council Present:	Acting Chair - Councillor Washington Councillor Darling Councillor McCurrach Councillor Penner Councillor Petriw Councillor Pollock
Council Absent:	Chair - Mayor West
Staff Present:	R. Bremner, CAO K. Grommada, Deputy CAO B. Clarkson, Fire Chief C. Deakin, Corporate Officer J. Frederick, Director Engineering & Public Works B. Irvine, Director Development Services D. Long, Director Community Safety & Corporate Services J. Lovell, Director Finance G. Mitzel, Director Recreation

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1. CALL TO ORDER

The meeting was called to order at 5:30 p.m.

2. ADOPTION OF THE AGENDA

2.1 Adoption of the Agenda

Moved-Seconded:

That the Tuesday, September 24, 2024, Committee of Council Meeting Agenda be adopted as circulated.

In Favour (6): Councillor Washington, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Mayor West

Carried

3. CONFIRMATION OF MINUTES

3.1 Minutes of Committee of Council

Moved-Seconded:

That the minutes of the following Committee of Council Meetings be adopted:

- *June 26, 2024*
- *September 3, 2024*
- *September 10, 2024.*

In Favour (6): Councillor Washington, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Mayor West

Carried

4. DELEGATIONS

4.1 Tri-Cities Chamber of Commerce - 2024 Fee for Service

Leslie Courchesne, CEO, Tri-Cities Chamber of Commerce gave an on-screen presentation noting how the Chamber is uniquely positioned to enhance economic development and local prosperity, advocacy, and public policy for local businesses. She also provided key insights into being the collective voice for businesses dealing with emerging issues.

5. REPORTS

5.1 Departmental Update - Fire and Emergency Services (verbal report)

Chief Clarkson gave an on-screen presentation highlighting the NG911 (new generation 911 service) which now has the ability to receive real-time images or videos from callers. He also informed Committee of Council about the new *Fire Safety Act,* which replaces the previous regulation, the recent transition to Starlink for communications in the event of a disaster as it will maintain uninterrupted dispatch and coordination with local and provincial emergency services. The update also included Emergency Operations Center & Training Room upgrades and workplace culture improvements.

6. COUNCILLORS' UPDATE

No update.

7. MAYOR'S UPDATE

No update.

8. CAO UPDATE

No update.

9. RESOLUTION TO CLOSE

This closed meeting was cancelled therefore a resolution to close was not required.

10. ADJOURNMENT

10.1 Adjournment of the Meeting

Moved-Seconded:

That the Tuesday, September 24, 2024, Committee of Council Meeting be adjourned. (6:06 p.m.)

In Favour (6): Councillor Washington, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Mayor West

Carried

Mayor	Corporate Officer

Committee of Council Minutes

Tuesday, October 1, 2024
Council Chambers
3rd Floor City Hall, 2580 Shaughnessy Street, Port Coquitlam, BC

Council Present:	Chair - Mayor West Councillor Darling Councillor McCurrach Councillor Penner Councillor Petriw Councillor Pollock
Council Absent:	Councillor Washington
Staff Present:	R. Bremner, CAO K. Grommada, Deputy CAO B. Clarkson, Fire Chief C. Deakin, Corporate Officer J. Frederick, Director Engineering & Public Works B. Irvine, Director Development Services D. Long, Director Community Safety & Corporate Services J. Lovell, Director Finance G. Mitzel, Director Recreation V. Washington, Manager of Legislative Services

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1. CALL TO ORDER

The meeting was called to order at 2:00 p.m.

2. ADOPTION OF THE AGENDA

2.1 Adoption of the Agenda

Moved-Seconded:

That the Tuesday, October 1, 2024, Committee of Council Meeting Agenda be adopted as amended by removing item 4.1 from the agenda.

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

3. CONFIRMATION OF MINUTES

None.

4. DELEGATION

4.1 Tri-Cities Community Action Team

This item was deleted from the agenda.

5. REPORTS

5.1 2025 Fees and Charges Bylaw

Moved-Seconded:

That Committee of Council support the proposed updates to the Fees and Charges Bylaw (2023) and that a new bylaw be prepared for 2025 and sent to Council for first three readings.

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

5.2 2025 Permissive Tax Exemptions

Moved-Seconded:

That Committee of Council recommend to Council that:

1. *the Hyde Creek Watershed Society, Kinsmen Club of Port Coquitlam, and Port Coquitlam Heritage and Cultural Society be approved for a permissive tax exemption for a period of 5 years, 2025-2029; and*
2. *previously approved permissive property tax exemptions continue for the 2025 taxation year.*

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

5.3 2026 Capital Methodology and Funding Approvals

Moved-Seconded:

That Committee of Council:

1. *approve reallocating a portion of the LTR (approximately $4.45M general, $892K water, $669K sanitary) in 2026 to the respective capital reserves for funding the capital plan, and*
2. *support the 2026 capital plan be prepared consistent with the 2017-2025 capital plans, utilizing the three project categories of Neighbourhood Rehabilitation, Other Rehabilitation and New.*

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

6. COUNCILLORS' UPDATE

No update.

7. MAYOR'S UPDATE

No update.

8. CAO UPDATE

No update.

9. RESOLUTION TO CLOSE

9.1 Resolution to Close

Moved-Seconded:

That the Committee of Council Meeting of Tuesday, October 1, 2024, be closed to the public pursuant to the following subsections(s) of Section 90(1) of the Community Charter:
Item 5.1

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public;

l. discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].

Item 5.2

e. the acquisition, disposition or expropriation of land or improvements, if the council considers that disclosure could reasonably be expected to harm the interests of the municipality;

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public;

l. discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

10. ADJOURNMENT

10.1 Adjournment of the Meeting

Moved-Seconded:

That the Tuesday, October 1, 2024, Committee of Council Meeting be adjourned.(5:20 p.m.)

In Favour (6): Mayor West, Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (1): Councillor Washington

Carried

Mayor	Corporate Officer

Committee of Council Minutes

Tuesday, October 8, 2024
Council Chambers
3rd Floor City Hall, 2580 Shaughnessy Street, Port Coquitlam, BC

Council Present:	Acting Chair, Councillor Darling Councillor McCurrach Councillor Penner Councillor Petriw Councillor Pollock
Council Absent:	Chair - Mayor West Councillor Washington
Staff Present:	R. Bremner, CAO K. Grommada, Deputy CAO B. Clarkson, Fire Chief C. Deakin, Corporate Officer J. Frederick, Director Engineering & Public Works B. Irvine, Director Development Services D. Long, Director Community Safety & Corporate Services J. Lovell, Director Finance G. Mitzel, Director Recreation

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1. CALL TO ORDER

The meeting was called to order at 5:00 p.m.

2. ADOPTION OF THE AGENDA

2.1 Adoption of the Agenda

Moved-Seconded:

That the Tuesday, October 8, 2024, Committee of Council Meeting Agenda be adopted as amended, by adding item 5.1, under 8.1, Resolution to Close, Section 90 (1) k and renumbering the remaining item.

In Favour (5): Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (2): Mayor West, and Councillor Washington

Carried

3. CONFIRMATION OF MINUTES

None.

4. REPORTS

4.1 Port Coquitlam Heritage Society (verbal report)

Mr. Jack Choules, President of the PoCo Heritage and Cultural Society presented an on-screen overview of the organization's partnership agreement with the City, and requested additional funding (to be decided as part of the City's budget discussions) to support their efforts in being a living wage employer.

4.2 South Port Coquitlam Draft Integrated Watershed Management Plan

Moved-Seconded:

That Committee of Council provide feedback on the South Port Coquitlam Draft Integrated Watershed Management Plan and authorize staff to solicit public input on the plan.

In Favour (5): Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (2): Mayor West, and Councillor Washington

Carried

5. COUNCILLORS' UPDATE

Council provided updates on City business.

6. MAYOR'S UPDATE

No update.

7. CAO UPDATE

No update.

8. RESOLUTION TO CLOSE

8.1 Resolution to Close

Moved-Seconded:

That the Committee of Council Meeting of Tuesday, October 8, 2024, be closed to the public pursuant to the following subsections(s) of Section 90(1) of the Community Charter:

Item 5.1

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public.

Item 5.2

e. the acquisition, disposition or expropriation of land or improvements, if the council considers that disclosure could reasonably be expected to harm the interests of the municipality;

k. negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public;

l. discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [annual municipal report].

In Favour (5): Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (2): Mayor West, and Councillor Washington

Carried

9. ADJOURNMENT

9.1 Adjournment of the Meeting

Moved-Seconded:

That the Tuesday, October 8, 2024, Committee of Council Meeting be adjourned. (5:57 p.m.)

In Favour (5): Councillor Darling, Councillor McCurrach, Councillor Penner, Councillor Petriw, and Councillor Pollock

Absent (2): Mayor West, and Councillor Washington

Carried

Mayor	Corporate Officer

Asset Management Plans – Final Reports

RECOMMENDATION:

None.

PREVIOUS COUNCIL/COMMITTEE ACTION

At the July 11, 2023, Committee of Council meeting, a staff report was provided along with the Draft Asset Management Plans for each of the City's eight asset groups.

At the May 21, 2021 Committee of Council meeting, a staff report was provided with a progress update on the City's Asset Management Plans, summary of the State of the Infrastructure report, and Condition Assessment Guidelines developed for each of the City's eight asset portfolios.

At the March 26, 2019 Committee of Council meeting, a report was brought forward with information on the work planned for 2019 and a resolution request for receipt of $15,000 in grant funding from the Union of British Columbia Municipalities (UBCM).

At the January 15, 2019 Committee of Council meeting, a presentation was provided to Council on the Asset Management Strategy along with an opportunity to provide feedback on the report.

At the December 11, 2018 Committee of Council meeting, a report was brought forward with information on the 2018 asset management work which included an assessment of city assets and asset management practices along with the development of an asset management strategy. A draft Asset Management Strategy report, dated November 2018, was provided to Council members.

At the May 1, 2018 Finance and Budget Committee, a report was brought forward with information on the Phase 1 asset management work, which included assessment, strategy and policy items.

REPORT SUMMARY

This report presents the City's final asset management plans along with a summary of the recommendations and information on next steps of the City's asset management program.

BACKGROUND

Following delivery of the draft asset management plans in July 2023, a financial strategy was developed along with recommendations to support implementation of the plans. Staff were directed to incorporate the information into the draft reports and bring the final asset management plans back to Council.

DISCUSSION

The financial strategy and recommendations to support implementation of the City's eight asset management plans were incorporated into the draft plans to finalize the reports. A copy of each of the final asset management plans is provided in the Attachments.

A summary of the recommendations from the final asset management plans is provided below, followed by information on next steps of the City's asset management program

Asset Management Plan Recommendations

The asset management plans recommended that the City adopt a fully funded model to meet asset replacement needs using a 15-year phase-in period for an equitable distribution of financial burden between current and future residents. In addition to the current annual increase of 1%:

  - **Tax-funded Service Areas**: incrementally increase the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period.
  - **Water Services**: incrementally increase the LTWIR contribution by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period.
  - **Sanitary Services**: incrementally increase the LTSIR contribution by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period.

- Account for the impacts of inflation on both annual capital expenditures and contributions to the LTGIR to maintain fiscal strength.
- Consider the establishment of a Drainage Utility Levy and dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).
- Address the infrastructure backlog through the strategic use of senior government funding and DCC program, using asset criticality and risk analysis from the asset management plans to prioritize projects.

NEXT STEPS

Consider tax and levy increases as part of the City's financial planning process.

Develop 10-20 year capital plans for each of the eight asset groups based on the financial strategy and risk information provided in the asset management plans.

Bring forward a staff report with information on the establishment of a Drainage Utility Levy.

FINANCIAL IMPLICATIONS

Consider tax and utility levy increases as part of the City's future financial planning process. In addition to the current annual increase of 1%:

- Increasing the LTGIR contribution by an additional 1% of the budgeted prior year's taxation each year would increase individual property taxes by $21.30, based on a home assessed at $969,000.
- Increasing the LTWIR contribution by an additional 0.55% of the budgeted prior year's utility levy each year would increase individual water levies by $2.73, over and above the existing 1% annual increase of $4.98.
- Increasing the LTSIR contribution by an additional 1.03% of the budgeted prior year's utility levy each year would increase individual sanitary levies by $3.71 over and above the existing 1% annual increase of $3.60.

ATTACHMENTS

Attachment 1: Transportation AMP

Attachment 2: Drainage AMP

Attachment 3: Water AMP

Attachment 4: Sanitary AMP

Attachment 5: Facilities AMP

Attachment 6: Parks AMP

Attachment 7: Fleet and Equipment AMP

Attachment 8: Information Services AMP

Lead author(s): Melony Burton

City of Port Coquitlam | Asset Management Plan

2024

Transportation

Final Version
August 2024

Contents

Executive Summary 7
Approach and Methodology 12
Developing the Asset Management Plan 13
Build a comprehensive asset inventory 13
Conduct asset-level risk assessments and build risk models 14
Compile lifecycle activity data 14
Compile levels of service data 14
Develop financial strategy 14
Limitations and Constraints 15
State of the Infrastructure 16
Asset Hierarchy and Data Classification 17
Inventory and Valuation 18
Costing Methods 18
Asset Condition 20
Source of Condition Data 20
Condition Assessment Guidelines 21
Condition Rating System 22
Projected Asset Conditions 23
Age Profile 26
Historical Asset Expenditures 26
Serviceable Life vs. Current Asset Age 27
Lifecycle Management 30
Current Lifecycle Framework 31
Reinvestment Rates 36
Reinvestment Rate Benchmarks 37
Forecasted Long-term Replacement Needs 40
Risk Analysis 42
Calculating Asset Level Risk 43
Risk Models and Matrices 46
Risk Matrix: All Major Transportation Assets 46
Road Network 47
Sidewalks 51
Bridges 57
Levels of Service 61
Defining Levels of Service 62
Levels of Service Framework 62
Levels of Service Analysis 67
Financial Strategy 69

Approach and Methodology....70
Current Financial Planning Framework....71
Capital Budget....71
Debt....71
Senior Government Support....73
Sustainability....73
Reserves....74
Development Cost Charges (DCC) Program....76
Achieving Reinvestment Rate Targets....77
Tax-Funded Service Areas....78
Levy-Funded Service Areas....84
Infrastructure Backlogs....89
Using Reserves....90
Leveraging Development Cost Charges (DCC)....91
Recommendations....92
Tax Funded Service Areas....92
Levy-Funded Service Areas....92
Next Steps....94

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Asset Condition: All Transportation Assets 23
Figure 5: Asset Condition: Road Network Overall 24
Figure 6: Asset Condition: Road Network by Functional Classification 24
Figure 7: Asset Condition: Bridges 25
Figure 8: Asset Condition: Other Transportation Assets 25
Figure 9: Historical Expenditures on Asset Acquisition 26
Figure 10: Average Asset Age vs. Estimated Useful Life: Road Network 27
Figure 11: Percentage of Estimated Useful Life Consumed: Road Network 28
Figure 12: Average Asset Age vs. Estimated Useful Life: Bridges and Other Transportation Assets 29
Figure 13: Percentage of Estimated Useful Life Consumed: Bridges and Other Transportation Assets 29
Figure 14: Summary of Capital, Maintenance, and Operations Expenditures 32
Figure 15: Forecasted Long-term Replacement Needs 40
Figure 16: Calculating Risk Ratings 43
Figure 17: Risk Ratings and Lifecycle Strategy 45
Figure 18: Detailed Risk Matrix – Major Transportation Assets 46
Figure 19: Consolidated Risk Matrix - Major Transportation Assets 46
Figure 20: Probability of Failure – Road Network 47
Figure 21: Consequence of Failure – Road Network 48
Figure 22: Detailed Risk Matrix - Road Network 50
Figure 23: Consolidated Risk Matrix – Road Network 50
Figure 24: Probability of Failure – Sidewalks 51
Figure 25: Consequence of Failure – Sidewalks 52
Figure 26: Detailed Risk Matrix – Sidewalks 53
Figure 27: Consolidated Risk Matrix – Sidewalks 53
Figure 28: Probability of Failure – Retaining Walls 54
Figure 29: Consequence of Failure – Retaining Walls 55
Figure 30: Detailed Risk Matrix – Retaining Walls 56
Figure 31: Consolidated Risk Matrix – Retaining Walls 56
Figure 32: Probability of Failure – Bridges 57
Figure 33: Consequence of Failure – Bridges 58
Figure 34: Detailed Risk Matrix – Bridges 60
Figure 35: Consolidated Risk Matrix – Bridges 60
Figure 36: Historical MFA Lending Rates 72
Figure 37: Funding Flow 75
Figure 38: Annual Contributions to the LTGIR vs. Annual Capital Spending 79
Figure 39: Annual Contributions to the LTWIR vs. Annual Capital Spending 85
Figure 40: Annual Contributions to the LTSIR vs. Annual Capital Spending 85

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 20
Table 4: General Condition Rating Scale – All Assets 22
Table 5: General Condition Rating Scale – Road Network 22
Table 6: General Condition Rating Scale – Bridges 22
Table 7: Components of a Lifecycle Framework 31
Table 8: Lifecycle Framework 33
Table 9: Current Reinvestment Rates 36
Table 10: System-generated Reinvestment Rates 38
Table 11: Transportation Capital Reinvestment Rate Comparison 38
Table 12: Purpose of Capital and Operating Budgets 39
Table 13: Types of Consequences of Asset Failure 44
Table 14: Defining Probability of Failure Ranges – Road Network 47
Table 15: Defining Consequence of Failure Ranges – Road Network 49
Table 16: Defining Probability of Failure Ranges - Sidewalks 51
Table 17: Defining Consequence of Failure Ranges - Sidewalks 52
Table 18: Defining Probability of Failure Ranges - Retaining Walls 54
Table 19: Defining Consequence of Failure Ranges - Retaining Walls 55
Table 20: Defining Probability of Failure Ranges - Bridges 57
Table 21: Defining Consequence of Failure Ranges - Bridges 59
Table 22: Components of a Levels of Service Framework 62
Table 23: Core Values and Service Statements 63
Table 24: Customer Levels of Service 64
Table 25: Technical Levels of Service 65
Table 26: Trends in Select Customer Levels of Service KPIs 67
Table 27: Trends in Customer Levels of Service KPIs – Service Delivery 67
Table 28: Balancing Cost, Performance, and Risk 68
Table 29: Service Area Replacement Costs and Target Reinvestment Rates 70
Table 30: Long-Term Infrastructure Reserve Balances 74
Table 31: Capital Reserve Balances 75
Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments 78
Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 78
Table 35: Funding Levels and Resulting Funding Deficits 80
Table 36: Risks and Benefits of Funding Models 81
Table 37: Tax Rate Increase Required to Achieve Funding Levels 82
Table 38: Comparing Average Annual Requirements Against Current Capital Reinvestments 84
Table 39: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 84
Table 40: Funding Levels and Resulting Funding Deficits: Water Services 86
Table 41: Funding Levels and Resulting Funding Deficits: Sanitary Services 86
Table 42: Utility Rate Increase Required to Achieve Funding Levels: Water 87
Table 43: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 87
Table 44: Age- and Condition-based Infrastructure Backlogs 89
Table 45: Long-Term Infrastructure Reserves vs. Backlogs 90
Table 46: Development Cost Charges (DCC) Program 91
Table 47: Overlap Between DCC Program and Assets in Backlog State 91

26,500	Number of assets on record in the Transportation asset database
$533.1 million	2023 replacement cost of these assets
2000s	Decade with the highest capital expenditures on the construction or acquisition of Transportation assets ($191M)
2030s	Decade with the first major forecasted asset replacement spike ($177M)
30%	Percentage of assets in poor or worse condition, or with less than 40% service life remaining.
$160.2 million	Current age- and condition-based infrastructure backlog
$31.1 million	Current replacement cost of assets with a very high risk rating
$8.2 million	Annual City spending on capital, maintenance, and operations related to Transportation
2.9%	System-generated recommended capital reinvestment rate for Transportation System infrastructure ($15.6M per year)
1.1%	Port Coquitlam's actual capital reinvestment rate ($5.8M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Transportation assets. It is a continuation of the City's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services.

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Transportation portfolio has nearly 27,000 assets on record including 241 kilometers of roadways, 144 kilometers of sidewalks, 33 bridges, and various other assets such as streetlights, traffic signals, and retaining walls. The total current replacement cost of all Transportation assets is estimated at $533.1 million as of 2023, with roads making up nearly 50% of the valuation.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

Based on a combination of field inspection data and age, 30% of assets, with a current replacement cost of $160.2 million, are in poor to very poor condition or have less than 40% service life remaining. These assets should be considered for upgrade or replacement in the immediate or short term to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Data suggests that between 1960 and 2019, an average of $87 million per decade was spent on Transportation assets. The largest expenditures were made between 2000 and 2009, totaling nearly $202 million, dominated by the construction of the Coast Meridian Overpass ($103 million). New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. These assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Transportation totals $8.2 million. Of that, $7.1 million per year is spent on the inspection, maintenance, and replacement of Transportation assets. An additional $1.2 million is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. The City is expected to experience substantial asset replacement needs over the coming decades, peaking at $172.7 million in the current decade, between 2023 and 2032. Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $14.8 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to over $160 million when assets that are in poor or worse condition or have less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in tax and/or utility rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 193 assets, with a current replacement cost of $31.1 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 2,273 assets, with a current replacement cost of $169.2 million, were classified with a high risk rating.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Transportation, a total of 68 KPIs were selected. This included 26 KPIs to measure customer levels of service, and 42 to track the City's technical levels of service. Technical levels of service can be thought of as the activities and steps (inputs) that an organization takes to deliver customer levels of service (outputs) KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax- or utility levies. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas

For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility
Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas
Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

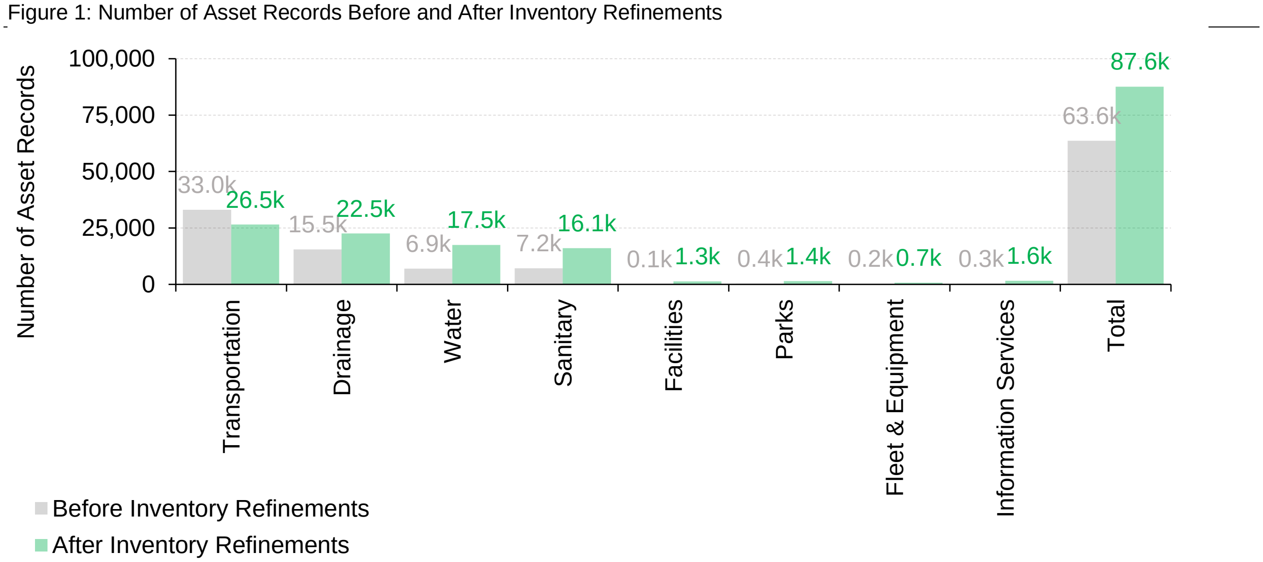
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 asset records to 87,647. For Transportation, however, data refinement led to a 20% decrease, from 33,026 asset records to 26,484.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budget envelopes associated with each activity. Data in any available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., asphalt repairs and crack sealing of roads), activities meant to ensure delivery and continuity of acceptable service levels were also included. For example, snow and ice control, street sweeping, and signal timing adjustments have no direct impact on asset lifespan, but they are part of providing Transportation services to residents.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable, and practical. To track the performance of Transportation, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. For Transportation, 28 KPIs were selected for customer levels of service, and 42 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a consolidated financial strategy. The strategy outlines the City's current funding position for each service area and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.
2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, and deployed in this AMP for some asset groups, can produce highly inaccurate estimates.
3. In the absence of condition assessment data, age was used to estimate asset condition ratings. This approach can result in an over- or understatement of asset needs. As a result, financial requirements generated through this approach can differ from those produced by staff.
4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.
5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

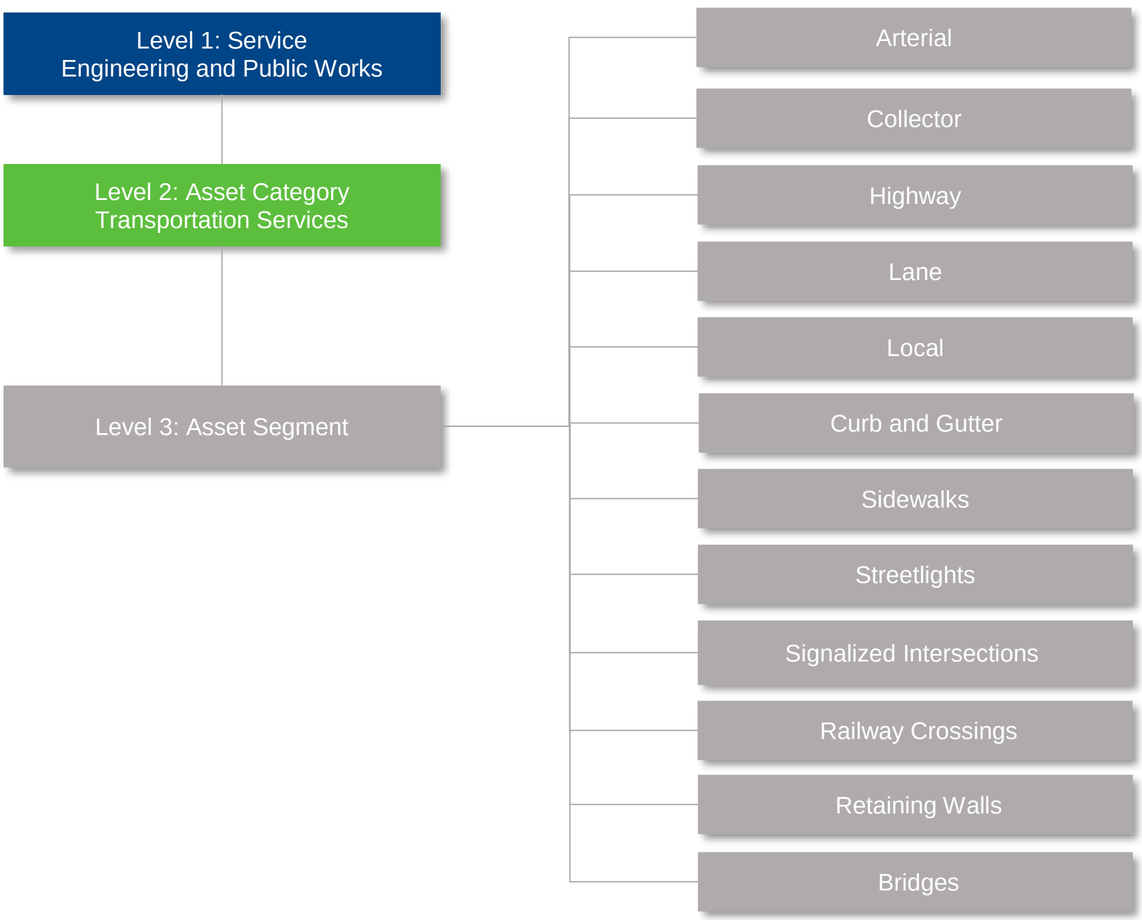
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of the City of Port Coquitlam's Transportation assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Transportation portfolio contains nearly 27,000 unique asset records, comprising 241 centerline kilometres (CL-KM) of roadway, 144 kilometres of sidewalks, 33 bridges, and various roadway appurtenance such as streetlights, street signs, signals, and railway crossings. The total current replacement cost of these assets was estimated at nearly $533.1 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

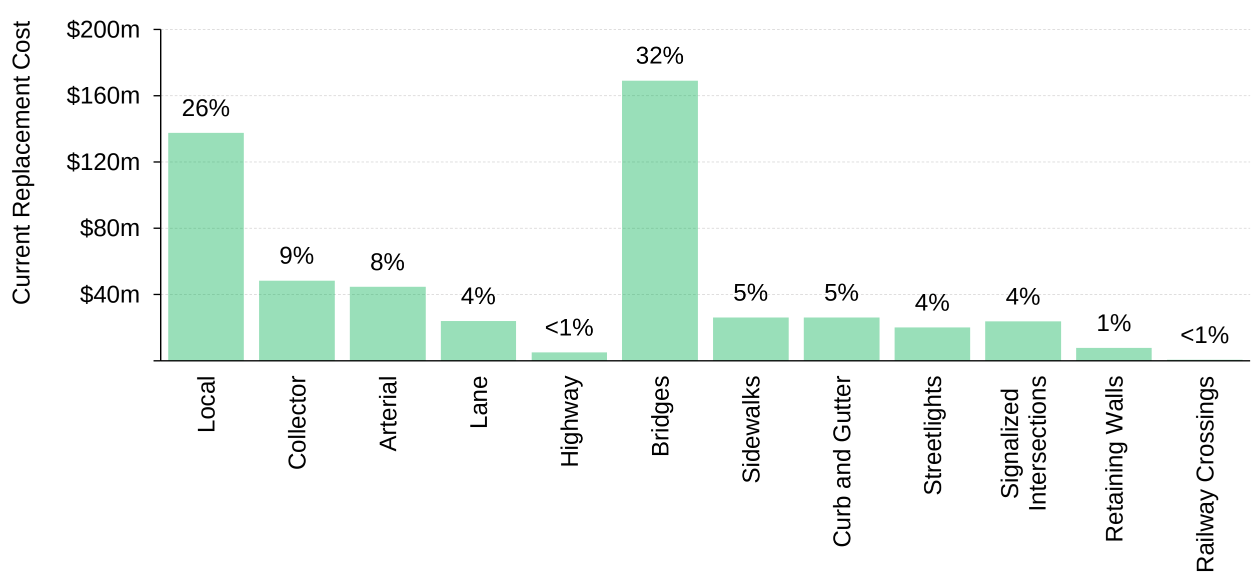
Table 2 summarizes the quantity and current replacement cost of the City's Transportation assets as managed in its primary asset management register, Citywide. With a total current replacement cost of $245.4 million, roads comprise nearly 50% of the overall portfolio, followed by bridges at 32%.

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Roads	241,301 CL-M	$137,583,207	Cost per unit
Local	124,027 CL-M	$48,327,982	Cost per unit
Collector	36,779 CL-M	$44,593,384	Cost per unit
Arterial	33,494 CL-M	$23,921,305	Cost per unit
Lane (Paved only)	42,928 CL-M	$5,036,426	Cost per unit
Highway	4,073 CL-M	$169,119,500	Cost per unit
Bridges	33	$26,072,590	User defined
Sidewalks	144,164m	$26,078,575	Cost per unit
Curb and Gutter	384,258m	$20,119,000	Cost per unit
Streetlights	3,658	$23,808,917	Cost per unit
Signalized Intersections	55	$7,843,871	User defined
Retaining Walls	6,194m	$577,500	Cost per unit
Railway Crossings	75m	$137,583,207	Cost per unit
Total		**$533,082,257**	

Figure 3: Portfolio Valuation



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

This asset management plan relies on assessed condition for 79% of Transportation assets, based on and weighted by replacement cost. For the remaining assets, aged is used as an approximation of condition. The table below identifies the source of condition data used throughout this AMP.

Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source
Transportation	Highway	99%	2019 Pavement Condition Study
	Arterial	100%	2019 Pavement Condition Study
	Collector	99%	2019 Pavement Condition Study
	Local	97%	2019 Pavement Condition Study
	Lane	99%	2019 Pavement Condition Study
	Sidewalks	0%	Age-based estimates
	Curb and Gutter	0%	Age-based estimates
	Streetlights	0%	Age-based estimates
	Signalized Intersections	0%	Age-based estimates
	Railway Crossings	0%	Age-based estimates
	Bridges	98%	2020 Bridge Inspection Report
	Retaining Walls	0%	Age-based estimates
Total		**79%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Transportation assets to support the collection of condition data. It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a combination of a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey, and asset-specific condition rating scales when available, including the City's pavement condition assessments and bridge inspection reports.

The pavement survey assigns an overall pavement quality index (PQI) rating to each road segment, ranging from 0 to 100. PQI is determined by a combination of road surface distresses and ride comfort. The condition rating system used for bridges uses a 5-point rating system based on the type and nature of bridge defects found.

Table 4: General Condition Rating Scale – All Assets

Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

Table 5: General Condition Rating Scale – Road Network

Overall Performance Rating	Pavement Quality Index (PQI)
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Table 6: General Condition Rating Scale – Bridges

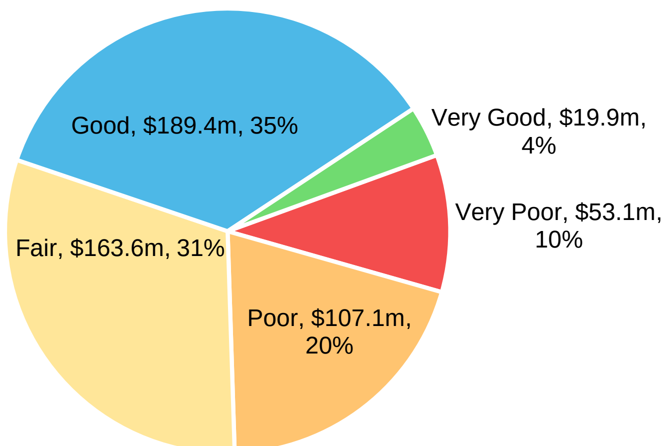
Condition Rating	Description
Very Good	No defects, as new condition
Good (1)	Normal wear and deterioration; not requiring maintenance/repair
Fair (2)	Functioning as intended; minor maintenance/repair required
Poor (3)	Not functioning as intended; more extensive repair required
Very Poor (4)	Not functioning as intended; major repair or replacement required

Projected Asset Conditions

Figure 4 summarizes the replacement cost-weighted condition of all Transportation assets. Based on a combination of field inspection data and age, 70% of assets are in fair or better condition; the remaining 30% of assets, with a current replacement cost of $160.2 million, are estimated to be in poor to very poor condition, or have less than 40% service life remining. Additional detail is provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 4: Asset Condition: All Transportation Assets



It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

Road Network

As illustrated in Figure 5 , based on condition assessments, 43% of the City's roads, with a current replacement cost of nearly $111.9 million, are in poor or worse condition. These roads have a pavement quality index of less than 40 out of 100. Roads in this condition exhibit substantial surface distresses, such as cracking and deformations—ultimately delivering a low quality of service to end users.

Of these, 9% were assessed as very poor, making them prime candidates for reconstruction. The condition of these road segments are beyond repair, deliver a very low ride quality, and may impede the efficient and safe flow of traffic.

Figure 5: Asset Condition: Road Network Overall

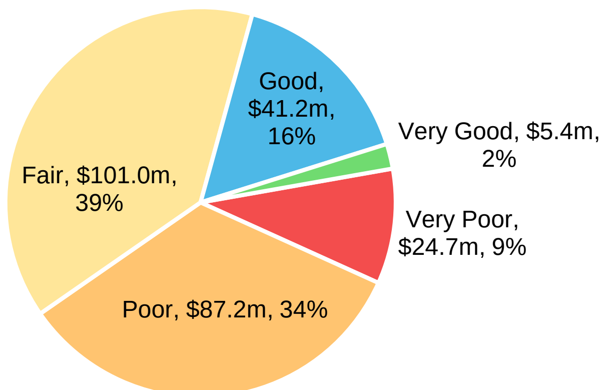
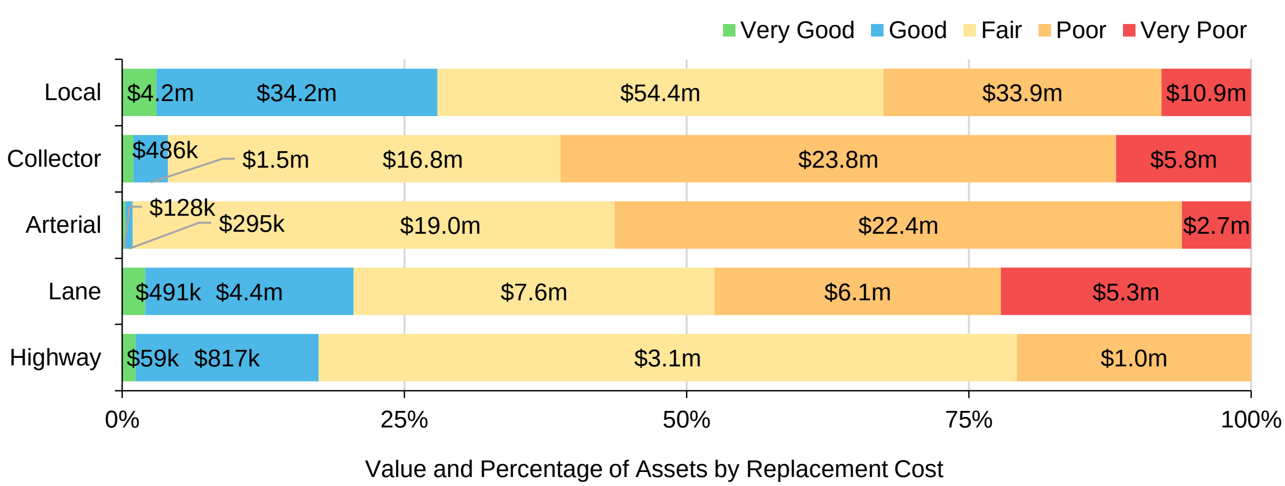


Figure 6 provides condition details for the City's road network by different road classes. This analysis shows that 61% of collector roads, with a current replacement cost of nearly $30 million, were assessed as poor to very poor in condition. The findings were similar for arterial roadways, with 56% found in poor or very poor condition. Although 67% of local roads were assessed as fair or better, the remaining 33%, with a current replacement value of $44.8 million were found to be in poor or worse condition.

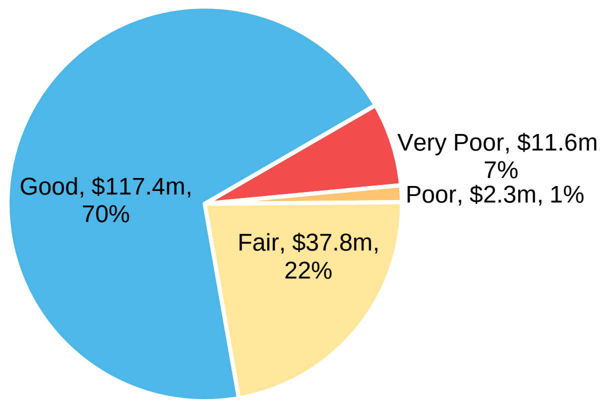
Figure 6: Asset Condition: Road Network by Functional Classification



Bridges and Other Assets

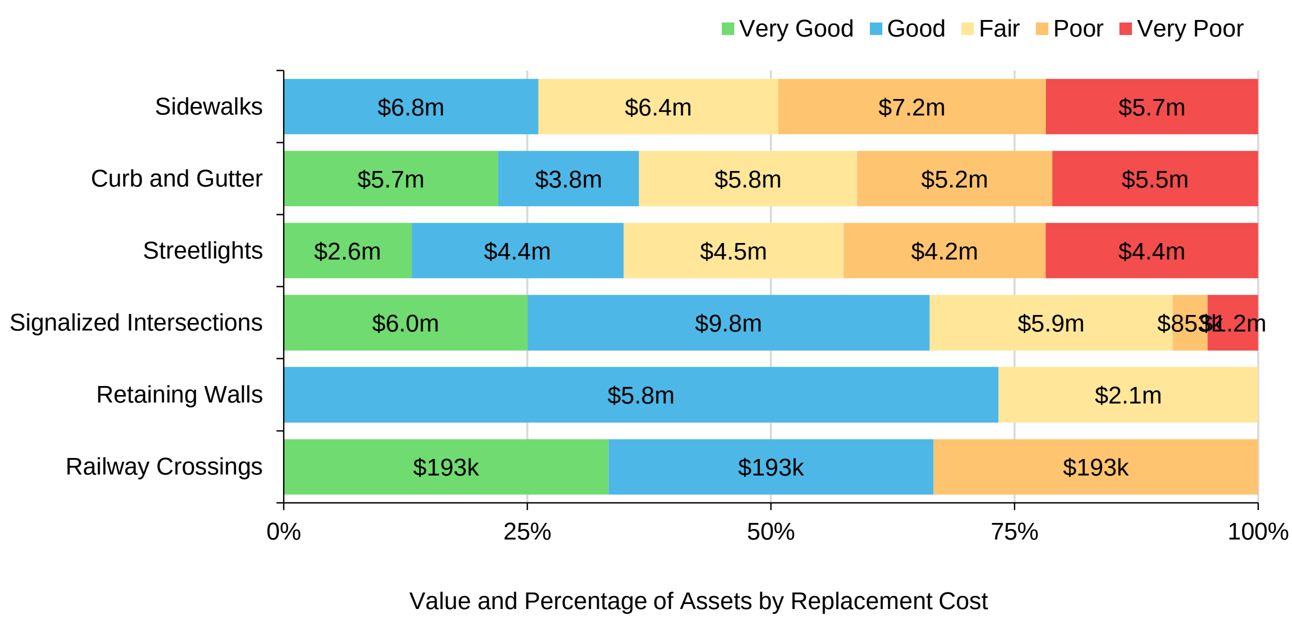
Figure 7 and Figure 8 summarize the condition of the City's bridges and other Transportation assets. Data shows that 92% of bridges are in fair or better condition, with 70% assigned a rating of 'Good'. The remaining 8%, with a current replacement cost of $13.9 million, were given an assessed condition rating of poor or very poor. A poor condition rating for bridges does not necessarily mean that the structures are unsafe. The City's detailed bridge inspection report identifies the condition of each bridge and the level of urgency required in addressing identified defects.

Figure 7: Asset Condition: Bridges



As no in-field condition data was available for other Transportation assets, asset age was used to approximate their condition using a general condition rating scale. Based on asset construction or acquisition years, the majority of these assets are estimated to be in fair or better condition. However, 33% with a current replacement cost exceeding $34 million may be in poor or worse condition, or have less than 40% service life remaining.

Figure 8: Asset Condition: Other Transportation Assets



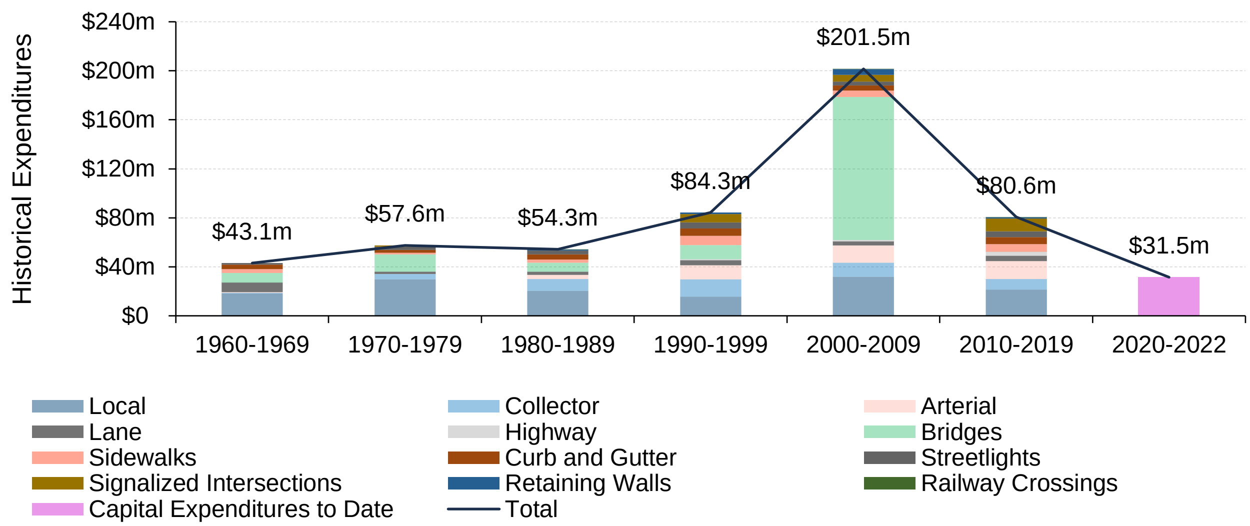
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 9 illustrates historical expenditures on the construction or acquisition of Transportation assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 9: Historical Expenditures on Asset Acquisition



The decade from 2000-2009 represented a period of substantial expenditures on Transportation assets—the highest in the last 60 years. More than $201 million was invested in bridges, roads, and other Transportation assets. The Coast Meridian Overpass project accounted for $103 million of these investments. On average between 1960 and 2019, transportation expenditures were approximately $87 million each decade. In the current decade, the City has made capital investments in roads, signals, streetlights, sidewalks, and safety improvements, totaling $31.5 million between 2020 and 2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

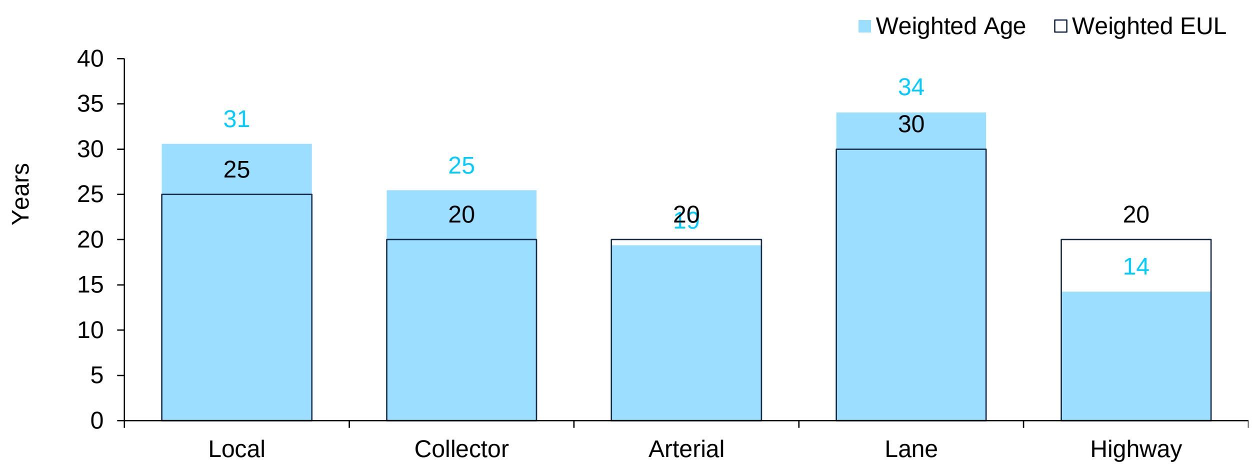
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 10 plots the average established useful life of each of the City's various road classes against the current age of road segments included in each class. Both values were weighted by the replacement cost of individual assets.

Figure 10: Average Asset Age vs. Estimated Useful Life: Road Network

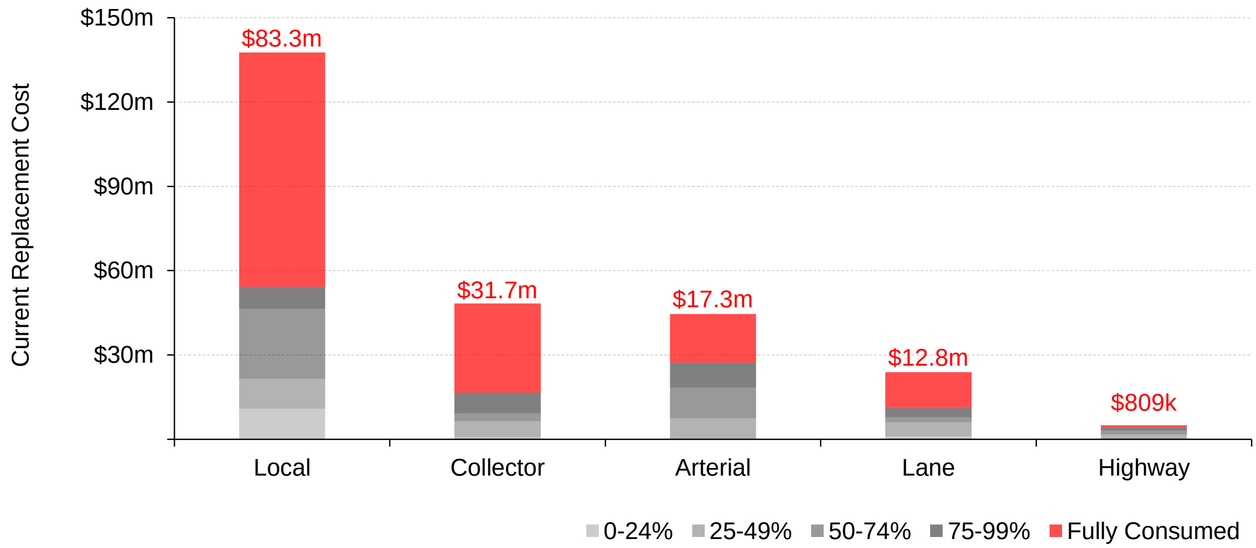


Age analysis shows that, on average, the City's local, collector, and lane roadways continue to remain in service well beyond their established lifespans. Arterial and highway surfaces have also consumed virtually all of their estimated useful life.

The City's Transportation portfolio also includes gravel laneways. Gravel surfaces can last indefinitely if maintained regularly, and do not require periodic, end-of-life reconstruction and replacement like paved roadways.

Figure 11 shows a detailed distribution of the City's paved road network based on the portion of useful life consumed to date. The analysis shows that 61% of local roads with a current replacement cost of $83.3 million, and 66% of collector roadways ($31.7 million) continue to remain in service beyond their established useful life. Arterial and paved lane roadways also contain significant portions that remain in service beyond their lifespans.

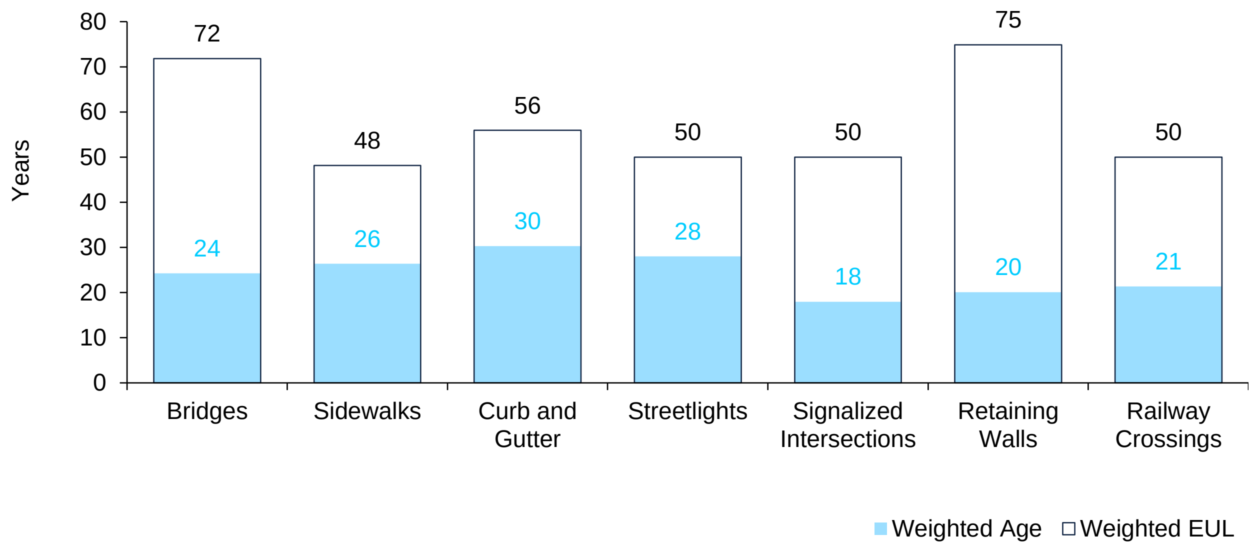
Figure 11: Percentage of Estimated Useful Life Consumed: Road Network



Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

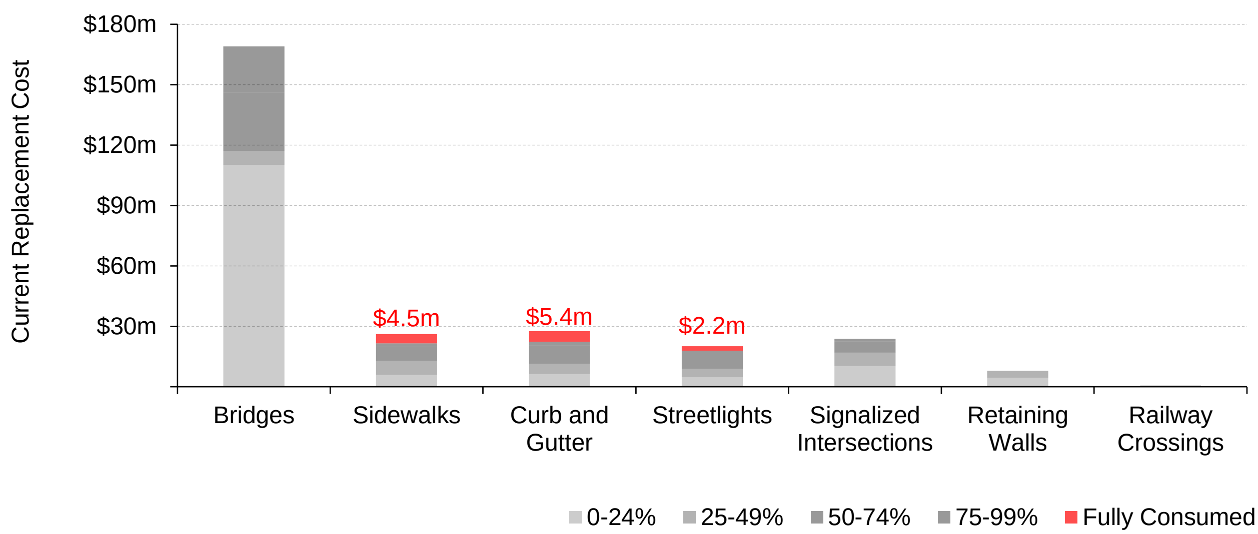
Figure 12 provides a similar analysis for the City's bridges and other Transportation assets. The data reveals that, on average, sidewalks, curb and gutters, and streetlights are in the latter stages of their lifecycle, having consumed more than 50 % of their established lifespans. As illustrated further in Figure 13, this asset group also contains assets that remain in service beyond their established lifespans, worth $12.1 million in current replacement costs.

Figure 12: Average Asset Age vs. Estimated Useful Life: Bridges and Other Transportation Assets



Although Figure 12 suggests that bridges are, on average, in the earlier stages of their lifespans and no bridges were identified as still in operation beyond their lifespan in Figure 13 (as of 2023).The eastbound Lougheed Bridge at Coquitlam River, with a replacement cost of $11.6 million, was placed in to service in 1949 and is due to reach the end of its life in 2024.

Figure 13: Percentage of Estimated Useful Life Consumed: Bridges and Other Transportation Assets



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require maintenance, repair, and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

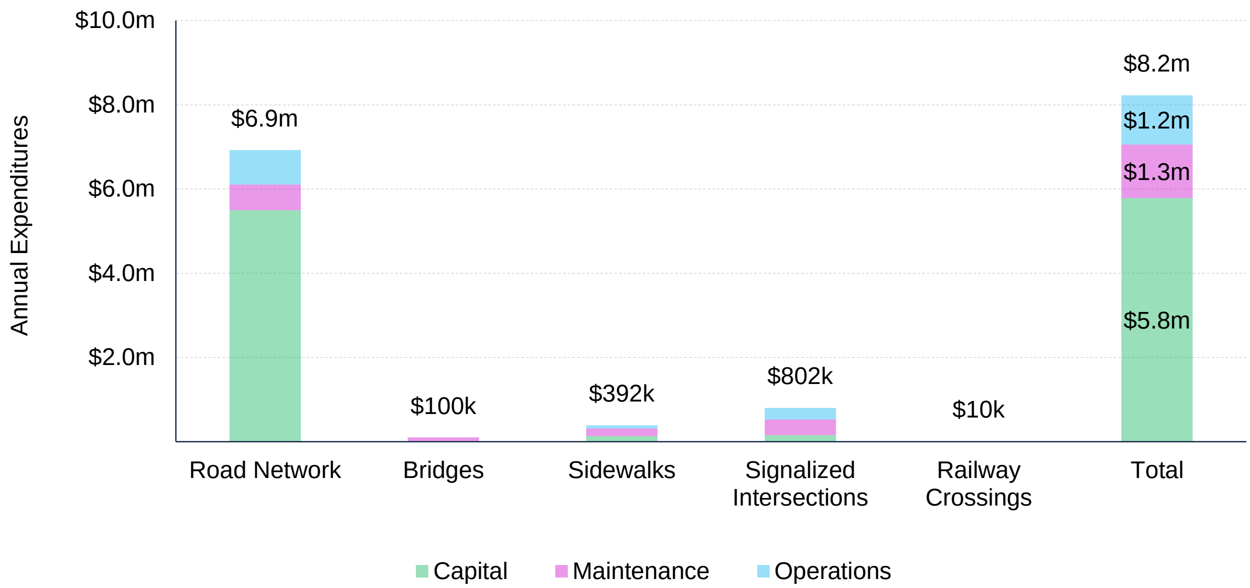
The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair, and replacement activities are guided by technical external condition assessment surveys, asset age, and staff judgment through routine inspections and monitoring. Priority levels and other contextual information is used to select the right lifecycle activity at the right time. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 7.

Table 7: Components of a Lifecycle Framework

Component	Description		
Activity	The treatment, event, or intervention implemented,		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Activity Trigger	This can include an asset's age and/or a minimum condition threshold. Other triggers may include priority levels, service request, and previously established frequency.		
Impact on Serviceable Life	Impact on an asset's serviceable lifespan resulting from the activity completed		
Annual Budget	Typical funding envelope available (actual spending may vary from year to year).		
Reinvestment Rate	Annual capital budget envelope of each activity as a portion of the total Transportation asset portfolio replacement cost of **$533,082,257**.		

Figure 14 summarizes total annual expenditures by asset segment and expenditure type. On average, the City allocates $8.2 million annually on Transportation assets. Major capital expenditures on bridges vary year-to-year and depend on the types of defects and repair needs identified by bridge inspections. Road paving represents the largest program within Transportation services, accounting for more than 70% of all expenditures.

Figure 14: Summary of Capital, Maintenance, and Operations Expenditures



Of the $8.2 million annual Transportation budget, $7.1 million is spent on the inspection, maintenance, and replacement, of assets. An additional $1.2 million is allocated annually towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., snow removal, signal timing readjustments, street sweeping).

The following table outlines the City’s lifecycle framework for Transportation assets.

Table 8: Lifecycle Framework

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Road Paving - Arterials	Capital	Condition	Extended by 25 years	$1,500,000
Road Paving - Collectors	Capital	Condition	Extended by 25 years	$1,500,000
Road Paving - Locals	Capital	Condition	Extended by 25 years	$2,300,000
Road Paving - Lanes	Capital	Condition	Extended by 25 years	$200,000
Sidewalk Rehabilitation	Capital	Inspection	Extended by 50 years	$130,000
Major bridge repairs, upgrades, and replacements	Capital	Condition	Extended by 10-75 years	Not budgeted
Major retaining wall repairs, upgrades and replacements	Capital	Poor	Extended by 10-75 years	Not budgeted
Streetlight Pole Replacement	Capital	Inspection	Extended by 25 years	$32,000
Signal Pole Replacement	Capital	Inspection	Extended by 25 years	$65,000
Streetlight Bulb Replacement	Capital	Every 15 years	Extended by 15 years	$57,500
Sub-Total Capital				**$5,784,500**
Asphalt Repairs	Maintenance	Condition	Extended by 10 years	$275,000
Crack Sealing	Maintenance	Condition	Extended by 10 years	$55,000
Pot Hole Repairs	Maintenance	Condition	Extended by 5 years	$90,000
Curb and Gutter Repairs	Maintenance	Condition	Extended by 5 years	$64,500
Downtown Parking Lots	Maintenance	Condition	Extended by 5 years	$16,700
Grading - Lanes	Maintenance	Scheduled	Extended by 3 years	$100,000
Sidewalk Inspections	Maintenance	Scheduled	Extended by 5 years	$10,000
Sidewalk repairs and maintenance	Maintenance	Scheduled	Extended by 5-10 years	$120,000
Bus Stop Maintenance	Maintenance	Scheduled	Extended by 5 years	$3,000

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Boulevard Maintenance	Maintenance	Scheduled	Extended by 5 years	$50,000
Bridge inspection	Maintenance	Scheduled	Variable	$100,000
Minor bridge repairs and maintenance	Maintenance	Condition	Extended by 5-10 years	Not budgeted
Retaining wall Inspection	Maintenance	Scheduled	Extended by 10-20 years	Not budgeted
Minor retaining wall repairs and Maintenance	Maintenance	Poor	Extended by 5-10 years	Not budgeted
Traffic Signal Repairs	Maintenance	Inspection	Extended by 10 years	$240,000
Traffic Signal Relamping	Maintenance	Inspection	Extended by 7 years	$3,000
Streetlight Panel Repairs and Replacement	Maintenance	Inspection	Extended by 15 years	$45,000
Streetlight Painting and Numbering	Maintenance	Inspection	Extended by 5 years	$18,000
Sign Installation and Repairs	Maintenance	Scheduled	Extended by 10 years	$70,000
Railway Crossing Maintenance	Maintenance	Condition	Extended by 5 years	$10,000
Sub-Total Maintenance				**$1,270,2000**
Street Sweeping	Operations	Scheduled	No impact	$165,000
Snow & Ice Response	Operations	Priority	No impact	$400,000
Dust Control – Lanes	Operations	Scheduled	No impact	$32,300
Vandalism	Operations	By request	No impact	$6,500
Illegal Dumping	Operations	By request	No impact	$80,000
Christmas Decorations	Operations	Scheduled	No impact	$24,180
Road Marking Inspection and Cleaning	Operations	Scheduled	No impact	$113,500
Sidewalk Grinding	Operations	Scheduled	No impact	$9,000
Sidewalk Snow & Ice Response	Operations	Weather and Priority	No impact	$70,000

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Signal Adjustments	Operations	Traffic Condition	No impact	$25,000
Streetlight Outages	Operations	Inspection	No impact	$60,000
Sign Layout and Manufacturing	Operations	By request	No impact	$160,000
Sign Inspection and Cleaning	Operations	Inspection	No impact	$5,100
New Traffic Control Sign Installations	Operations	Inspection	No impact	$21,500
Sub-Total Operations				**$1,172,080**
Total				**$8,226,780**

Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 9 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 9 shows that the City's annual Transportation capital expenditures of $6.1 million yield an overall, service area reinvestment rate of 1.1%.

Table 9: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Road Network	$5,775,000	2.2%	1.1%
Bridges	$0	0.0%	0.0%
Sidewalks	$130,000	0.5%	0.0%
Streetlights	$89,500	0.4%	0.02%
Signalized Intersections	$154,500	0.6%	0.0%
Retaining Walls	$0	0.0%	0.0%
Railway Crossings	$0	0.0%	0.0%
Total	**$5,784,500**		**1.1%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

With respect to transportation infrastructure, the CIRC report card contained reinvestment rates only for roads, sidewalks, and bridges. Rates for all transportation assets were unavailable from CIRC, but an average of 1-3% is typically used for major infrastructure groups, such as roads, facilities, water, sanitary, and storm.

System Generated Reinvestment Rates

Using the City’s inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending, or allocations to reserves, to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates. For Transportation assets, the average annual requirements total $15,648,055, for a system-generated target reinvestment rate of 2.9%.

Table 10: System-generated Reinvestment Rates

Segment	AAR	System-generated TRR
Road Network	$11,198,595	4.3%
Bridges	$2,397,502	1.4%
Sidewalks	$560,111	2.1%
Curb and Gutter	$496,397	1.9%
Streetlights	$402,380	2.0%
Signalized Intersections	$476,178	2.0%
Retaining Walls	$105,342	1.3%
Railway Crossings	$11,550	2.0%
Total	**$15,648,055**	**2.9%**

Comparative Analysis

Table 11 compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide.

Table 11: Transportation Capital Reinvestment Rate Comparison

Benchmark	Assets Included	Target Capital Reinvestment Range	2016 Municipal Average	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
CIRC	Roads and Sidewalks	2.0% - 3.0%	1.1%	2.1%	1.1%
CIRC	Bridges	1.0% - 1.5%	0.8%	0%	0%
Citywide Asset Manager	Roads and Sidewalks	4.1%	1.1%	2.1%	1.1%
Citywide Asset Manager	Bridges	1.4%	0.8%	0%	0%
Citywide Asset Manager	All Transportation Assets	2.4%	1-3%	<0.5%	1.1%

The analysis shows that, at the segment level, Port Coquitlam's reinvestment rate for roads and sidewalks is comparable to the CIRC range but below system-generated targets: the City is reinvesting 2.1 % of the total replacement cost of all roads and sidewalks back into these assets each year. Investments in bridges can fluctuate substantially year to year. Overall, the City's capital reinvestment rate of 1.1% for transportation, while in line with the 2016 municipal average, remains below both the CIRC and system-generated levels.

Maintaining adequate reinvestment rates –whether through actual spending on infrastructure programs or earmarking funds for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 12: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

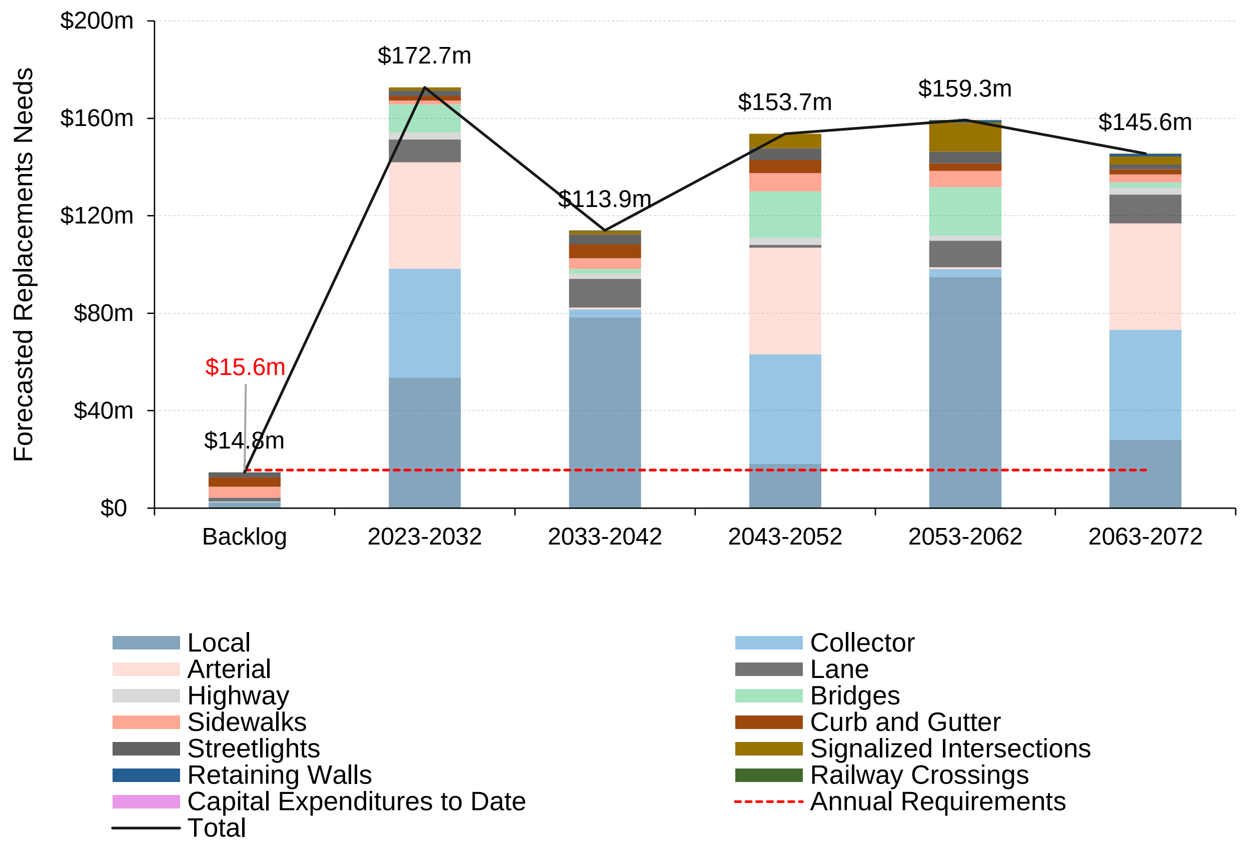
Forecasted Long-term Replacement Needs

In contrast to historical investments in infrastructure, Figure 15 illustrates the cyclical short-, medium- and long-term replacement requirements for Transportation assets over the coming decades. The City's average annual requirements for Transportation asset replacements total $15.6 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of approximately $5.8 million per year on Transportation asset replacements are less than half of the $15.6 million recommended to ensure that replacement needs are met.

The chart illustrates substantial capital needs through the forecast period. The first replacement spike, totaling $172.7 million is forecasted in the current decade—approximately 20 years after 2000-2009 during which the largest investments were made in transportation infrastructure.

Figure 15: Forecasted Long-term Replacement Needs



The chart also shows a Transportation age-based backlog of $14.8 million, comprising assets that have reached the end of their estimated useful life. However, the figure increases to $160.2

million when assets in poor or worse condition, or with less than 40% service life are included in the backlog estimate. These assets may be candidates for immediate or short-term replacement because they are in poor or very poor condition. Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates.

The magnitude of capital needs typically far exceeds what most agencies can afford to fund. risk-based approach can be used to direct funds where they are needed most first in order to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 16: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition (pavement distress), age, previous performance history, capacity challenges, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from non-eventful to severe. An uneven sidewalk with some surface distress may pose a minor inconvenience to residents. However, a bridge failure poses critical health and safety risks, and may disconnect areas of the City.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 13: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for major Transportation assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 17.

Figure 17: Risk Ratings and Lifecycle Strategy

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
13,522 Assets	7,960 Assets	2,271 Assets	2,273 Assets	193 Assets
$77,602,234	$79,119,989	$176,004,717	$169,224,767	$31,130,550

► **Strategy**: Monitoring, e.g., routine inspections
► **Goal**: Detetect any early signs of wear or potential issues

► **Strategy**: Monitoring and proactive management and preventative maintenance
► **Goal**: Prevent escalation of issues and further disrepair

► **Strategy**: Immediate action, e.g., repair or replacement
► **Goal**: Avoid further downtime, and reduce consequences of asset failure

Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

This following section outlines the proposed risk models for Transportation assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are illustrated for each major asset type, as well as major Transportation Services assets as a whole.

Risk Matrix: All Major Transportation Assets

The following summary-level risk matrix show how roads, sidewalks, retaining walls, and bridges are classified based on their risk ratings.

Figure 18: Detailed Risk Matrix – Major Transportation Assets

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	12 Assets $117.5M	10 Assets $23.8M	13 Assets $10.5M	0 Assets $0	1 Asset $11.6M
3	147 Assets $8.3M	191 Assets $16.1M	518 Assets $47.6M	342 Assets $45.9M	70 Assets $1.4M
2	501 Assets $16.2M	683 Assets $22.7M	1,619 Assets $57.7M	1,689 Assets $69.1M	252 Assets $2.7M
1	227 Assets $731.5K	1,147 Assets $2.2M	2,194 Assets $4.7M	343 Assets $2.4M	1,013 Assets $1.5M

Probability of Failure

To provide a more simplified view, the matrix below consolidates assets into broader risk classifications. The figure illustrates that 193 assets, with a current replacement cost of $31.1 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 2,273 assets, with a current replacement cost of $169.2 million, were classified with a high risk rating.

Figure 19: Consolidated Risk Matrix - Major Transportation Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
2,575 Assets	3,660 Assets	2,271 Assets	2,273 Assets	193 Assets
$18,269,038	$67,869,193	$176,004,717	$169,224,767	$31,130,550

Road Network

The City's road network datasets contain several essential attributes that have been integrated into these risk models, including condition data such as Pavement Quality Index (PQI), road class, and route designations (e.g., heavy truck route, disaster response route).

In the model below for probability of failure, a road section's PQI was determined to be the best predictor of its potential failure. Hence, it received the largest relative weighting, at 75%. This general approach is used for all probability of failure models.

Figure 20: Probability of Failure – Road Network

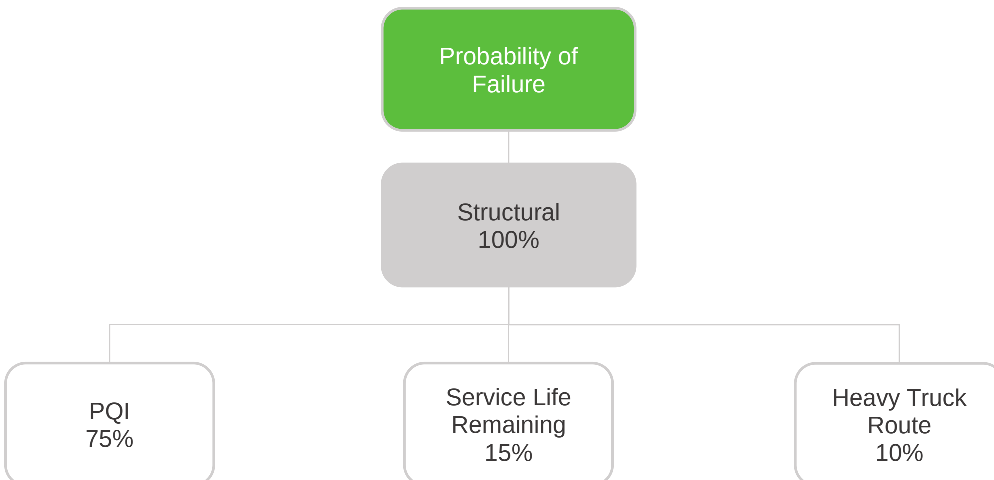


Table 14 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 75% or less, or with a remaining service life of less than 15%, have the highest likelihood of failure, i.e., 'Almost Certain'.

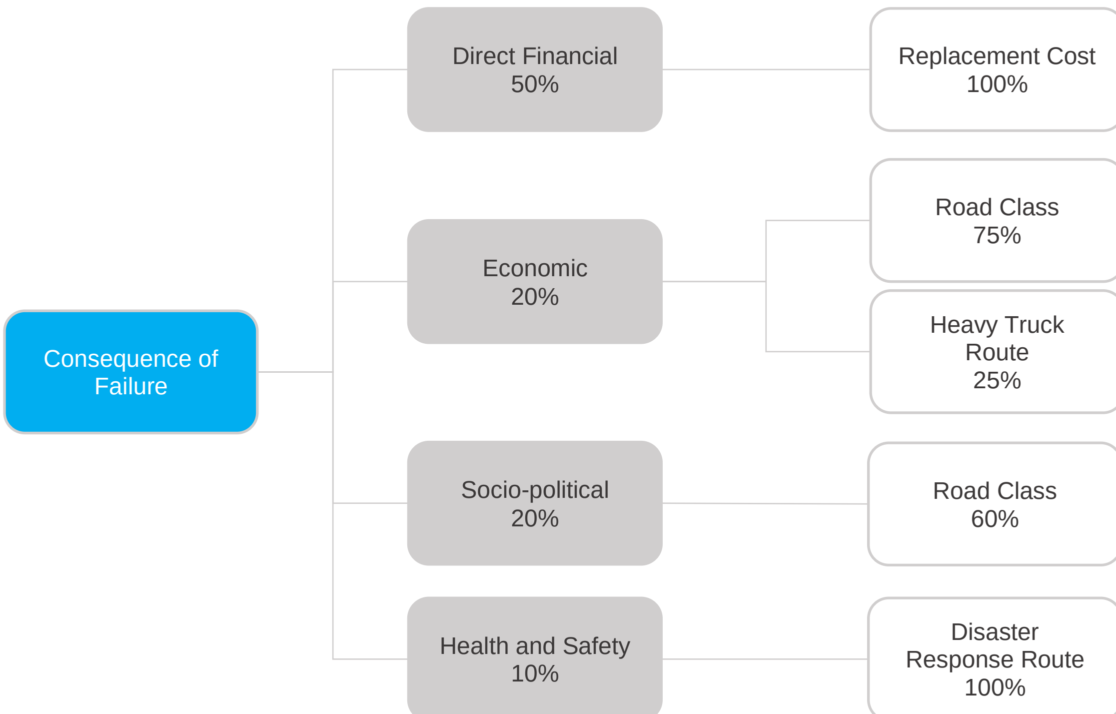
Table 14: Defining Probability of Failure Ranges – Road Network

Factor	Range (0-100%)	Probability of Failure
PQI (%)	100	1—Rare
	70 - 99	2—Unlikely
	50 - 70	3—Possible
	20 - 50	4—Likely or Probable
	0 - 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain
Heavy Truck Route	No	2—Unlikely
	Yes	3—Possible

The model below outlines the type of potential consequences that may result from failure of the City's roads, the relative weight of each consequence type, and the data (attributes) used to approximate that effect.

For example, high capacity roadways such as highways and arterial roads carry a higher volume and variety of traffic than local roads. Traffic speeds along these roads are also much higher than other road types. As a result, Road Class was determined to be the best proxy for an asset's economic consequence of failure, receiving the highest relative weighting of 75%.

Figure 21: Consequence of Failure – Road Network



This approach was used for all consequence of failure models developed for Transportation assets.

Table 15: Defining Consequence of Failure Ranges – Road Network

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Economic	Road Class	Consequence of Failure
	Lane	1—Insignificant
	Local	2—Minor
	Collector	3—Moderate
	Arterial	4—Major
	Highway	5—Severe
	Heavy Truck Route Designation	Consequence of Failure
	No	2—Minor
	Yes	4—Major
Socio-political	Road Class	Consequence of Failure
	Lane	1—Insignificant
	Local	2—Minor
	Collector	3—Moderate
	Arterial	4—Major
	Highway	5—Severe
Health and Safety	Disaster Response Route Designation	Consequence of Failure
	No	2—Minor
	Yes	5—Severe

Risk Matrix: Road Network

The risk matrix below is based on the previous risk model developed for the City's road network. It is generated using available asset data.

Figure 22: Detailed Risk Matrix - Road Network

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	1 Asset $59.4K	7 Assets $1.2M	10 Assets $2.7M	0 Assets $0	0 Assets $0
3	15 Assets $1.8M	105 Assets $13.5M	425 Assets $37.9M	340 Assets $43.9M	0 Assets $0
2	177 Assets $9.8M	459 Assets $20.4M	1,268 Assets $54.1M	1,678 Assets $68.9M	2 Assets $56.7K
1	44 Assets $306.1K	87 Assets $792.7K	183 Assets $1.8M	277 Assets $2.3M	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 23 shows that 1,993 road segments, with a current replacement cost of $142 million have a high risk to very high risk rating. Assets with these risk ratings typically have a minimum probability of failure of 'Possible' and a moderate to severe potential consequence of failure.

Figure 23: Consolidated Risk Matrix – Road Network

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
268 Assets	1,527 Assets	1,290 Assets	1,873 Assets	120 Assets
$8,011,943	$48,389,788	$61,067,147	$125,756,235	$16,237,191

Sidewalks

Figure 24: Probability of Failure – Sidewalks

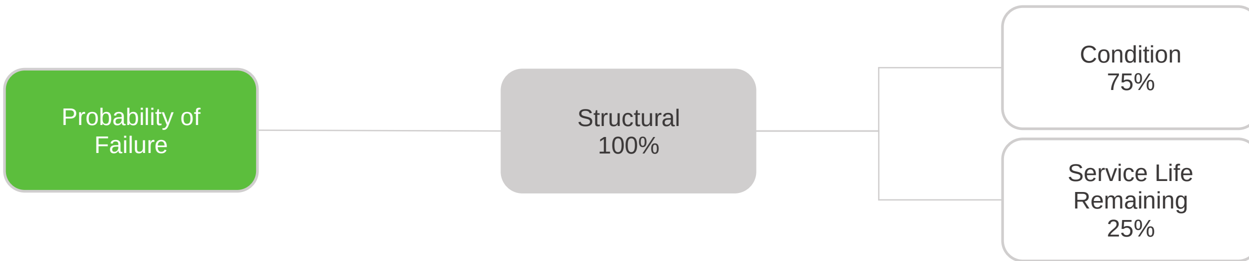


Table 16: Defining Probability of Failure Ranges - Sidewalks

Factor	Range (0-100%)	Probability of Failure
Condition (%)	100	1—Rare
	70 - 99	2—Unlikely
	50 - 70	3—Possible
	20 - 50	4—Likely or Probable
	0 - 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 25: Consequence of Failure – Sidewalks

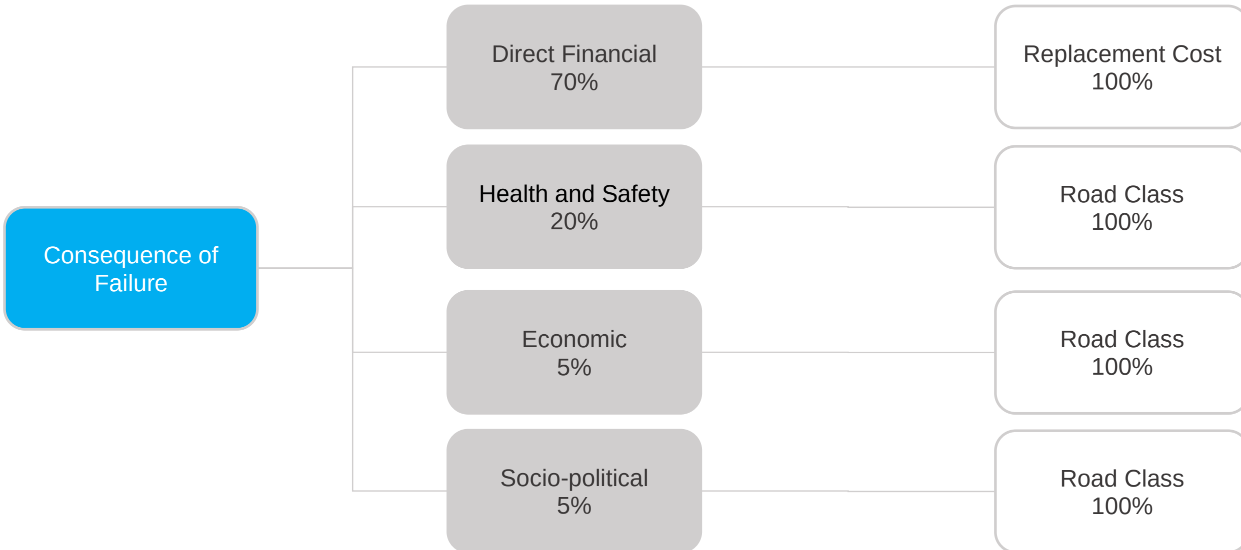


Table 17: Defining Consequence of Failure Ranges - Sidewalks

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1- Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
Health and Safety	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector	3—Moderate
	Arterial/Highway	4 – Major
Economic	Road Class	Consequence of Failure
	Lane/Local/	2—Minor
	Collector	3 - Moderate
	Arterial/Highway	4 – Major
Socio-political	Road Class	Consequence of Failure
	Lane/Local	2 – Minor
	Collector	3 - Moderate
	Arterial/Highway	4 – Major

Risk Matrix: Sidewalks

The risk matrix below is based on the previous risk model developed for the City's sidewalks.

Figure 26: Detailed Risk Matrix – Sidewalks

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	1 Assets $128.3K	0 Assets $0	1 Asset $110.5K	0 Assets $0	0 Assets $0
3	107 Assets $2.7M	84 Assets $2.2M	85 Assets $1.8M	1 Asset $43.6K	70 Assets $1.4M
2	190 Assets $2.8M	224 Assets $2.3M	351 Assets $3.5M	11 Assets $141.5K	250 Assets $2.6M
1	138 Assets $306.6K	1,060 Assets $1.4M	2,011 Assets $3.0M	66 Assets $80.0K	1,013 Assets $1.5M

Probability of Failure

The consolidated risk matrix in Figure 27 shows that 71 sidewalk sections with a current replacement cost of $1.4 million have a very high risk rating. Assets with this risk rating have a minimum probability of failure of 'Possible' and a moderate to severe potential consequence of failure. An additional 387 assets, with a combined replacement cost of $5.2 million, carry a high risk rating.

Figure 27: Consolidated Risk Matrix – Sidewalks

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
2,116 Assets	2,109 Assets	980 Assets	387 Assets	71 Assets
$4,571,769	$9,901,360	$4,937,571	$5,243,532	$1,418,359

Figure 28: Probability of Failure – Retaining Walls

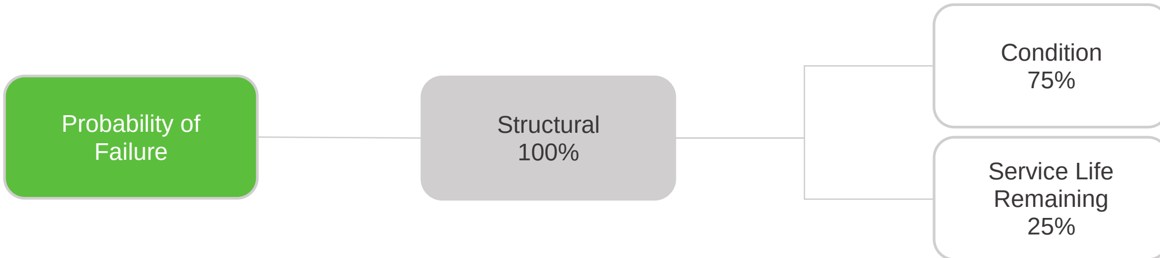


Table 18: Defining Probability of Failure Ranges - Retaining Walls

Factor	Range (0-100%)	Probability of Failure
Condition (%)	100	1—Rare
	70 - 99	2—Unlikely
	50 - 70	3—Possible
	20 - 50	4—Likely or Probable
	0 - 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 29: Consequence of Failure – Retaining Walls

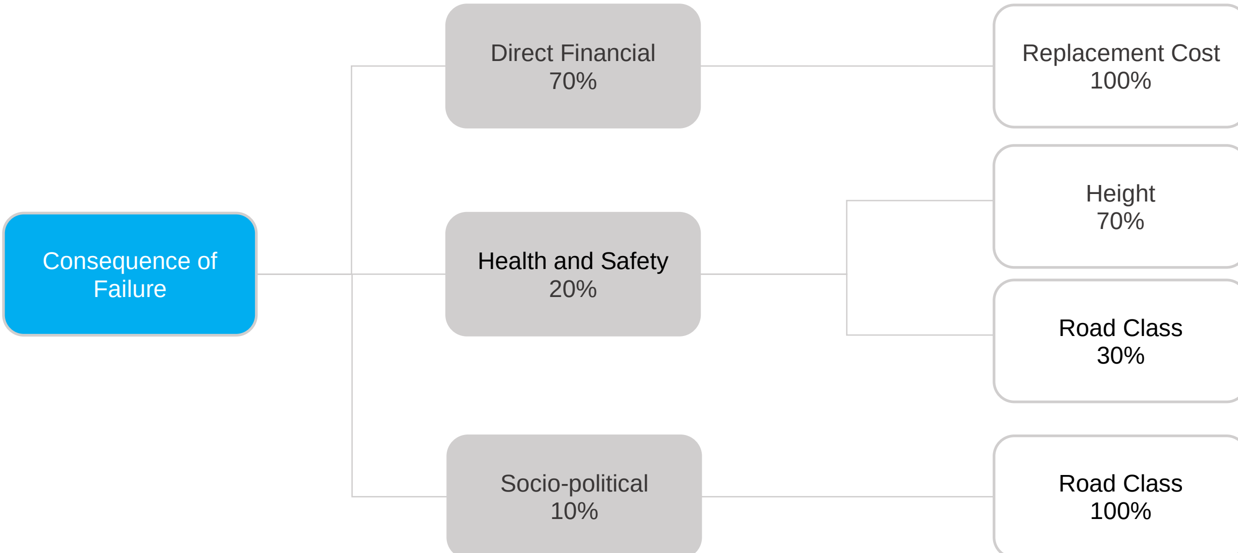


Table 19: Defining Consequence of Failure Ranges - Retaining Walls

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1— Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 – $100,000	3—Moderate
	$100,000 to $500,000	4—Major
	More than $500,000	5 - Severe
Health and Safety	Height	Consequence of Failure
	Less than 2m	2—Minor
	2m - 4m	3—Moderate
	4m - 8m	4—Major
	Greater than 8m	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector	3—Moderate
	Arterial/Highway	5—Severe
Socio-political	Road Class	Consequence of Failure
	Lane/Local	1—Insignificant
	Collector	3—Moderate
	Arterial/Highway	5—Severe

Risk Matrix: Retaining Walls

The risk matrix below is based on the previous risk model developed for the City's retaining walls.

Figure 30: Detailed Risk Matrix – Retaining Walls

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	5 Assets $1.6M	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
3	17 Assets $2.6M	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
2	131 Assets $3.5M	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
1	45 Assets $118.7K	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 31 shows that all retaining walls are currently classified with a very low to low risk rating. However, as no inspection data was available, only age was used to approximate the condition of retaining walls. This may distort the asset's probability of failure rating.

Figure 31: Consolidated Risk Matrix – Retaining Walls

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
188 Assets	10 Assets	0 Assets	0 Assets	0 Assets
$5,580,826	$2,263,045	$0	$0	$0

Bridges

Figure 32: Probability of Failure – Bridges

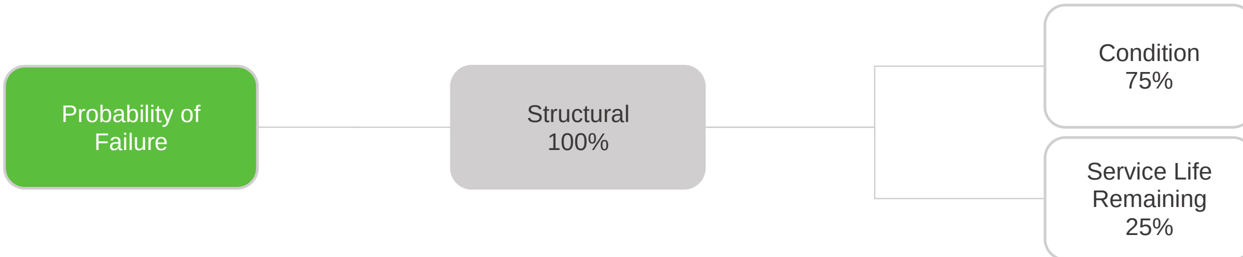


Table 20: Defining Probability of Failure Ranges - Bridges

Factor	Range (0-100%)	Probability of Failure
Condition (%)	100	1—Rare
	70 - 99	2—Unlikely
	50 - 70	3—Possible
	20 - 50	4—Likely or Probable
	0 - 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 33: Consequence of Failure – Bridges

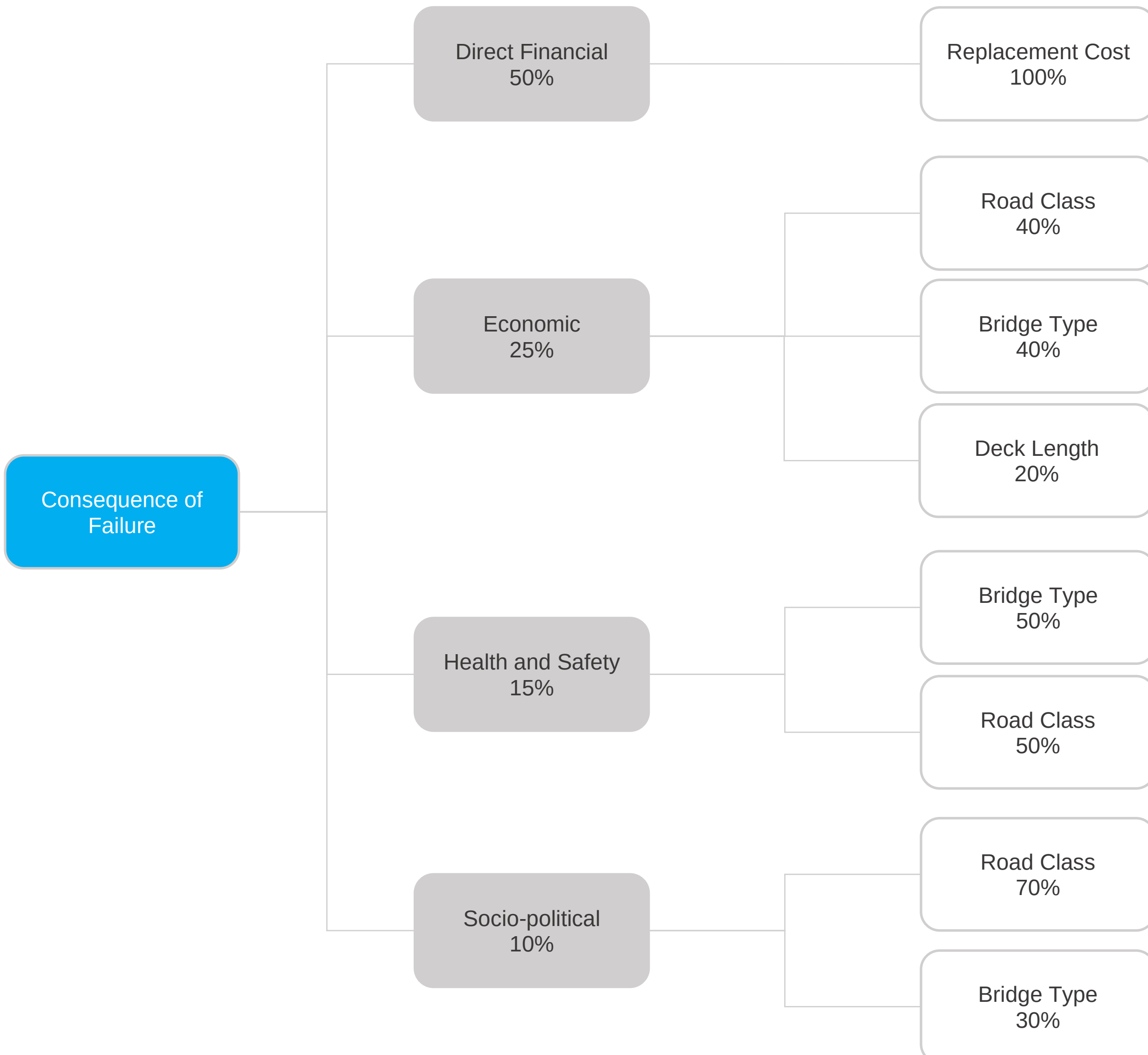


Table 21: Defining Consequence of Failure Ranges - Bridges

Type of Consequence	Measurement	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1 - Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - 100,000	3—Moderate
	$100,000 - 500,000	4—Major
	More than $500,000	5—Severe
Economic	Deck Length	Consequence of Failure
	5m or Less	2—Minor
	5m - 30m	3—Moderate
	30m - 100m	4—Major
	More than 100m	5—Severe
	Bridge Type	Consequence of Failure
	Pedestrian	2 – Minor
	Vehicle	4—Major
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector	3—Moderate
	Arterial	4—Major
	Highway	5—Severe
Health and Safety	Bridge Type	Consequence of Failure
	Pedestrian	3—Moderate
	Vehicle	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector	3—Moderate
	Arterial	4—Major
	Highway	5—Severe
Socio-political	Bridge Type	Consequence of Failure
	Pedestrian	3 – Moderate
	Vehicle	4—Major
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector	3—Moderate
	Arterial	4—Major
	Highway	5—Severe

Risk Matrix: Bridges

The risk matrix below is based on the previous risk model developed for the City's bridges.

Figure 34: Detailed Risk Matrix – Bridges

Consequence of Failure	Probability of Failure 1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	5 Assets $115.7M	3 Assets $22.7M	2 Assets $7.7M	0 Assets $0	1 Asset $11.6M
3	8 Assets $1.3M	2 Assets $330.0K	8 Assets $7.9M	1 Asset $1.9M	0 Assets $0
2	3 Assets $104.5K	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
1	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0

The consolidated risk matrix in Figure 35 shows that two City bridges (Eastbound Lougheed Highway vehicle bridge and the McAllister Avenue pedestrian bridge), with a replacement value of $13.5 million carry a very high risk rating, due to their high probability of failure and major potential consequences of a failure event. An additional 13 assets, with a combined replacement cost of $38.2 million were classified with a high risk rating. This includes the Westbound Lougheed Highway section.

Figure 35: Consolidated Risk Matrix – Bridges

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
3 Assets	14 Assets	1 Asset	13 Assets	2 Assets
$104,500	$7,315,000	$110,000,000	$38,225,000	$13,475,000

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 22: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the various **activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 23 outlines the four core values and service developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 23: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Transportation, a total of 68 KPIs were selected. This included 26 KPIs to measure customer levels of service, and 42 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 24: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
# of service requests related to road rehabilitation	0	15	41	43	↗
% of transportation assets in poor or worse condition	*	*	*	30	*
% of roads in poor or worse condition	*	*	*	43	*
% of bridges in poor or worse condition	*	*	*	8	*
% of sidewalks in poor or worse condition	*	*	*	49	*
% of traffic signals or lights in poor or worse condition	*	*	*	9	*
Maintenance					
# of service requests related to bridges	8	12	17	22	↗
# of service requests related to barricades/no-posts/guard rail	30	42	50	57	↗
# of service requests for lane maintenance	87	124	135	152	↗
# of service requests for potholes	223	291	303	312	↗
# of service requests for sinkholes	15	26	26	17	→
# of service requests for road repairs (crack sealing, patching)	101	140	125	83	↘
# of service requests related to sidewalk maintenance, curb, and driveway letdowns	148	233	278	261	→
Operations					
# of service requests related to illegal dumping	522	680	779	968	↗
# of calls related to vandalism	5	11	9	6	→
# of service requests for dust control	34	23	41	58	↗
# of service requests for shoulder grading	7	15	17	16	→
# of service requests related to snow removal on roads	44	71	119	125	↗
# of service requests related to pavement markings	3	29	44	32	→
# of service requests related to streetlight maintenance (City)	1	141	332	354	↗
# of service requests related to streetlight maintenance (BC Hydro)	0	47	97	118	↗
# of service requests related to street signage	2	154	258	195	→
# of service requests for traffic signal maintenance	0	66	99	65	→
# of service requests for driveway let downs	0	11	27	32	↗
# of service requests for street sweeping	148	158	131	163	→

Table 25: Technical Levels of Service

KPI	2021	Budget
Capital		
Annual capital investment in sidewalk rehabilitation	$130,000	$130,000
Annual capital investment in local road paving	$3,000,000	$2,300,000
Annual capital investment in lane paving	$200,000	$200,000
Annual capital investment in collector road paving	$445,000	$1,500,000
Annual capital investment in arterial road paving	$1,925,000	$1,500,000
Annual capital investment in streetlight pole replacement	12	$32,000
Annual capital investment in streetlight bulb replacement (of 3377)	241	$57,500
Annual capital investment in traffic signal pole replacements (0f 251)	0	$65,000
Average annual reinvestment rate in road bridge replacement	$0	$0
Average annual reinvestment rate in pedestrian bridge replacement	$0	$0
Annual capital investment	$5,700, 000	$5,784,500
Maintenance		
Bus stop inspection, maintenance and repairs (of 5 City shelters) - scheduled and reactive	5 inspections, 1 repair	$3,000
Parking lot inspection, maintenance and repairs (of 4 lots)	4 inspections and repairs	$16,700
Annual capital investment in asphalt repairs		$275,000
Grading and repair of gravel lanes (42km), parking lots (5), shoulders (planned & reactive)	84km	$100,000
Bridge inspection, maintenance and repair	31	$100,000
Streetlight panel inspection and replacement	6	$45,000
Annual maintenance costs for rail crossings (3)	3	$10,000
Traffic signal inspection and repair (of 251)	251	$240,000
Traffic signal relamping (of 251)		$3,000
Signs inspection and repair (of 7,700, based on 10-year cycle)	1,634	$70,000
Meters of crack sealing completed (per 195km of paved roads)	35km	$55,000

KPI	2021	Budget
# of potholes filled (per 225km of roads and lanes)	807	$90,000
Sidewalk maintenance and repair (of 66,000 m^2)	155	$120,000
Curb and gutter repairs (of 203km)	n/a	$64,500
Sidewalk inspections - scheduled (per 66,000 m^2)	100%	$10,000
City owned boulevard and median maintenance – scheduled and reactive	100%	$50,000
Streetlight poles painted annually (0f 225)	43	$18,000
Average annual maintenance expenditures		$1,270,000
Operations		
Dust control - gravel lanes (42km) and gravel parking lots (5)	48 km	$32,300
# of illegal dumping responses	589	$80,000
Vandalism (as reported)	100%	$6,500
Road and bridge sweeping - scheduled and reactive	423 lane-km	$165,000
Christmas Decorations	100%	$24,180
Streetlight Outages	N/A	$60,000
Traffic signals inspection and adjustment (of 54)	55	$25,000
Road marking inspection and repainting	34	$113,500
Sign inspection and cleaning	676	$5,100
Traffic control signs manufactured	3,697	$160,000
New traffic control sign installations	313	$21,500
Sidewalk grinding (trip hazards)	N/A	$9,000
Sidewalks and trails cleared of snow and ice hazards - scheduled per Priority 1, 2 & 3	100%	$70,000
Roads cleared of snow and ice hazards (of 202km) - scheduled per Priority 1, 2 & 3	100%	$400,000
Average annual operating expenditures		$1,172,080

Levels of Service Analysis

Table 26 provides the 4-year percentage change in service requests for KPIs that best align with asset condition and performance. These may be helpful indicators in determining if sufficient funding and resources are being allocated to the maintenance and replacement of assets.

Table 26: Trends in Select Customer Levels of Service KPIs

KPI	Percentage change between 2018-2021
# of service requests for lane maintenance	+75%
# of service requests for potholes	+40%
# of service requests for road repairs (crack sealing, patching)	-18%
# of service requests for shoulder grading	+129%
# of service requests for sinkholes	+13%
# of service requests related to barricades/no-posts/guard rail	+90%
# of service requests related to bridges	+175%
# of service requests related to road rehabilitation	+187%
# of service requests related to sidewalk maintenance, curb and driveway letdowns	+76%

Table 27 shows the change in service requests for KPIs that best align with service delivery, but have no direct relationship with asset lifespans. These may be helpful indicators in determining if sufficient funding and resources are being allocated towards service delivery.

Table 27: Trends in Customer Levels of Service KPIs – Service Delivery

KPI	Percentage change between 2018-2021
# of service requests for street sweeping	+10%
# of calls related to vandalism	+20%
# of service requests related to illegal dumping	+85%

KPI data can be used to support decisions to maintain, increase, or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions.

For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 28 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Those service levels have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 28: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 29 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 29: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 36: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 30: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

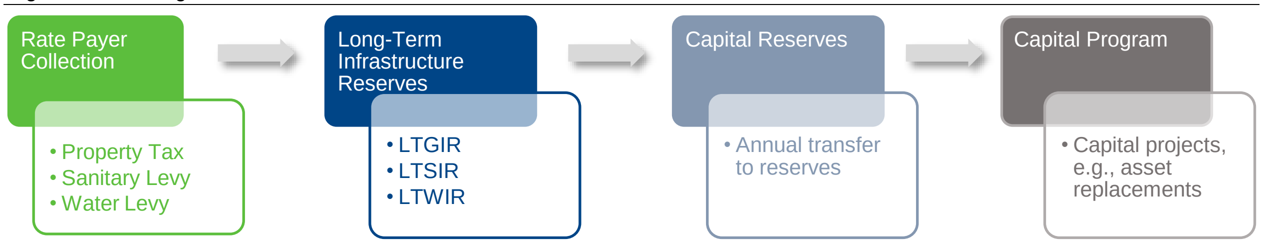
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 31: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 37: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 29. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies . The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 32, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 33, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

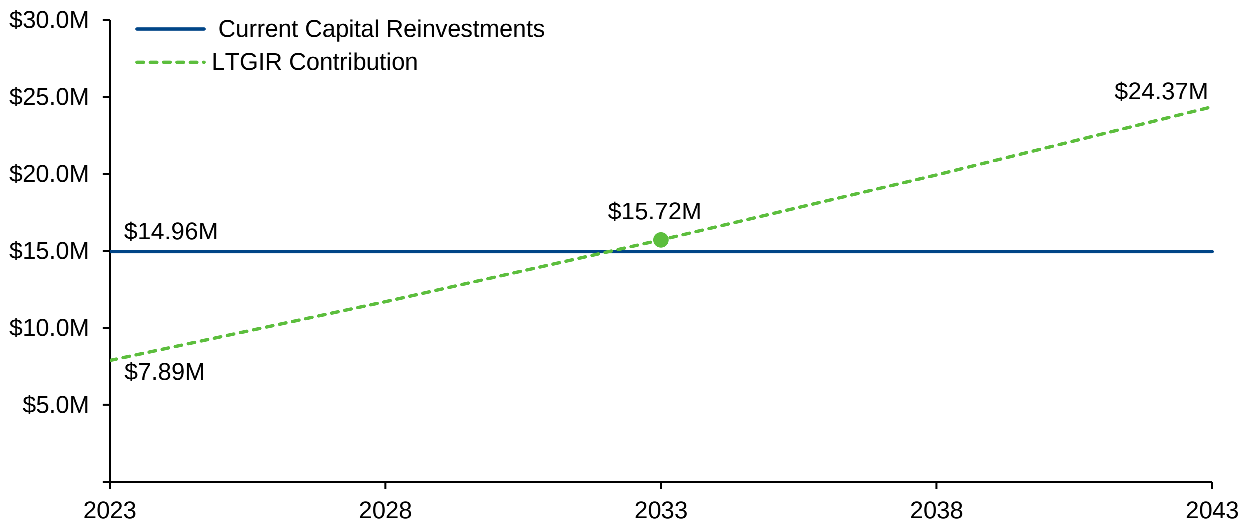
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 32 above as $15 million.

Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 38: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 32.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 33. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 34: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 35: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 36: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 36, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

We recommend that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 37: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 38: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 39: Annual Contributions to the LTWIR vs. Annual Capital Spending

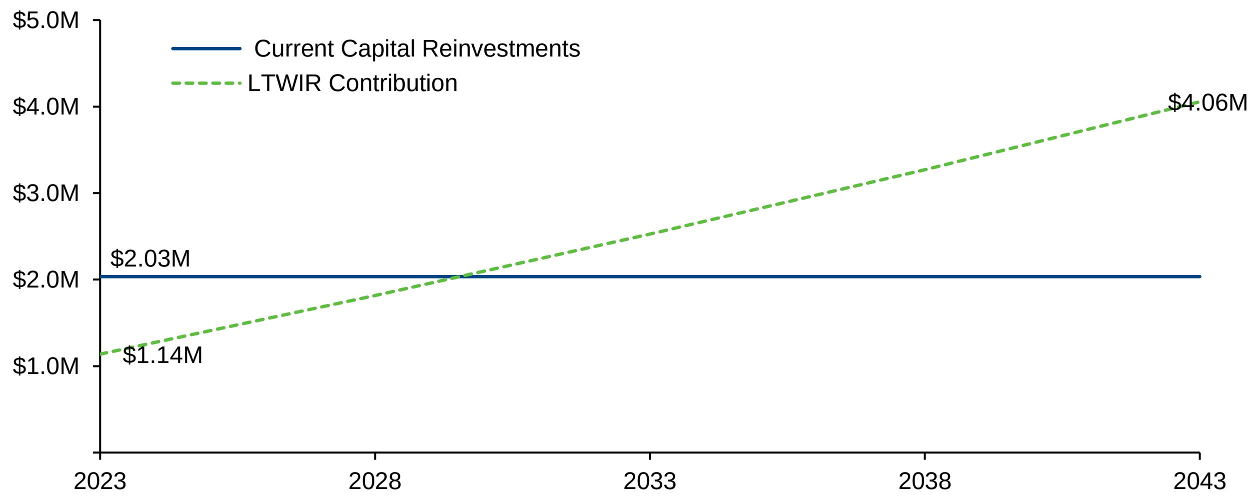
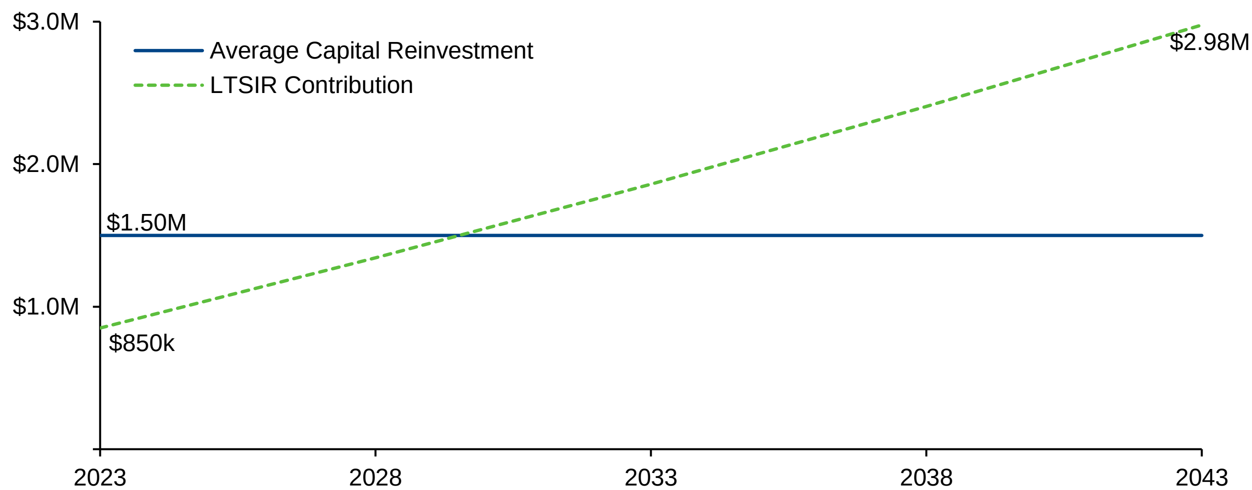


Figure 40: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 37, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 38 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 39: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 40: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 35: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 41: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 42: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 41, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 43 summarizes the infrastructure backlog for each service area.

Table 43: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 44 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 44: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 45: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 46: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.
- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.
- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Drainage

Final Version
August 2024

Contents

Executive Summary 7

Approach and Methodology 12
- Developing the Asset Management Plan 13
  - Build a comprehensive asset inventory 13
  - Conduct asset-level risk assessments and build risk models 14
  - Compile lifecycle activity data 14
  - Compile levels of service data 14
  - Develop financial strategy 14
- Limitations and Constraints 15

State of the Infrastructure 16
- Asset Hierarchy and Data Classification 17
- Inventory and Valuation 18
  - Costing Methods 18
- Asset Condition 21
  - Source of Condition Data 21
  - Condition Assessment Guidelines 23
  - Condition Rating System 24
  - Projected Asset Conditions 25
- Age Profile 27
  - Historical Asset Expenditures 27
  - Serviceable Life vs. Current Asset Age 28

Lifecycle Management 30
- Current Lifecycle Framework 31
- Reinvestment Rates 34
  - Reinvestment Rate Benchmarks 34
- Forecasted Long-term Replacement Needs 38

Risk Analysis 40
- Calculating Asset Level Risk 41
- Risk Models and Matrices 44
  - Risk Matrix: All Drainage Assets 44
  - Gravity Mains and Perforated Pipes 45
  - Drainage Culverts 50
  - Pump Stations and Other Assets 53

Levels of Service 56
- Defining Levels of Service 57
  - Levels of Service Framework 57
  - Levels of Service Analysis 62

Financial Strategy 64

Approach and Methodology 65
Current Financial Planning Framework 66
Capital Budget 66
Debt 66
Senior Government Support 68
Sustainability 68
Reserves 69
Development Cost Charges (DCC) Program 71
Achieving Reinvestment Rate Targets 72
Tax-Funded Service Areas 73
Levy-Funded Service Areas 79
Infrastructure Backlogs 84
Using Reserves 85
Leveraging Development Cost Charges (DCC) 86
Recommendations 87
Tax Funded Service Areas 87
Levy-Funded Service Areas 87
Next Steps 89

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Pipe Material by Length 20
Figure 5: Condition Assessment Year 22
Figure 6: Asset Condition: All Drainage Assets 25
Figure 7: Asset Condition: Drainage System – By Asset Type (Segment) 26
Figure 8: Historical Expenditures on Asset Acquisition 27
Figure 9: Average Asset Age vs. Estimated Useful Life 28
Figure 10: Percentage of Estimated Useful Life Consumed 29
Figure 11: Summary of Capital, Maintenance, and Operating Expenditures 32
Figure 12: Forecasted Long-term Replacement Needs 38
Figure 13: Calculating Risk Ratings 41
Figure 14: Generic Risk Matrix 43
Figure 15: Detailed Risk Matrix – All Drainage System Assets 44
Figure 16: Consolidated Risk Matrix – All Drainage System Assets 44
Figure 17 Probability of Failure – Gravity Mains and Perforated Pipes 45
Figure 18 Consequence of Failure – Gravity Mains and Perforated Pipes 47
Figure 19: Detailed Risk Matrix – Gravity Mains and Perforated Pipes 49
Figure 20: Consolidated Risk Matrix – Gravity Mains and Perforated Pipes 49
Figure 21: Probability of Failure – Drainage Culverts 50
Figure 22: Consequence of Failure – Drainage Culverts 51
Figure 23: Detailed Risk Matrix – Drainage Culverts 52
Figure 24: Consolidated Risk Matrix – Drainage Culverts 52
Figure 25: Probability of Failure – Pump Stations and Other Assets 53
Figure 26: Consequence of Failure – Pump Stations and Other Assets 54
Figure 27: Detailed Risk Matrix – Pump Stations and Other Assets 55
Figure 28: Consolidated Risk Matrix – Pump Stations and Other Assets 55
Figure 29: Historical MFA Lending Rates 67
Figure 30: Funding Flow 70
Figure 31: Annual Contributions to the LTGIR vs. Annual Capital Spending 74
Figure 32: Annual Contributions to the LTWIR vs. Annual Capital Spending 80
Figure 33: Annual Contributions to the LTSIR vs. Annual Capital Spending 80

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 21
Table 4: General Condition Rating Scale – All Assets 24
Table 5: PACP Pipe Rating Scale 24
Table 6: Components of a Lifecycle Framework 31
Table 7: Lifecycle Framework 33
Table 8: Current Reinvestment Rates 34
Table 9: System-generated Reinvestment Rates 35
Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks 36
Table 11: Purpose of Capital and Operating Budgets 37
Table 12: Types of Consequences of Asset Failure 42
Table 13 Defining Probability of Failure Ranges – Gravity Mains and Perforated Pipes 45
Table 14 Defining Consequence of Failure Ranges – Gravity Mains and Perforated Pipes 48
Table 15: Defining Probability of Failure Ranges – Drainage Culverts 50
Table 16: Defining Consequence of Failure Ranges – Drainage Culverts 51
Table 17: Defining Probability of Failure Ranges – Pump Stations and Other Assets 53
Table 18: Defining Consequence of Failure Ranges – Pump Stations and Other Assets 54
Table 19: Components of a Levels of Service Framework 57
Table 20: Core Values and Service Statements 58
Table 21: Customer Levels of Service 59
Table 22: Technical Levels of Service 60
Table 23: Trends in Select Customer Levels of Service KPIs – Asset Condition and Performance 62
Table 24: Trends in Customer Levels of Service KPIs – Service Delivery 62
Table 25: Balancing Cost, Performance, and Risk 63
Table 26: Service Area Replacement Costs and Target Reinvestment Rates 65
Table 27: Long-Term Infrastructure Reserve Balances 69
Table 28: Capital Reserve Balances 70
Table 29: Comparing Average Annual Requirements Against Current Capital Reinvestments 73
Table 30: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 73
Table 31: Funding Levels and Resulting Funding Deficits 75
Table 32: Risks and Benefits of Funding Models 76
Table 33: Tax Rate Increase Required to Achieve Funding Levels 77
Table 34: Comparing Average Annual Requirements Against Current Capital Reinvestments 79
Table 35: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 79
Table 36: Funding Levels and Resulting Funding Deficits: Water Services 81
Table 37: Funding Levels and Resulting Funding Deficits: Sanitary Services 81
Table 38: Utility Rate Increase Required to Achieve Funding Levels: Water 82
Table 39: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 82
Table 40: Age- and Condition-based Infrastructure Backlogs 84
Table 41: Long-Term Infrastructure Reserves vs. Backlogs 85
Table 42: Development Cost Charges (DCC) Program 86
Table 43: Overlap Between DCC Program and Assets in Backlog State 86

23,000	Number of assets on record in the Drainage asset database
$446.1 million	2023 replacement cost of these assets
1980s	Decade with the highest capital expenditures on the construction or acquisition of Drainage assets ($140.2M)
2030s	Decade with the first major forecasted asset replacement spike ($61.4M)
37%	Percentage of assets in poor or worse condition, or less than 40% service life remaining
$162.1 million	Current age- and condition-based infrastructure backlog
$82.1 million	Current replacement cost of assets with a very high risk rating
$3.4 million	Annual City spending on capital, maintenance, and operations related to Drainage
1.7%	System-generated recommended capital reinvestment rate for Drainage assets ($7.4M per year)
0.6%	Port Coquitlam’s actual reinvestment rate ($2.5M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Drainage assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary Sewer, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Drainage portfolio includes 197 kilometers of gravity storm mains, 87km of culverts, 84km of service connections, 11 pump stations, and appurtenances, such as manholes, catch basins, cleanouts, and inspection chambers. The total current replacement cost of all Drainage assets was estimated at $446.1 million as of 2023, with gravity mains making up 42% of the valuation, followed by pump stations at 19%.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

Condition data was available for 60% of gravity mains, 25% of culverts, and 6% of perforated pipes through inspections from the City's annual CCTV program and culvert condition assessments. For all other assets, age was used to approximate asset condition.

Based on a combination of age and CCTV data, 63% of all Drainage assets are in fair or better condition. However, the remaining 37%, with a current replacement cost of more than $162 million, are in poor to very poor condition, with less than 40% service life remaining. This includes 25% of all gravity mains, with a current replacement cost of $45.9 million and 64% of pump station assets, valued at $54.8 million.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Data suggests that the largest expenditures in Drainage assets were made in the 1980s, totaling $140.2 million, and dominated by installation of gravity mains and pump stations. New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Drainage totals $3.4 million annually. Of that, $3.2 million per year is spent on the inspection, maintenance, and replacement of Drainage assets. An additional $183k per is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. Port Coquitlam is expected to experience a rapid increase in asset replacement needs in the 2030s, in excess of $61 million, and eventually peaking at more than $125 million in the 2050s as assets installed in the 1980s reach the end of their 70-year lifespan. A substantial portion of pump station assets may also be due for replacement during this decade.

Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $59.6 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to more than $162 million when assets in poor or worse condition, or less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in utility rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 261 assets, with a current replacement cost of $82.1 million have a very high-risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 4,972 assets, with a current replacement cost of $75.2 million, were classified with a high-risk rating. The majority of these assets are pump stations, culverts, and gravity mains.

Although many of these assets do carry a major to severe consequence of failure rating, their overall risk rating is also heavily influenced by a poor to very poor age-based condition rating—a proxy for the likelihood of asset failure.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Drainage, a total of 45 KPIs were selected. This included 18 KPIs to measure customer levels of service, and 27 to track the City's technical levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service. Technical levels of service can be thought of as the activities and steps (inputs) that an organization takes to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas
For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility
Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas
Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can may be used as supplementary viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

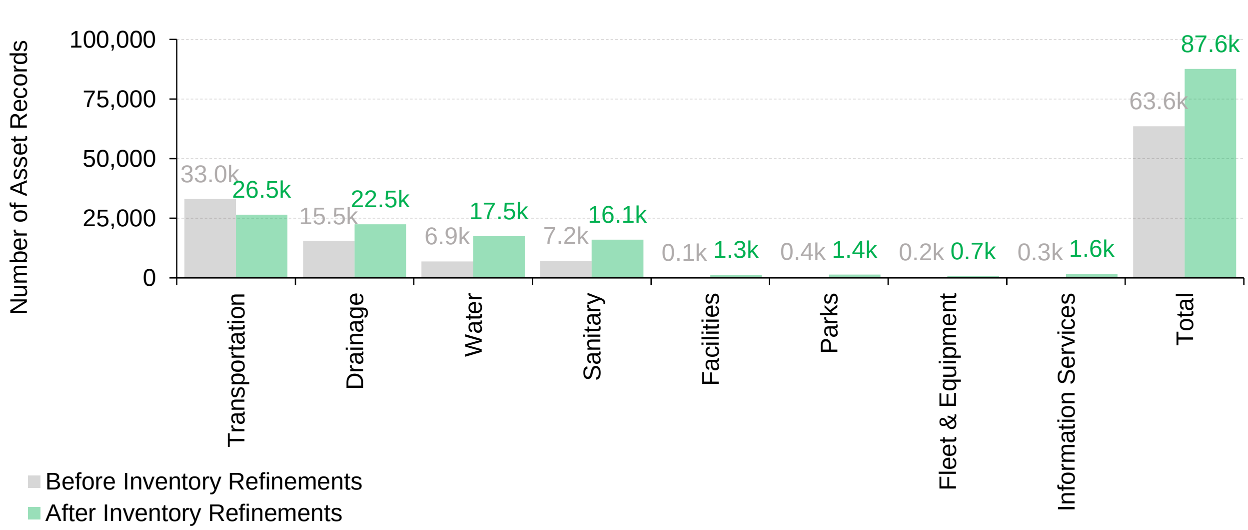
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth. A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 asset records to 87,647. For Drainage, data refinement led to a substantial increase in asset records, from less than 16,000 to 23,000- an increase of 46%.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budgets associated with each lifecycle activity. Data in available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., flushing of mains, main repairs, pump station maintenance), activities meant to ensure delivery and continuity of acceptable service levels were also included. For example, catch basin cleaning and storm and electricity for pump stations have no direct impact on asset lifespan, but they are part of providing Drainage services to residents.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable, and practical. To track the performance of Drainage service delivery, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. A total of 45 KPIs were selected, with 18 used for customer levels of service, and 27 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

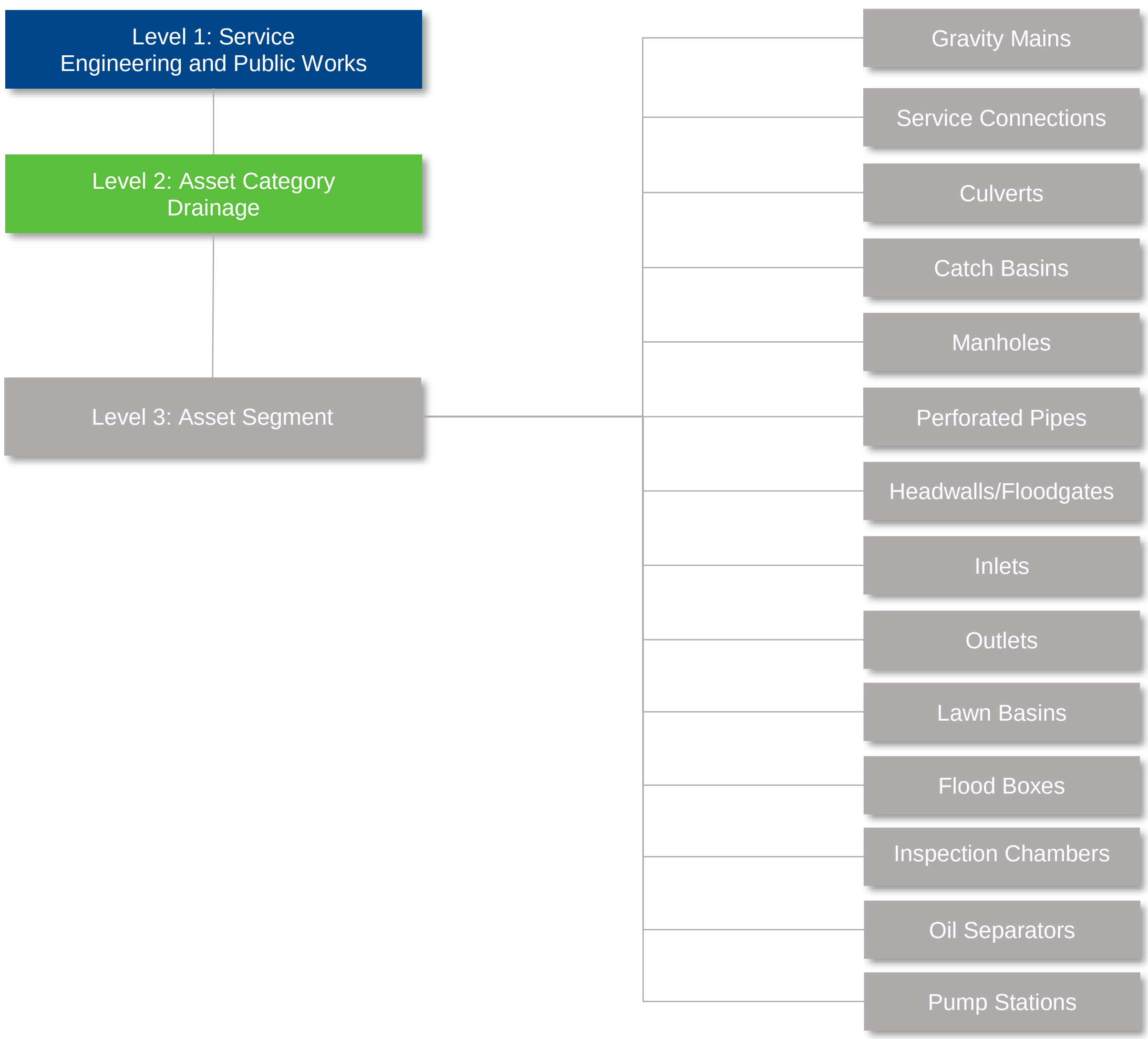
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of the City of Port Coquitlam's Drainage assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Drainage database contains more than 25,000 unique asset records, comprising 197 kilometers of gravity storm mains, 84km of service connections that connect properties to the City's Drainage system, and other assets such as catch basins, manholes and pump stations that facilitate the safe and effective management of stormwater runoff. The total current replacement cost of these assets was estimated at $446.1 million as of 2023.

Natural Assets

Natural assets, such as ditches and creeks, are essential elements of a stormwater management system. These watercourses serve as drainage channels, collecting and conveying urban and suburban stormwater runoff, helping to mitigate the risk of flash flooding and property damage. They also support wildlife habitat and help to filter pollutants from stormwater runoff. Natural assets were not included with this AMP, but can be considered with the development of a future natural asset management strategy.

The City's dikes were also not included with this AMP. However, they should be valued and considered along with climate change impacts as future work with the City's asset management program.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

Table 2 summarizes the quantity and current replacement cost of the City's Drainage assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of $261.7 million, mains and service connections comprise 60% of the portfolio.

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Gravity Mains	197,254m	$187,316,776	Cost per unit
Service Connections	84,247m	$74,351,639	Cost per unit
Culverts	8,689m	$31,487,495	Cost per unit
Catch Basins	5,404	$29,705,500	Cost per unit
Manholes	3,348	$25,779,600	Cost per unit
Pump Stations	11	$86,052,022	User defined
Perforated Pipes	4480m	$3,952,977	Cost per unit
Headwalls & Floodgates	177	$1,947,000	Cost per unit
Inlets	134	$1,474,000	Cost per unit
Outlets	128	$1,408,000	Cost per unit
Lawn Basins	359	$1,184,700	Cost per unit
Flood Box	24	$627,000	User defined
Inspection Chambers	174	$382,800	Cost per unit
Cleanouts	114	$376,200	Cost per unit
Oil Separators	5	$82,500	Cost per unit
Total		**$446,128,207**	

Figure 3: Portfolio Valuation

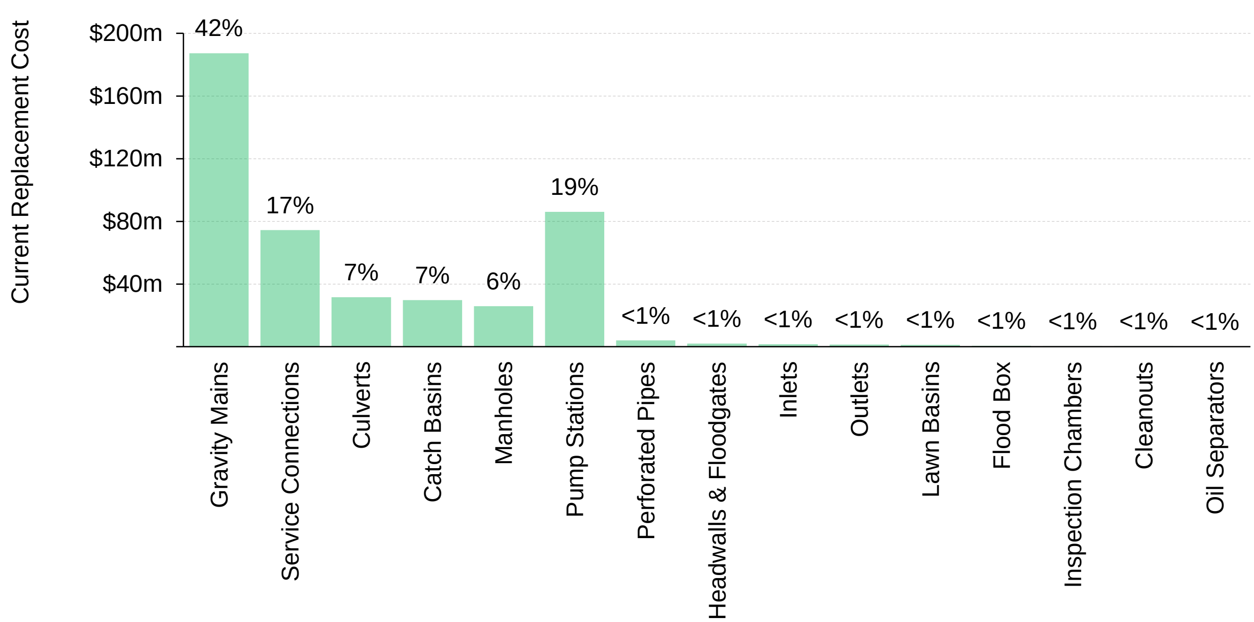
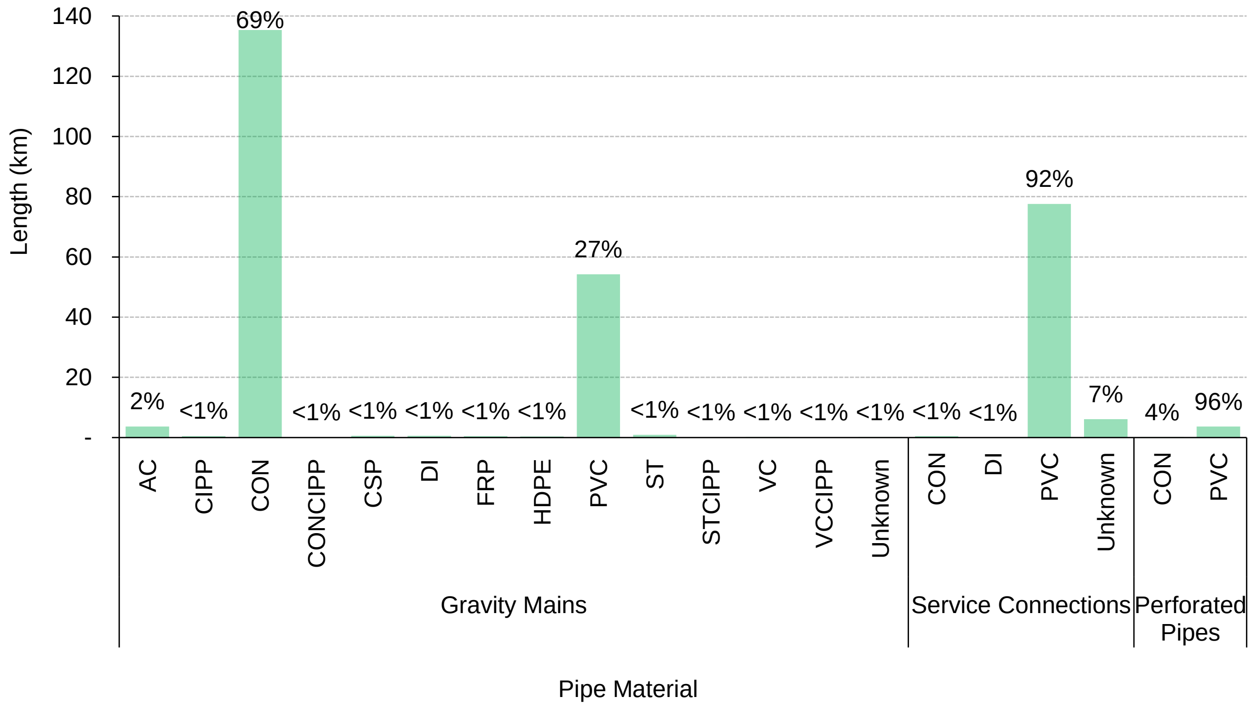


Figure 4 summarizes pipe materials of the linear Drainage assets based on length. Concrete comprises 70% of drainage gravity mains, while records currently show more than 90% of service connections are made of PVC. As this is an unusually high prevalence of PVC pipes in service connections, future work within the City's asset management program should include efforts to verify the material types.

Figure 4: Pipe Material by Length



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

Table 3 summarizes how condition ratings were derived for Drainage assets in the AMP. Overall, based on replacement cost, in-field condition ratings were available for 27% of the assets, limited to gravity mains, culverts, and perforated pipes. Asset age is currently used to estimate the replacement year for pump stations, with condition inspections and maintenance history used to support replacement decisions.

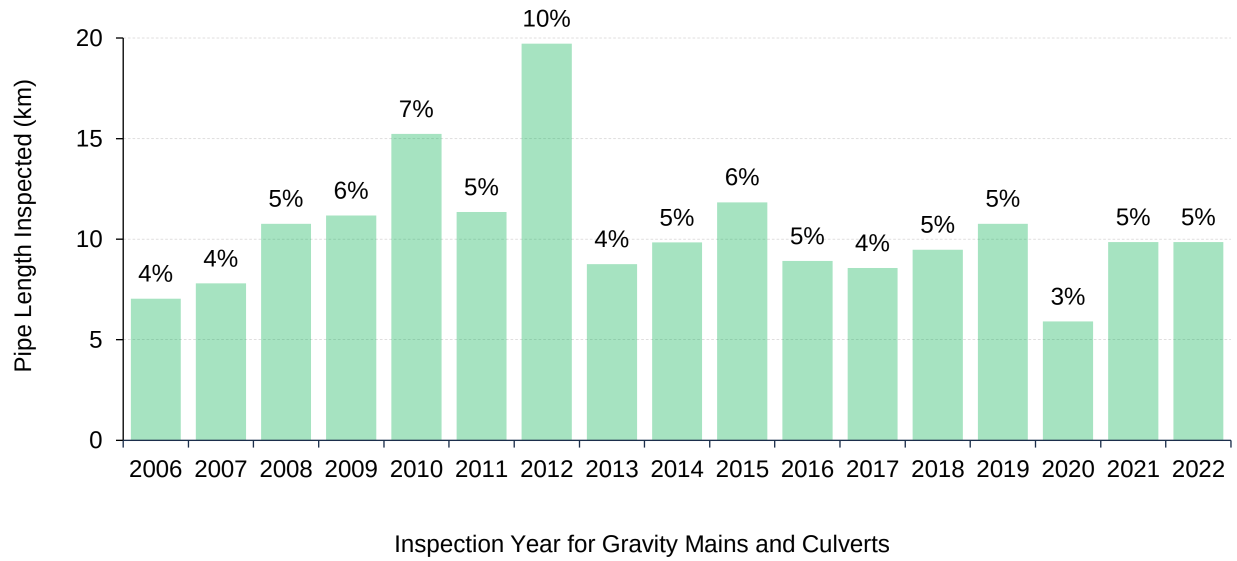
Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Drainage	Gravity Mains	60%	CCTV Inspections
	Service Connections	0%	Age-based estimates
	Culverts	25%	CCTV Inspections and Culvert Inspections
	Catch Basins	0%	Age-based estimates
	Manholes	0%	Age-based estimates
	Pump Stations	0%	Age-based estimates
	Perforated Pipes	5%	CCTV Inspections
	Headwalls & Floodgates	0%	Age-based estimates
	Inlets	0%	Age-based estimates
	Outlets	0%	Age-based estimates
	Lawn Basins	0%	Age-based estimates
	Flood Box	0%	Age-based estimates
	Bioswales	0%	Age-based estimates
	Inspection Chambers	0%	Age-based estimates
	Cleanouts	0%	Age-based estimates
	Oil Separators	0%	Age-based estimates only
Total		**27%**	

Municipalities typically conduct annual inspections ranging from 5%-25% of the network length every year.

Figure 5 shows that, on average between 2006 and 2022, the City inspected approximately 5% of its drainage mains and culverts by length each year. Over the 13 year period, 177km of drainage mains and culverts have been inspected, accounting for 85% of the total network by length.

Figure 5: Condition Assessment Year



In addition to CCTV inspections, in-field culvert inspections are performed every five years for approximately 1.2km of culverts with a diameter larger than 600mm.

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Drainage assets to support the collection of condition data. It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey, as well as the Pipeline Assessment Certification Program (PACP) pipe rating system, scored on a scale of 1-5. An abbreviated version of the PACP rating is provide in Table 5.

Table 4: General Condition Rating Scale – All Assets

Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

The PACP methodology rates pipe condition using the presence of structural defects (e.g., cracks) and presence of operational and maintenance issues (e.g., blockages). These results are obtained from closed-circuit camera television (CCTV) inspections, where each defect is identified and noted along the segment of pipe. An overall Structural Pipe Rating Index (SPRI) of the pipe segment is determined, considering the extent, severity, location, and number of defects.

Table 5: PACP Pipe Rating Scale

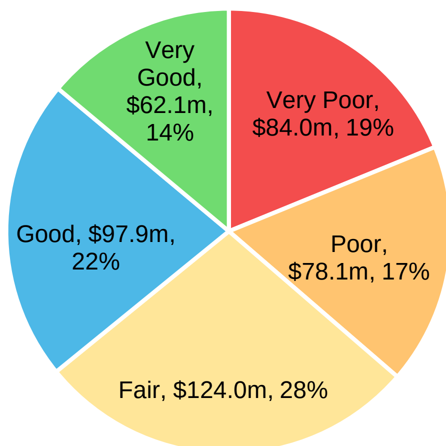
Overall SPRI	Description
1 – Very Good	Minor defects; failure unlikely for the next 20 years
2 – Good	Moderate defects; failure expected within 10-20 years
3 – Fair	Major to severe defects; failure expected within 5-10 years
4 – Poor	Severe defects; failure is possible within the five years or has occurred
5 – Very Poor	Pipe segment has failed and no longer operational

Projected Asset Conditions

Figure 6 summarizes the replacement cost-weighted condition of all Drainage assets. Based on a combination of inspection and age data, 63% of assets are in fair or better condition. The remaining 37%, with a current replacement cost of more than $162 million have less than 40% service life remaining and are estimated to be in poor to very poor condition. Additional detail is also provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 6: Asset Condition: All Drainage Assets



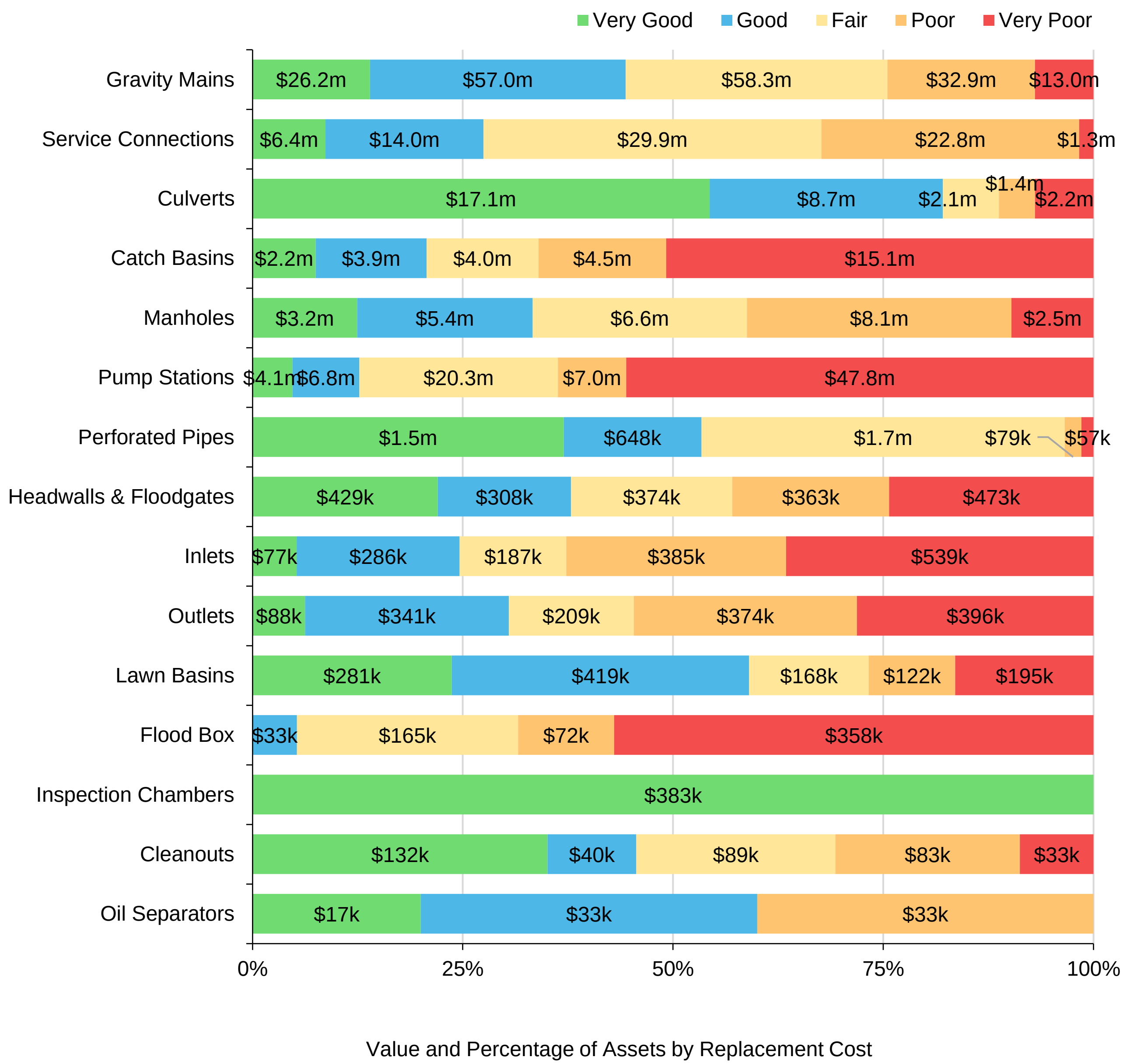
It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

Major Linear Assets

As illustrated in Figure 7, age and CCTV inspection data indicates that 25% of gravity mains, with a current replacement cost of $45.9 million, and 11% of culverts with valued at $3.5 million, are in poor or worse condition. Based on age data only, 32% of service connections, 66% of catch basins, and 41% of manholes are also in poor or worse condition.

In addition, nearly 60% of pump station assets, comprising mechanical and electrical elements, are in poor or worse condition. Half of all such assets were found in the Maple, Cedar, Dominion, Harbour, and Laurier pump stations.

Figure 7: Asset Condition: Drainage System – By Asset Type (Segment)



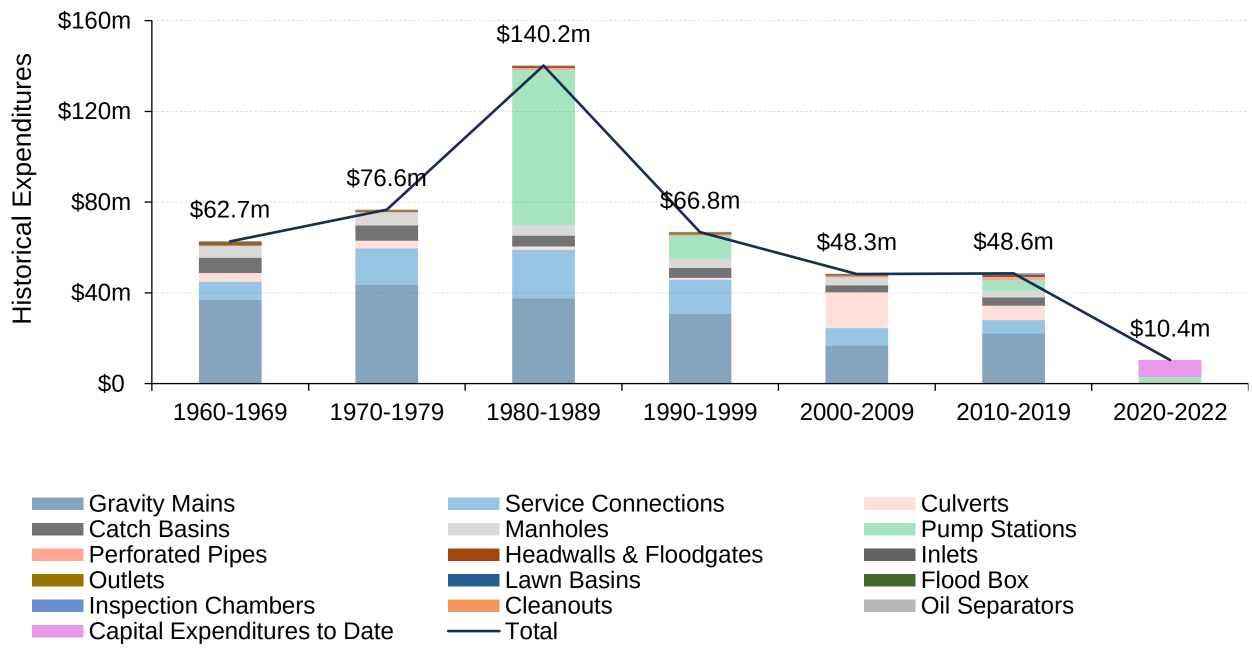
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 8 illustrates historical expenditures on the construction or acquisition of Drainage assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 8: Historical Expenditures on Asset Acquisition



Expenditures on Drainage infrastructure averaged $64.8 million per decade over the last 60 years. The largest investments were made in the 1980s, totaling more than $140 million and dominated by installation of gravity mains, service connections, and new pump stations. In the current decade, the City has made capital investments of $10.4 million between 2020 and 2022. Storm mains comprise the largest share of most stormwater management networks and have lengthy lifespans.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

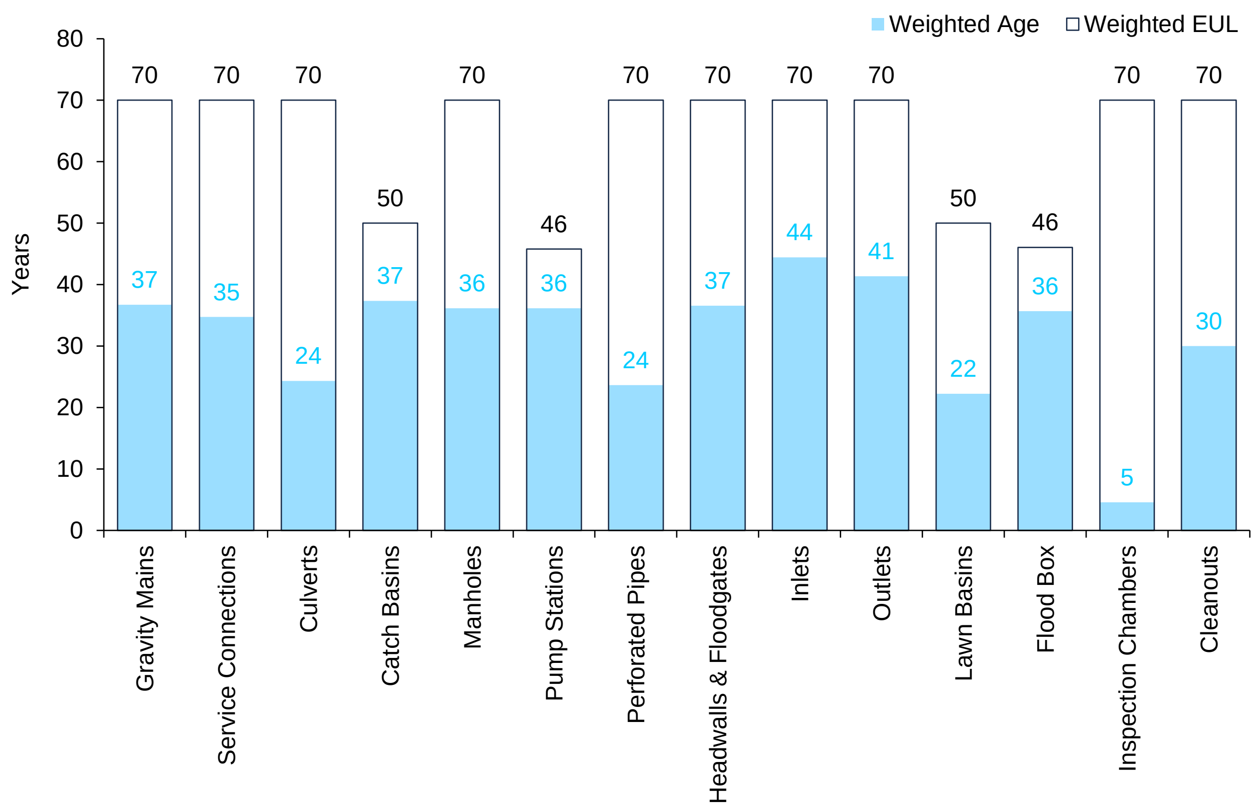
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 9 plots the average established useful life of major linear assets against their current average age. Both values were weighted by the replacement cost of individual assets.

Figure 9: Average Asset Age vs. Estimated Useful Life

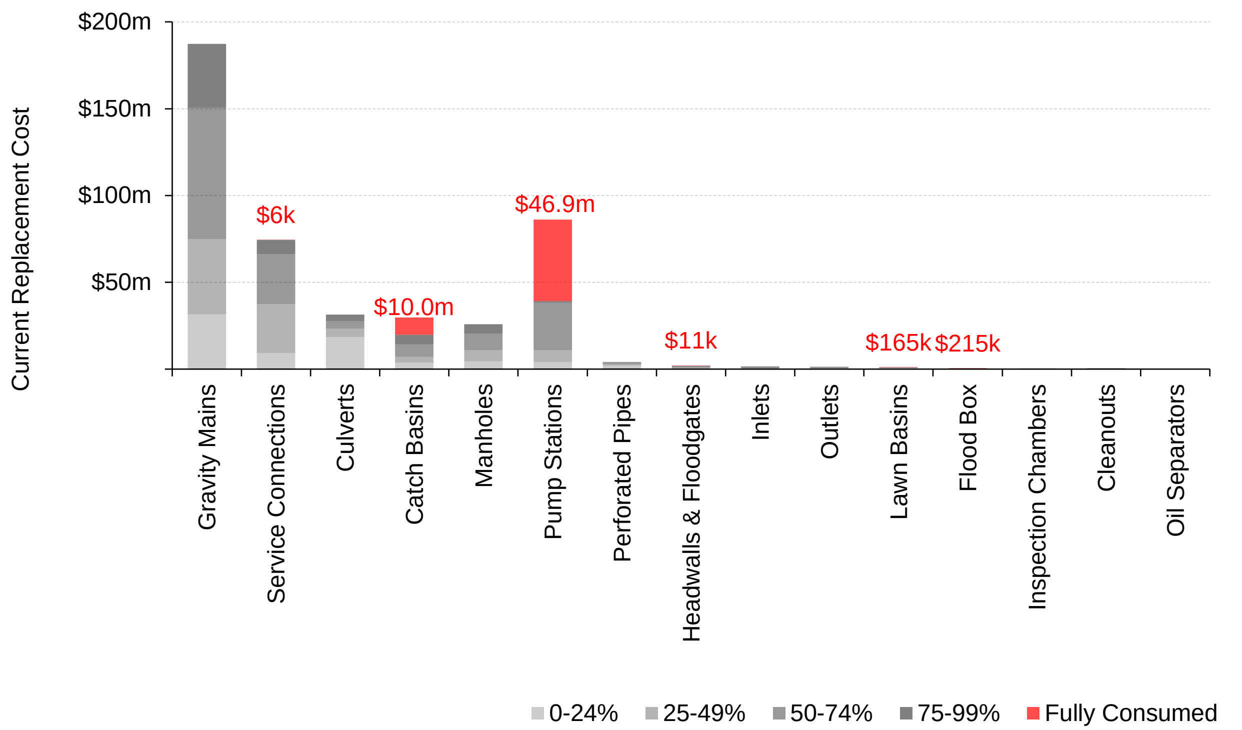


Age analysis indicates that, with the exception of drainage culverts and perforated pipes, major linear assets are already in, or approaching, the latter half of their established lifespans. Analysis for other assets, including pump stations, shows similar findings. As sanitary mains age, the risk of a section failing, blockages, and collapse become an increasing concern. Older sanitary mains are also more vulnerable to extreme weather events. These assets may require more vigilant monitoring, inspections, and cleaning to maintain service levels and avoid service disruptions.

Figure 10 shows a detailed distribution of Drainage assets based on the portion of useful life consumed to date. The distribution shows that most gravity mains, with a replacement cost exceeding $112 million, have consumed at least 50% of their design life. These sections may be candidates for replacement in the short term. Of this, sections valued at nearly $37 million are approaching the end of their useful life.

More than 50% of pump station assets, with a current replacement cost of $46.9 million, have fully consumed their estimated useful life but remain in service. Similarly, more than one third of catch basins, valued at $10 million, have also fully consumed their established lifespan.

Figure 10: Percentage of Estimated Useful Life Consumed



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, repair, and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

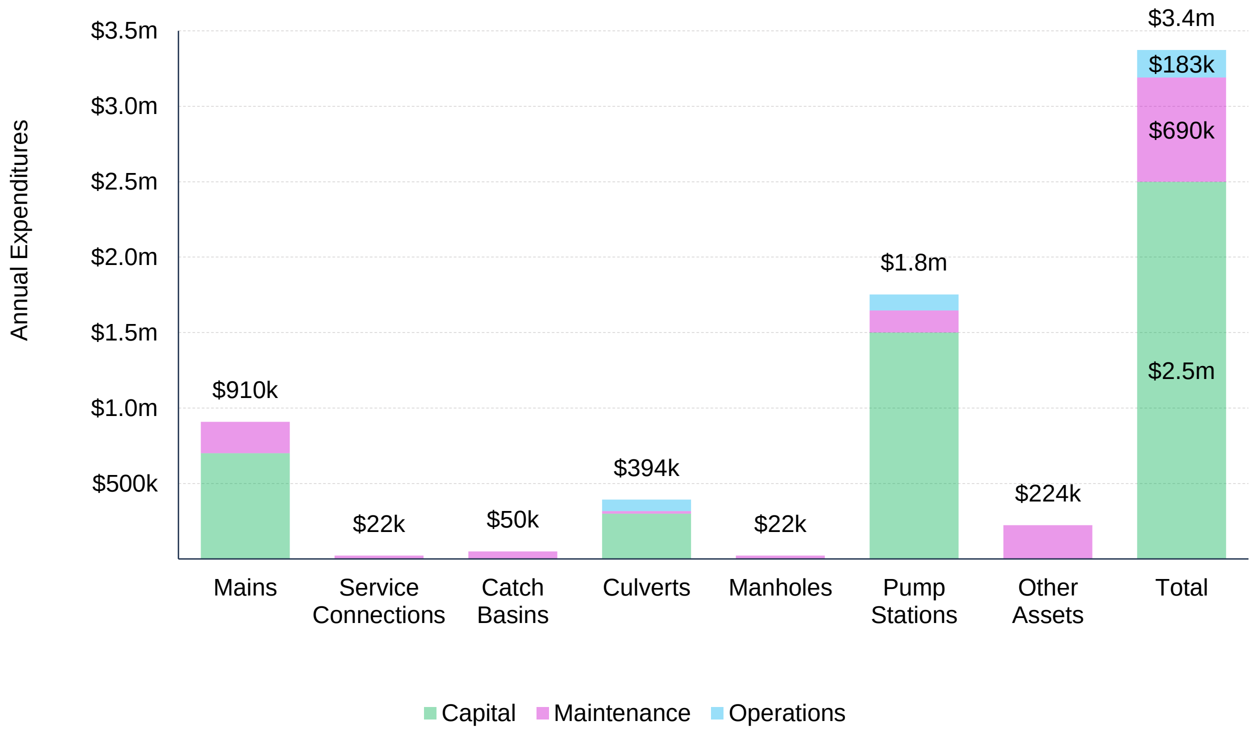
The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair, and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring. Lifecycle strategies are meant to ensure the City's linear network can safely and reliably collect and convey wastewater for its eventual treatment. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 6.

Table 6: Components of a Lifecycle Framework

Component	Description		
Activity	The treatment, event, or intervention implemented,		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	Maintenance Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Activity Trigger	This can include an asset's age and/or a minimum condition threshold. Other triggers may include priority levels, service request, and previously established frequency.		
Impact on Serviceable Life	Impact on an asset's serviceable lifespan resulting from the activity completed		
Annual Budget	Typical funding envelope available (actual spending may vary from year to year).		
Reinvestment Rate	Annual capital budget envelope of each activity as a portion of the total Drainage asset portfolio replacement cost of **$446,128,207**.		

Figure 11 summarizes total annual expenditures by asset segment and expenditure type. On average, the City allocates $3.4 million annually on Drainage. Replacement of pump stations is the largest annual capital program, accounting for more than 50% of total expenditures.

Figure 11: Summary of Capital, Maintenance, and Operating Expenditures



Of the $3.4 million annual Drainage budget, approximately $3.2 million is spent on the inspection, maintenance, and replacement of assets. An additional $183k is allocated annually towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., pump station electrical costs).

The following table outlines the City's lifecycle framework for Drainage assets.

Table 7: Lifecycle Framework

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Storm Main, Service and Manhole Replacements	Capital	Capacity or Condition	Extended by 70 years	$700,000
Culvert Replacements	Capital	Capacity or Condition	Extended by 70 years	$300,000
Storm Pump Station Replacements	Capital	Capacity or Condition	Extended by 35 years	$1,500,000
Sub-Total Capital				**$2,500,000**
Storm Sewer Cleaning	Maintenance	Scheduled/Condition	Extended by 5 years	$66,600
Storm Sewer Video Inspection	Maintenance	Every 10-20 years	Extended by 10 years	$30,000
Storm Main Repairs	Maintenance	Condition	Extended by 25 years	$112,900
Storm Service Repairs	Maintenance	By Request	Extended by 10 years	$22,000
Culvert Inspections, Repairs & Cleaning	Maintenance	Annual	Extended by 25 years	$16,600
Catch Basin Repairs & Replacement	Maintenance	Condition	Extended by 25-50 years	$49,500
Locate & Adjust Storm Manholes	Maintenance	By request	Extended by 5 years	$21,800
Storm Pump SCADA/Alarms	Maintenance	Annually	Extended by 10 years	$40,300
Storm Pump Generator Servicing	Maintenance	Annually	Extended by 10 years	$7,500
Storm Pump – Planned Preventative Maintenance	Maintenance	Weekly	Extended by 10 years	$73,300
Storm Pump Reactive Emergency Repairs	Maintenance	Condition	Extended by 10 years	$26,300
Trash Gate Inspection & Cleaning	Maintenance	Annually	Extended by 10 years	$24,300
Dike Inspections	Maintenance	Annually	Extended by 25 years	$13,700
Storm Flood Gate Cleaning and Repairs	Maintenance	Annually	Extended by 10 years	$46,100
Ditch Cleaning and Shaping	Maintenance	Annually	Extended by 10 years	$139,400
Sub-Total Maintenance				**$690,300**
Catch Basin Cleaning	Operations	Scheduled/Reactive	No impact	$77,000
Storm Pump Electricity and Communication Billings	Operations	Usage	No change	$106,400
Sub-Total Operations				**$183,400**
Total				**$3,373,700**

Reinvestment Rates

Reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 8 illustrates two types of reinvestment rates: segment and service area. The segment reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 8: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Linear	$1,000,000	0.3%	0.2%
Non-linear	$1,500,000	1.0%	0.3%
Total	**$2,500,000**		**0.6%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 9: System-generated Reinvestment Rates

Segment	Type	AAR	System-generated TRR
Gravity Mains	Linear	$2,675,954	1.4%
Service Connections	Linear	$1,062,166	1.4%
Culverts	Linear	$449,821	1.4%
Catch Basins	Non-linear	$594,110	2.0%
Manholes	Non-linear	$368,280	1.4%
Pump Stations	Non-linear	$2,079,925	2.4%
Perforated Pipes	Linear	$56,471	1.4%
Headwalls & Floodgates	Non-linear	$27,814	1.4%
Inlets	Linear	$21,057	1.4%
Outlets	Linear	$20,114	1.4%
Lawn Basins	Non-linear	$23,694	2.0%
Flood Box	Non-linear	$15,086	2.4%
Inspection Chambers	Non-linear	$5,469	1.4%
Cleanouts	Non-linear	$5,374	1.4%
Oil Separators	Non-linear	$1,650	2.0%
Total		**$7,406,986**	**1.7%**

For Drainage assets, the average annual requirements for linear assets total $4,285,584 for a system-generated target reinvestment rate of 1.4%. Similarly, for pump stations and other non-linear, the AAR total $3,121,402, for a reinvestment rate of 2.1%. Combined, the system-generated, service area reinvestment rate is estimated at 1.7%.

Comparative Analysis

Table 10 compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide.

Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks

Benchmark	Asset Type	Target Reinvestment Range	2016 Municipal Average	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
CIRC	Linear	1.0% - 1.3%	0.3%	0.3%	0.2%
CIRC	Non-linear	1.7% - 2.0%	1.3%	1.0%	0.3%
Citywide Asset Manager	Linear	1.4%	0.3%	0.3%	0.2%
Citywide Asset Manager	Non-linear	2.1%	1.3%	1.0%	0.3%
Citywide Asset Manager	All Sanitary Assets	1.7%	-	-	0.6%

The analysis shows that, at the segment level, Port Coquitlam's reinvestment rate for both linear and non-linear assets falls below the CIRC and system-generated targets: the City is reinvesting 0.3% of the total replacement cost of all linear assets and 1.0% for non-linear assets back into these assets each year. Similarly, at the service area level, the City's overall reinvestment rate of 0.6% also remains well below recommended ranges.

Maintaining adequate reinvestment rates –whether through actual spending on infrastructure programs or allocating funds to reserves for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 11: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

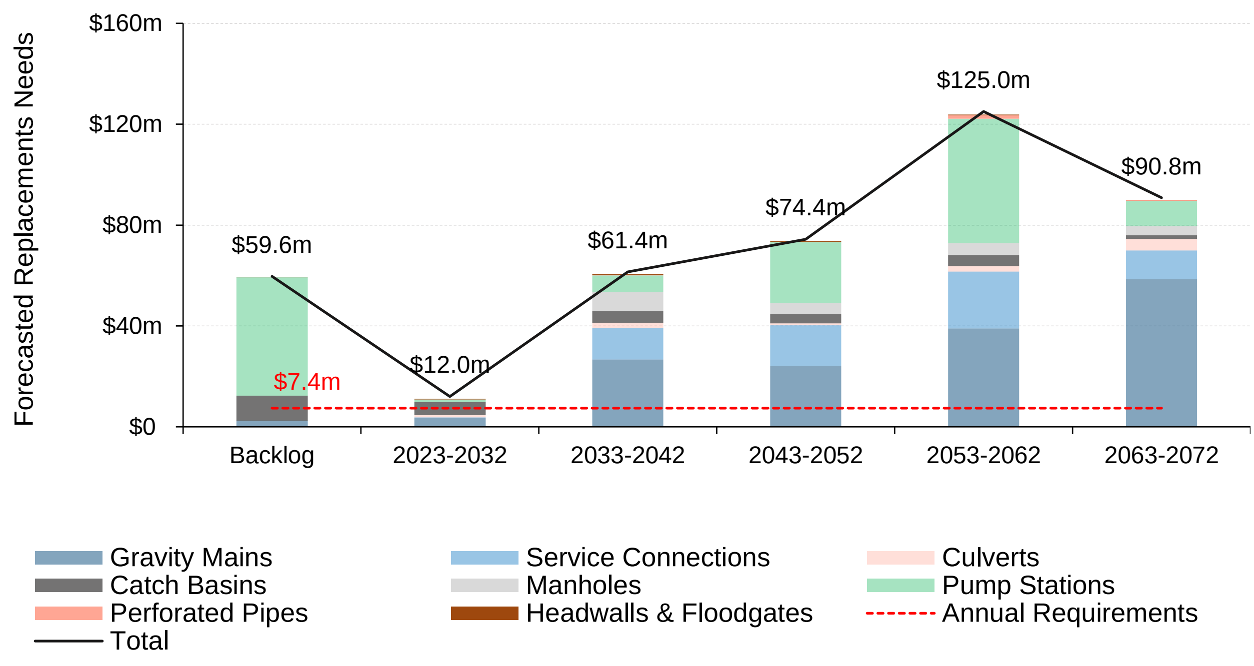
Forecasted Long-term Replacement Needs

In contrast to historical investments in infrastructure, Figure 12 illustrates the cyclical short-, medium- and long-term replacement requirements for City's Drainage assets over the coming decades. The City's average annual requirements for asset replacements total $7.4 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $2.5 million per year on Drainage asset replacements are less than 40% of the $7.4 million recommended to ensure that replacement needs are met.

The chart illustrates a sharp increase in capital needs beginning in the 2030s when substantial portions of the linear network will reach the end of its serviceable lifespan. Replacement needs will continue to increase steadily through the forecast period, peaking at more than $125 million in the 2050s—approximately 70 years after the largest investments were made in gravity mains and service connections in the 1980s, coinciding with the estimated 70 year lifespan of pipes. A substantial portion of pump station assets will also reach the end of their lifespan.

Figure 12: Forecasted Long-term Replacement Needs



The chart also shows a Drainage age-based backlog of $59.6 million, comprising assets that have reached the end of their estimated useful life. However, this figure increases to $162.1 million when assets in poor or worse condition, or less than 40% service life remaining are included. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition.

Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates. The magnitude of capital needs typically far exceeds what most agencies can afford to fund. It is also unlikely that all assets deemed as candidates for replacement will require reconstruction or replacement. A risk-based approach can be used to strategically address age- and condition-based backlogs.

However, more frequent and intense extreme weather events resulting from climate change may accelerate asset replacements, driven by capacity requirements rather than condition, which is a rising concern for municipalities across Canada.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 13: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, previous performance history, capacity challenges, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe. Failure of a small diameter storm main may cause localized flooding and cause inconvenience to a city block. However, the failure of a large storm pipe may cause damage to roadways and surrounding infrastructure, and impede the safe flow of traffic.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

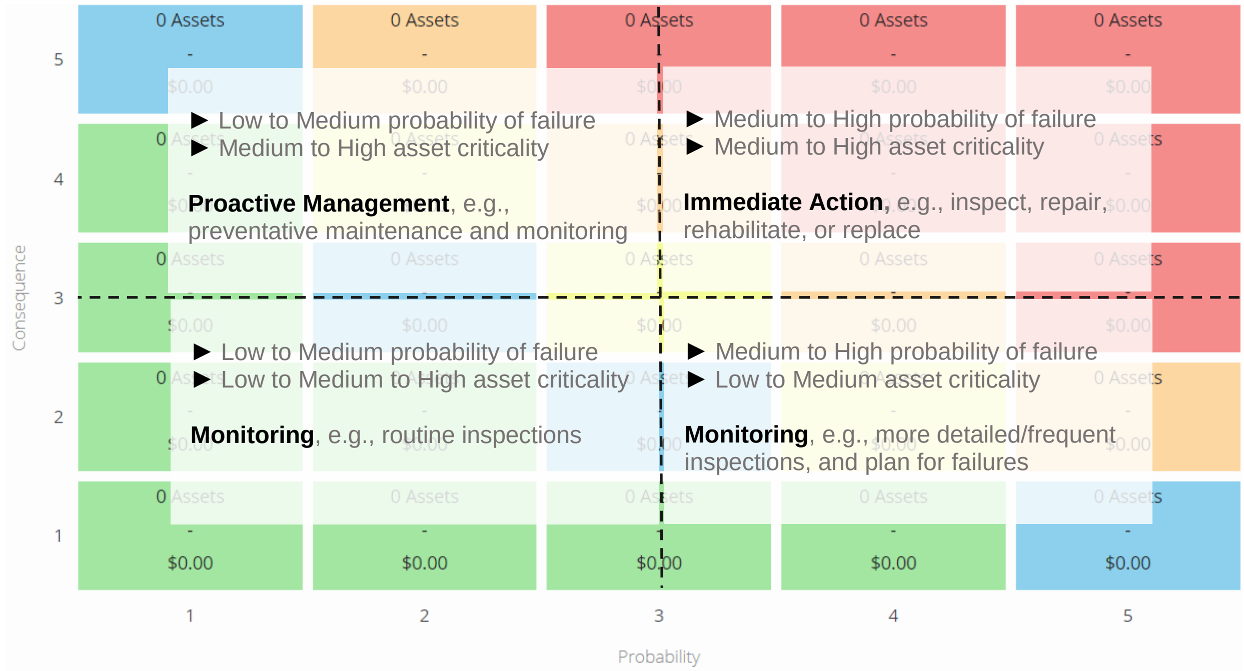
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 12: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for Drainage assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 14.

Figure 14: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Drainage assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as the Drainage portfolio as a whole.

Risk Matrix: All Drainage Assets

The following summary-level risk matrix shows how all Drainage assets are classified based on their risk ratings.

Figure 15: Detailed Risk Matrix – All Drainage System Assets

Consequence of Failure	1	2	3	4	5
5	23 Assets $27.5M	0 Assets $0	12 Assets $26.7M	1 Asset $563.2K	11 Assets $46.4M
4	68 Assets $11.8M	32 Assets $4.5M	28 Assets $4.0M	8 Assets $1.0M	5 Assets $1.3M
3	1,004 Assets $31.7M	1,483 Assets $48.2M	1,405 Assets $38.0M	244 Assets $8.9M	70 $1.1M
2	3,816 Assets $42.2M	4,147 Assets $60.4M	3,754 Assets $49.4M	1,304 Assets $16.4M	2,508 Assets $14.0M
1	960 Assets $4.2M	724 Assets $3.4M	734 Assets $3.2M	136 Assets $1.1M	63 Assets $206.7K

Probability of Failure

To provide a more simplified view, the matrix below consolidates assets into broader risk classifications. The figure illustrates that 261 assets, with a current replacement cost of $82.1 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 4,972 assets, with a current replacement cost of $75.2 million, were classified with a high risk rating.

Figure 16: Consolidated Risk Matrix – All Drainage System Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
6,151 Assets	6,905 Assets	4,251 Assets	4,972 Assets	261 Assets
$72,640,332	$124,567,504	$91,583,556	$75,202,820	$82,133,996

Gravity Mains and Perforated Pipes

Three factors were used to help explain potential asset failure. These include the service life remaining of each asset, age-based condition ratings or in-field CCTV inspections, and history of surcharge or flooding incidents. In the model below for probability of failure, both condition ratings and incident history can help predict and explain potential asset failure. Hence, both received a weighting of 40%.

Figure 17 Probability of Failure – Gravity Mains and Perforated Pipes

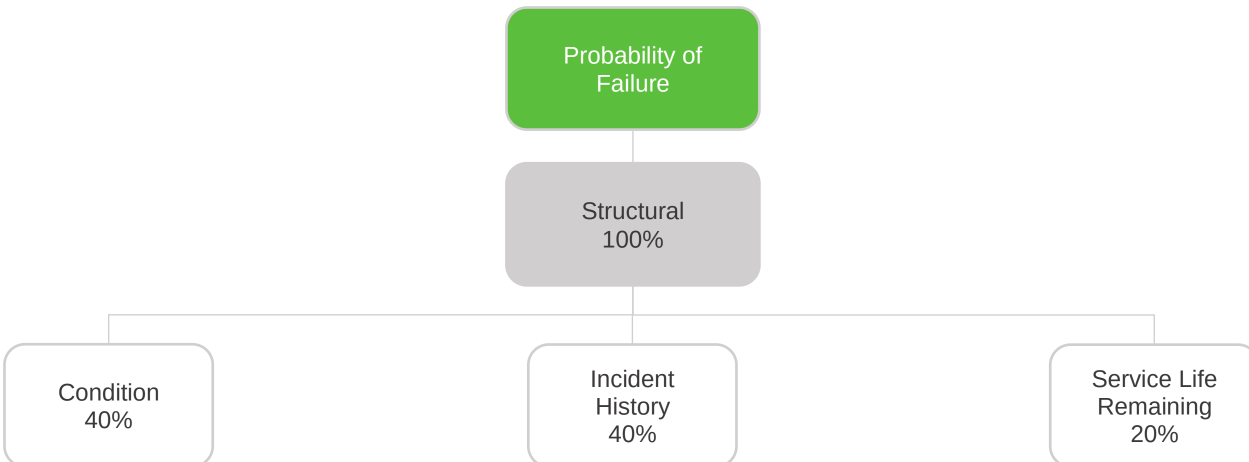


Table 13 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 13 Defining Probability of Failure Ranges – Gravity Mains and Perforated Pipes

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain
Incident History	Surcharge Incident (70% Full)	3—Possible
	Flood or Overflow Incident (100% Full)	4—Likely or Probable

The model in Figure 18 outlines the type of potential consequences that may result from failure of a gravity main or perforated pipe, the relative weight of each consequence type, and the data (attributes) used to approximate that effect. Four types of consequences are accounted for: direct financial, economic, socio-political, and environmental.

Data for drainage mains and pipes includes the replacement cost of each asset, as well as pipe diameter. Additionally, GIS data was used to identify service type (industrial, commercial, or institutional), and drainage mains located in easements. If they fail, drainage mains located in easements have a greater chance of impacting properties than those located in roadways. These attributes are used to assist in measuring and quantifying the economic, socio-political, and environmental consequences of main failures.

GIS analysis was also conducted to append the appropriate road class to each main segment. This allowed for a more nuanced assessment and understanding of a main's economic consequence of failure—that is, a main failure along an arterial road would cause more disruption than one occurring beneath a collector or lane roadway.

Figure 18 Consequence of Failure – Gravity Mains and Perforated Pipes

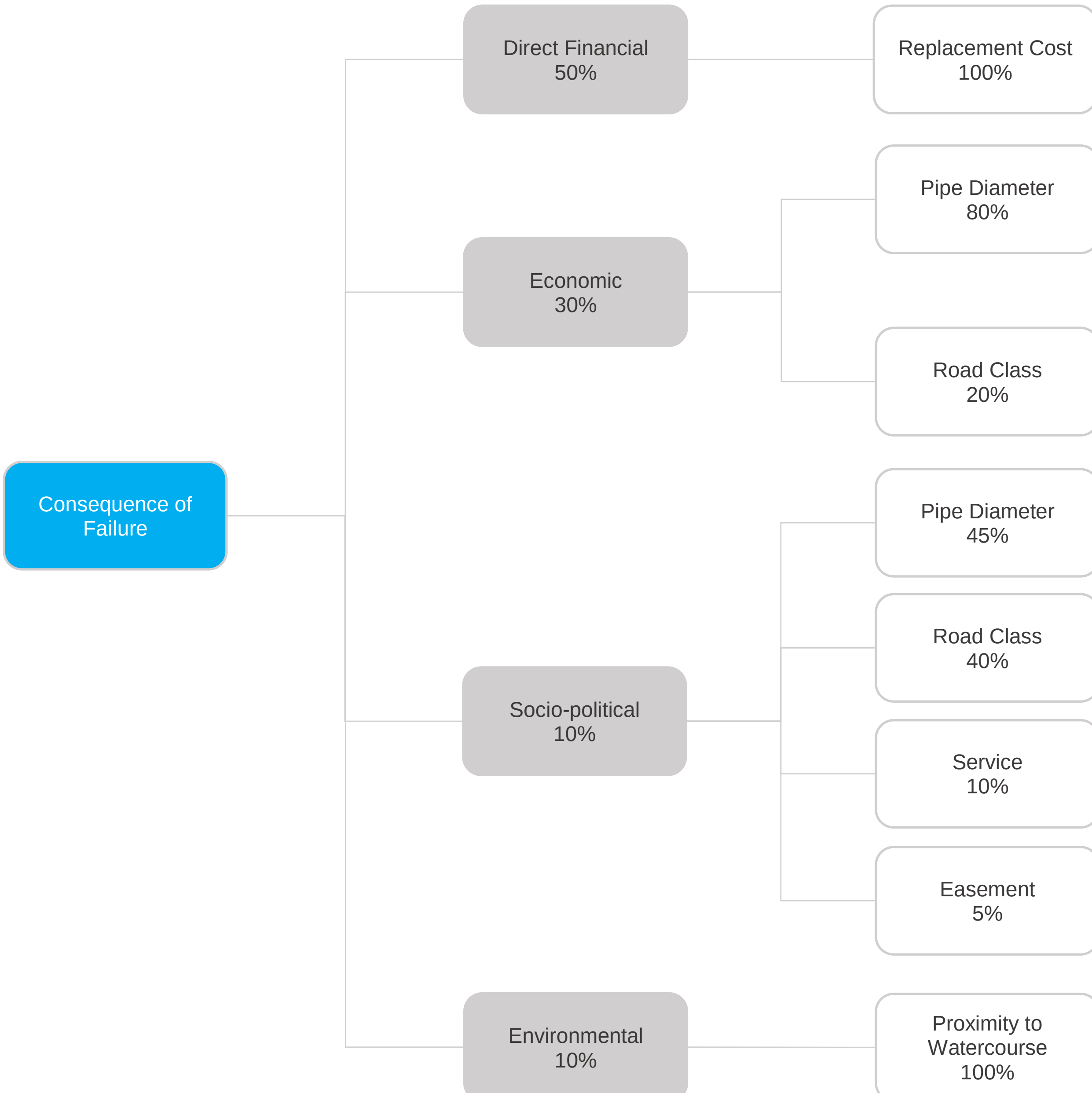


Table 14 Defining Consequence of Failure Ranges – Gravity Mains and Perforated Pipes

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Economic	Pipe Diameter (mm)	Consequence of Failure
	Less than 150	1—Insignificant
	150 - 200	2—Minor
	200 - 300	3—Moderate
	300 - 600	4—Major
	Greater than 600	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
Socio-political	Pipe Diameter (mm)	Consequence of Failure
	Less than 150	1—Insignificant
	150 - 200	2—Minor
	200 - 300	3—Moderate
	300 - 600	4—Major
	Greater than 600	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Service	Consequence of Failure
	Residential	3—Moderate
	Industrial/Commercial/Institutional	4—Major
	Presence of easement:	Consequence of Failure
	No	1—Insignificant
	Yes	3—Moderate
Environmental	Proximity to watercourse (m)	Consequence of Failure
	More than 30 m	1—Insignificant
	Within 30 m	3—Moderate
	Crossing Watercourse	4—Major

Risk Matrix: Gravity Mains and Perforated Pipes

The risk matrix below is based on the previous risk model developed for gravity mains and perforated pipes. It is generated using available asset data.

Figure 19: Detailed Risk Matrix – Gravity Mains and Perforated Pipes

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	34 Assets $4.5M	22 Assets $3.0M	20 Assets $2.5M	4 Assets $521.1K	1 Asset $143.9K
3	296 Assets $20.8M	412 Assets $33.0M	268 Assets $22.3M	70 Assets $5.8M	0 Assets $0
2	633 Assets $20.4M	888 Assets $36.8M	659 Assets $279.9M	214 Assets $8.8M	0 Assets $0
1	176 Assets $1.7M	101 Assets $1.4M	73 Assets $822.1K	45 Assets $744.9K	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 20 shows that 33 main segments, with a replacement cost of $3.4 million have a very high risk rating. These include segments under Shaughnessy Street, an arterial roadway.

An additional 523 main segments, with a combined current replacement cost of $37 million, carry a high overall risk rating. Although most have a minor to moderate consequence of failure rating, the poor condition of these assets and the resulting high probability of failure escalated the overall risk rating. Some main segments carried a consequence of failure rating of ‘Major’, given their servicing of institutional, commercial, or industrial properties and an arterial road class.

Figure 20: Consolidated Risk Matrix – Gravity Mains and Perforated Pipes

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
1,206 Assets	1,518 Assets	636 Assets	523 Assets	33 Assets
$39,937,463	$72,499,781	$38,400,851	$37,014,149	$3,417,509

Drainage Culverts

Figure 21: Probability of Failure – Drainage Culverts

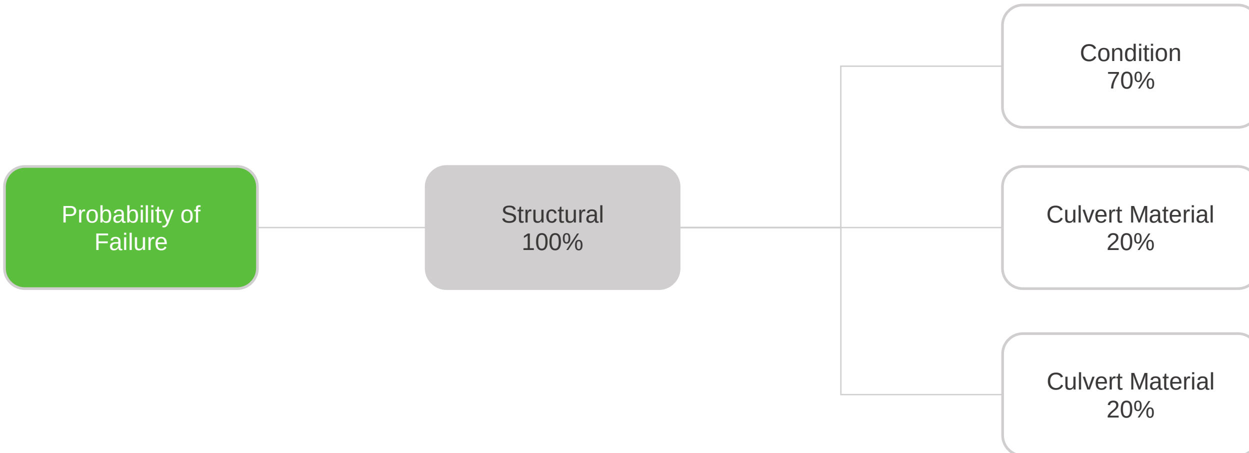


Table 15: Defining Probability of Failure Ranges – Drainage Culverts

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain
Culvert Material	Material	Probability of Failure
	CON and CSP	1—Rare
	PVC and HDPE	3—Possible

Figure 22: Consequence of Failure – Drainage Culverts

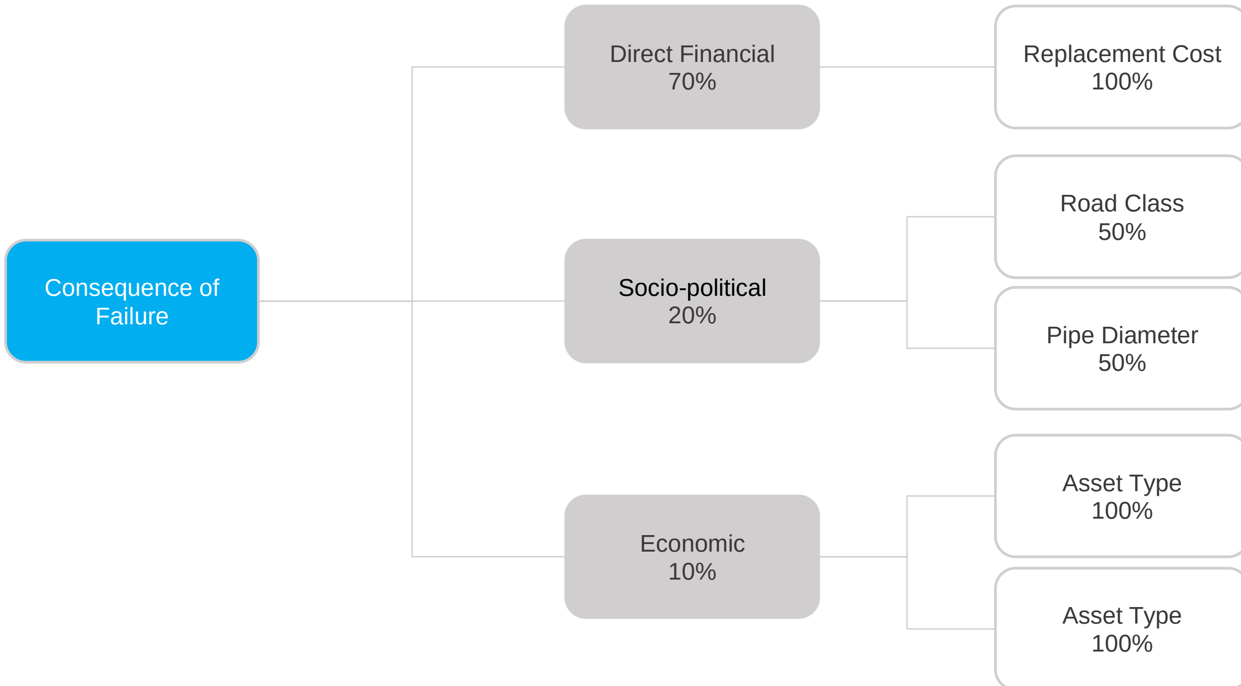


Table 16: Defining Consequence of Failure Ranges – Drainage Culverts

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1—Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Socio-political	Pipe Diameter (mm)	Consequence of Failure
	Less than 200	1—Insignificant
	200 - 300	2—Minor
	300 - 600	3—Moderate
	600 - 900	4—Major
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
Economic	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Pipe Diameter (mm)	Consequence of Failure
	Less than 200	1—Insignificant
	200 - 300	2—Minor
	300 - 600	3—Moderate
	600 - 900	4—Major
	Greater than 900	5—Severe

Risk Matrix: Drainage Culverts

The risk matrix below is based on the previous risk model developed for Drainage culverts.

Figure 23: Detailed Risk Matrix – Drainage Culverts

Consequence of Failure	1	2	3	4	5
5	17 Assets $18.6M	0 Assets $0	0 Assets $0	1 Asset $563.2K	0 Assets $0
4	26 Assets $5.3M	10 Assets $1.5M	6 Assets $985.9K	3 Assets $400.6K	0 Assets $0
3	30 Assets $1.6M	21 Assets $948.6K	20 Assets $608.9K	25 Assets $756.4	0 Assets $0
2	1 Asset $6.6K	5 Assets $31.6K	12 Assets $86.3K	18 Assets $126.5K	0 Assets $0
1	0 Assets $0	3 Assets $9.6K	1 Asset $2.3K	3 Assets $10.5K	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 24 shows that five assets with a current replacement cost of $1.1 million have a very high risk rating, driven primarily by their poor condition and a relatively high replacement cost. An additional 39 assets were assigned a ‘High’ overall risk score, again driven by condition ratings, and high relative replacement costs.

Figure 24: Consolidated Risk Matrix – Drainage Culverts

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
23 Assets	80 Assets	55 Assets	39 Assets	5 Assets
$852,693	$12,892,303	$14,288,208	$2,330,466	$1,123,826

Pump Stations and Other Assets

Figure 25: Probability of Failure – Pump Stations and Other Assets

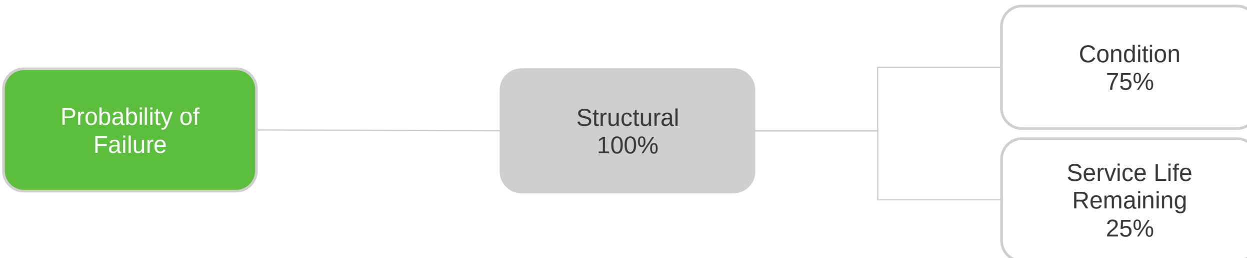


Table 17: Defining Probability of Failure Ranges – Pump Stations and Other Assets

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 26: Consequence of Failure – Pump Stations and Other Assets

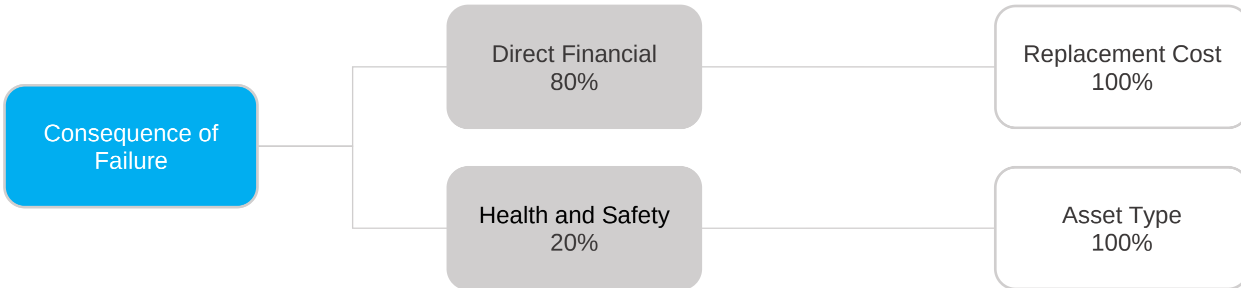


Table 18: Defining Consequence of Failure Ranges – Pump Stations and Other Assets

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1—Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Health and Safety	Asset Type	Consequence of Failure
	Catch Basins, Cleanouts, Chambers, Lawn Basins, Oil Separators, Inlets	2—Minor
	Flood Box, Outlets,	3—Moderate
	Headwalls and Floodgates, Manholes, Service Connections	4—Major
	Pump Stations	5—Severe

Risk Matrix: All Other Assets

The risk matrix below is based on the previous risk model developed for all remaining Drainage assets, including: service connections, pump stations, manholes, and appurtenances.

Figure 27: Detailed Risk Matrix – Pump Stations and Other Assets

Consequence of Failure	1	2	3	4	5
5	6 Assets $8.9M	0 Assets $0	12 Assets $26.7M	0 Assets $0	11 Assets $46.4M
4	8 Assets $2.0M	0 Assets $0	2 Assets $495.0K	1 Asset $115.3K	4 Assets $1.2M
3	678 Assets $9.3M	1,050 Assets $14.2M	1,117 Assets $15.1M	149 Assets $2.4M	70 Assets $1.1M
2	2,100 Assets $15.8M	2,602 Assets $20.0M	2,219 Assets $16.6M	737 Assets $5.6M	40 Assets $415.4K
1	739 Assets $2.3M	589 Assets $1.9M	638 Assets $2.3M	75 Assets $305.5K	60 Assets $196.8K

Probability of Failure

The consolidated risk matrix in Figure 28 shows that 223 assets with a current replacement cost of $77.6 million have a very high risk rating. Of these, the highest risk score was assigned to Maple, Cedar, Harbour, and Dominion pump station assets—explained by both a poor to very poor condition rating, and severe consequences of asset failures. Catch basins comprised a large portion of assets assigned a 'High' risk rating.

Figure 28: Consolidated Risk Matrix – Pump Stations and Other Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
4,922 Assets	5,307 Assets	3,560 Assets	4,410 Assets	223 Assets
$31,850,176	$39,175,421	$38,894,496	$35,858,206	$77,592,662

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community’s long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 19: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 20 outlines the four core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 20: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Drainage, a total of 45 KPIs were selected. This included 18 KPIs to measure customer levels of service, and 27 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 21: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
Average age of storm mains	*	*	*	60	NA
% of drainage system in poor or worse condition	*	*	*	32	NA
% of mains in poor or worse condition	*	*	*	30	NA
% of pump stations in poor or worse condition	*	*	*	57	NA
Average age of storm mains	*	*	*	60	NA
Maintenance					
# of drainage main flushing calls	0	0	1	7	↗
# of manhole calls	28	34	33	43	→
# of catch basin calls	186	255	273	354	↗
# of ditch flooding calls	30	39	36	45	→
# of city property flooding calls	87	85	55	111	↗
# of pump station calls	2	1	4	0	→
# of culvert calls	15	25	31	40	↗
Operating					
# of drainage inspection chamber requests	6	7	19	2	→
# of storm sewer locate requests	12	13	16	12	→
# of residential flooding calls	84	89	101	109	↗
# of road flooding calls	50	27	25	62	→
# of environmental spill calls	28	39	62	77	↗
# of fish, watercourse and environmental calls	6	14	22	24	↗
# of beaver dam calls	17	24	21	13	→

Table 22: Technical Levels of Service

KPI	2021	Budget
Capital		
Storm Main, Service and Manhole Replacements	NA	$700,000
Metres of storm mains replaced	NA	TBD
Meters of service connections replaced	NA	TBD
Number of manholes replaced	NA	TBD
Culvert Replacements	NA	$300,000
Storm Pump Station Replacements	1	$1,500,000
Average annual capital reinvestment rate	$2,500,000	
Maintenance		
# of catch basins repaired or replaced (of 5,356)	156	$49,500
# of culverts inspected, repaired, cleaned (of 250)	42	$16,600
# of dike inspections completed annually	1	$13,700
Kilometers of ditch cleaning completed annually	2.6	$139,400
Kilometers of storm sewer mains flushed (of 210km) based on established frequency (10-year cycle)	13	$66,600
Kilometers of storm sewer mains flushed in response to service requests	NA	NA
Kilometers of storm sewer mains video inspected (of 210km)	3.05	$30,000
Metres of storm mains repaired (of 210km)	4 repairs	$112,900
# of manholes located or adjusted	202	$21,800
# of storm service repairs (of 8,127 connections)	4	$22,000
# of SCADA/alarm maintenance	9	$40,300
# of storm pump generators serviced (of 2)	2	$7,500
# of pump station inspections completed within established frequency standards	378	$73,300
# of reactive repair work on storm pumps	NA	$26,300
# of trash gate inspections and cleanings completed (on 129 gates)	777	$24,300
# of reactive flood gate cleanings	560	$46,100
Average annual maintenance expenditures	$690,300	
Operations		
# of beaver dam removals or actions (based on inspections fall through spring)	12	NA
# of catch basins cleaned based (of 5,386) based on established frequency (every four or 8 years)	1067	$77,000
Stream permitting, monitoring, reporting and collaboration (of 15km of fish bearing watercourses)	28%	NA

KPI	2021	Budget
# of kilowatt hours used for storm pump electricity and communication	NA	$106,400
Average annual operating expenditures	$183,400	

Levels of Service Analysis

Table 23 provides the 4-year percentage change in service requests for KPIs that best align with asset condition and performance. These may be helpful indicators in determining if sufficient funding and resources are being allocated to the maintenance and replacement of assets.

Table 23: Trends in Select Customer Levels of Service KPIs – Asset Condition and Performance

KPI	Percentage change between 2018-2021
# of manhole calls	+54%
# of city property flooding calls	+28%
# of culvert calls	167%

Table 24 shows the change in service requests for KPIs that best align with service delivery, but have no direct relationship with asset lifespans. These may be helpful indicators in determining if sufficient funding and resources are being allocated towards service delivery.

Table 24: Trends in Customer Levels of Service KPIs – Service Delivery

KPI	Percentage change between 2018-2021
# environmental spill calls	+175%
# inspection chamber locates	-67%
# fish, watercourse and environmental calls	+300%

KPI data can be used to support decisions to maintain, increase, or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions.

For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be considered to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 25 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Such activities have a direct impact on assets by maximizing their service life or deferring their replacement.

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 25: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different infrastructure programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 26 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 26: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 29: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 27: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

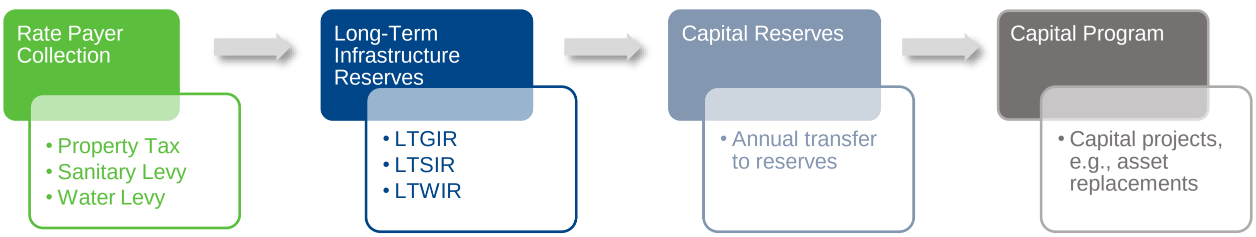
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 28: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 30: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 26. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies. The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 29, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 29: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 30, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

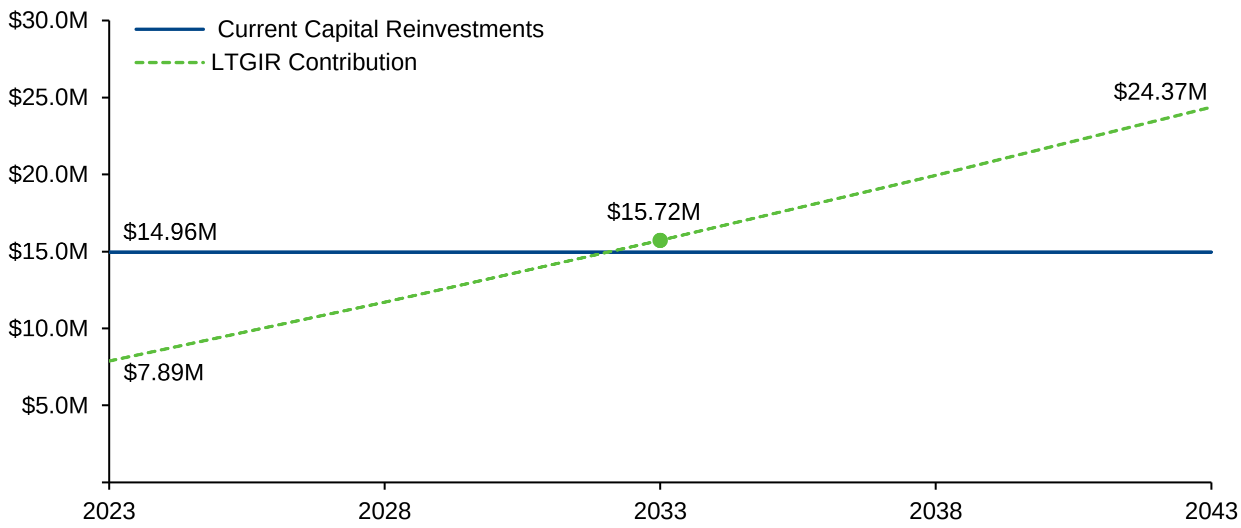
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 29 above as $15 million.

Table 30: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 31: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 29.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 30. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 31: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 32: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 33: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 33, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 34: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 35: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 32: Annual Contributions to the LTWIR vs. Annual Capital Spending

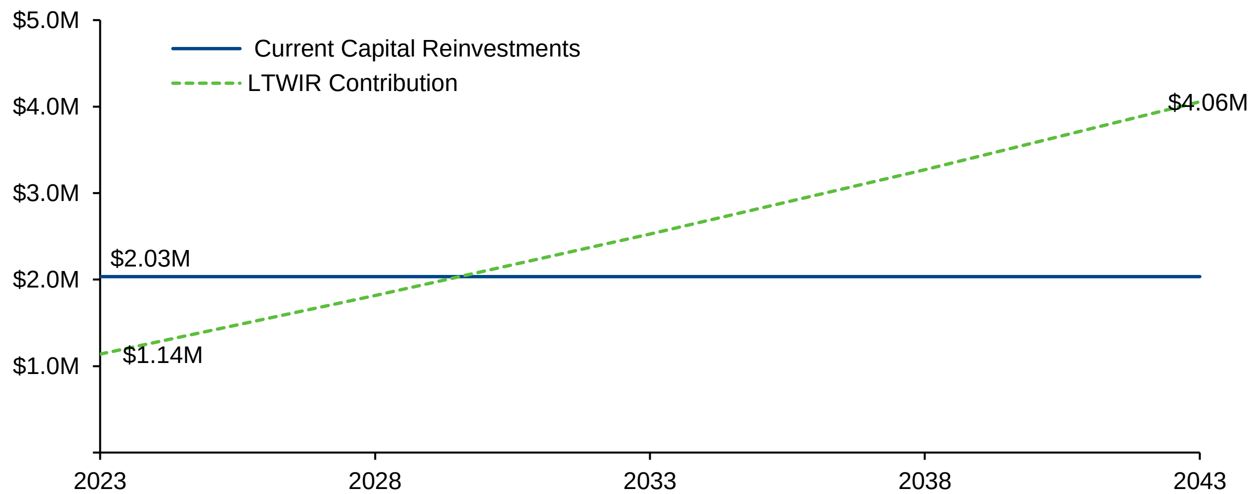
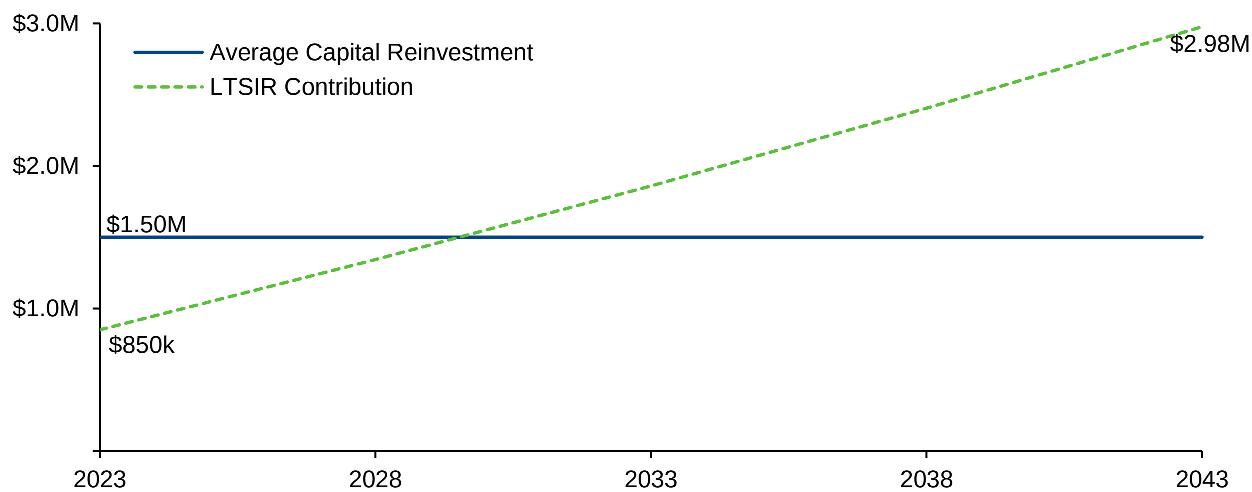


Figure 33: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 34, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 35 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 36: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 37: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 32: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 38: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 39: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 38, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 40 summarizes the infrastructure backlog for each service area.

Table 40: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 41 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 41: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 42: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 43: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, the City a 15-year phase-in period is recommended to, allow for an equitable distribution of financial burden between current and future residents.

- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.

- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects.
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting.
- Training staff on the Citywide asset management software and keeping the database up to date.
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Water

Final Version
August 2024

Contents

Executive Summary 7

Approach and Methodology 12
- Developing the Asset Management Plan 13
  - Build a comprehensive asset inventory 13
  - Conduct asset-level risk assessments and build risk models 14
  - Compile lifecycle activity data 14
  - Compile levels of service data 14
  - Develop financial strategy 14
- Limitations and Constraints 15

State of the Infrastructure 16
- Asset Hierarchy and Data Classification 17
- Inventory and Valuation 18
  - Costing Methods 18
- Asset Condition 21
  - Source of Condition Data 21
  - Condition Assessment Guidelines 22
  - Condition Rating System 23
  - Projected Asset Conditions 24
  - Watermain Break History 26
- Age Profile 28
  - Historical Asset Expenditures 28
  - Serviceable Life vs. Current Asset Age 29

Lifecycle Management 32
- Current Lifecycle Framework 33
- Capital Reinvestment Rates 37
  - Reinvestment Rate Benchmarks 37
- Forecasted Long-term Replacement Needs 41

Risk Analysis 42
- Calculating Asset Level Risk 43
- Risk Models and Matrices 46
  - Risk Matrix: All Water Assets 46
  - Linear Assets 47
  - Facilities and Appurtenances 52

Levels of Service 55
- Defining Levels of Service 56
  - Levels of Service Framework 56
  - Levels of Service Analysis 61

Financial Strategy 63

Approach and Methodology 64
Current Financial Planning Framework 65
Capital Budget 65
Debt 65
Senior Government Support 67
Sustainability 67
Reserves 68
Development Cost Charges (DCC) Program 70
Achieving Reinvestment Rate Targets 71
Tax-Funded Service Areas 72
Levy-Funded Service Areas 78
Infrastructure Backlogs 83
Using Reserves 84
Leveraging Development Cost Charges (DCC) 85
Recommendations 86
Tax Funded Service Areas 86
Levy-Funded Service Areas 86
Next Steps 88

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Linear Asset Length by Pipe Material 20
Figure 5: Asset Condition: All Water Assets 24
Figure 6: Asset Condition: Water – Linear Assets 25
Figure 7: Asset Condition: Water System – Facilities and Appurtenances 25
Figure 8: Water System: Watermain Break History – By Installation Year 26
Figure 9:Historical Expenditures on Asset Acquisition 28
Figure 10: Average Asset Age vs. Estimated Useful Life: Linear Assets 29
Figure 11: Percentage of Estimated Useful Life Consumed: Linear Assets 30
Figure 12: Average Asset Age vs. Estimated Useful Life: Facilities and Appurtenances 31
Figure 13: Percentage of Estimated Useful Life Consumed: Facilities and Appurtenances 31
Figure 14: Summary of Capital, Maintenance, and Operations Expenditures 34
Figure 15: Forecasted Long-term Replacement Needs 41
Figure 16: Calculating Risk Ratings 43
Figure 17: Generic Risk Matrix 45
Figure 18: Detailed Risk Matrix – All Water Assets 46
Figure 19: Consolidated Risk Matrix – All Water System Assets 46
Figure 20 Probability of Failure – Linear Assets 47
Figure 21 Consequence of Failure – Linear Assets 49
Figure 22: Detailed Risk Matrix – Linear Assets 51
Figure 23: Consolidated Risk Matrix – Linear Assets 51
Figure 24: Probability of Failure – Facilities and Appurtenances 52
Figure 25: Consequence of Failure – Facilities and Appurtenances 53
Figure 26: Detailed Risk Matrix – Facilities and Appurtenances 54
Figure 27: Consolidated Risk Matrix – Facilities and Appurtenances 54
Figure 28: Historical MFA Lending Rates 66
Figure 29: Funding Flow 69
Figure 30: Annual Contributions to the LTGIR vs. Annual Capital Spending 73
Figure 31: Annual Contributions to the LTWIR vs. Annual Capital Spending 79
Figure 32: Annual Contributions to the LTSIR vs. Annual Capital Spending 79

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 21
Table 4: General Condition Rating Scale – All Assets 23
Table 5 Water System: Watermain Break History – By Material 27
Table 6: Components of a Lifecycle Framework 33
Table 7: Lifecycle Framework 35
Table 8: Current Reinvestment Rates 37
Table 9: System-generated Reinvestment Rates 38
Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks 39
Table 11: Purpose of Capital and Operating Budgets 40
Table 12: Types of Consequences of Asset Failure 44
Table 13 Defining Probability of Failure Ranges – Linear Assets 47
Table 14: Defining Consequence of Failure Ranges – Linear Assets 50
Table 15: Defining Probability of Failure Ranges - Facilities and Appurtenances 52
Table 16: Defining Consequence of Failure Ranges - Facilities and Appurtenances 53
Table 17: Components of a Levels of Service Framework 56
Table 18: Core Values and Service Statements 57
Table 19: Customer Levels of Service 58
Table 20: Technical Levels of Service 59
Table 21: Trends in Select Customer Levels of Service KPIs – Asset Condition and Performance 61
Table 22: Trends in Customer Levels of Service KPIs – Service Delivery 61
Table 23: Balancing Cost, Performance, and Risk 62
Table 24: Service Area Replacement Costs and Target Reinvestment Rates 64
Table 25: Long-Term Infrastructure Reserve Balances 68
Table 26: Capital Reserve Balances 69
Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments 72
Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 72
Table 29: Funding Levels and Resulting Funding Deficits 74
Table 30: Risks and Benefits of Funding Models 75
Table 31: Tax Rate Increase Required to Achieve Funding Levels 76
Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments 78
Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 78
Table 34: Funding Levels and Resulting Funding Deficits: Water Services 80
Table 35: Funding Levels and Resulting Funding Deficits: Sanitary Services 80
Table 36: Utility Rate Increase Required to Achieve Funding Levels: Water 81
Table 37: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 81
Table 38: Age- and Condition-based Infrastructure Backlogs 83
Table 39: Long-Term Infrastructure Reserves vs. Backlogs 84
Table 40: Development Cost Charges (DCC) Program 85
Table 41: Overlap Between DCC Program and Assets in Backlog State 85

17,500	Number of assets on record in the Water asset database
$303.3 million	2023 replacement cost of these assets
1990s	Decade with the highest capital expenditures on the construction or acquisition of Water assets ($57.1M)
2030s	Decade with the first major forecasted asset replacement spike ($69M)
36%	Percentage of assets in poor or worse condition, or less than 40% service life remaining
$109.7 million	Current age- and condition-based infrastructure backlog
$29.9 million	Current replacement cost of assets with a very high risk rating
$3 million	Annual City spending on operations, maintenance, and capital works related to Water
1.5%	System-generated recommended capital reinvestment rate for Water System infrastructure ($4.5M per year)
0.7%	Port Coquitlam's actual capital reinvestment rate ($2M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Water assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services.

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Water portfolio includes 203 kilometers of distribution mains, 113 kilometers of service connections, two pump stations, and various water appurtenances, such as hydrants, valves, and water meters. The total current replacement cost of all Water assets was estimated at $303.3 million as of 2023, with distribution mains making up nearly 75% of the valuation.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

As no in-field condition data was available for Water assets, age was used to approximate their condition. This is typical for water distribution systems. Unlike sanitary sewer and drainage mains, water distributions mains are pressurized, making their inspections a more complex task. While possible, assessments of watermains can be prohibitively expensive and may require service disruptions. Watermain break history and age are commonly used to identify problematic sections of water distribution networks.

Age-based condition analysis suggests that 64% of the City's Water assets are in fair or better condition; the remaining 36% of assets, with a current replacement cost of $109.7 million, are estimated to be in poor to very poor condition with less than 40% service life remaining. Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Data suggests that the largest expenditures in Water assets were made between 1990 and 1999, totaling $57.1 million and dominated by installation of distribution mains. This coincided with the largest growth in the City's population—an increase of 28%.

New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Water totals approximately $3 million. Of that, $2.8 million per year is spent on the inspection, maintenance, and replacement of Water assets. An additional $217k is allocated for operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. The City is expected to experience a rapid increase in asset replacement needs in the 2030s, peaking at nearly $69 million. Replacement forecasts remain relatively high through the 50-year horizon, averaging $47.5 million per decade between 2023 and 2072.

Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $5.4 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to nearly $110 million when assets in poor or worse condition, or less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in tax and/or utility rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 310 assets, with a current replacement cost of $29.9 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 813 assets, with a current replacement cost of $66 million, were classified with a high risk rating.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Water, a total of 53 KPIs were selected to support performance tracking and monitoring. This included 19 KPIs to measure customer levels of service, and 34 to track the City's technical levels of service Technical levels of service can be thought of as the activities and steps (inputs) that an organization takes to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance, and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port

Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas

For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility

Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas

Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City’s development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

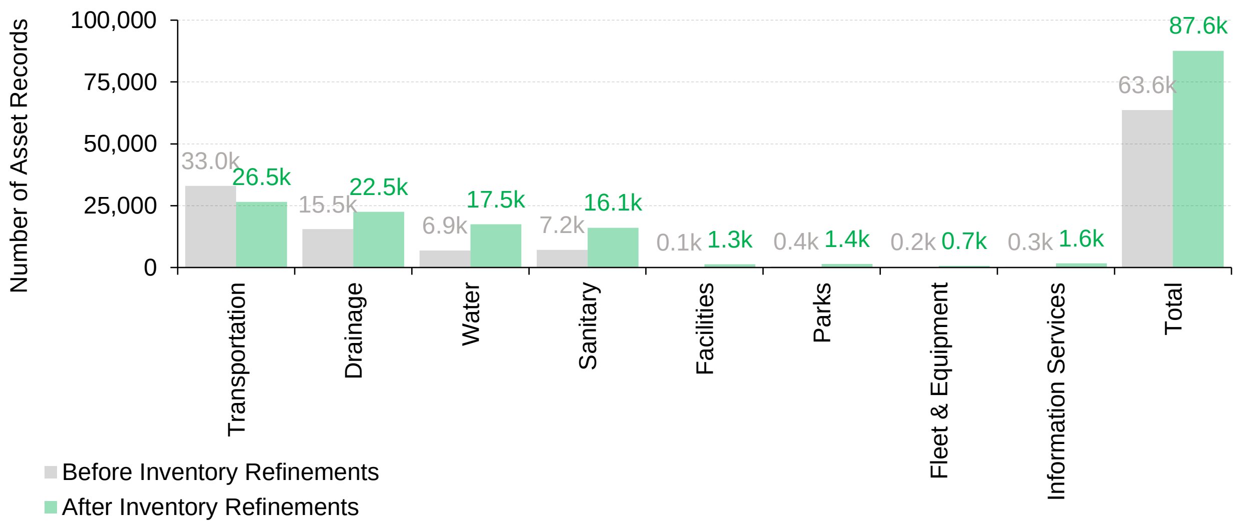
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 asset records to 87,647. For Water, data refinement led to a sharp increase in asset records, from less than 7,000 to 17,490—a change of 153%.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budgets associated with each activity. Data in available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., flushing of mains, break repairs, or hydrant repainting), activities meant to ensure delivery and continuity of acceptable service levels were also included. For example, water quality sampling and system pressure adjustments have no direct impact on assets, but they are part of providing water services to residents to ensure a safe and high quality water supply,

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable, and practical. To track the performance of Water, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. For the Water System, 19 KPIs were selected for customer levels of service, and 34 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. As no in-field condition data was available, age was used to estimate asset condition ratings. This is a typical approach for water distribution networks, given the cost and potential complexity of inspecting live watermains. Although age is an essential component of asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

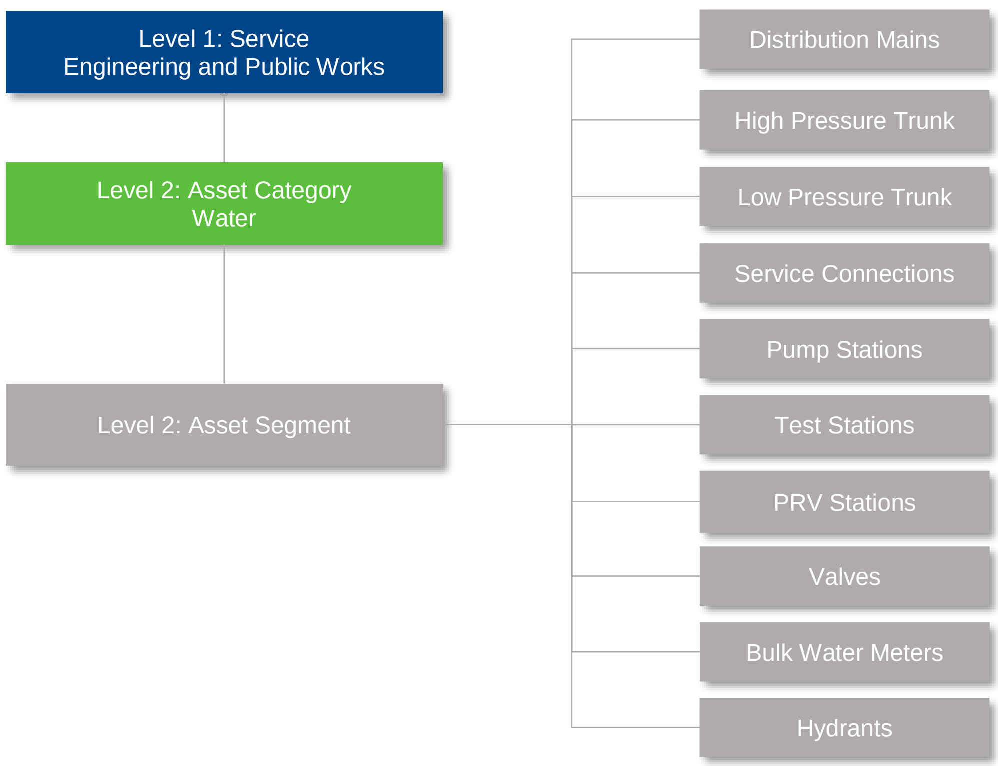
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of the City of Port Coquitlam's Water assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Water database contains 17,500 unique asset records, comprising 203 kilometers of water distribution mains, more than 1,000 hydrants, two pump stations, 20 pressure reducing stations and various appurtenances, such as water meters and valves. The total current replacement cost of these assets was estimated at $303.3 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to all linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

Table 2 summarizes the quantity and current replacement cost of the City's Water assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of $262.4 million, mains and service connections comprise nearly 90% of the portfolio.

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Distribution Mains	202,889m	$217,044,875	Cost per unit
Service Connections	113,020m	$45,336,041	Cost per unit
High Pressure Trunk	6,922m	$9,103,887	Cost per unit
Low Pressure Trunk	2,446m	$3,224,439	Cost per unit
Hydrants	1,044	$9,761,400	Cost per unit
PRV Stations	20	$4,400,000	User defined
Pump Stations	2	$6,999,999	User defined
Valves	2,958	$6,395,500	Cost per unit
Bulk Water Meters	22	$906,873	User defined
Test Stations	14	$105,000	Cost per unit
Total		**$303,278,014**	

The City has 20 Pressure Reducing Valve (PRV) Stations containing 39 pressure reducing valves; some stations have multiple valves. There are approximately 3000 other valves in the Water system including air valves, blow off valves, gate valves, check valves, and zone valves.

Figure 3: Portfolio Valuation

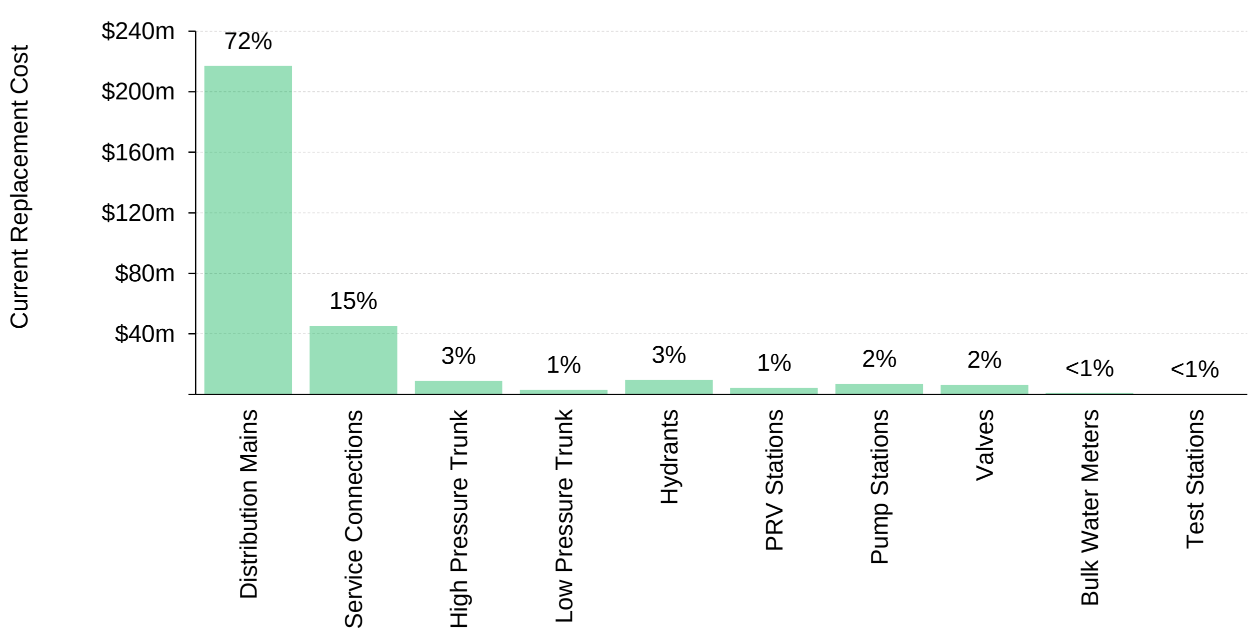
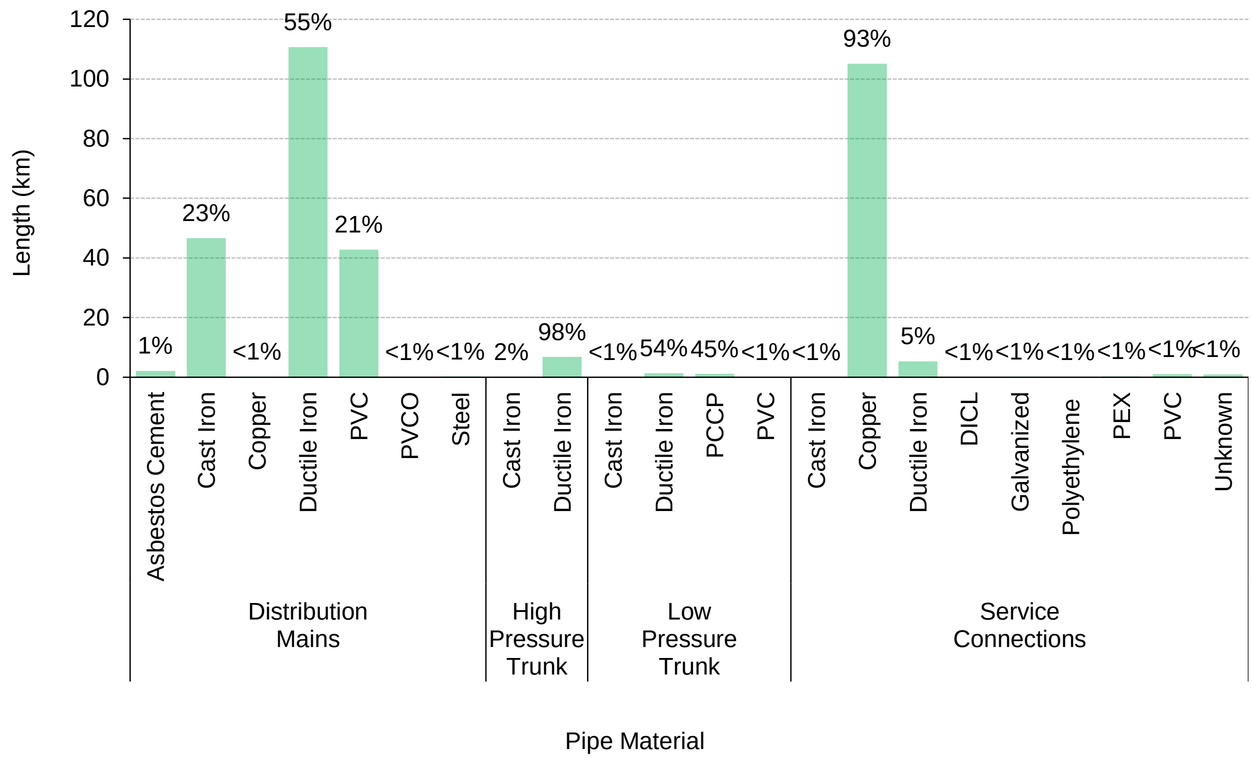


Figure 4 summarizes the length, in kilometers, of the various mains based on pipe material. The majority of distribution mains are ductile iron. Cast iron mains comprise nearly a quarter of distribution mains. However, the City is proactively replacing them due to water quality and other issues. Cast iron has a tendency to reduce the effectiveness of water treatment products, and is also prone to corrosion and breakage.

Figure 4: Linear Asset Length by Pipe Material



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

As no condition data was available for Water assets, age was used to approximate their condition. This is quite typical for linear water distribution networks. Although live watermain condition assessments can be conducted (acoustic leak detection, pressure testing, camera inspections), they can be prohibitively expensive or may require service disruptions. Asset age and break history are commonly used to identify potentially problematic sections of the water distribution system, and can assist in prioritizing main segments for any further, targeted inspection.

Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
	Distribution Mains	0%	Age-based estimates
	Service Connections	0%	Age-based estimates
	High Pressure Trunk	0%	Age-based estimates
	Low Pressure Trunk	0%	Age-based estimates
	Pump Stations	0%	Age-based estimates
	Test Stations	0%	Age-based estimates
	Hydrants	0%	Age-based estimates
	Bulk Water Meters	0%	Age-based estimates
	PRV Stations	0%	Age-based estimates
	Valves	0%	Age-based estimates
Total		**0%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Water assets to support the collection of condition data. It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey.

Table 4: General Condition Rating Scale – All Assets

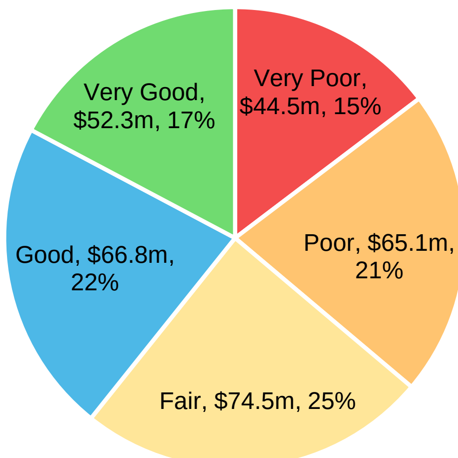
Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

Projected Asset Conditions

Figure 5 summarizes the replacement cost-weighted condition of all Water assets. Based only on age data, although 64% of assets are in fair or better condition, the remaining 36%, with a current replacement cost of nearly $110 million, have less than 40% service life remaining and are estimated to be in poor to very poor condition. Additional detail is also provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 5: Asset Condition: All Water Assets

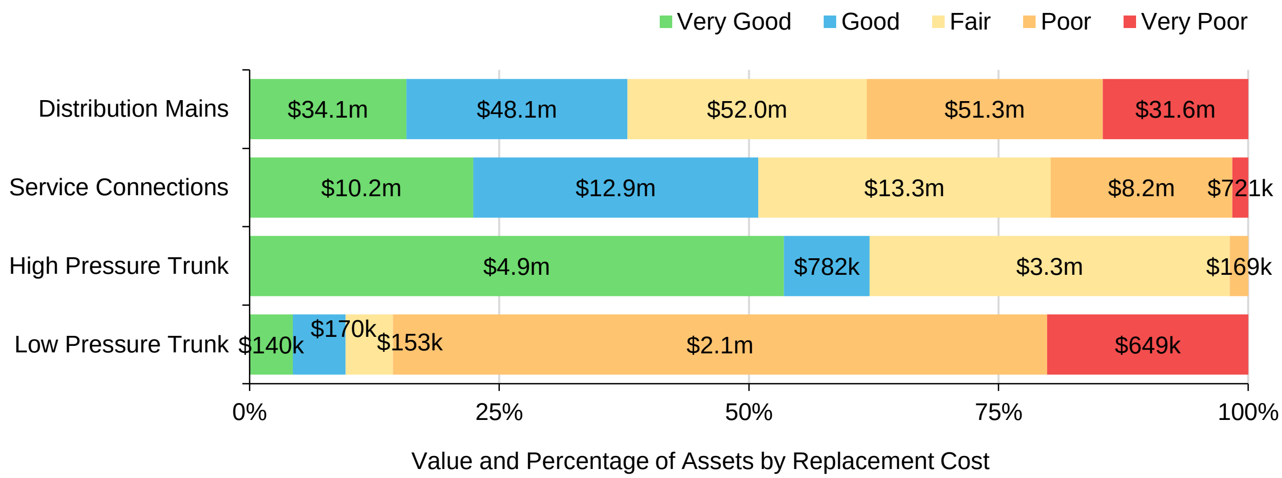


It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

Linear Assets

As illustrated in Figure 6, age data suggests that 62% of distribution mains, 80% of service connections, and 98% of high pressure trunks are in fair or better condition. The remaining 38% of distribution mains, with a current replacement cost of more than $78 million, were assigned an age-based condition rating of poor or very poor. These assets may begin to exhibit signs of deterioration and experience more frequent breaks.

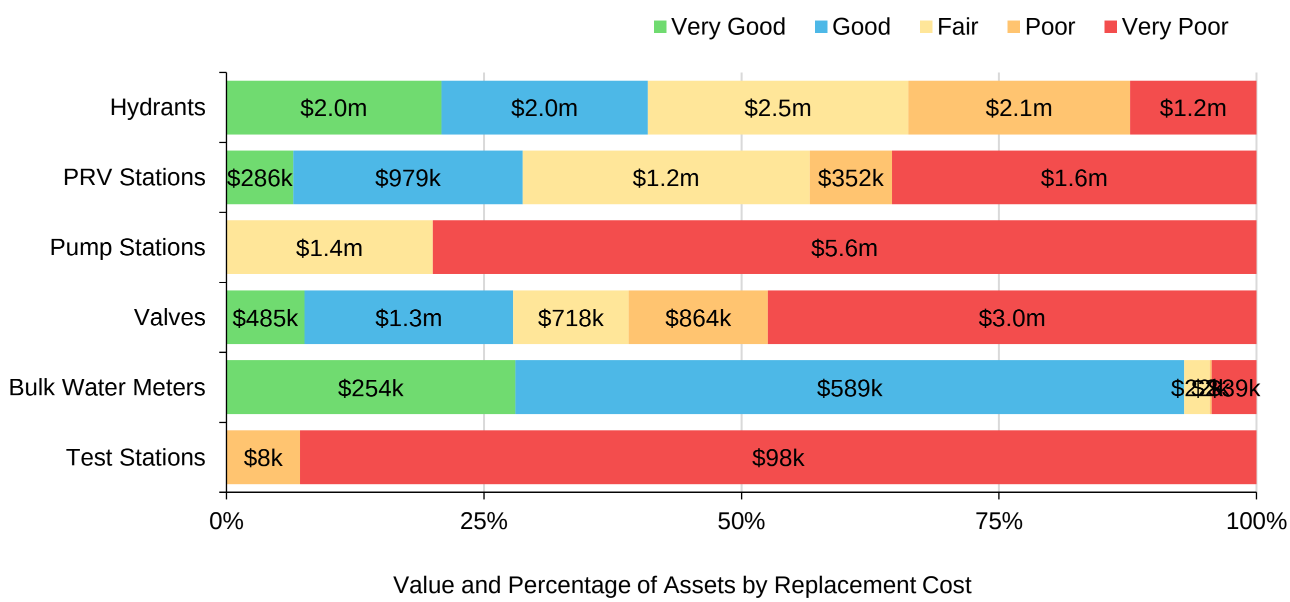
Figure 6: Asset Condition: Water – Linear Assets



Facilities and Appurtenances

Figure 7 provides age-based condition details for the various facilities and appurtenances that support the distribution of the City's water supply. Based on in-service dates of individual assets, the majority of assets within both of the City's two water pump stations (Citadel and Penny Place) are in poor or worse condition.

Figure 7: Asset Condition: Water System – Facilities and Appurtenances



Watermain Break History

Watermain condition assessments can require service disruptions and can be prohibitively expensive. In conjunction with age, watermain break history can also provide useful data for identifying problematic sections of the water distribution network. Figure 8 illustrates the break history for 122 water main sections based on their installation years.

These sections total 19 kilometers in length—a small portion of the overall distribution network. The analysis shows that watermains installed in the 1960s, particularly those placed into service in 1965, account for a disproportionate number of breaks.

Figure 8: Water System: Watermain Break History – By Installation Year

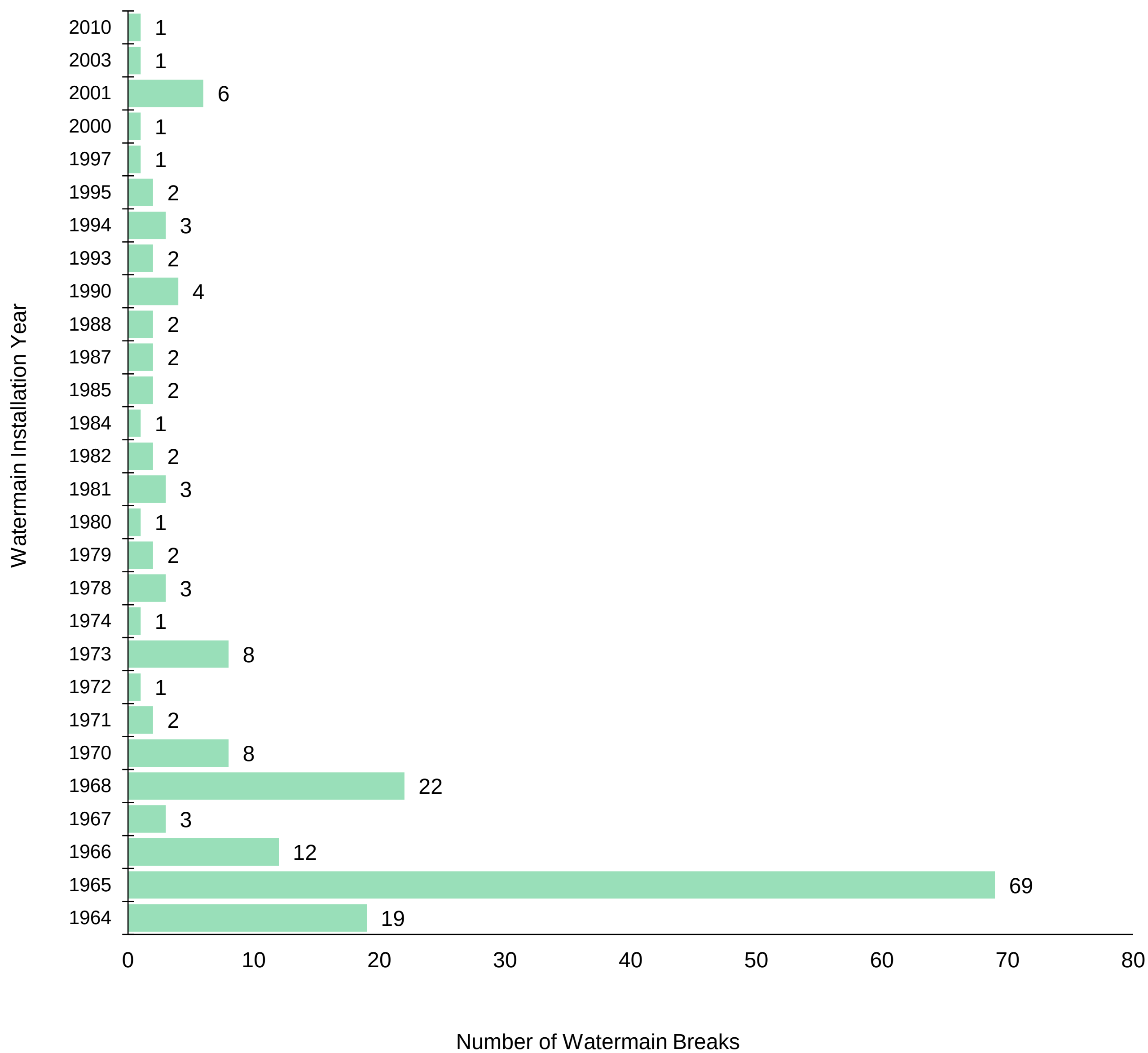


Table 5 summarizes the break history of the above segments. Of the 19km of mains with break history, cast iron makes up more than 14km, or 77% of the total affected pipe length, and also accounts for 75% of the 184 total break incidents recorded. The City's cast iron main replacement program is intended to address issues commonly associated with cast iron, e.g., break rates, corrosion, and adverse impacts on water quality.

Table 5 Water System: Watermain Break History – By Material

Pipe Material	Number of Breaks	Length (m)	Breaks per km	Percentage of Total Length	Percentage of Breaks
Cast Iron	141	14,369m	9.8	77%	75%
Ductile Iron	38	4,177m	9.1	21%	22%
PVC	5	489	10.2	3%	3%
Total	**184**	**19,036m**		**100%**	**100%**

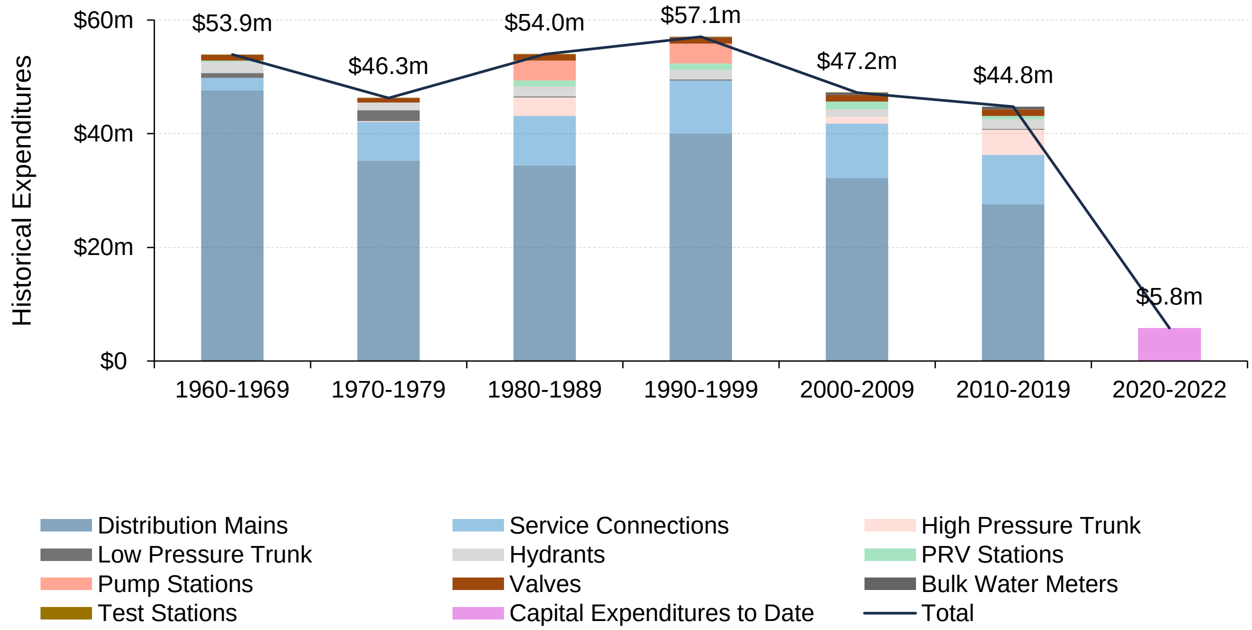
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 9 illustrates historical expenditures on the construction or acquisition of Water assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 9:Historical Expenditures on Asset Acquisition



Expenditures on Water infrastructure averaged $46.4 million per decade over the last 60 years, remaining relatively steady between 1960 and the late 1990s, with distribution mains accounting for the vast majority of expenditures. The largest investments were made between 1990 and 1999, coinciding with the largest growth in the City's population—an increase of 28%. In the current decade, the City has made capital investments of $5.8 million between 2020 and 2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

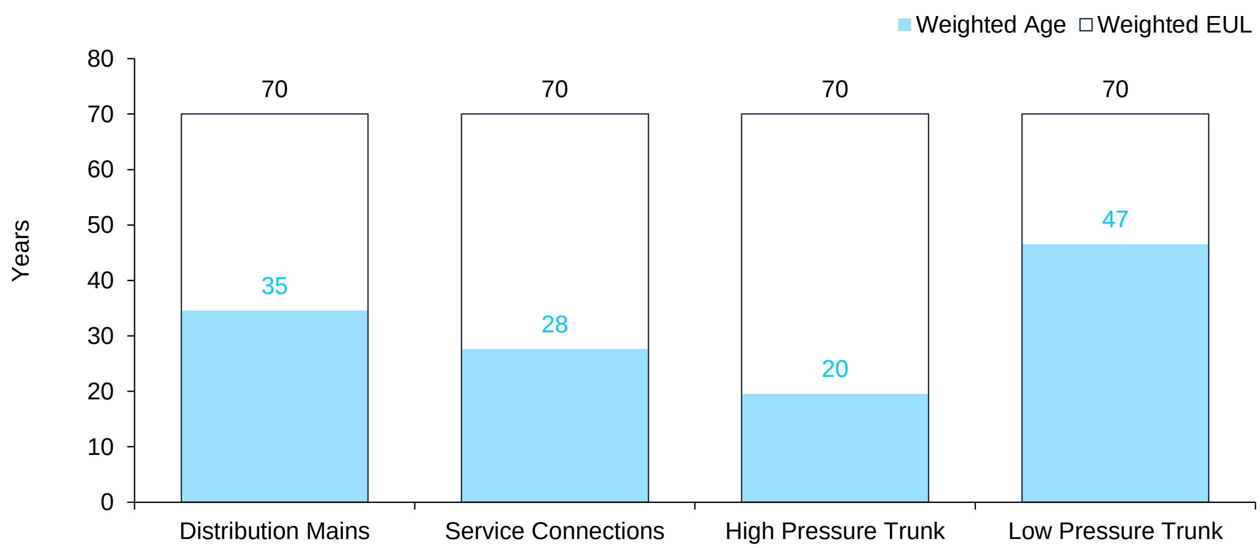
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 10 plots the average established useful life of distribution mains, trunk mains, and service connections against their current average age. Both values were weighted by the replacement cost of individual assets.

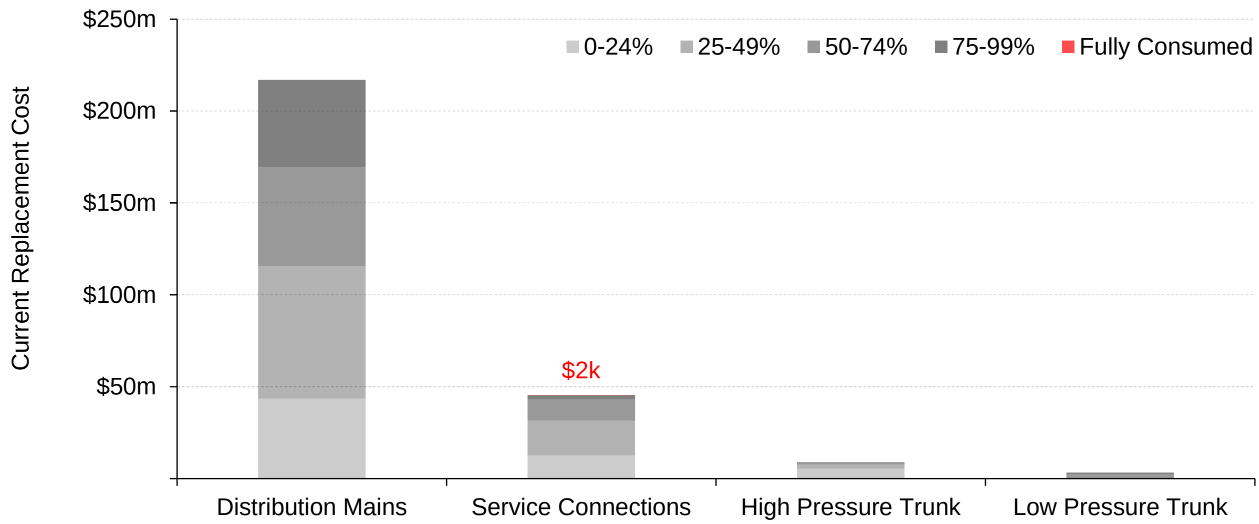
Figure 10: Average Asset Age vs. Estimated Useful Life: Linear Assets



Age analysis shows that with the exception of low pressure trunk mains, the City's water distribution network is still in the first half of its estimated lifespan. Distribution mains are on average 35 years old, and have reached the midpoint of their estimated design life.

Figure 11 shows a detailed distribution of the City's linear water distribution network based on the portion of useful life consumed to date. The analysis shows that although water distribution mains—the largest asset group within the City's water system—are still within their serviceable lifespans, 22% of them, with a current replacement cost of $47.6 million, have consumed at least 75% of their established useful life. These sections may be candidates for replacement in the short term.

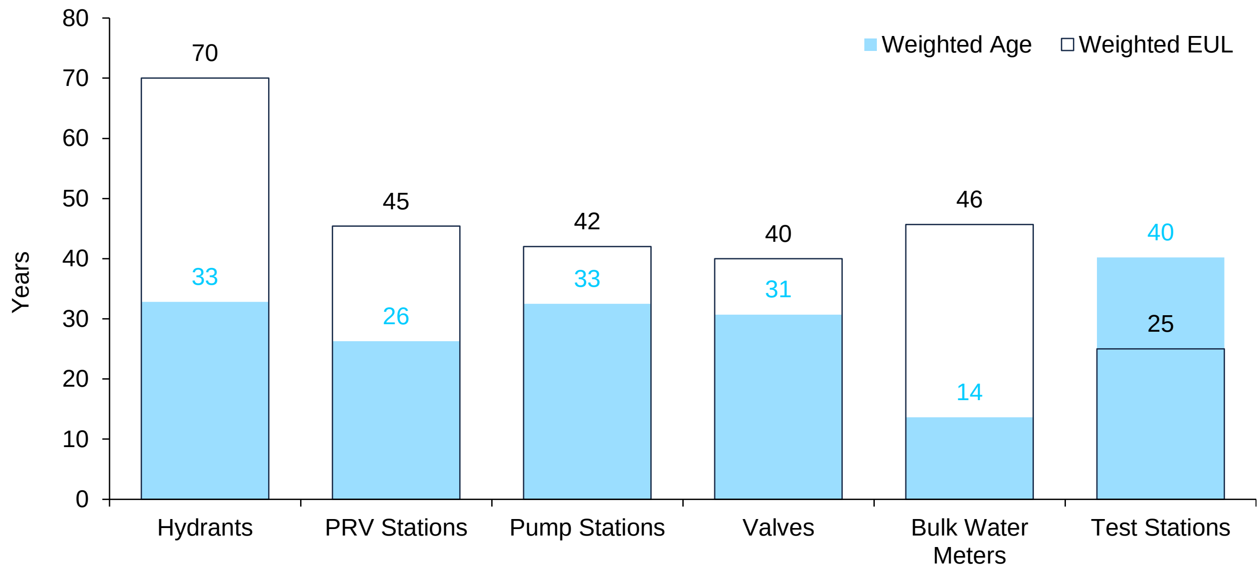
Figure 11: Percentage of Estimated Useful Life Consumed: Linear Assets



Although impacted by localized factors, watermains are designed to last many decades. PVC and ductile iron mains can last nearly a century when properly installed.

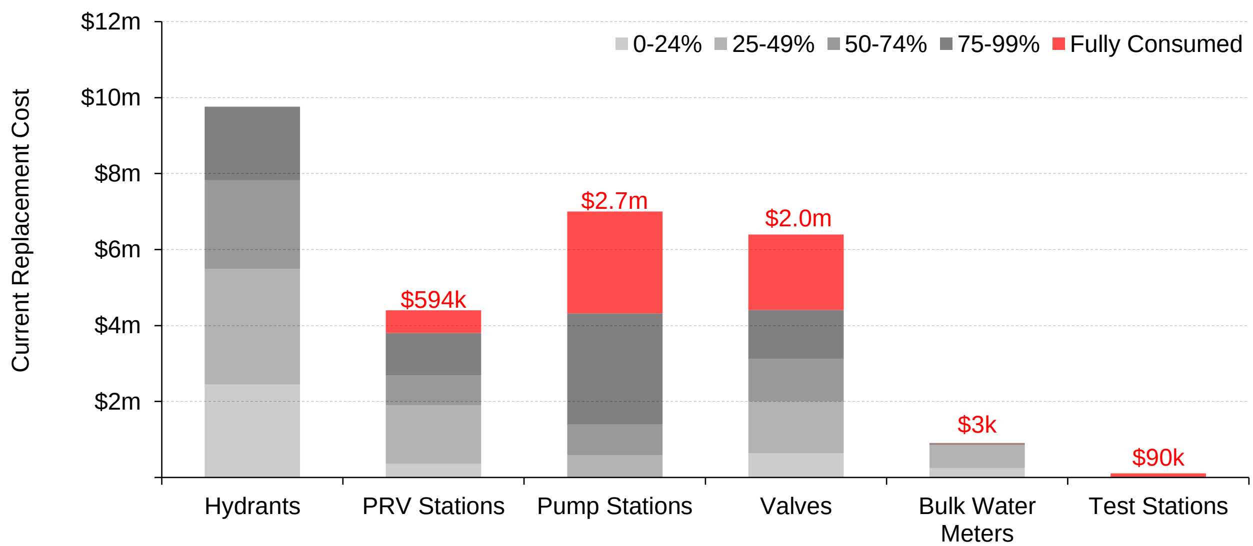
Figure 12 provides a similar analysis for Water facilities and appurtenances. The data shows that valves, hydrants, PRV station, and pump station assets are in the latter stages of their established useful life. On average, test stations remain in service well beyond their established useful life. However, based on replacement costs, these assets do represent only a minor portion of the overall Water portfolio.

Figure 12: Average Asset Age vs. Estimated Useful Life: Facilities and Appurtenances



Age and useful life consumption analysis shows that 38% of pump station assets and 31% of valves, with a current replacement cost of $2.7 million and $2 million, respectively, have fully consumed their established design-life.

Figure 13: Percentage of Estimated Useful Life Consumed: Facilities and Appurtenances



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, repair, and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair, and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring. Lifecycle activities are employed to maximize the serviceable life of assets while maintaining acceptable levels of service and efficient operations.

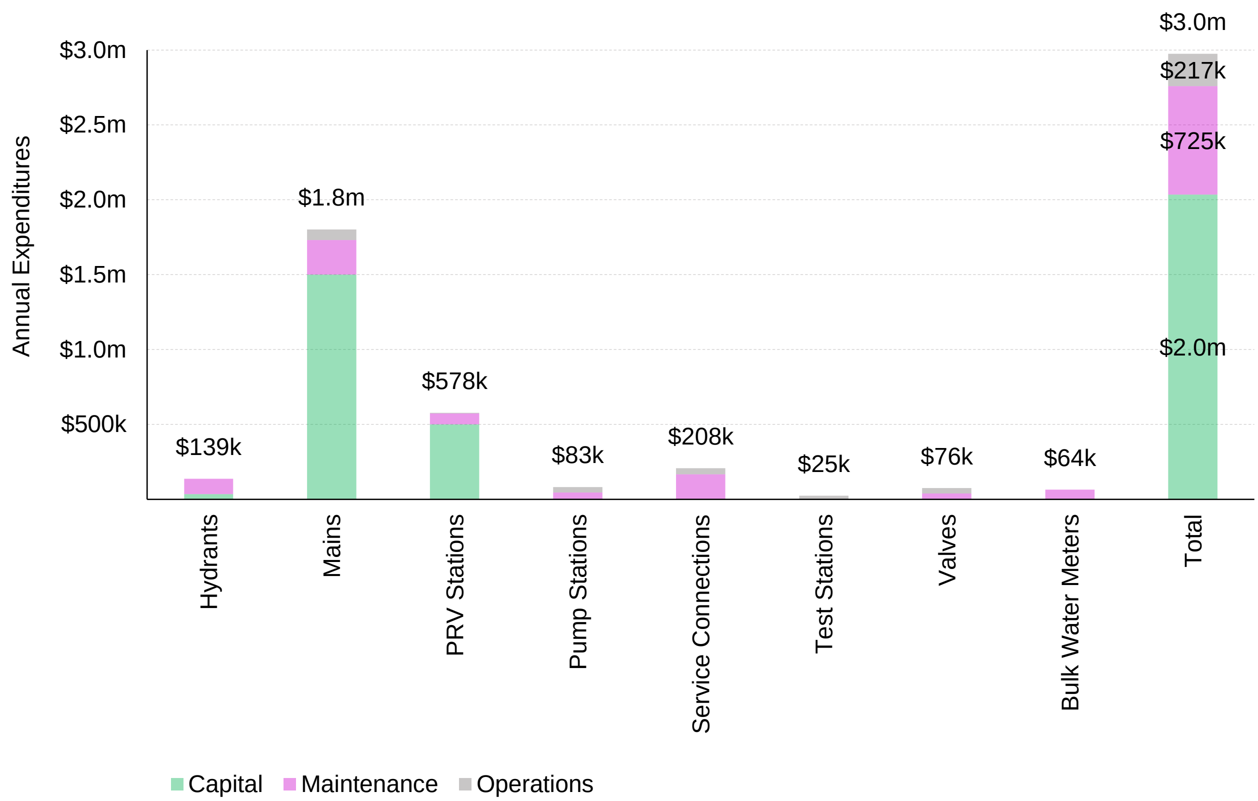
This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 6.

Table 6: Components of a Lifecycle Framework

Component	Description		
Lifecycle Activity	The treatment, event, or intervention implemented,		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Activity Trigger	This can include an asset's age and/or a minimum condition threshold. Other triggers may include priority levels, service request, and previously established frequency.		
Impact on Serviceable Life	Impact on an asset's serviceable lifespan resulting from the activity completed		
Annual Budget	Typical funding available (actual spending may vary from year to year)		
Reinvestment Rate	Annual capital budget of each activity as a portion of the total Water asset portfolio replacement cost of **$303,278,014**.		

Figure 14 summarizes total annual expenditures by asset segment and expenditure type. On average, the City allocates approximately $3 million annually on Water. Watermain replacements, including proactive replacements of cast iron segments, is the largest annual program, accounting for more than 60% of total expenditures.

Figure 14: Summary of Capital, Maintenance, and Operations Expenditures



Of the $3 million annual Water budget, approximately $2.8 million is spent on the inspection, maintenance, and replacement of assets. An additional $216,800 is allocated annually towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., system adjustments, service locates, water quality testing).

The following table outlines the City's lifecycle framework for Water assets.

Table 7: Lifecycle Framework

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Cast Iron Replacement Program	Capital	Material	Extended by 70 years	$1,000,000
Water Main Replacements	Capital	Capacity, age, number of breaks	Extended by 70 years	$500,000
Fire Hydrant Replacement	Capital	Condition	Extended by 50 years	$34,200
PRV Station Replacement	Capital	Capacity or condition	Extended by 35 years	$500,000
Water Pump Station Replacements	Capital	Capacity or condition	Extended by 35 years	$0
Sub-Total Capital				**$2,034,200**
Flushing Mains & Blow Offs	Maintenance	Once per year	Extended by 5 years	$32,400
Uni-directional Flushing	Maintenance	Every 3 years	Extended by 5 years	$40,700
Watermain Repairs	Maintenance	Condition	Extended by 25 years	$158,250
Water Service Repairs	Maintenance	Condition	Extended by 25 years	$167,850
Air Valve Servicing	Maintenance	Once per year	Extended by 10 years	$14,300
Fire Hydrant Servicing	Maintenance	Every 2 years	Extended by 10 years	$87,400
Fire Hydrant Painting & Cleanup	Maintenance	Condition	Extended by 5 years	$17,000
PRV Inspection, Planned and Preventative Maintenance	Maintenance	Once per week	Extended by 10 years	$52,700
PRV SCADA/Alarms	Maintenance	Once per year	Extended by 10 years	$9,600
PRV Reactive Emergency Repairs	Maintenance	Condition	Extended by 10 years	$10,800
Water Valve Replacement & Repairs	Maintenance	Condition	Extended by 25 years	$24,000
Water Meter Repairs	Maintenance	Condition	Extended by 5 years	$64,200

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Water Pump Station Inspection, Planned and Preventative Maintenance	Maintenance	Once per week	Extended by 10 years	$29,900
Water Pump Station SCADA/Alarms	Maintenance	Once per year	Extended by 10 years	$2,900
Water Pump Stations Generator Servicing	Maintenance	Once per year	Extended by 10 years	$3,800
Water Pump Station Reactive Repairs	Maintenance	Condition	Extended by 10years	$8,800
Sub-Total Maintenance				**$724,600**
Water System Adjustments	Operations	Water quality, supply, or pressure	No impact	$17,600
Water Service Locating & Adjusting	Operations	Condition	No impact	$40,200
Water Quality Sampling and Testing	Operations	Once per week	No impact	$25,300
Soil Disposal	Operations	With paving or utility projects	No impact	$53,700
PRV Station Electricity and Communication Billings	Operations	Usage	No impact	$5,000
Water Valve Locating & Adjusting	Operations	Once per year	No impact	$37,600
Water Pump Station Electricity and Communication	Operations	Usage	No impact	$37,400
Sub-Total Operations				**$216,800**
Total				**$2,975,600**

Capital Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 8 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 8 shows that the City's annual Water capital expenditures of $2.0 million yield an overall, service area reinvestment rate of 0.7%.

Table 8: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Linear	$1,500,000	0.5%	0.5%
Non-linear	$534,200	1.9%	0.2%
Total	**$2,034,200**		**0.7%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

The CIRC reinvestment levels for non-linear assets includes water treatment plants, which are not part of the City's Water portfolio.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 9: System-generated Reinvestment Rates

Segment	Type	AAR	System-generated TRR
Distribution Mains	Linear	$3,100,641	1.4%
Service Connections	Linear	$647,658	1.4%
High Pressure Trunk	Linear	$130,056	1.4%
Low Pressure Trunk	Linear	$46,063	1.4%
Hydrants	Non-linear	$139,449	1.4%
PRV Stations	Non-linear	$111,152	2.5%
Pump Stations	Non-linear	$179,966	2.6%
Valves	Non-linear	$159,888	2.5%
Bulk Water Meters	Non-linear	$21,965	2.4%
Total		**$4,541,037**	**1.5%**

For Water assets, the average annual requirements for linear assets total $3,924,418, for a system-generated target reinvestment rate of 1.4%. Similarly, for non-linear assets, the AAR total $616,619, for a reinvestment rate of 2.2%. Combined, the system-generated, service area target reinvestment rate is estimated at 1.5%.

Comparative Analysis

Table 10 compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide.

Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks

Benchmark	Assets Included	Target Reinvestment Range	2016 Municipal Average	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
CIRC	Linear	1.0% - 1.5%	0.9%	0.5%	0.5%
CIRC	Non-linear	1.7% - 2.5%	1.1%	1.9%	0.2%
Citywide Asset Manager	Linear	1.4%	0.9%	0.5%	0.5%
Citywide Asset Manager	Non-linear	2.2%	1.1%	1.9%	0.2%
Citywide Asset Manager	All Water Assets	1.5%	-	-	0.7%

The analysis shows that, at the segment level, Port Coquitlam's reinvestment rate for non-linear assets is comparable to both the CIRC and system-generated targets: the City is reinvesting 1.9% of the total replacement cost of all non-linear assets back into these assets each year. At 0.5%, the reinvestment rate for linear assets, however, falls well below the targets recommended by both benchmarks. At the service area level, the City's overall reinvestment rate of 0.7% also remains below recommended ranges.

Maintaining adequate reinvestment rates –whether through actual spending on infrastructure programs or allocating funds to reserves for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 11: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

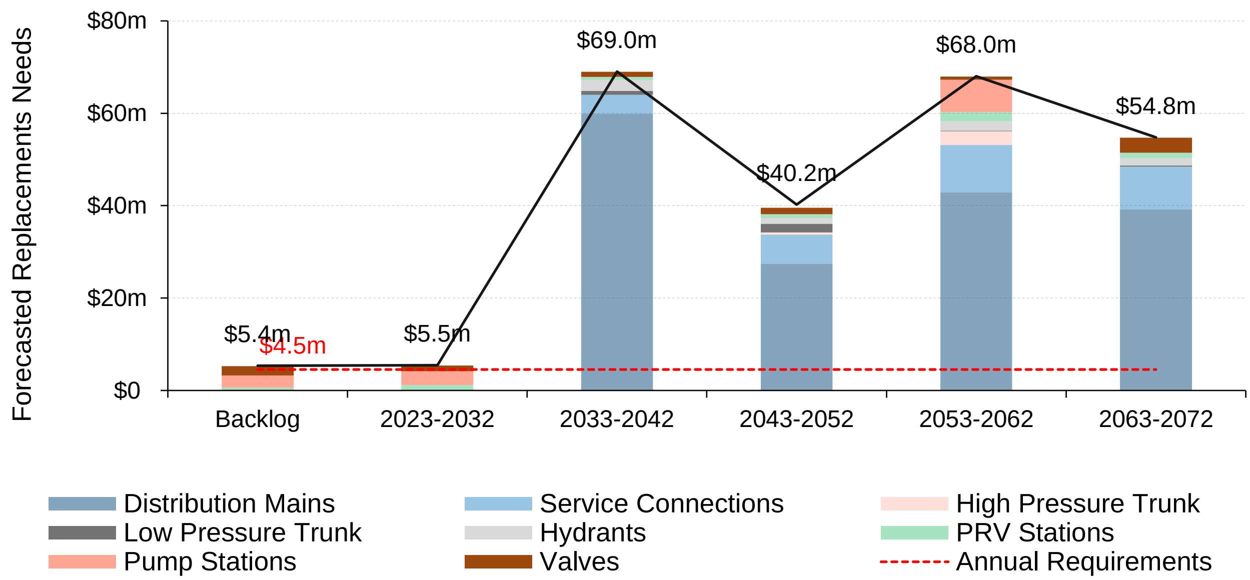
Forecasted Long-term Replacement Needs

In contrast to historical investments in infrastructure, Figure 15 illustrates the cyclical short-, medium- and long-term replacement requirements for Water assets over the coming decades. The City's average annual requirements for asset replacements total $4.5 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $2 million per year on Water asset replacements are less than half of the $4.5 million recommended to ensure that replacement needs are met.

The chart illustrates a sharp increase in capital needs beginning in the 2030s when substantial portions of the distribution network will reach the end of its serviceable lifespan. This spike, estimated at $69 million, comes approximately 70 years after the 1960s, when the largest number of distributions mains were installed. These replacement needs are expected to remain high, and relatively stable during the 50-year forecast period, averaging $47.5 million per decade.

Figure 15: Forecasted Long-term Replacement Needs



The chart also shows a Water age-based backlog of $5.4 million, comprising assets that have reached the end of their estimated useful life. However, this figure increases to $109.7 million when assets in poor or worse condition, or less than 40% service life remaining, are included. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition.

Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates. The magnitude of capital needs typically far exceeds what most agencies can afford to fund. A risk-based approach can be used to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 16: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, previous performance history, capacity challenges, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from non-eventful to severe: a small diameter water main break in a subdivision may cause several rate payers to be without water service for a short time. However, a larger trunk water main may break outside a hospital, leading to severely detrimental consequences.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

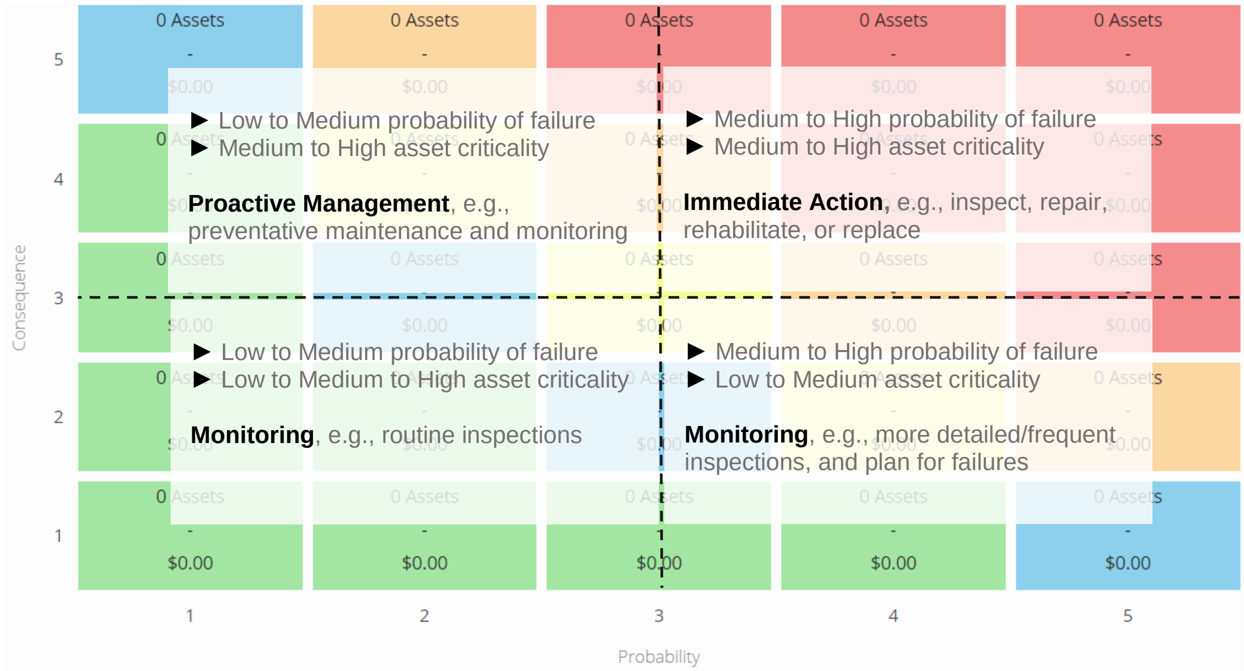
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 12: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for Water assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 17.

Figure 17: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

This following section outlines the proposed risk models for Water assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as the Water portfolio as a whole.

Risk Matrix: All Water Assets

The following summary-level risk matrix show how all Water System assets are classified based on their risk ratings.

Figure 18: Detailed Risk Matrix – All Water Assets

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	7 Assets $3.4M	12 Assets $5.0M	6 Assets $2.3M	4 Assets $2.9M	6 Assets $2.7M
3	725 Assets $60.9M	561 Assets $44.1	404 Assets $33.5M	359 Assets $31.2M	7 Assets $1.0M
2	660 Assets $19.4M	506 Assets $19.7M	366 Assets $17.2M	235 Assets $9.6M	36 Assets $198.0K
1	4,875 Assets $21.0M	3,950 Assets $14.1M	2,827 Assets $10.0M	816 Assets $2.5M	1,126 Assets $2.4M

Probability of Failure

To provide a more simplified view, the matrix below consolidates assets into broader risk classifications. The figure illustrates that 310 assets, with a current replacement cost of $29.9 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 813 assets, with a current replacement cost of $66 million, were classified with a high risk rating.

Figure 19: Consolidated Risk Matrix – All Water System Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
10,935 Assets	4,603 Assets	827 Assets	813 Assets	310 Assets
$81,552,362	$76,090,121	$49,754,929	$66,014,595	$29,866,008

Linear Assets

Since in-field condition data was not available, other attributes were used to explain the likelihood of failure for the City's linear water distribution system. These include age-based condition ratings, watermain break history, service life remaining, and pipe material. In the model below for probability of failure, age-based condition is the best proxy for estimating the likelihood of failure. Hence, it received a weighting of 65%.

Figure 20 Probability of Failure – Linear Assets

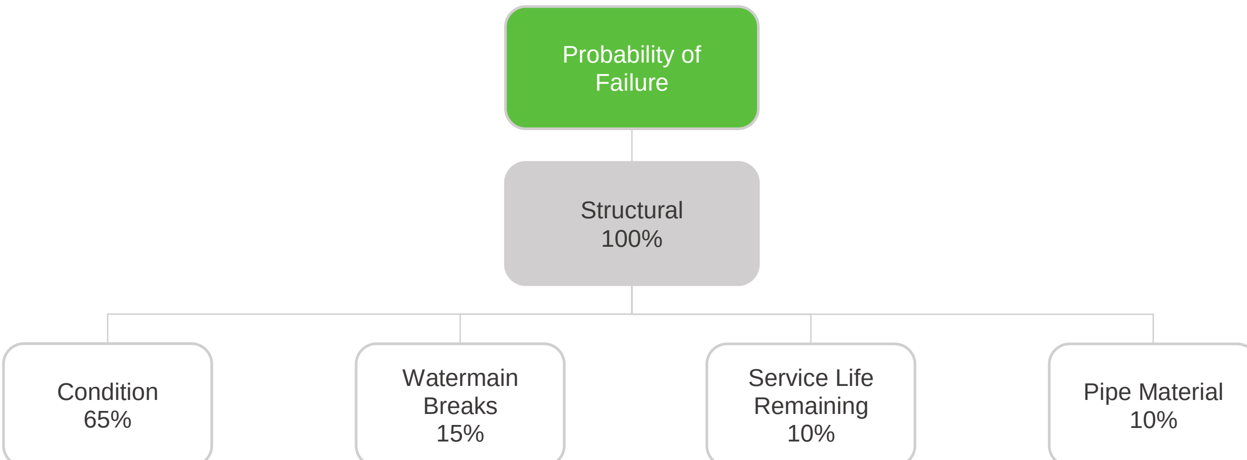


Table 13 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 13 Defining Probability of Failure Ranges – Linear Assets

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain
Number of Watermain Breaks	0	1—Rare
	1 – 2	2—Unlikely
	3 – 4	3—Possible
	5 – 6	4—Likely or Probable
	Greater than 6	5—Almost Certain
Pipe Material	PVC/PVCO/HDPE	1—Rare
	DI	2—Unlikely
	AC, CU, PCCP	3—Possible
	CI	4—Likely or Probable

The model in Figure 21 outlines the type of potential consequences that may result from failure of an asset within the City's linear Water distribution system, the relative weight of each consequence type, and the data (attributes) used to approximate that effect. Four types of consequences are accounted for: direct financial, economic, socio-political, and environmental.

The City's Water assets inventory includes the replacement cost, main type (e.g., distribution vs. trunk main) and diameter. Additionally, GIS data was used to identify service type (industrial, commercial, or institutional), and watermains located in dead ends, near watercourses, or in easements. If they fail, water mains located in easements have a greater chance of impacting properties than those located in roadways. These attributes are used to assist in measuring and quantifying the economic, socio-political, and environmental consequences of main failures.

In addition, GIS analysis was also conducted to append the appropriate road class to each main segment. This allowed for a more nuanced assessment and understanding of a main's economic consequence of failure—that is, a main failure along an arterial road would cause more disruption than one occurring beneath a collector or lane roadway.

Figure 21 Consequence of Failure – Linear Assets

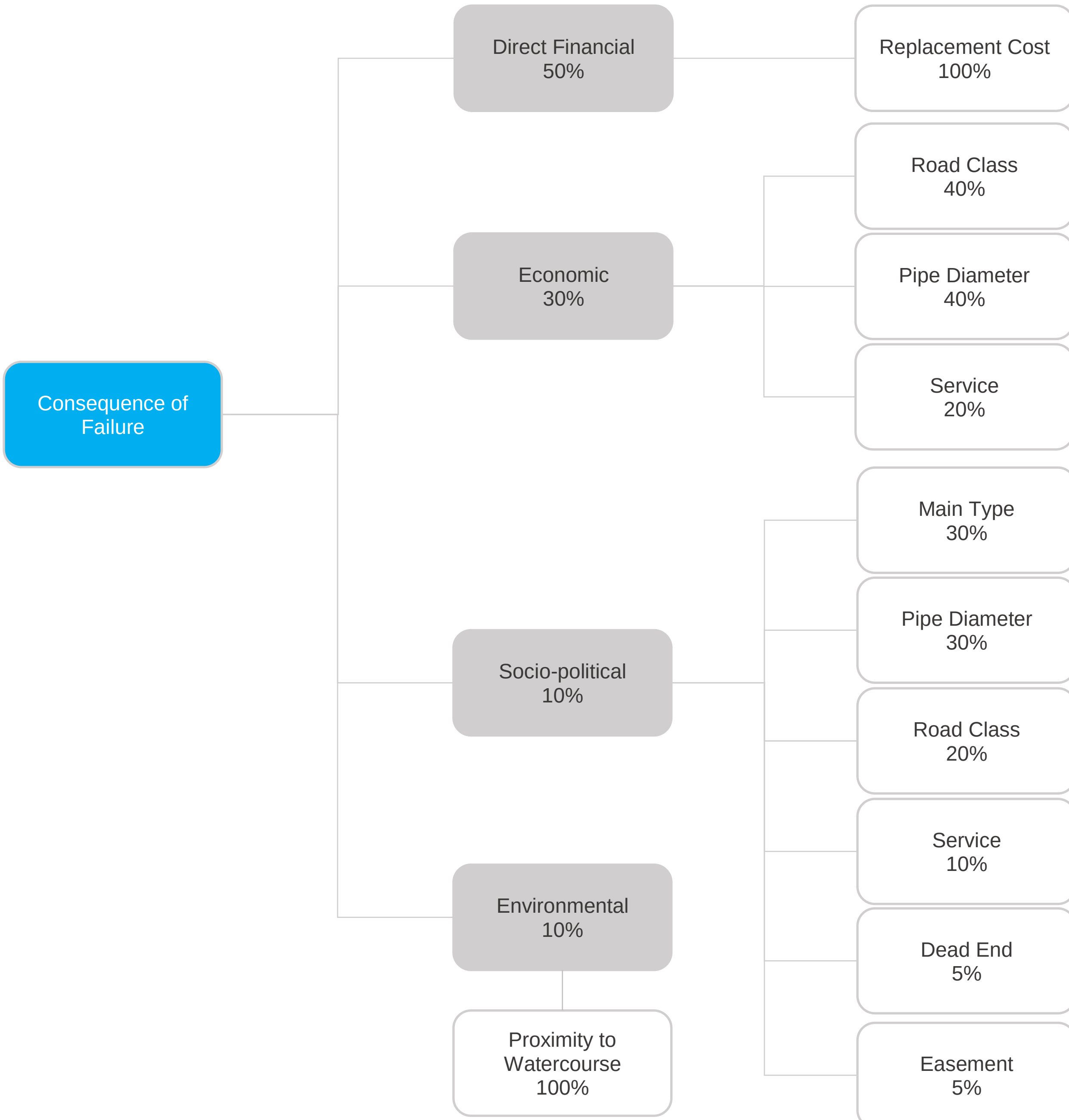


Table 14: Defining Consequence of Failure Ranges – Linear Assets

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$10,000 - $50,000	2—Minor
	$50,000 – $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Economic	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Pipe Diameter (mm)	Consequence of Failure
	Less than 100	2—Minor
	100 - 300	3—Moderate
	300 – 400	4—Major
	Greater than 400	5—Severe
	Service	Consequence of Failure
	Residential	3—Moderate
	Industrial/Commercial/Institutional	4—Major
Socio-political	Main Type	Consequence of Failure
	Distribution Mains	3—Moderate
	Low Pressure Trunk Mains	4—Major
	High Pressure Trunk Mains	5—Severe
	Pipe Diameter (mm)	Consequence of Failure
	Less than 100	1—Insignificant
	100 - 150	2—Minor
	150 - 200	3—Moderate
	200 - 450	4—Major
	Greater than 450	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Service	Consequence of Failure
	Residential	3—Moderate
	Industrial/Commercial/Institutional	4—Major
	At dead end:	Consequence of Failure
	No	1—Insignificant
	Yes	3—Moderate
	Presence of easement:	Consequence of Failure
	No	1—Insignificant
	Yes	3—Moderate
Environmental	Proximity to watercourse (m)	Consequence of Failure
	More than 30 m	1—Insignificant
	Within 30 m	3—Moderate
	Crossing Watercourse	4—Major

Risk Matrix: Linear Assets

The risk matrix below is based on the previous risk model developed for the linear Water system using available asset data.

Figure 22: Detailed Risk Matrix – Linear Assets

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	7 Assets $3.4M	8 Assets $3.6M	6 Assets $2.3M	0 Assets $0	0 Assets $0
3	342 Assets $57.1M	271 Assets $40.9M	197 Assets $31.2M	183 Assets $29.0M	0 Assets $0
2	597 Assets $18.4M	452 Assets $18.6M	344 Assets $17.0M	206 Assets $9.4M	0 Assets $0
1	4,245 Assets $19.3M	3,609 Assets $13.4M	2,439 Assets $9.2M	477 Assets $1.8M	8 Assets $32.9K

Probability of Failure

The consolidated risk matrix in Figure 23 shows that 117 assets, with a current replacement cost of $21 million have a high risk rating. The majority of these assets are cast iron and ductile iron distribution mains.

Figure 23: Consolidated Risk Matrix – Linear Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
9,725 Assets	2,480 Assets	508 Assets	561 Assets	117 Assets
$76,887,897	$68,506,367	$46,435,975	$61,852,335	$21,026,669

Facilities and Appurtenances

Figure 24: Probability of Failure – Facilities and Appurtenances

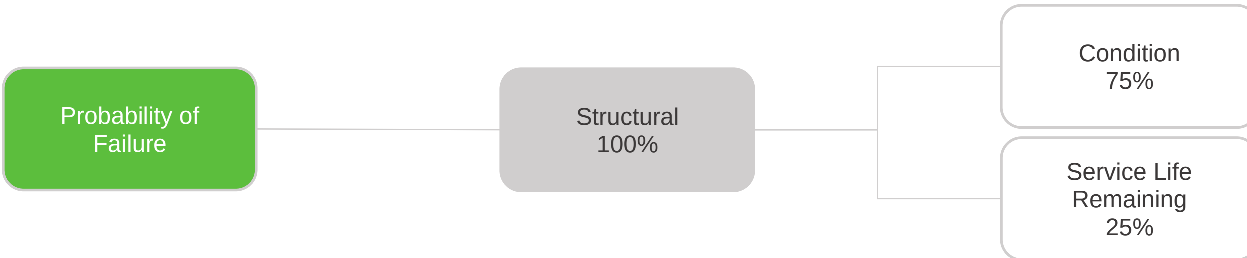


Table 15: Defining Probability of Failure Ranges - Facilities and Appurtenances

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 25: Consequence of Failure – Facilities and Appurtenances

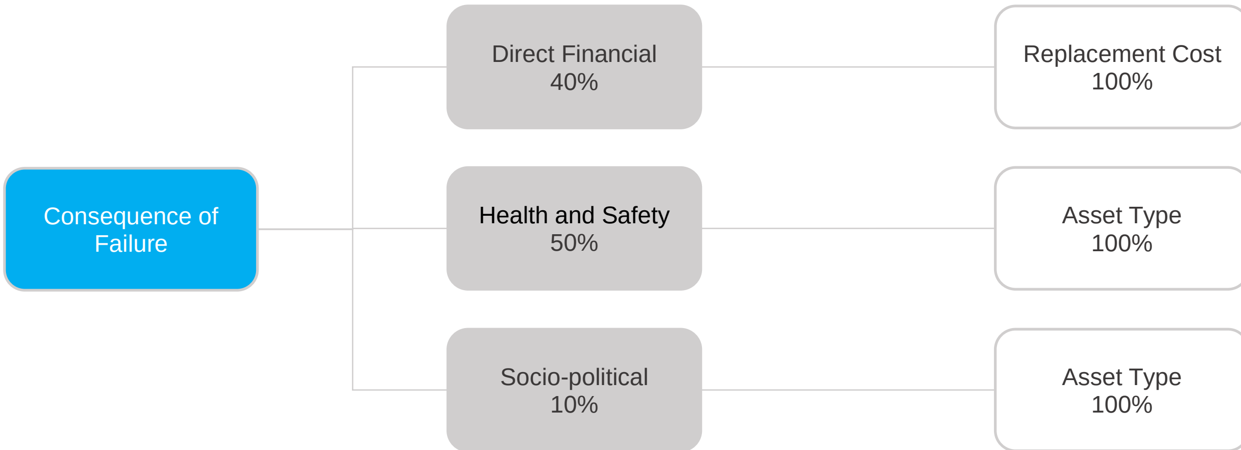


Table 16: Defining Consequence of Failure Ranges - Facilities and Appurtenances

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1—Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Health and Safety	Asset Type	Consequence of Failure
	Bulk Water Meters	1—Insignificant
	Valves	2—Minor
	PRV Stations	3—Moderate
	Hydrants, Pump Stations, Test Stations	5—Severe
Socio-political	Asset Type	Consequence of Failure
	Bulk Water Meters	1—Insignificant
	Valves	2—Minor
	PRV Stations	4—Major
	Hydrants, Pump Stations, Test Stations	5—Severe

Risk Matrix: Facilities and Appurtenances

The risk matrix below is based on the previous risk model developed for the City's Water facilities and appurtenances.

Figure 26: Detailed Risk Matrix – Facilities and Appurtenances

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	0 Assets $0	4 Assets $1.4M	0 Assets $0	4 Assets $2.9M	6 Assets $2.7M
3	383 Assets $3.9M	290 Assets $3.1M	207 Assets $2.4M	176 Assets $2.2M	7 Assets $1.0M
2	63 Assets $1.0M	54 Assets $1.1M	22 Assets $236.5	29 Assets $225.5K	360 Assets $198.0K
1	630 Assets $1.6M	341 Assets $771.9K	388 Assets $738.6K	339 Assets $660.0K	1,118 Assets $2.3M

Probability of Failure

The consolidated risk matrix in Figure 27 shows that 193 assets with a current replacement cost of $8.8 million have a very high risk rating. The majority of these are pump station assets. An additional 252 assets, valued at $4.2 million, carry a high risk rating. Most are hydrants, which while carrying a moderate consequence of failure rating, but are aging and have a higher probability of failure.

Figure 27: Consolidated Risk Matrix – Facilities and Appurtenances

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
1,210 Assets	2,123 Assets	319 Assets	252 Assets	193 Assets
$4,664,465	$7,583,754	$3,318,954	$4,162,260	$8,839,339

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 17: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 18 outlines the core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 18: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Water, a total of 53 KPIs were selected. This included 19 KPIs to measure customer levels of service, and 34 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 19: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
Average age of watermains (years)	NA	NA	NA	35	→
% of water assets in poor or worse condition	NA	NA	NA	34	→
% of mains in poor or worse condition	NA	NA	NA	38	→
% of pump station assets in poor or worse condition	NA	NA	NA	80	→
Maintenance					
# of water main flushing related calls	0	3	0	3	→
# of hydrant maintenance calls	23	26	27	33	→
# of pumpstation related calls	5	7	32	32	↗
# of watermain breaks	51	62	45	38	↘
# of waterbox maintenance calls	53	75	91	81	→
Operations					
# of water conservation calls	77	48	21	14	↘
# of water conservation violators tagged	NA	NA	NA	NA	→
# of water service locate requests	80	93	93	108	→
# of no-water low pressure complaints	54	78	66	68	→
# of water quality calls	66	88	71	110	↗
# of water service leak calls - emergency & city side service	140	182	184	212	↗
# of water service leak calls - private service	63	86	80	84	→
# of calls - turn on/off water service connection	145	184	202	236	↗
# of non-compliance incidents with water quality regulations	NA	NA	NA	4	→
Water consumption - million m3/year (per 61, 498 residents)	NA	NA	NA	10.68	→

Table 20: Technical Levels of Service

KPI	2021	Budget
Capital		
Meters of cast iron mains replaced	TBD	$1,000,000
Meters of watermains replaced	TBD	$500,000
# of pump stations replaced/upgraded	0	$0
# of PRV stations replaced	1	$500,000
# of fire hydrants replaced/repaired (per 978 city-owned hydrants)	2	$34,200
Average annual capital reinvestment	$2,034,500	
Maintenance		
# of air valves maintained (of 167) M	183	$14,300
# of fire hydrants serviced (of 1001 hydrants) - per Group A and Group B service levels	749	$87,400
# of fire hydrants painted and cleaned (per 1001 hydrants)	50	$17,000
# of hydrant valve installations	75	$0
# of dead-end watermains flushed (# dead ends)	222	$32,400
# kilometers of watermains flushed (unidirectional; per 213km of watermains)	80	$40,700
# of watermain break repairs (per 213km of watermains)	24	$158,250
# of PRV inspections completed (per 20 PRV stations)	366	$52,700
# of SCADA/alarm maintenance services completed (14 PRVs with SCADA)	14	$9,600
# of reactive PRV repairs completed (per 20 PRVs)	NA	$10,800
# of water services repaired or replaced (of 10,175)	108	$167,850
# of water valves repaired or replaced (of 2,240)	61	$24,000
# of water pump station inspections and maintenance (per 2 pump stations)	50	$29,900
# of water pump station SCADA/alarm maintenance services	2	$2,900

KPI	2021	Budget
# of water generators serviced (of 2 generators)	2	$3,800
# of unplanned pump station inspections and repairs	0	$8,800
# of water meters repaired or replaced (of 598 meters)	172	$64,200
Average annual maintenance expenditures	$724,600	
Operations		
# of watermain line valves inspected, adjusted, and exercised (of 2,240 valves)	1619	$37,600
# of annual water systems adjustments	5	$17,600
# of water samples taken per year (per 14 sample sites)	997	$25,300
# of kilowatt hours used for PRV station electricity communication (per 20 stations)	NA	$5,000
# of water services located or adjusted (of 10,175)	72	$40,200
# of water meters read annually (of 598 meters)	2469	$0
Kilowatt hours used for water pump station electricity and communication (per 2 PS)	NA	$37,400
Water Eco-initiative Outreach (# of household visits, events, social media)	200	$0
Volume of soil disposal - water	NA	$53,700
Average annual operating expenditures	$216,800	

Levels of Service Analysis

Table 21 provides the 3-year percentage change in service requests for KPIs that best align with asset condition and performance.

Table 21: Trends in Select Customer Levels of Service KPIs – Asset Condition and Performance

KPI	Percentage change between 2018-2021
# of watermain breaks	-25%
# of water service leak calls - emergency & city side service	+51%
# of pumpstation related calls	+540%

Table 22 shows the change in service requests for KPIs that best align with service delivery, but have no direct relationship with asset lifespans. These may be helpful indicators in determining if sufficient funding and resources are being allocated towards service delivery.

Table 22: Trends in Customer Levels of Service KPIs – Service Delivery

KPI	Percentage change between 2018-2021
# no-water low pressure complaints	+26%
# water service locates	35%
# water conservation calls	-82%
# water quality calls	+67%

KPI data can be used to support decisions to maintain, increase or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions.

For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 23 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Such activities have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 23: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different infrastructure programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 24 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 24: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 28: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."

[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 25: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

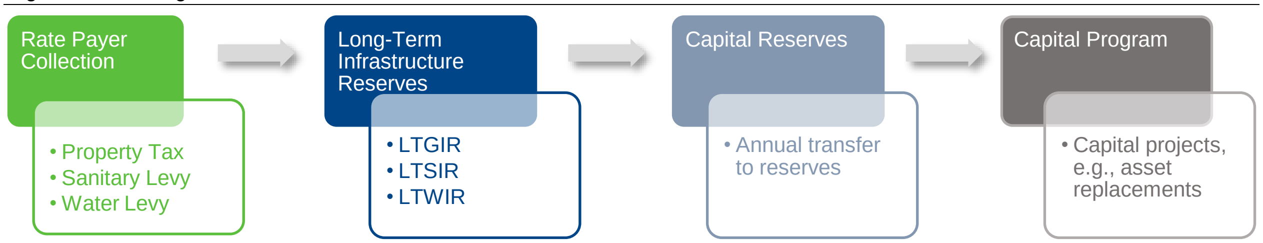
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 26: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 29: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 24. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies . The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 27, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 28, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

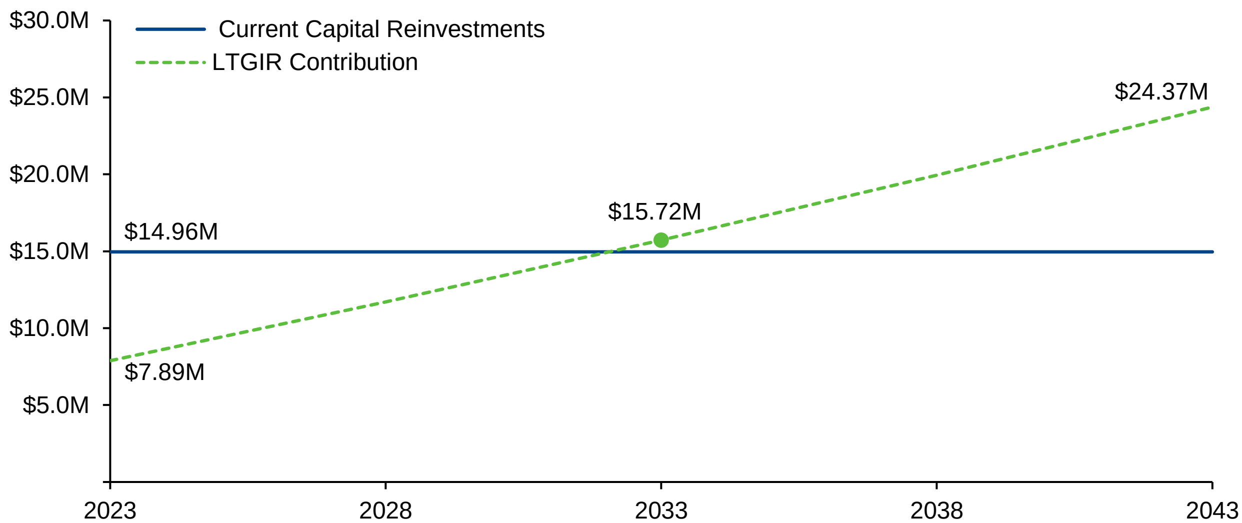
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 27 above as $15 million.

Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 30: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 27.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 28. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 29: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 30: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 31: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 31, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 31: Annual Contributions to the LTWIR vs. Annual Capital Spending

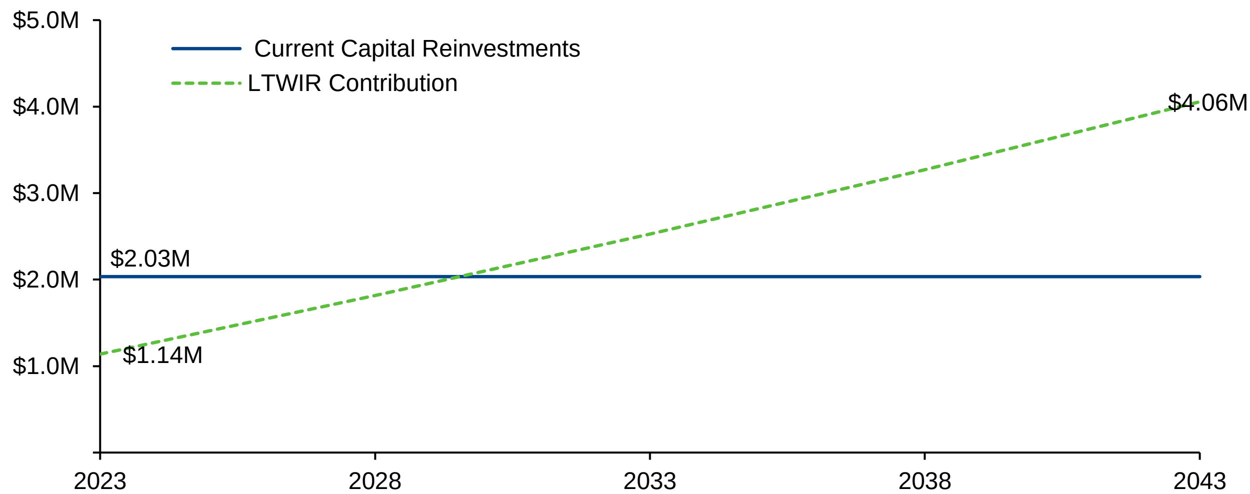
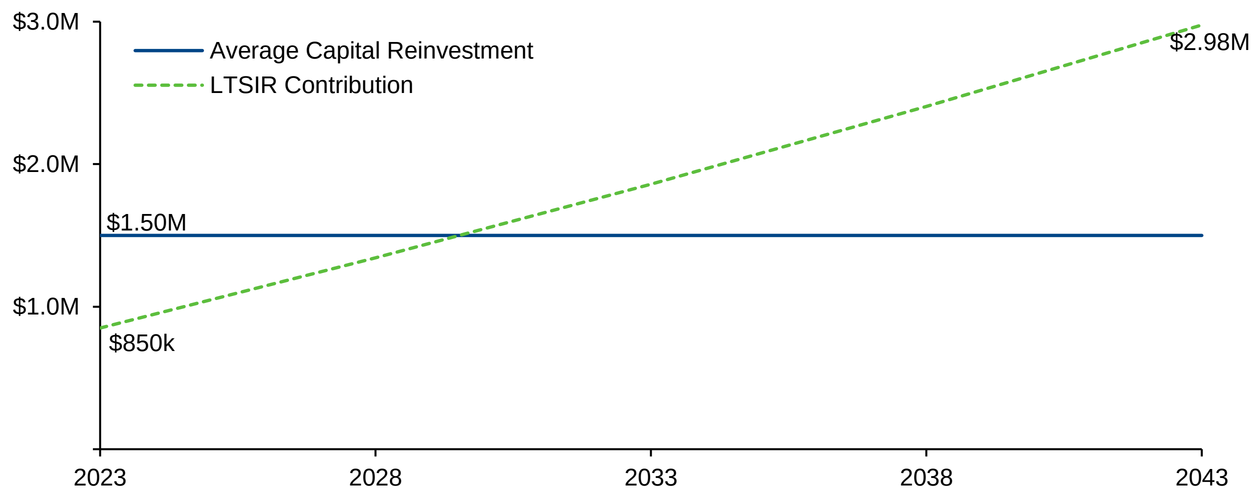


Figure 32: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 32, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 33 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 34: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 35: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 30: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 36: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 37: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 36, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 38 summarizes the infrastructure backlog for each service area.

Table 38: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 39 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 39: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 40: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 41: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.

- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.

- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Sanitary

Final Version
August 2024

Contents

Executive Summary 7

Approach and Methodology 12

Developing the Asset Management Plan 13

Build a comprehensive asset inventory 13

Conduct asset-level risk assessments and build risk models 14

Compile lifecycle activity data 14

Compile levels of service data 14

Develop financial strategy 14

Limitations and Constraints 15

State of the Infrastructure 16

Asset Hierarchy and Data Classification 17

Inventory and Valuation 18

Costing Methods 18

Asset Condition 21

Source of Condition Data 21

Condition Assessment Guidelines 23

Condition Rating System 24

Projected Asset Conditions 25

Age Profile 27

Historical Asset Expenditures 27

Serviceable Life vs. Current Asset Age 28

Lifecycle Management 30

Current Lifecycle Framework 31

Capital Reinvestment Rates 34

Reinvestment Rate Benchmarks 34

Forecasted Long-term Replacement Needs 38

Risk Analysis 39

Calculating Asset Level Risk 40

Risk Models and Matrices 43

Risk Matrix: All Sanitary Assets 43

Gravity and Pressure Mains 44

Facilities and Appurtenances 50

Levels of Service 53

Defining Levels of Service 54

Levels of Service Framework 54

Levels of Service Analysis 58

Financial Strategy 60

Approach and Methodology 61

Current Financial Planning Framework....62
Capital Budget....62
Debt....62
Senior Government Support....64
Sustainability....64
Reserves....65
Development Cost Charges (DCC) Program....67
Achieving Reinvestment Rate Targets....68
Tax-Funded Service Areas....69
Levy-Funded Service Areas....75
Infrastructure Backlogs....80
Using Reserves....81
Leveraging Development Cost Charges (DCC)....82
Recommendations....83
Tax Funded Service Areas....83
Levy-Funded Service Areas....83
Next Steps....85

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Linear Asset Length by Pipe Material (Mains and Service Connections) 20
Figure 5: Condition Assessment Year 22
Figure 6: Asset Condition: All Sanitary Assets 25
Figure 7: Asset Condition: By Asset Type (Segment) 26
Figure 8: Historical Expenditures on Asset Acquisition 27
Figure 9: Average Asset Age vs. Estimated Useful Life: Sanitary Assets 28
Figure 10: Percentage of Estimated Useful Life Consumed As of 2023 29
Figure 11: Summary of Capital, Maintenance, and Operations Expenditures 32
Figure 12: Forecasted Long-term Replacement Needs 38
Figure 13: Calculating Risk Ratings 40
Figure 14: Generic Risk Matrix 42
Figure 15: Detailed Risk Matrix – All Sanitary Assets 43
Figure 16: Consolidated Risk Matrix – All Sanitary Assets 43
Figure 17: Probability of Failure – Gravity, Pressure, and Overflow Mains 44
Figure 18 Consequence of Failure – Gravity and Pressure Mains 46
Figure 19: Detailed Risk Matrix – Gravity and Pressure Mains 49
Figure 20: Consolidated Risk Matrix – Gravity and Pressure Mains 49
Figure 21: Probability of Failure – All Other Assets 50
Figure 22: Consequence of Failure – All Other Assets 51
Figure 23: Detailed Risk Matrix – All Other Assets 52
Figure 24: Consolidated Risk Matrix – All Other Assets 52
Figure 25: Historical MFA Lending Rates 63
Figure 26: Funding Flow 66
Figure 27: Annual Contributions to the LTGIR vs. Annual Capital Spending 70
Figure 28: Annual Contributions to the LTWIR vs. Annual Capital Spending 76
Figure 29: Annual Contributions to the LTSIR vs. Annual Capital Spending 76

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 21
Table 4: General Condition Rating Scale – All Assets 24
Table 5: PACP Pipe Rating Scale 24
Table 6: Components of a Lifecycle Framework 31
Table 7: Lifecycle Framework 33
Table 8: Current Reinvestment Rates 34
Table 9: System-generated Reinvestment Rates 35
Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks 36
Table 11: Purpose of Capital and Operating Budgets 37
Table 12: Types of Consequences of Asset Failure 41
Table 13: Defining Probability of Failure Ranges – Gravity, Pressure, and Overflow Mains 44
Table 14 Defining Consequence of Failure Ranges – Gravity and Pressure Mains 47
Table 15: Defining Probability of Failure Ranges – All Other Assets 50
Table 16: Defining Consequence of Failure Ranges – All Other Assets 51
Table 17: Components of a Levels of Service Framework 54
Table 18: Core Values and Service Statements 55
Table 19: Customer Levels of Service 56
Table 20: Technical Levels of Service 57
Table 21: Trends in Customer Levels of Service KPIs – Asset Condition and Performance 58
Table 22: Trends in Customer Levels of Service KPIs – Service Delivery 58
Table 23: Balancing Cost, Performance, and Risk 59
Table 24: Service Area Replacement Costs and Target Reinvestment Rates 61
Table 25: Long-Term Infrastructure Reserve Balances 65
Table 26: Capital Reserve Balances 66
Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments 69
Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 69
Table 29: Funding Levels and Resulting Funding Deficits 71
Table 30: Risks and Benefits of Funding Models 72
Table 31: Tax Rate Increase Required to Achieve Funding Levels 73
Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments 75
Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 75
Table 34: Funding Levels and Resulting Funding Deficits: Water Services 77
Table 35: Funding Levels and Resulting Funding Deficits: Sanitary Services 77
Table 36: Utility Rate Increase Required to Achieve Funding Levels: Water 78
Table 37: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 78
Table 38: Age- and Condition-based Infrastructure Backlogs 80
Table 39: Long-Term Infrastructure Reserves vs. Backlogs 81
Table 40: Development Cost Charges (DCC) Program 82
Table 41: Overlap Between DCC Program and Assets in Backlog State 82

16,089	Number of assets on record in the Sanitary asset database
$266.4 million	2023 replacement cost of these assets
1960s	Decade with the highest capital expenditures on the construction or acquisition of Sanitary assets ($86.7M)
2030s	Decade with the first major forecasted asset replacement spike ($51.7M)
35%	Percentage of assets in poor or worse condition, or less than 40% service life remaining
$99.5 million	Current age-and condition-based infrastructure backlog
$22.8 million	Current replacement cost of assets with a very high risk rating
$2.3 million	Annual City spending on operations, maintenance, and capital works related to Sanitary
1.6%	System-generated recommended capital reinvestment rate for Sanitary assets ($4.2M per year)
0.6%	Port Coquitlam's actual capital reinvestment rate ($1.5M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Sanitary assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Sanitary portfolio includes 181 kilometers of gravity and pressure mains, 100km of service connections, 23 lift stations, and appurtenances such as manholes, cleanouts, and air valves. The total current replacement cost of all Sanitary assets was estimated at $266.4 million as of 2023, with gravity and pressure mains making up 65% of the valuation.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

In-field condition data was available for 71% of gravity mains through inspections from the City's annual CCTV program. For all other assets, age was used to approximate asset condition.

Based on a combination of age and CCTV data, 63% of all Sanitary assets are in fair or better condition. However, the remaining 37%, with a current replacement cost of nearly $100 million, are estimated to be in poor to very poor condition, with less than 40% service life remaining. This includes 28% of all mains, with a current replacement cost of $46.6 million.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Data suggests that the largest expenditures in Sanitary assets were made in the 1960s, totaling $86.7 million, dominated by installation of gravity mains.

New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Sanitary totals approximately $2.3 million. Of that, $2.2 million per year is spent on the inspection, maintenance, and replacement of Sanitary assets. An additional $142k is allocated for operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. The City is expected to experience a rapid increase in asset replacement needs in the 2030s, totaling $51.7million, and eventually peaking at more than $85 million in the 2060s. Replacements average $49.2 million per decade between 2023 and 2072.

Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $6.1 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to nearly $100 million when assets in poor or worse condition, or less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in utility rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 594 assets, with a current replacement cost of $22.8 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 6,695 assets, with a current replacement cost of $71.9 million, were classified with a high risk rating. The majority of these assets are gravity mains, pressure mains, and lift stations—critical components of a reliable sanitary sewer network.

Although many of these assets carry a major to severe consequence of failure rating, their overall risk rating is heavily influenced by a poor to very poor age-based condition rating—a proxy for the likelihood of asset failure.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Sanitary, a total of 34 KPIs were selected to support performance tracking and monitoring. This included 14 KPIs to measure customer levels of service, and 20 to track the City's technical levels of service Technical levels of service can be thought of as the activities and steps (inputs) that an organization takes to deliver customer levels of service (outputs) KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance, and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas
For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility
Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas
Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City’s development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

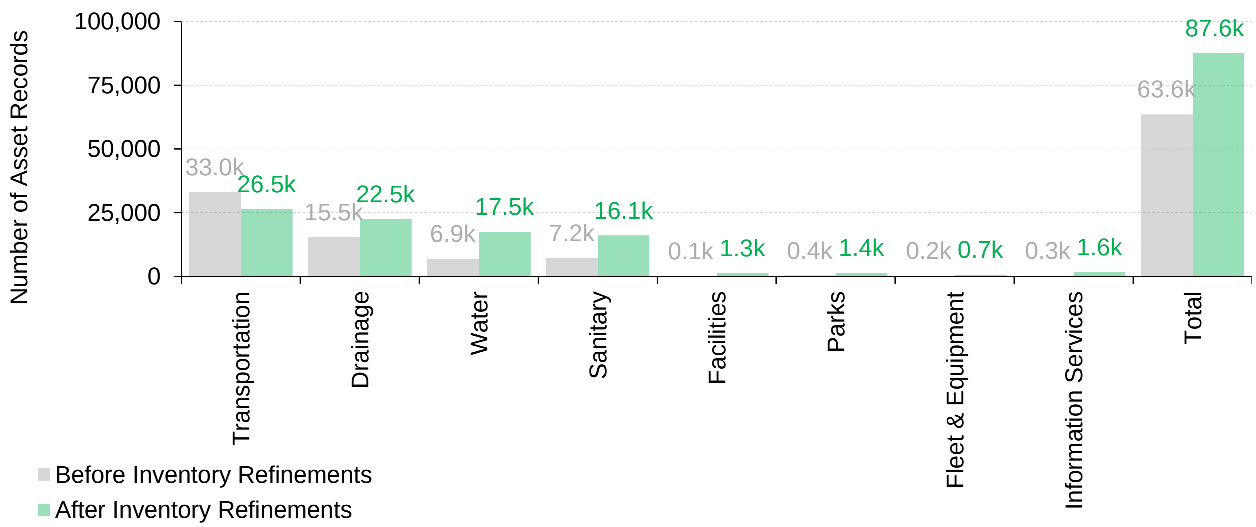
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 87,647. For Sanitary, data refinement led to a substantial increase in asset records, from less than 7,200 to 16,089—an increase of 125%.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budgets associated with each activity. Data in available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., flushing of mains, main repairs, lift station maintenance), activities meant to ensure delivery and continuity of acceptable service levels were also included. For example, sanitary service locates and electricity for lift stations have no direct impact on pipe lifespan, but they are part of providing Sanitary services to residents.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable and practical. To track the performance of Sanitary, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. A total of 34 KPIs were selected, with 14 used for customer levels of service, and 20 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

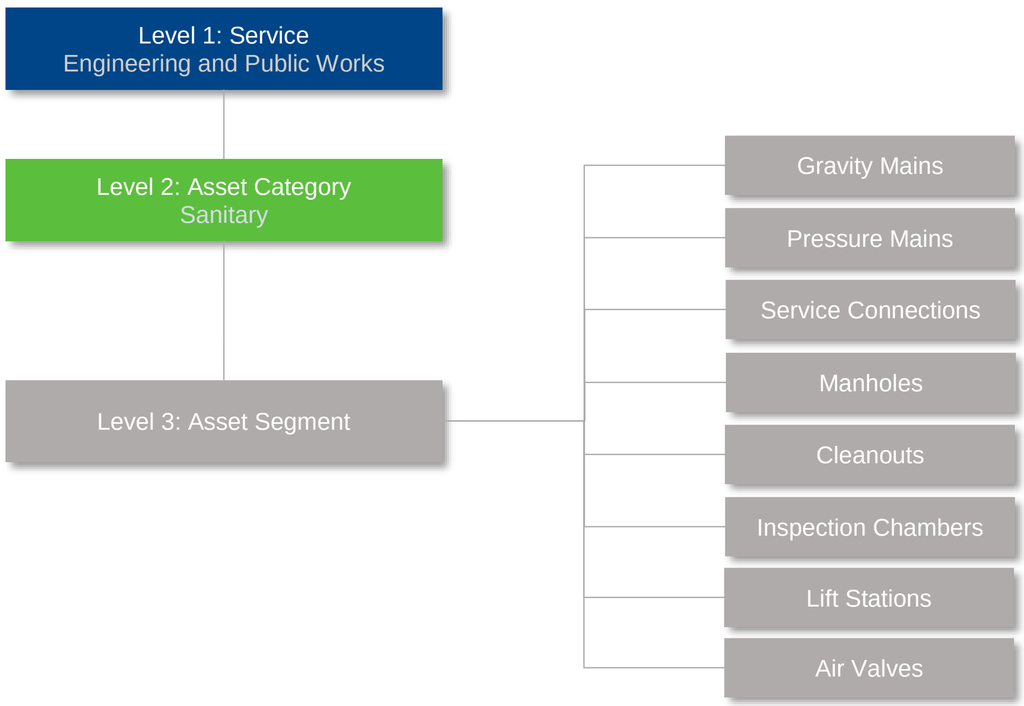
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of the City of Port Coquitlam's Sanitary assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Sanitary database contains more than 16,000 unique asset records, comprising 181 kilometers of gravity sewer mains, 100km of service connections, 23 lift stations, and other assets such as manholes and inspection chambers, that support the safe collection and conveyance of wastewater. The total current replacement cost of these assets was estimated at $266.4 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to all linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2 summarizes the quantity and current replacement cost of the City's Sanitary assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of approximately $210 million, mains and service connections comprise 80% of the portfolio.

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Gravity Mains	180,648m	$167,347,853	Cost per unit
Service Connections	100,134m	$42,270,443	Cost per unit
Lift Stations	23	$34,500,002	User defined
Manholes	2,790	$15,345,000	User defined
Pressure Mains	9,947 m	$6,257,043	User-defined
Cleanouts	140	$462,000	Cost per unit
Inspection Chambers	140	$170,170	User defined
Air Valves	6	$21,325	User defined
Total		**$266,373,836**	

Figure 3: Portfolio Valuation

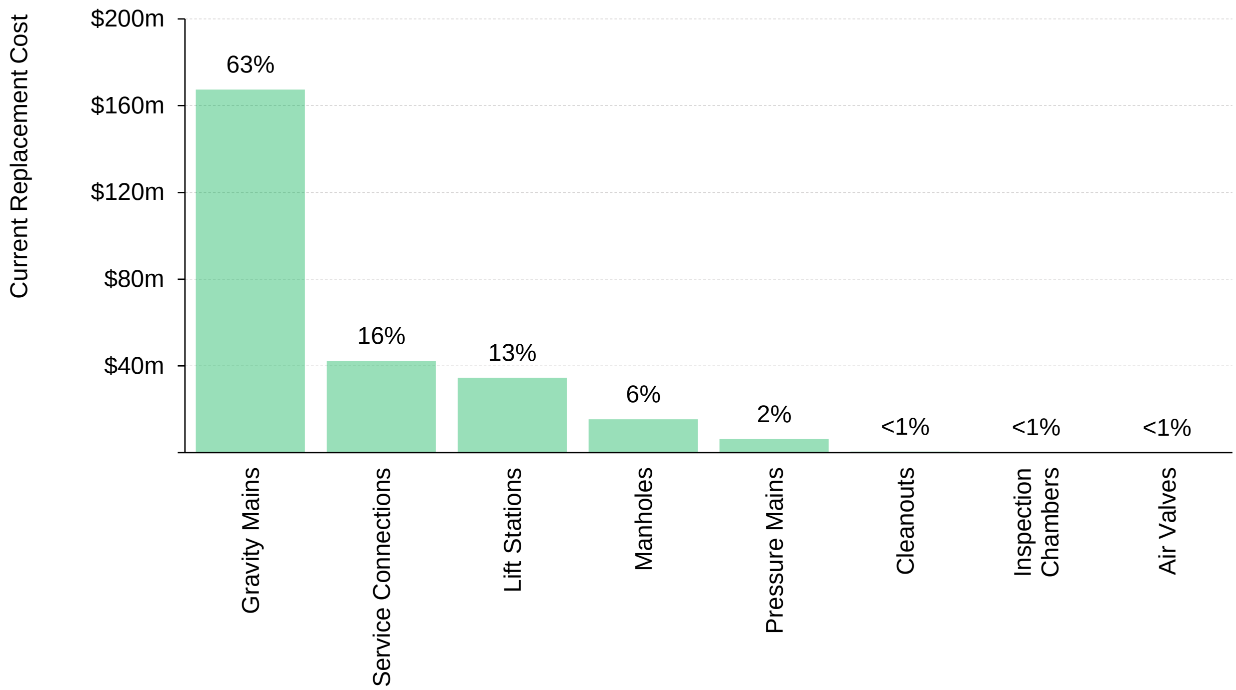
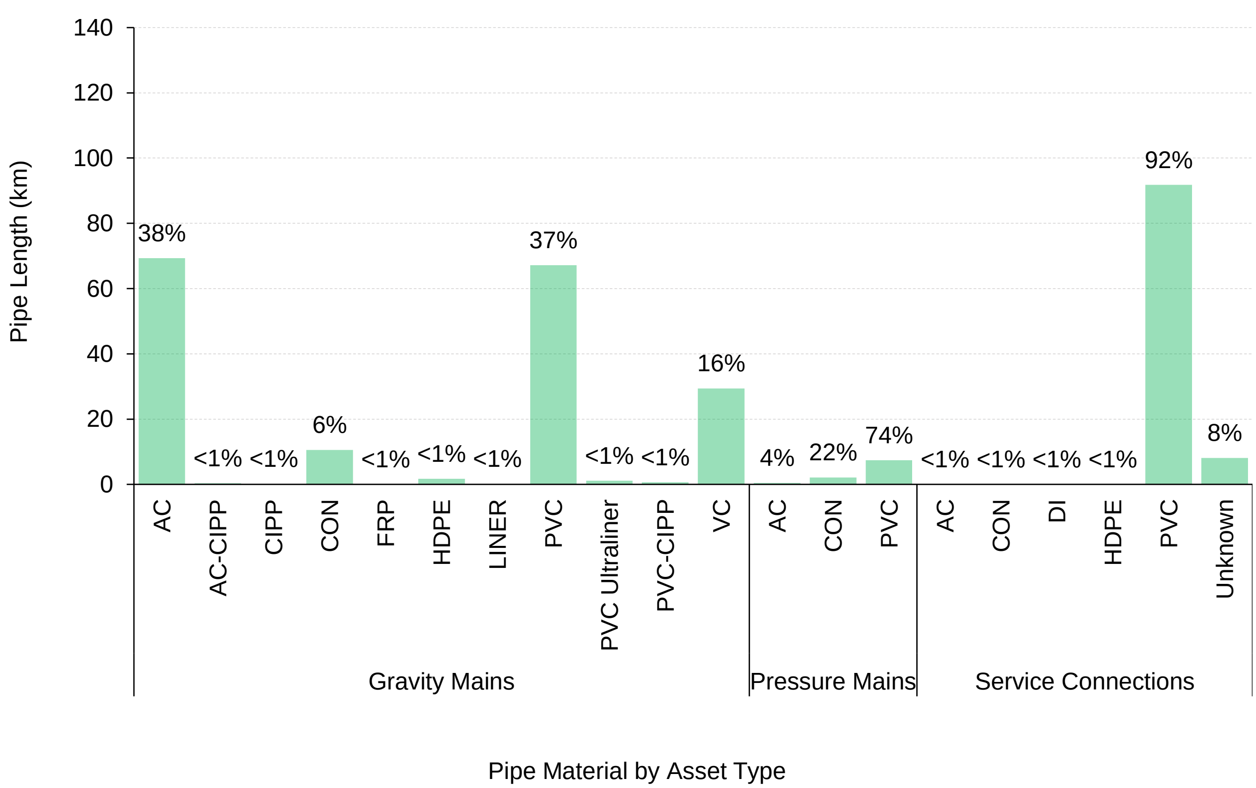


Figure 4 summarizes the length, in kilometres, of the City's linear Sanitary network based on pipe material. Asbestos cement (AC) and polyvinyl chloride (PVC) pipes make up 75% of the major linear network; approximately 30km of pipes are made of vitrified clay (VC).

Figure 4: Linear Asset Length by Pipe Material (Mains and Service Connections)



Records show that more than 90% of service connections are PVC. As this is an unusually high prevalence of PVC pipes in service connections, future work within the City's asset management program should include efforts to verify the material types.

Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

Table 3 summarizes how condition ratings were derived for Sanitary assets in the AMP. Overall, based on replacement cost, in-field condition ratings were available for 45% of the assets, limited to mains. Asset age is currently used to estimate the replacement year for Lift Stations, with condition inspections and maintenance history used to support replacement decisions.

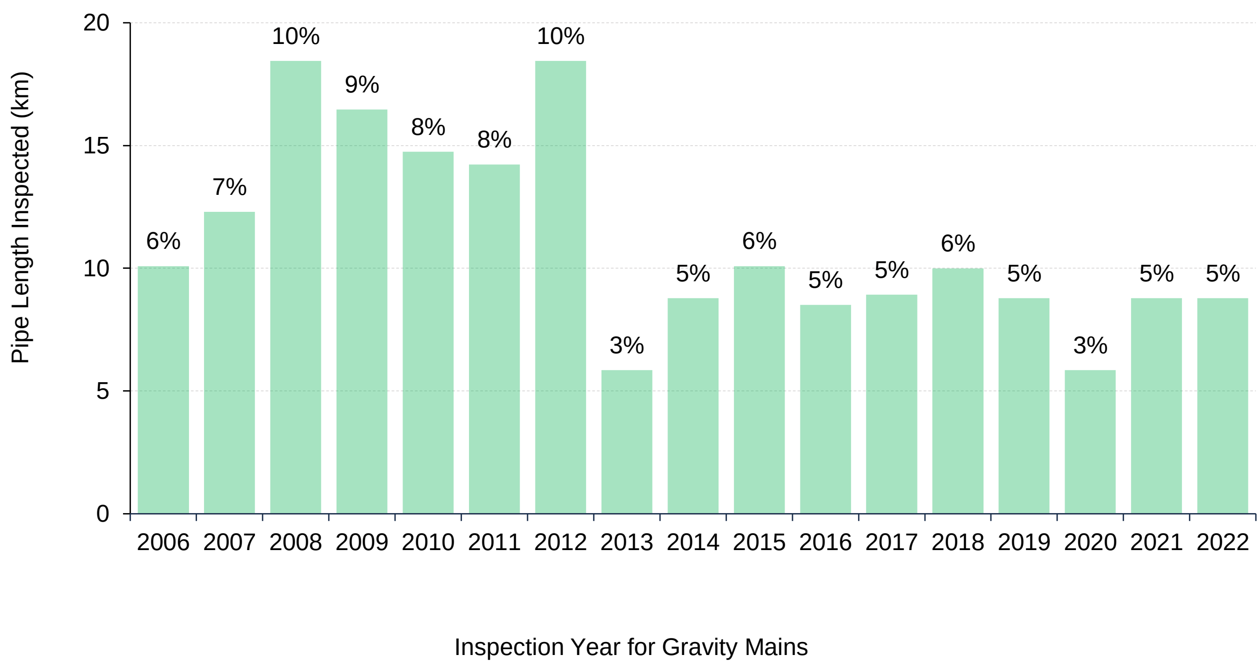
Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Sanitary	Gravity Mains	71%	CCTV Inspections
	Service Connections	0%	Age-based estimates
	Pressure Mains	0%	Age-based estimates
	Cleanouts	0%	Age-based estimates
	Chambers	0%	Age-based estimates
	Inspection Chambers	0%	Age-based estimates
	Manholes	0%	Age-based estimates
	Lift Stations	0%	Age-based estimates
	Air Valves	0%	Age-based estimates
Total		**45%**	

Municipalities typically conduct annual inspections ranging from 5%-25% of the network length every year, depending on the size of the network and budget constraints.

Figure 5 shows that, on average between 2006 and 2022, the City conducted sanitary sewer inspections for approximately 6% of its total gravity mains network by length each year.

Figure 5: Condition Assessment Year



Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Sanitary assets to support the collection of condition data. It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey, as well as the Pipeline Assessment Certification Program (PACP) pipe rating system, scored on a scale of 1-5. An abbreviated version of the PACP rating is provide in Table 5.

Table 4: General Condition Rating Scale – All Assets

Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

The PACP methodology rates pipe condition using the presence of structural defects (e.g., cracks) and presence of operational and maintenance issues (e.g., blockages). These results are obtained from closed-circuit camera television (CCTV) inspections, where each defect is identified and noted along the segment of pipe. An overall Structural Pipe Rating Index (SPRI) of the pipe segment is determined, considering the extent, severity, location, and number of defects.

Table 5: PACP Pipe Rating Scale

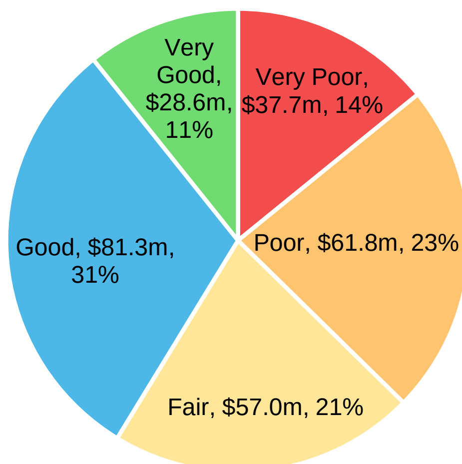
Overall SPRI	Description
1 – Very Good	Minor defects; failure unlikely for the next 20 years
2 – Good	Moderate defects; failure expected within 10-20 years
3 – Fair	Major to severe defects; failure expected within 5-10 years
4 – Poor	Severe defects; failure is possible within the five years or has occurred
5 – Very Poor	Pipe segment has failed and no longer operational

Projected Asset Conditions

Figure 6 summarizes the replacement cost-weighted condition of all Sanitary assets. Based on a combination of inspection and age data, 63% of assets are in fair or better condition. The remaining 37%, with a current replacement cost of nearly $100 million, have less than 40% service life remaining and are estimated to be in poor to very poor condition. Additional detail is also provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 6: Asset Condition: All Sanitary Assets



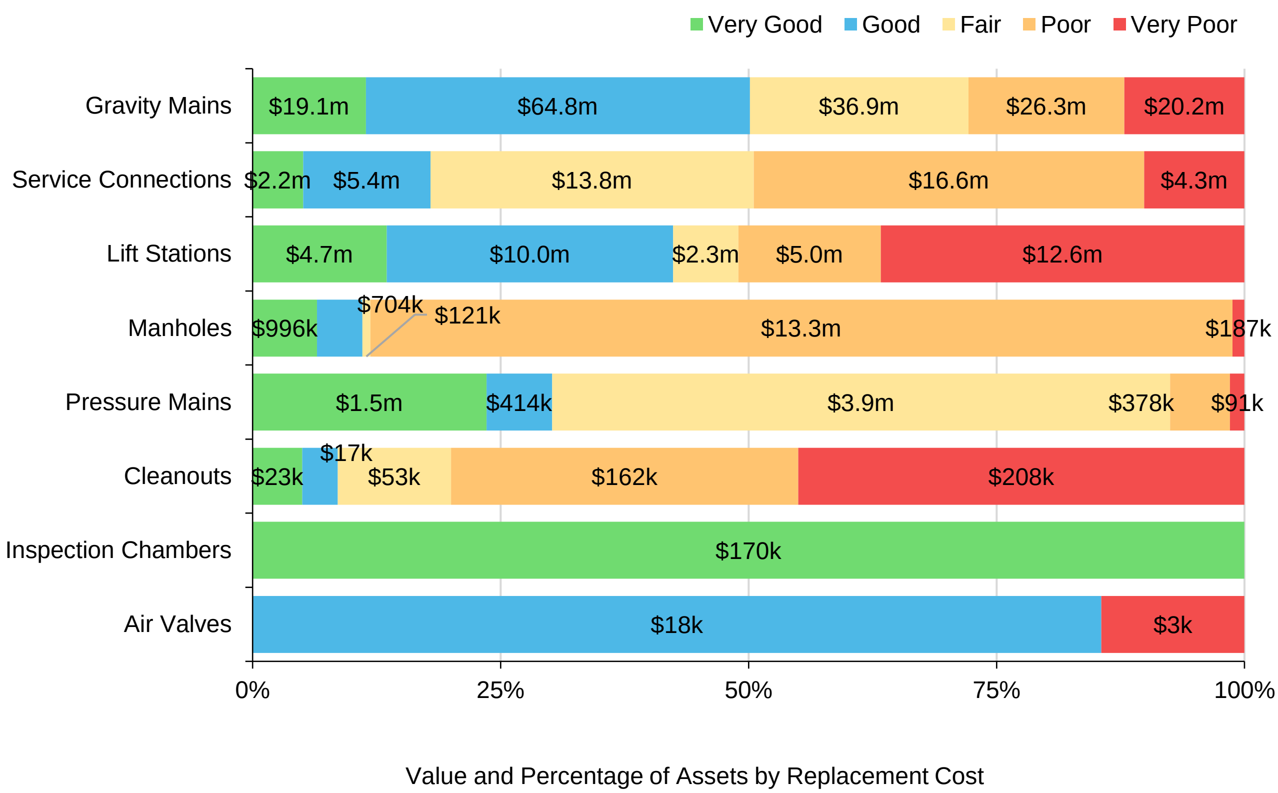
It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

As illustrated in Figure 7, age and CCTV inspection data indicates that 28% of gravity mains, with a current replacement cost of $46.6 million are in poor or worse condition, while most pressure mains are in fair or better condition.

Of the lift stations, 51% of assets, with a replacement cost of $17.6 million, are in poor or worse condition. Inspection chambers have only been installed in the City since 2012, and remain in very good condition.

Based on age data only, nearly 50% of service connections, 80% of cleanouts, and 90% of manholes are also in poor or worse condition.

Figure 7: Asset Condition: By Asset Type (Segment)



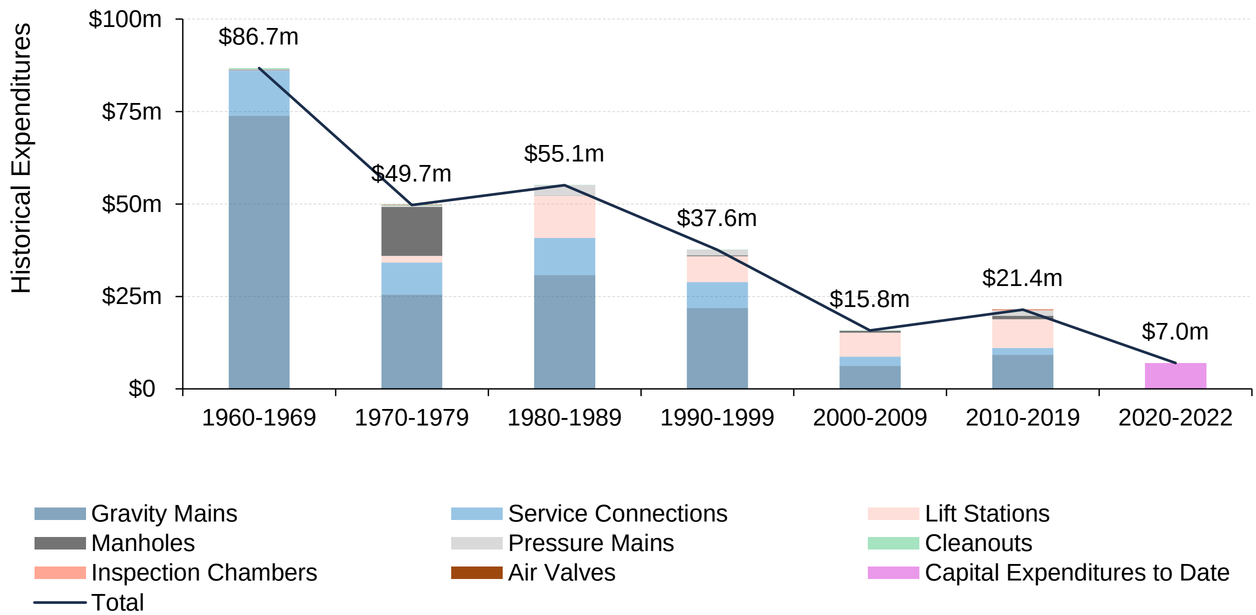
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 8 illustrates Port Coquitlam historical expenditures on the construction or acquisition of Sanitary assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 8: Historical Expenditures on Asset Acquisition



Expenditures on Sanitary infrastructure averaged $39 million per decade over the last 60 years. The largest investments were made in the 1960s, totaling nearly $87 million and dominated by installation of gravity mains. In the current decade, the City has made capital investments of $7 million between 2020 and 2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

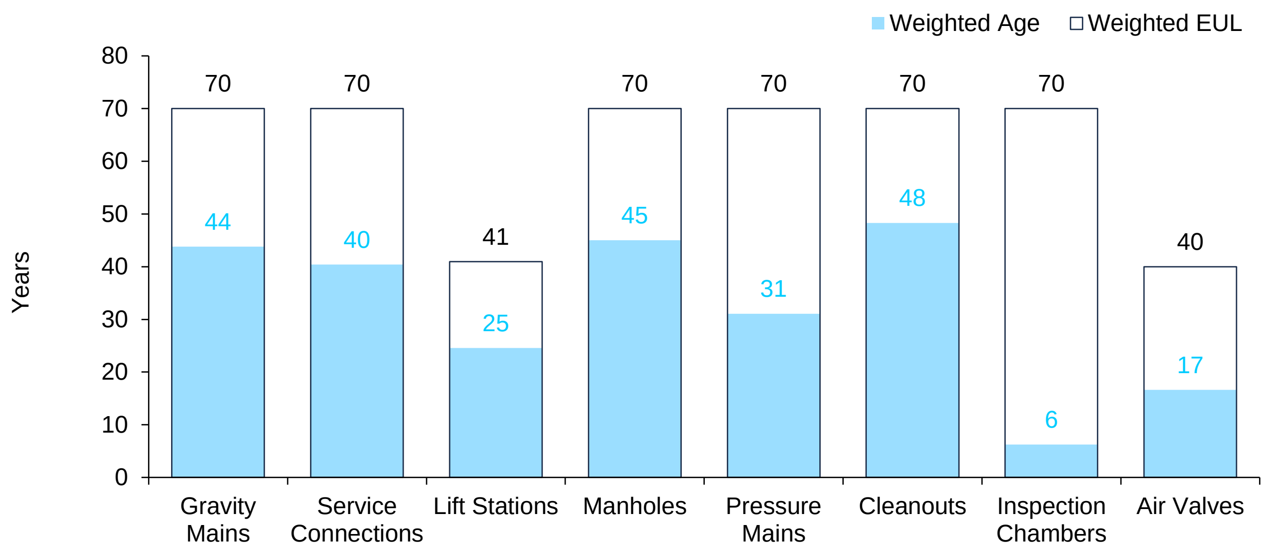
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 9 plots the average established useful life of major and minor linear assets against their current average age. Both values were weighted by the replacement cost of individual assets.

Figure 9: Average Asset Age vs. Estimated Useful Life: Sanitary Assets



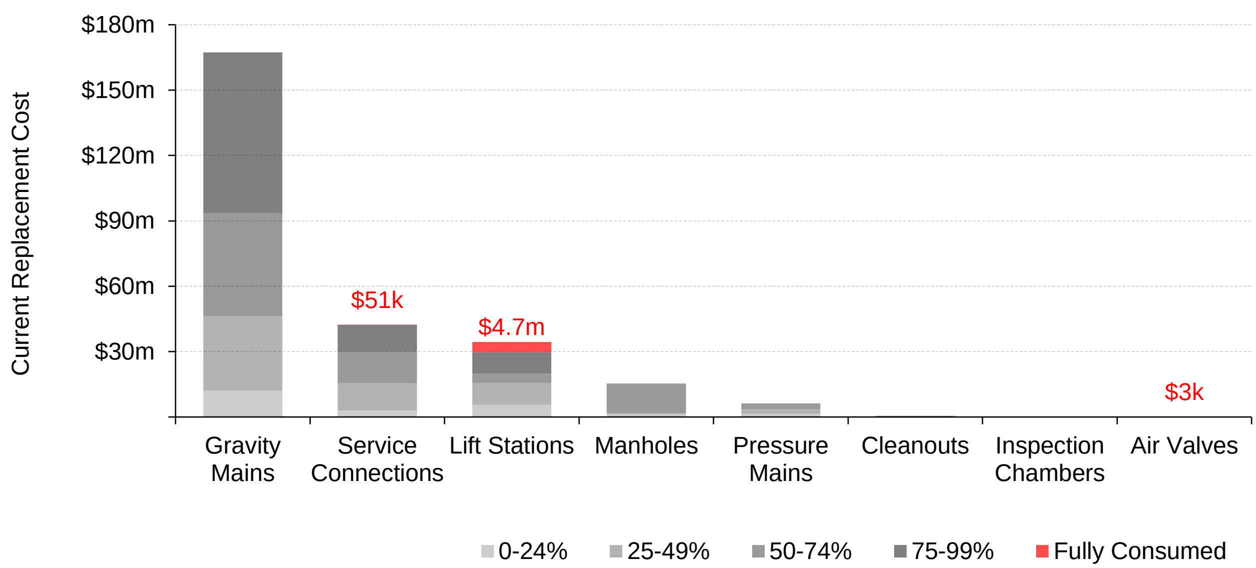
Age analysis shows that gravity mains and service connections are well into the latter stages of their established lifespan, with an average age of 45 and 41years, respectively, against a design life of 70 years. As sewer mains age, the risk of a section failing, blockages, and collapse become an increasing concern. These assets may require more vigilant monitoring, inspections, and cleaning to maintain service levels and avoid service disruptions.

Figure 10 shows a detailed distribution of Sanitary assets based on the portion of useful life consumed to date. The distribution shows that although all gravity mains still have some design life remaining, most have consumed at least 50% of their design life. These sections may be candidates for replacement in the short term. Of this, pipe sections with a combined current replacement cost of $74 million, are approaching the end of their useful life, having consumed at least 75% of their established useful life. Although impacted by localized factors, sewer mains are designed to last many decades. PVC pipes can last nearly a century when properly installed.

Useful life consumptions levels are distributed similarly for service connections, with a small portion, totaling $51k, that remain in operation beyond their established design life. On average, lift station components are approaching the second half of their estimated design life, and may require replacements or renewals in the short to medium term.

Lift stations are made up of structures, with an EUL of 70 years, pumps and electrical components with an EUL of 35 years, and generators with an EUL of 50 years. Age and useful life consumption analysis shows that some of these lift station components, with a combined replacement cost of $4.7 million, remain in service despite having fully consumed their established useful life.

Figure 10: Percentage of Estimated Useful Life Consumed As of 2023



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, repair, and replacements to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also incurred to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring. Lifecycle activities are employed to maximize the serviceable life of assets while maintaining acceptable levels of service and efficient operations.

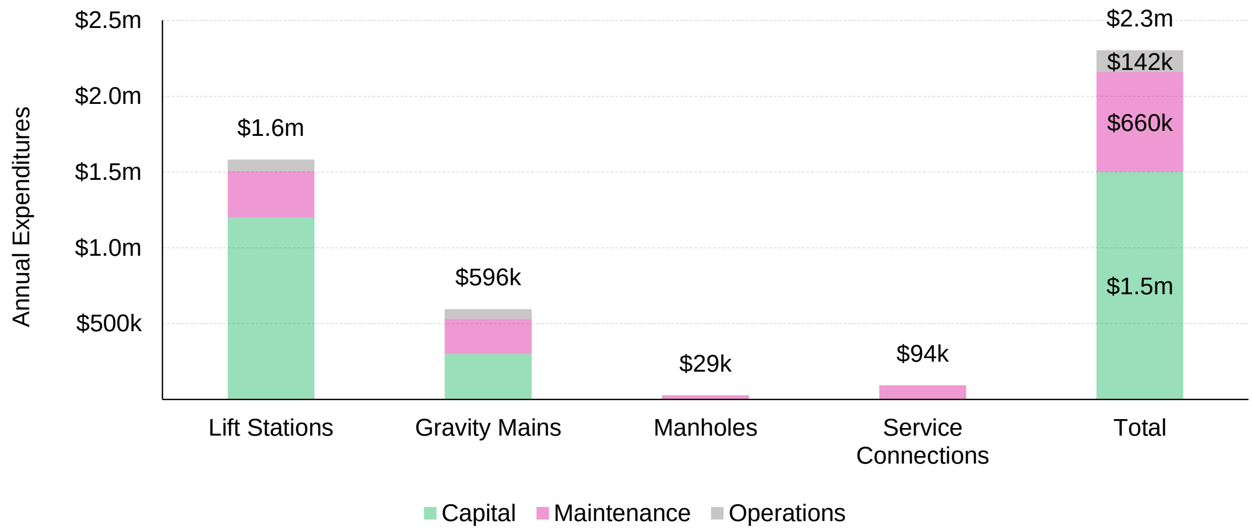
This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 6.

Table 6: Components of a Lifecycle Framework

Component	Description		
Activity	The treatment, event, or intervention implemented		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Activity Trigger	This can include an asset's age and/or a minimum condition threshold. Other triggers may include priority levels, service request, and previously established frequency.		
Impact on Serviceable Life	Impact on an asset's serviceable lifespan resulting from the activity completed		
Annual Budget	Typical funding envelope available (actual spending may vary from year to year)		
Overall Reinvestment Rate	Annual capital budget as a portion of the total Sanitary asset portfolio replacement cost of **$266,373,836**.		

Figure 11 summarizes total annual expenditures by asset segment and expenditure type. In total, the City allocates $2.3 million annually on Sanitary, of which approximately $2.2 million is spent on the inspection, maintenance, and replacement of assets. Replacement of the City's lift stations is the largest annual program, accounting for approximately 52% of total expenditures on Sanitary assets.

Figure 11: Summary of Capital, Maintenance, and Operations Expenditures



An additional $142k is allocated annually towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., lift station electrical costs, soil disposal costs).

The following table outlines the City's lifecycle framework for Sanitary assets.

Table 7: Lifecycle Framework

Activity	Asset Segment	Type	Activity Trigger	Impact on Serviceable Life	Budget
Sanitary Lift Station Replacements	Lift Stations	Capital	Capacity or condition	Extended by 35-70 years	$1,200,000
Sanitary Main, Service, and Manhole Replacements	Mains/Multiple	Capital	Capacity or condition	Extended by 70 years	$300,000
Sub-Total Capital					**$1,500,000**
Sanitary Main Flushing	Mains	Maintenance	Scheduled/Condition	Extended by 5 years	$65,300
Sanitary Video Inspection	Mains	Maintenance	Every 10-20 years	Extended by 10 years	$30,000
Sanitary Main Repairs	Mains	Maintenance	Condition	Extended by 25 years	$131,500
I&I Monitoring	Mains	Maintenance	Condition	Extended by 5 years	$5,600
Sanitary Service Blockages	Service Connections	Maintenance	Condition	Extended by 10 years	$22,450
Sanitary Service Repairs	Service Connections	Maintenance	Condition	Extended by 10 years	$72,000
Locate & Adjust Sanitary Manholes	Manholes	Maintenance	Condition	Extended by 5 years	$13,500
Sanitary Manhole Repairs	Manholes	Maintenance	Condition	Extended by 25 years	$15,200
Sanitary Lift Station Generator Servicing	Lift Stations	Maintenance	Once per year	Extended by 10 years	$30,000
Sanitary Lift Station – Inspection, Planned and Preventative Maintenance	Lift Stations	Maintenance	Once per week	Extended by 10 years	$182,950
Sanitary Lift Station SCADA/Alarms	Lift Stations	Maintenance	Once per year	Extended by 10 years	$33,100
Sanitary Lift Station Reactive Emergency Repairs	Lift Stations	Maintenance	Condition	Extended by 10 years	$58,600
Sub-Total Maintenance					**$660,200**
Soil Disposal - Sewer	Mains	Operations	With paving or utility projects	No impact	$63,800
Sanitary Lift Station Electricity and Communication Billings	Lift Stations	Operations	Usage	No impact	$78,000
Sub-Total Operations					**$141,800**
Total					**$2,302,000**

Capital Reinvestment Rates

Reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 8 illustrates two types of reinvestment rates: segment and service area. The segment reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 8 shows that the City's annual capital Sanitary expenditures of $1.5 million yield an overall, service area reinvestment rate of approximately 0.6%.

Table 8: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Linear	$300,000	0.1%	0.1%
Non-linear	1,200,000	2.4%	0.5%
Total	**$1,500,000**		**0.6%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian

Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

The CIRC reinvestment levels for non-linear assets includes wastewater treatment plants, which are not part of the City's Sanitary portfolio; wastewater treatment is delivered by Metro Vancouver at regional facilities.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the replacement cost of assets at both the segment- and category-levels to calculate target reinvestment rates.

Table 9: System-generated Reinvestment Rates

Segment	Type	AAR	System-generated TRIR
Gravity Mains	Linear	$2,390,684	1.4%
Pressure Mains	Linear	$89,386	1.4%
Service Connections	Linear	$603,888	1.4%
Lift Stations	Non-linear	$901,403	2.6%
Manholes	Non-linear	$219,214	1.4%
Cleanouts	Non-linear	$6,600	1.4%
Inspection Chambers	Non-linear	$2,431	1.4%
Air Valves	Non-linear	$533	2.5%
Total		**$4,214,139**	**1.6%**

For Sanitary assets the average annual requirements for linear assets total $3,083,958, for a system-generated target reinvestment rate of 1.4%. Similarly, for non-linear assets, the AAR total is $1,130,181.14, for a reinvestment rate of 2.2%. Combined, the system-generated, service area or category-level target reinvestment rate is estimated at 1.6%.

Comparative Analysis

Table 10 compares the City's current capital reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide. Reinvestment rates are presented at both the segment and category levels.

Table 10: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks

Benchmark	Asset Type	Target Reinvestment Range	2016 Municipal Average	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
CIRC	Linear	1.0% - 1.3%	0.7%	0.1%	0.1%
CIRC	Non-linear	1.7% - 2.5%	1.4%	2.4%	0.5%
Citywide Asset Manager	Linear	1.4%	0.7%	0.1%	0.1%
Citywide Asset Manager	Non-linear	2.2%	1.4%	2.4%	0.5%
Citywide Asset Manager	All Sanitary Assets	1.6%	-	-	0.6%

The analysis shows that, at the segment level, Port Coquitlam's reinvestment rate for non-linear assets is comparable to both the CIRC and system-generated targets: the City is reinvesting 2.4% of the total replacement cost of all non-linear assets back into these assets each year. At 0.1%, the reinvestment rate for linear assets, however, falls well below the targets recommended by both benchmarks. At the service area level, the City's overall reinvestment rate of 0.6% also remains well below recommended ranges.

Maintaining adequate reinvestment rates—whether through actual spending on infrastructure programs or earmarking funds for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 11: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

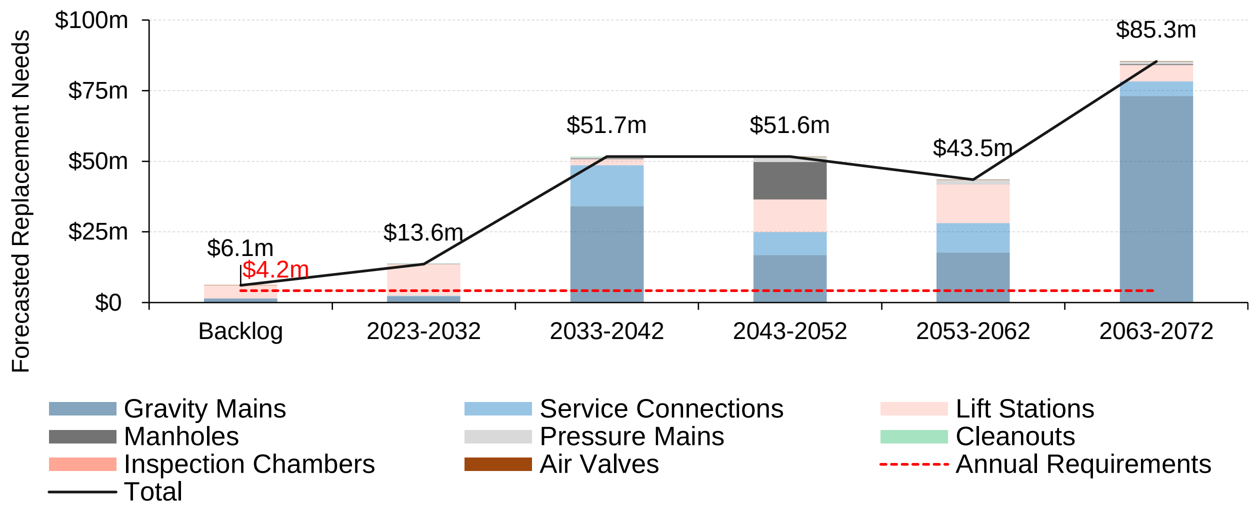
Forecasted Long-term Replacement Needs

In contrast to historical expenditures in infrastructure, Figure 12 illustrates the cyclical short-, medium- and long-term replacement requirements for Sanitary assets over the coming decades. The City's average annual requirements for asset replacements total $4.2 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $1.5 million per year on Sanitary asset replacements are less than 40% of the $4.2 million recommended to ensure that replacement needs are met.

The chart illustrates a sharp increase in capital replacement needs beginning in the 2030s when substantial portions of the linear network will reach the end of its serviceable lifespan. This spike comes approximately 70 years after the 1960s, when the largest number of gravity mains were installed. The largest replacement spike is not forecasted until the 2060s, when investments required will total more than $85 million over the decade.

Figure 12: Forecasted Long-term Replacement Needs



The chart also shows a Sanitary age- and condition-based backlog of $6.1 million, comprising assets that have reached the end of their estimated useful life, but remain in service. However, this figure increases to $99.5 million when the backlog is broadened to include assets in poor or worse condition, or have less than 40% useful life remaining. Some of these assets may also already be candidates for immediate or short-term replacement because of their assumed condition.

Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates. The magnitude of capital needs typically far exceeds what most agencies can afford to fund. A risk-based approach can be used to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 13: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, previous performance history, capacity challenges, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe: a small diameter sewer main may break in a subdivision and may cause several rate payers to be without sanitary service for a short time. However, a larger main may break near a watercourse and cause substantial environmental damage and pose health and safety risks.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

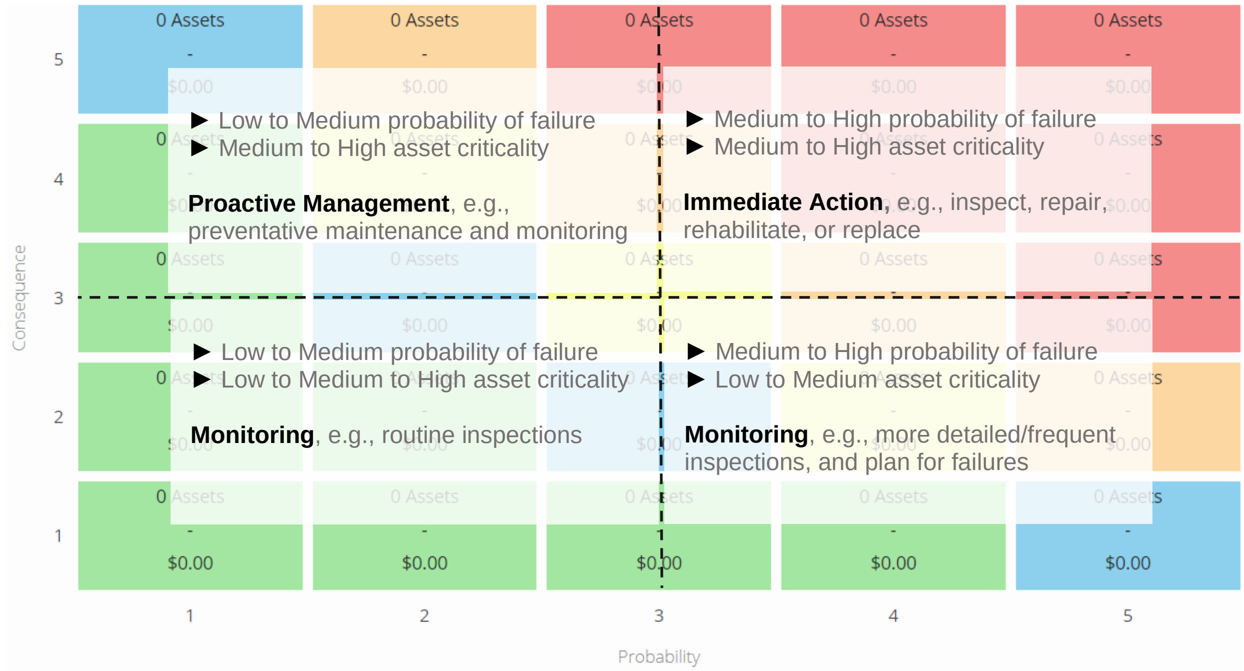
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 12: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for Sanitary assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 14.

Figure 14: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Sanitary assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as the Sanitary portfolio as a whole.

Risk Matrix: All Sanitary Assets

The following summary-level risk matrix shows how all Sanitary assets are classified based on their risk ratings.

Figure 15: Detailed Risk Matrix – All Sanitary Assets

Consequence of Failure	1	2	3	4	5
5	4 Assets $2.8M	3 Assets $2.0M	3 Assets $2.0M	1 Assets $737.7K	10 Assets $6.8M
4	23 Assets $5.9M	22 Assets $5.4M	7 Assets $1.2M	6 Assets $1.0M	19 Assets $5.3M
3	724 Assets $4.9M	956 Assets $6.9M	3,378 Assets $20.9M	544 Assets $4.6M	17 Assets $742.9K
2	1,006 Assets $3.0M	2,207 Assets $7.1M	2,223 Assets $7.0M	1,675 Assets $4.0M	5 Assets $18.3K
1	230 Assets $199.9K	17 Assets $56.1K	42 Assets $138.6K	69 Assets $227.7K	3 Assets $9.9K

Probability of Failure

To provide a more simplified view, the matrix below consolidates assets into broader risk classifications. The figure illustrates that 594 assets, with a current replacement cost of $22.8 million have a very high risk rating due to their potentially high probability of failure, and moderate to severe consequences of failure. An additional 6,695 assets, with a current replacement cost of $71.9 million, were classified with a high risk rating.

Figure 16: Consolidated Risk Matrix – All Sanitary Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
2,454 Assets	4,754 Assets	1,592 Assets	6,695 Assets	594 Assets
$45,290,921	$84,446,550	$42,004,976	$71,860,876	$22,770,513

Gravity and Pressure Mains

Three factors were used to help explain potential asset failure. These include the service life remaining of each asset, age-based condition ratings, in-field CCTV inspections, and history of surcharge or flooding incidents. In the model below for probability of failure, both condition ratings and incident history can help predict and explain potential asset failure. Hence, both received a weighting of 40%.

Figure 17: Probability of Failure – Gravity, Pressure, and Overflow Mains

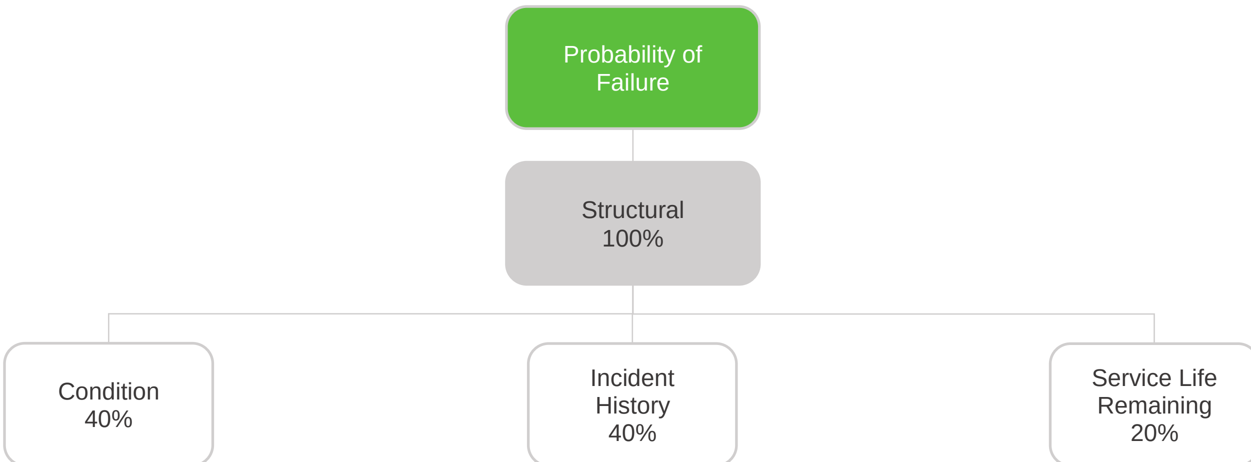


Table 13 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 13: Defining Probability of Failure Ranges – Gravity, Pressure, and Overflow Mains

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain
Incident History	Surcharge Incident (70% Full)	3—Possible
	Flood or Overflow Incident (100% Full)	4—Likely or Probable

The model in Figure 18 outlines the type of potential consequences that may result from failure of a gravity or pressure main, the relative weight of each consequence type, and the data (attributes) used to approximate that effect. Five types of consequences are accounted for: direct financial, economic, socio-political, environmental, and health and safety.

The City’s sanitary main inventory includes the replacement cost, main type (i.e., gravity, pressure, or overflow) and diameter. Additionally, GIS data was used to identify service type (industrial, commercial, or institutional), and sanitary mains located in easements. If they fail, sanitary mains located in easements have a greater chance of impacting properties than those located in roadways. These attributes are used to assist in measuring and quantifying the economic, socio-political, and environmental consequences of main failures.

In addition, GIS analysis was also conducted to append the appropriate road class to each main segment. This allowed for a more nuanced assessment and understanding of a main’s economic consequence of failure—that is, a main failure along an arterial road would cause more disruption than one occurring beneath a collector or lane roadway.

Figure 18 Consequence of Failure – Gravity and Pressure Mains

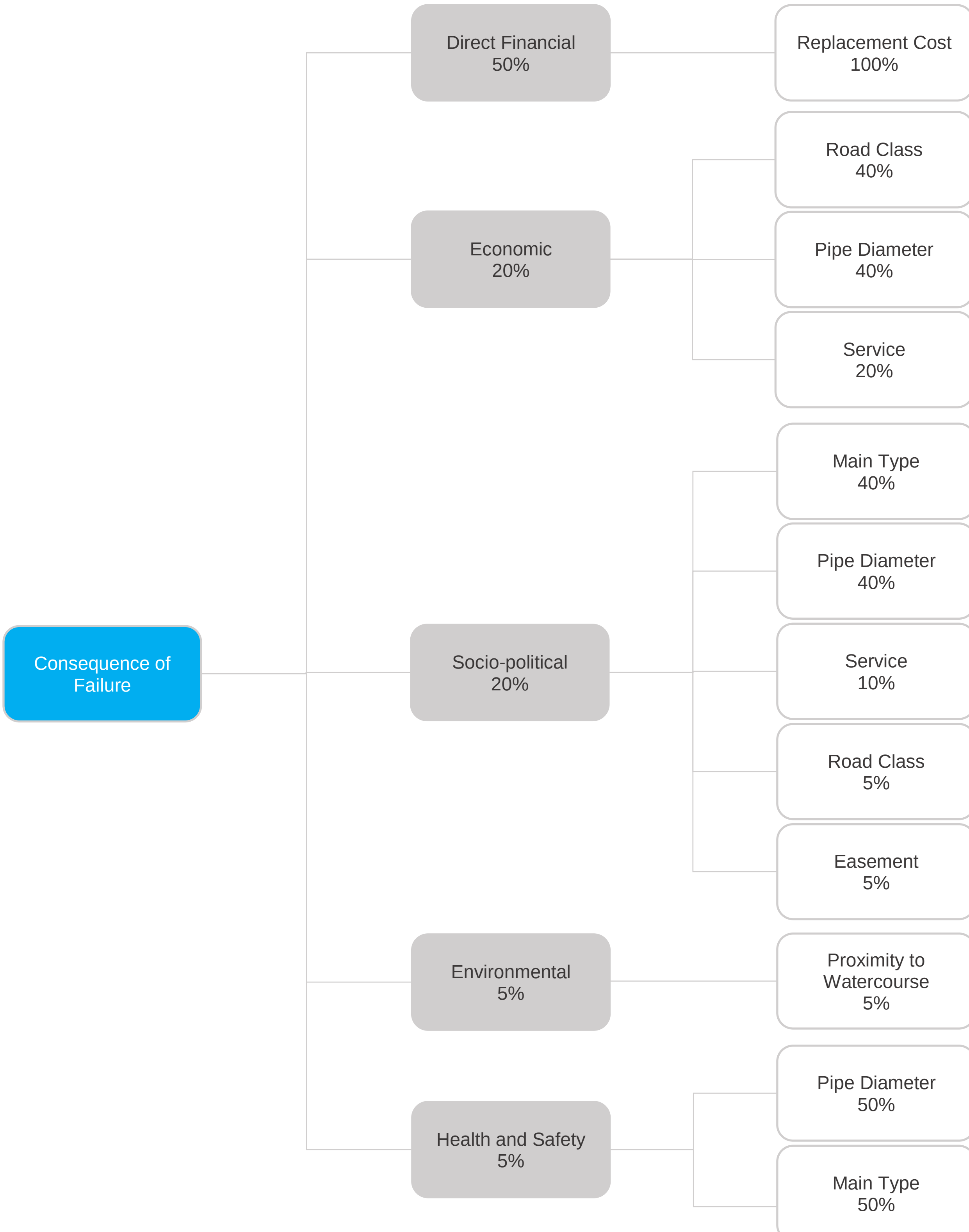


Table 14 Defining Consequence of Failure Ranges – Gravity and Pressure Mains

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Economic	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Pipe Diameter (mm)	Consequence of Failure
	200 or less	1—Insignificant
	200 - 300	2—Minor
	300 - 600	3—Moderate
	600 - 900	4—Major
	Greater than 900	5—Severe
	Service	Consequence of Failure
	Residential	3—Moderate
	Industrial/Commercial/Institutional	4—Major
Socio-political	Main Type	Consequence of Failure
	Gravity Mains	3—Moderate
	Pressure Mains	5—Severe
	Pipe Diameter (mm)	Consequence of Failure
	200 or less	1—Insignificant
	200 - 300	2—Minor
	300 - 600	3—Moderate
	600 - 900	4—Major
	Greater than 900	5—Severe
	Road Class	Consequence of Failure
	Lane/Local	2—Minor
	Collector/Arterial	3—Moderate
	Highway	4—Major
	Service	Consequence of Failure
	Residential	3—Moderate
	Industrial/Commercial/Institutional	4—Major
	Presence of easement:	Consequence of Failure
	No	1—Insignificant
	Yes	3—Moderate
Environmental	Proximity to watercourse (m)	Consequence of Failure

Type of Consequence	Measure	
	More than 30m	1—Insignificant
	Within 30m	3—Moderate
	Crossing Watercourse	4—Major
Health and Safety	Pipe Diameter (mm)	Consequence of Failure
	200 or less	1—Insignificant
	200 - 300	2—Minor
	300 - 600	3—Moderate
	600 - 900	4—Major
	Greater than 900	5—Severe
	Main Type	Consequence of Failure
	Gravity Mains	3—Moderate
	Pressure Mains	5—Severe

Risk Matrix: Gravity, Pressure, and Overflow Mains

The risk matrix below is based on the previous risk model developed for gravity and pressure, and mains using available asset data.

Figure 19: Detailed Risk Matrix – Gravity and Pressure Mains

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	0 Assets $0	0 Assets $0	2 Assets $1.3M	0 Assets $0	0 Assets $0
3	54 Assets $6.9M	141 Assets $16.5M	112 Assets $12.6M	70 Assets $8.1M	0 Assets $0
2	339 Assets $19.2M	573 Assets $35.1M	482 Assets $32.9M	272 Assets $16.9M	0 Assets $0
1	199 Assets $5.0M	329 Assets $9.6M	219 Assets $6.3M	103 Assets $3.1M	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 20 shows that 13 main segments, with a current replacement cost of $1.7 million, carry a high risk rating.

Figure 20: Consolidated Risk Matrix – Gravity and Pressure Mains

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
909 Assets	1,082 Assets	500 Assets	391 Assets	13 Assets
$37,428,504	$64,858,965	$35,015,978	$34,631,768	$1,669,682

Facilities and Appurtenances

Figure 21: Probability of Failure – All Other Assets

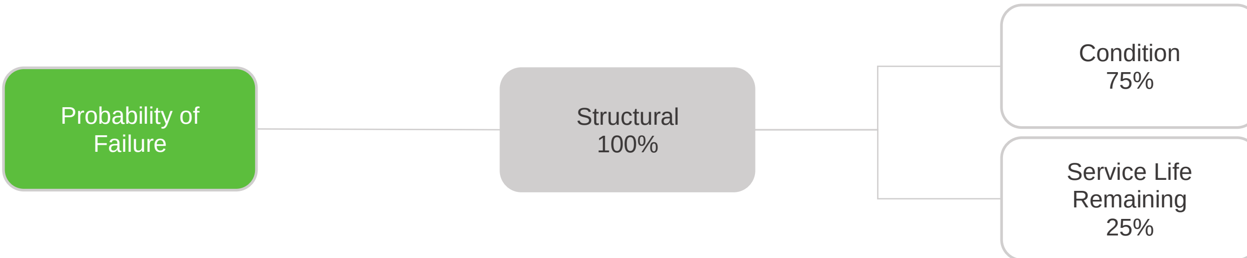


Table 15: Defining Probability of Failure Ranges – All Other Assets

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

Figure 22: Consequence of Failure – All Other Assets

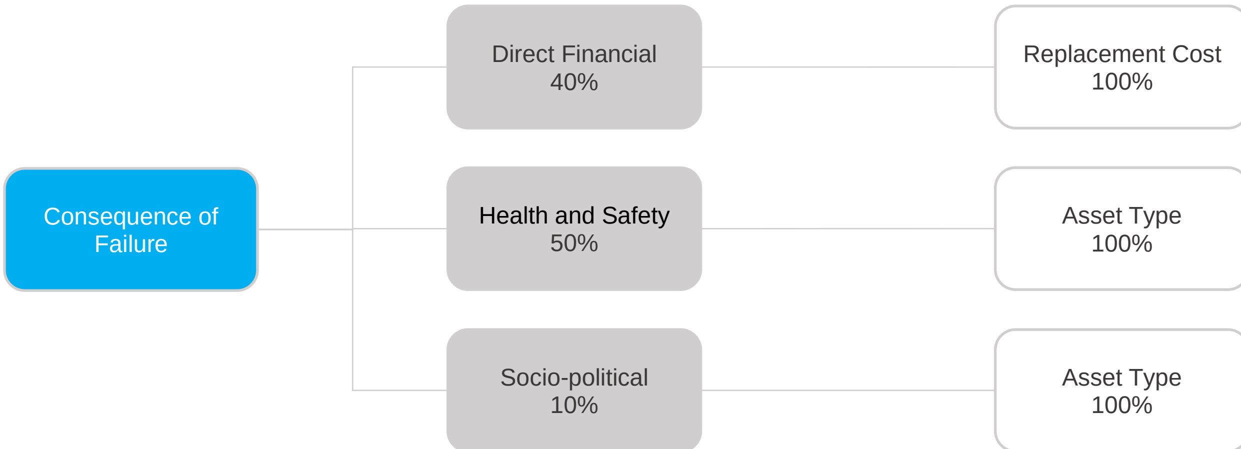


Table 16: Defining Consequence of Failure Ranges – All Other Assets

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $5,000	1—Insignificant
	$5,000 - $10,000	2—Minor
	$10,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Health and Safety	Asset Type	Consequence of Failure
	Inspection Chambers, Chambers, Cleanouts	2—Minor
	Air Valves, Manholes, Service Connections, Lift Stations	4—Major
Socio-political	Asset Type	Consequence of Failure
	Inspection Chambers, Chambers, Cleanouts	1—Insignificant
	Air Valves, Manholes, Service Connections, Lift Stations	4—Major

Risk Matrix: All Other Assets

The risk matrix below is based on the previous risk model developed for all remaining Sanitary assets, including: service connections, lift stations, manholes, inspection chambers, cleanouts, and air valves.

Figure 23: Detailed Risk Matrix – All Other Assets

Consequence of Failure	1	2	3	4	5
5	4 Assets $2.8M	3 Assets $2.0M	3 Assets $2.0M	1 Assets $737.7K	10 Assets $6.8M
4	23 Assets $5.9M	22 Assets $5.4M	9 Assets $2.5M	6 Assets $1.0M	19 Assets $5.3M
3	778 Assets $11.8M	1,097 Assets $23.4M	3,490 Assets $33.5M	614 Assets $12.7M	17 Assets $742.9K
2	1,345 Assets $22.1M	2,780 Assets $42.2M	2,705 Assets $39.9M	1,947 Assets $21.0M	5 Assets $18.3K
1	429 Assets $5.2M	346 Assets $9.7M	261 Assets $6.4M	172 Assets $3.4M	3 Assets $9.9K

Probability of Failure

The consolidated risk matrix in Figure 24 shows that 581 assets with a current replacement cost of $21.1 million have a very high risk rating. Based on replacement costs, the majority of these assets are lift station components, with a poor to very poor age-based condition rating and a moderate to major consequence of failure.

Service connections make up the majority of assets (by quantity and replacement cost) with a high risk rating, due primarily to their poor to very poor age-based condition ratings.

Figure 24: Consolidated Risk Matrix – All Other Assets

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
1,545 Assets	3,672 Assets	1,092 Assets	6,304 Assets	581 Assets
$7,862,417	$19,587,586	$6,988,998	$37,229,108	$21,100,831

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 17: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 18 outlines the four core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 18: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Sanitary, a total of 34 KPIs were selected. This included 14 KPIs to measure customer levels of service, and 20 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 19: Customer Levels of Service

KPI	2018	2019	2020	2021	Overall Trend
Capital					
Average age of sanitary mains (gravity) in years	NA	NA	NA	43	→
% of sanitary assets in poor or worse condition	NA	NA	NA	35	→
% of sanitary mains in poor or worse condition	NA	NA	NA	28	→
% of sanitary lift stations in poor or worse condition	NA	NA	NA	35	→
Maintenance					
# of sanitary main flushing calls	1	12	3	7	↗
# of manhole related requests	28	34	33	43	↗
# of lift station related calls	4	8	11	12	↗
# of sanitary sewer main backup calls	22	25	26	26	→
# of city sanitary service back up calls	57	32	53	66	↗
# of sewer odour complaints	21	15	25	30	↗
Operations					
# of inspection chamber requests	9	9	18	2	→
# of sanitary sewer locate requests	4	3	15	12	→
# of private sanitary service back up calls	36	52	41	46	↗

Table 20: Technical Levels of Service

KPI	2021	Budget
Capital		
Sanitary Main, Service and Manhole Replacements	NA	$300,000
Meters of sanitary mains replaced	NA	NA
Meters of service connections replaced	NA	NA
# of manholes replaced	N/A	NA
# of lift stations replaced	1	$1,200,000
Average annual capital reinvestment rate	$1,500,000	
Maintenance		
# of sanitary manhole locate and adjustments per year (per 2,697 manholes)	241	$72,000
# of sanitary manholes repaired (of 2,697)	46	$15,200
# of sanitary lift station generators serviced (of 21 generators)	21	$30,000
# of pump station inspection and preventative maintenance completed (for 24 stations)	503	$182,950
# of SCADA/alarm maintenance services for lift stations (for 24 stations)	21	$33,100
# of unplanned emergency inspections and repairs on lift stations	NA	$58,600
Kilometers of sanitary sewer mains flushed (of 181km of mains)	31	$65,300
Kilometers of sanitary sewer mains inspected through CCTV (of 181km of mains)	8126m	$30,000
Kilometers of sanitary mains repaired (of 181km of sanitary mains)	NA	$131,500
# of sanitary service repairs completed (per 10,362 connections)	30	$72,000
# of sanitary service blockages cleared (per 10,362 connections)	33	$22,450
# of I&I monitoring locations or activities	0	$5,600
Average annual maintenance expenditures	$660,200	
Operations		
# of kilowatt hours used for sanitary lift station electricity and communication (per 23 stations)	NA	$78,000
Volume of soil disposal - Sanitary		$63,800
Average annual operating expenditures	$141,800	

Levels of Service Analysis

Table 21 provides the 4-year percentage change in-service requests for KPIs that best align with asset condition and performance. These may be helpful indicators in determining if sufficient funding and resources are being allocated to the maintenance and replacement of assets.

Table 21: Trends in Customer Levels of Service KPIs – Asset Condition and Performance

KPI	Percentage change between 2018-2021
# of manhole related requests	+54%
# of sanitary sewer main back-up calls	+18%
# of city sanitary service back up calls	+16%

Table 22 shows the change in service requests for KPIs that best align with service delivery, but have no direct relationship with asset lifespan. These may be helpful indicators in determining if sufficient funding and resources are being allocated towards service delivery.

Table 22: Trends in Customer Levels of Service KPIs – Service Delivery

KPI	Percentage change between 2018-2021
# of sewer odour complaints	+43%
# of sanitary sewer locate requests	+200%

KPI data can be used to support decisions to maintain, increase, or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions.

For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 23 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Such activities have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 23: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different infrastructure programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 24 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 24: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 25: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: “New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years.”
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 25: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

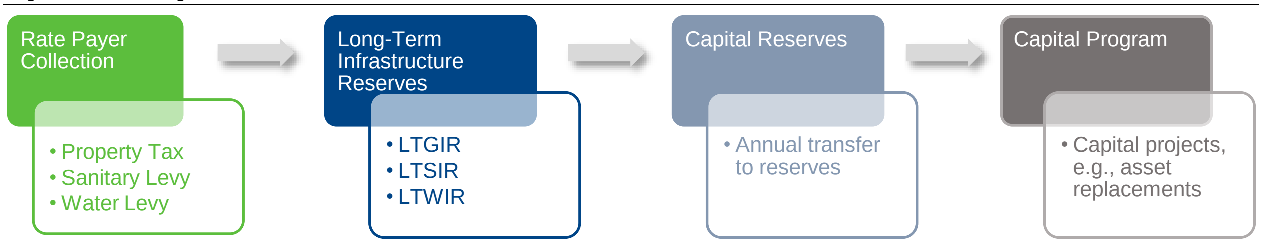
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 26: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 26: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 24. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies. The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 27, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 28, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

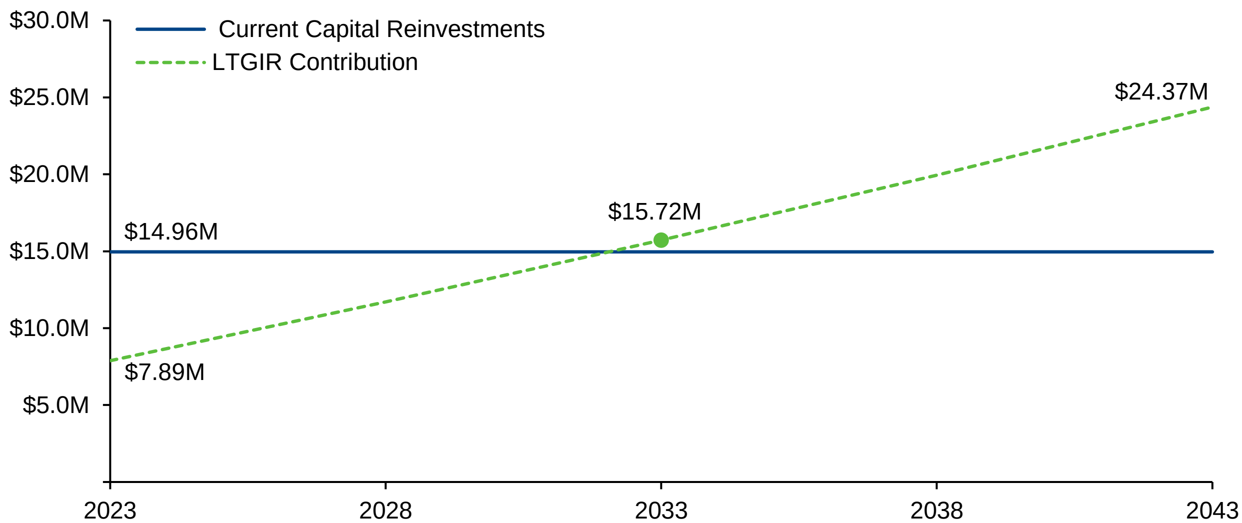
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 27 above as $15 million.

Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 27: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 27.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 28. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 29: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 30: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 31: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 31, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 32: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 33: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 28: Annual Contributions to the LTWIR vs. Annual Capital Spending

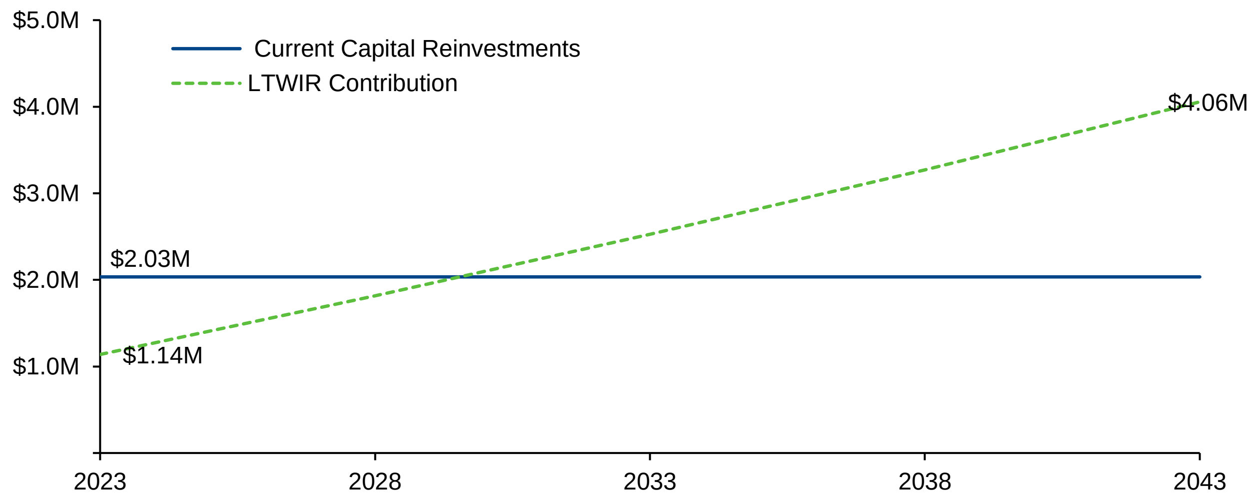
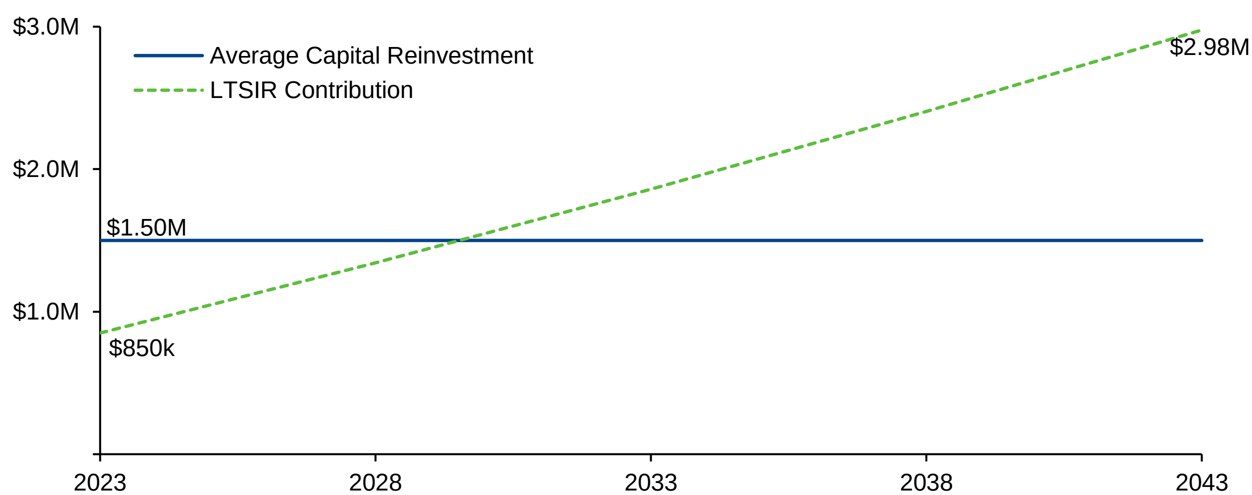


Figure 29: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 32, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 33 for both water and sanitary services, and is the target of the financial strategy.

Funding Models
The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 34: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 35: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 30: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 36: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 37: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 36, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 38 summarizes the infrastructure backlog for each service area.

Table 38: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 39 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 39: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 40: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 41: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.
- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.
- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.
- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the

15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Facilities

Final Version
August 2024

Contents

Executive Summary 7

Approach and Methodology 12
- Developing the Asset Management Plan 13
  - Build a comprehensive asset inventory 13
  - Conduct asset-level risk assessments and build risk models 14
  - Compile lifecycle activity data 14
  - Compile levels of service data 14
  - Develop financial strategy 14
- Limitations and Constraints 15

State of the Infrastructure 16
- Asset Hierarchy and Data Classification 17
- Inventory and Valuation 19
  - Costing Methods 19
- Asset Condition 21
  - Source of Condition Data 21
  - Condition Assessment Guidelines 22
  - Condition Rating System 23
  - Projected Asset Conditions 24
- Age Profile 26
  - Historical Asset Expenditures 26
  - Serviceable Life vs. Current Asset Age 27

Lifecycle Management 30
- Current Lifecycle Framework 31
- Reinvestment Rates 36
  - Reinvestment Rate Benchmarks 37
- Forecasted Long-term Replacement Needs 40

Risk Analysis 41
- Calculating Asset Level Risk 42
- Risk Models and Matrices 45
  - Risk Matrix 48

Levels of Service 49
- Defining Levels of Service 50
  - Levels of Service Framework 50
  - Levels of Service Analysis 54

Financial Strategy 56
- Approach and Methodology 57
- Current Financial Planning Framework 58
  - Capital Budget 58

Debt....58
Senior Government Support....60
Sustainability....60
Reserves....61
Development Cost Charges (DCC) Program....63
Achieving Reinvestment Rate Targets....64
Tax-Funded Service Areas....65
Levy-Funded Service Areas....71
Infrastructure Backlogs....76
Using Reserves....77
Leveraging Development Cost Charges (DCC)....78
Recommendations....79
Tax Funded Service Areas....79
Levy-Funded Service Areas....79
Next Steps....81

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 20
Figure 4: Asset Condition: All Facilities Assets – PCCC Excluded 24
Figure 5: Asset Condition – By Service 25
Figure 6: Asset Condition – All Facilities Assets By Uniformat II Code Level 1 25
Figure 7: Historical Expenditures on Asset Construction or Acquisition 26
Figure 8: Average Asset Age vs. Estimated Useful Life – By Service 27
Figure 9: Percentage of Estimated Useful Life Consumed – By Service 28
Figure 10: Average Asset Age vs. Estimated Useful Life – By Uniformat II Code Level 1 29
Figure 11: Percentage of Estimated Useful Life Consumed – By Uniformat II Code Level 1 29
Figure 12: Summary of Capital, Maintenance, and Operating Expenditures 32
Figure 13: Forecasted Long-term Replacement Needs 40
Figure 14: Calculating Risk Ratings 42
Figure 15: Generic Risk Matrix 44
Figure 16: Probability of Failure 45
Figure 17: Consequence of Failure 46
Figure 18: Detailed Risk Matrix – All Facilities Assets 48
Figure 19: Consolidated Risk Matrix 48
Figure 20: Historical MFA Lending Rates 59
Figure 21: Funding Flow 62
Figure 22: Annual Contributions to the LTGIR vs. Annual Capital Spending 66
Figure 23: Annual Contributions to the LTWIR vs. Annual Capital Spending 72
Figure 24: Annual Contributions to the LTSIR vs. Annual Capital Spending 72

List of Tables

Table 1: Methods for Establishing Replacement Costs 19
Table 2: Detailed Asset Inventory 20
Table 3: Source of Condition Data 21
Table 4: General Condition Rating Scale – All Assets 23
Table 5: Components of a Lifecycle Framework 31
Table 6: Lifecycle Framework – Civic Facilities 33
Table 7: Lifecycle Framework – Recreation Facilities 33
Table 8: Lifecycle Framework – Emergency Facilities 34
Table 9: Lifecycle Framework – Operations Facilities 34
Table 10: Lifecycle Framework – Parks Facilities 35
Table 11: Current Reinvestment Rates 36
Table 12: System-generated Reinvestment Rates 37
Table 13: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks 38
Table 14: Purpose of Capital and Operating Budgets 39
Table 15: Types of Consequences of Asset Failure 43
Table 16: Defining Probability of Failure Ranges 45
Table 17: Defining Consequence of Failure Ranges 47
Table 18: Components of a Levels of Service Framework 50
Table 19: Core Values and Service Statements 51
Table 20: Customer Levels of Service 52
Table 21: Technical Levels of Service 52
Table 22: Balancing Cost, Performance, and Risk 55
Table 23: Service Area Replacement Costs and Target Reinvestment Rates 57
Table 24: Long-Term Infrastructure Reserve Balances 61
Table 25: Capital Reserve Balances 62
Table 26: Comparing Average Annual Requirements Against Current Capital Reinvestments 65
Table 27: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 65
Table 28: Funding Levels and Resulting Funding Deficits 67
Table 29: Risks and Benefits of Funding Models 68
Table 30: Tax Rate Increase Required to Achieve Funding Levels 69
Table 31: Comparing Average Annual Requirements Against Current Capital Reinvestments 71
Table 32: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 71
Table 33: Funding Levels and Resulting Funding Deficits: Water Services 73
Table 34: Funding Levels and Resulting Funding Deficits: Sanitary Services 73
Table 35: Utility Rate Increase Required to Achieve Funding Levels: Water 74
Table 36: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 74
Table 37: Age- and Condition-based Infrastructure Backlogs 76
Table 38: Long-Term Infrastructure Reserves vs. Backlogs 77
Table 39: Development Cost Charges (DCC) Program 78
Table 40: Overlap Between DCC Program and Assets in Backlog State 78

1,320	Number of assets on record in the Facilities asset database
$262.3 million	2023 replacement cost of these assets
2020s	Decade with the highest capital expenditures on the construction or acquisition of Facilities assets ($101.8M)
2050s	Decade with the first major forecasted asset replacement spike ($46.4 million)
24%	Percentage of assets in poor or worse condition, or with less than 40% service life remaining
$29.8 million	Current age- and condition-based asset backlog
$22.9 million	Current replacement cost of assets with a very high risk rating
$2.7 million	Annual City spending on capital, maintenance, and operations related to Facilities
1.7%	System-generated recommended capital reinvestment rate for replacement of Facilities assets ($4.6M per year)
0.2%	Port Coquitlam's actual capital reinvestment rate ($583k per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Facilities assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary, Drainage, Transportation, Facilities, Parks, Fleet & Equipment, and Information Services

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Facilities portfolio includes various civic, recreational, operational, and emergency services buildings. The total current replacement cost of all Facilities assets, as analyzed in this AMP, was estimated at $262.3 million as of 2023, with Recreation comprising 70% of the portfolio.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Condition data was not available for Facilities assets at the time of this AMP. However, Condition Assessment Guidelines were developed to support the collection of condition data moving forward.

Asset age is currently used to estimate the physical condition and replacement year for Facilities assets, with condition inspections and maintenance history used to support replacement decisions. With the exception of the newly constructed Port Coquitlam Community Centre, 24% of Facilities assets with a current replacement cost of nearly $30 million have less than 40% service life remaining and are estimated to be in poor or worse condition.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Expenditures on Facilities assets averaged $37.8 million per decade between 1960 and 2022, dominated by the recent construction of the PCCC. Prior to that, the largest investments occurred in the 1990s and 2010s.

New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget Facilities totals approximately $2.7 million. Of that, $1.3 million per year is spent on the inspection, maintenance, and replacement of Facilities assets.

An additional $1.4 million per year is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life. Port Coquitlam is expected to experience a rapid increase in asset replacement needs in the 2050s, totaling nearly $46.4 million. Of note, the PCCC has not yet been fully componentized into individual assets, each with their own useful life and replacement schedule. As more granularity and detail are added to the Facilities database, the replacement forecasts will evolve to better reflect the lifespan and cost of individual assets.

Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $10.5 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to nearly $30 million when assets in poor or worse condition, or less than 40% service life, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in user fees and tax rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 65 Facilities assets, with a combined replacement cost of $22.9 million have a very high risk rating. Of these, most are older Civic, Community and Recreation, and Emergency services assets—some with installation or construction dating back to 1940s and 1960s. This results in a high, presumed likelihood of failure that can yield a very high risk rating, particularly for older assets within Emergency services, which also carry a high consequence of failure. An additional 429 assets, with a combined replacement cost of $33.8M were classified with a high-risk rating.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators.

For Facilities, a total of 32 key performance indicators (KPI) were selected. This included six KPIs to measure customer levels of service, and 26 to track the City's technical levels of service. Technical levels of service can be thought of as the activities and steps the organization takes (inputs) to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas
For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility
Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas
Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

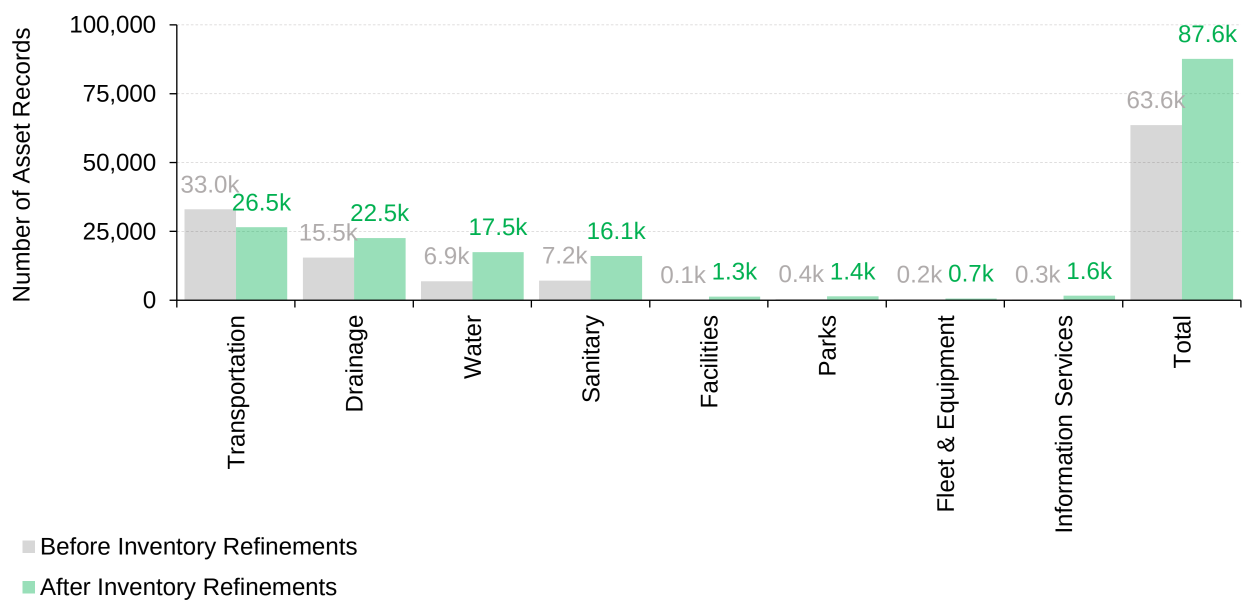
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 asset records to 87,647. For Facilities, data refinement led to a 14x increase, from 98 asset records to 1,320.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., regular maintenance and repairs), activities meant to ensure delivery and continuity of acceptable service levels were also included. For example, energy costs have no direct impact on asset lifespan, but they are part of providing Facilities service to residents.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable and practical. To track the performance of the Facilities, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. A total of 32 KPIs were selected, with six used for customer levels of service, and 26 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff,

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

State of the Infrastructure

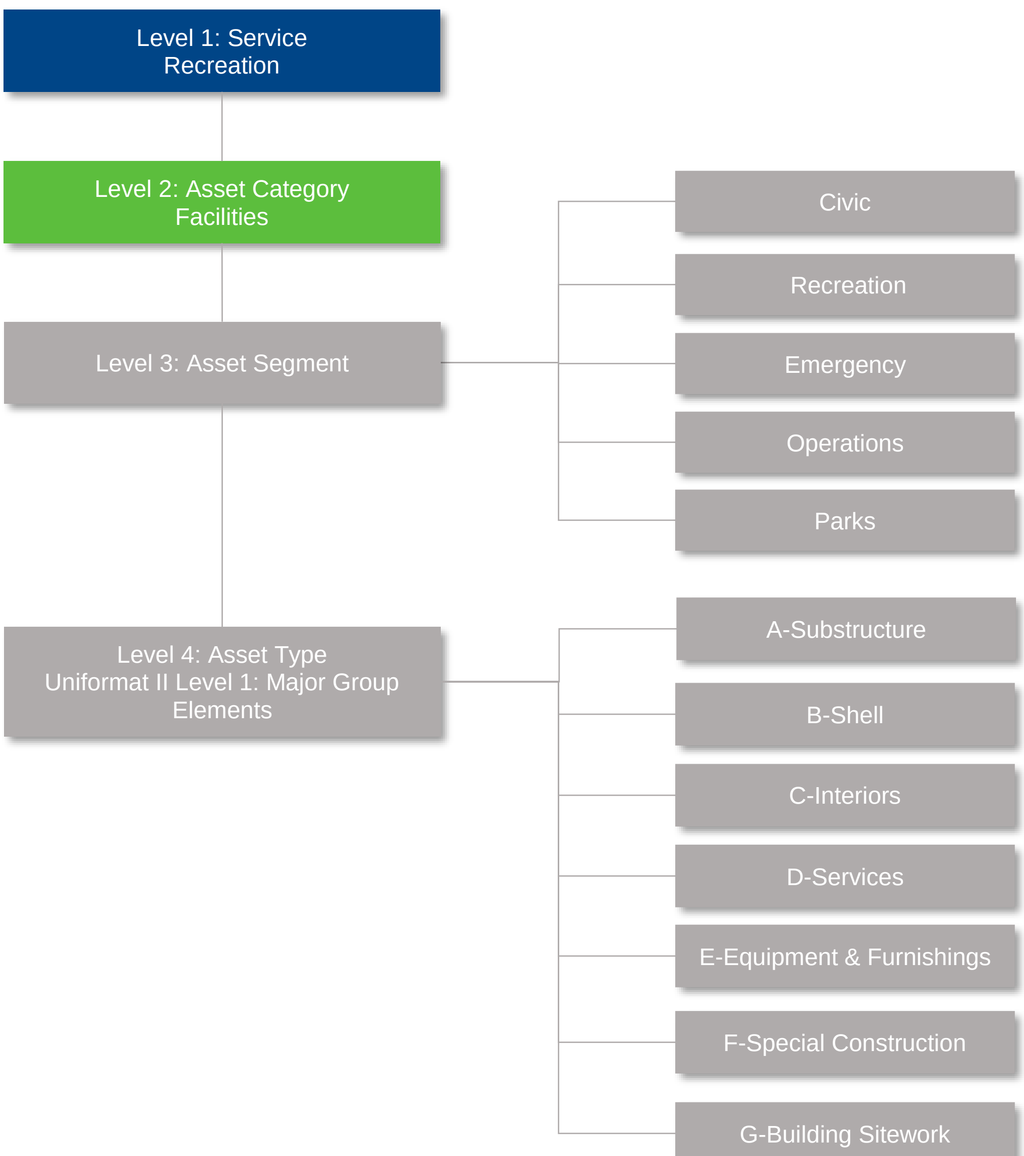
The state of the infrastructure (SOTI) provides a detailed overview of the City of Port Coquitlam's Facilities. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Facilities are made up of thousands of individual assets, such as the building's shell, foundation, roofing, various electrical and mechanical elements, and minor assets such furnishings and fixtures. To support supplemental reporting by these asset types, the City's facilities were componentized using the Uniformat II Classification for Building Elements, which offers a standardized approach to breaking down facilities into smaller assets, with increasing granularity.

Figure 2: Asset Hierarchy and Data Classification



Civic facilities include City Hall and the City Hall Annex (strata ownership). Recreation facilities include the Port Coquitlam Community Centre (PCCC), Hyde Creek Recreation Centre, Heritage Museum, Outlet and Gathering Place. Emergency Facilities include Fire Hall #1 and Fire Hall #2, Community Police Station (leased) and RCMP Station (cost shared with City of Coquitlam). Operations Facilities include the Operations Centre, Garage, Stores Building and Shed, Water and Parks Building, and various Auxiliary Buildings and Sheds. Parks facilities include washrooms and parks buildings, outdoor pools and spray parks.

Services include mechanical, electrical plumbing, HVAC and fire protection assets. Special Construction includes special structures, facilities, and controls such as those associated with pools and ice rinks. Building Sitework includes demolition and clearing, parking lots, and site specific services (water drainage, sanitary, electrical). At the time of this AMP, no assets were inventoried for interiors, which includes doors, stairs, floors, and walls.

Inventory and Valuation

The City of Port Coquitlam's Facilities database contains 33 individual facilities or sites, made up of more than 1,300 individual asset records. These include various Civic, Recreation, Emergency, Operations, and Parks facilities, with a combined replacement cost of nearly $262.3 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

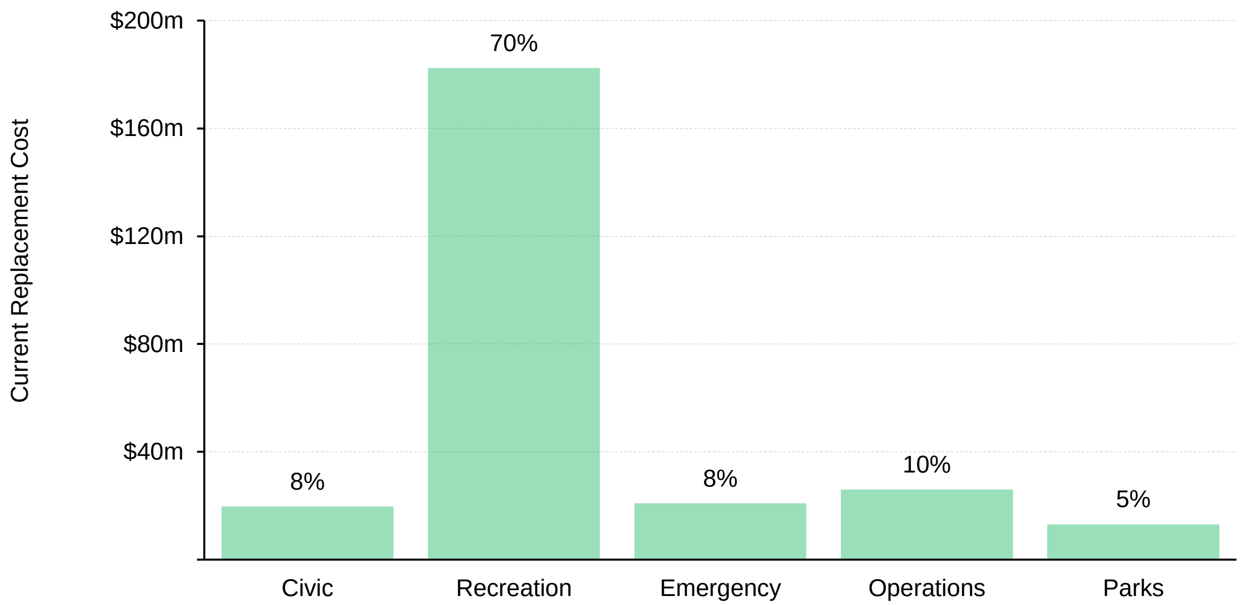
Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to linear or non-point assets.	High

Table 2 summarizes the quantity and current replacement cost of Facilities assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of $182.4 million, Recreation comprises the largest share of the Facilities portfolio, and includes the newly built Port Coquitlam Community Centre (PCCC).

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Civic	3	$19,737,547	User-defined
Recreation	5	$182,443,251	User-defined
Emergency	4	$20,908,468	User-defined
Operations	5	$26,030,000	User-defined
Parks	24	$13,143,047	User-defined
Total	**41**	**$262,262,312**	

Figure 3: Portfolio Valuation



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

Asset age is currently used to estimate the physical condition and replacement year for Facilities assets, with condition inspections and maintenance history used to support replacement decisions.

Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Facilities	Civic	0%	Age-based estimates
	Recreation	0%	Age-based estimates
	Emergency	0%	Age-based estimates
	Operations	0%	Age-based estimates
	Parks	0%	Age-based estimates
Total		**0%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Facilities assets to support the collection of condition data. It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey.

Table 4: General Condition Rating Scale – All Assets

Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

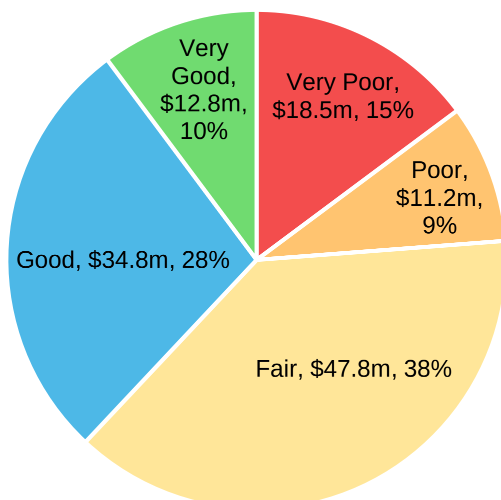
Projected Asset Conditions

Figure 4 summarizes the replacement cost-weighted condition of all Facilities assets, with the exception of the Port Coquitlam Community Centre (PCCC). Assets within the PCCC are newly acquired and constructed and assumed to be in very good condition. To avoid skewing results, these assets, with a combined current replacement cost of $137.1 million, have been excluded from all condition and age analysis.

Based on age data, 76% of assets are in fair or better condition. However, the remaining 24%, with a current replacement cost of nearly $30 million, are in poor to very poor condition. Additional detail is also provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 4: Asset Condition: All Facilities Assets – PCCC Excluded



It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

As illustrated in Figure 5, with the exception of Parks, most assets within each service area are in fair or better condition. Within Parks, 42% of assets with a current replacement cost of $5.5 million are in poor or worse condition. Approximately 20-25% of assets within the remaining service areas were also assigned a condition rating of poor or worse.

Figure 5: Asset Condition – By Service

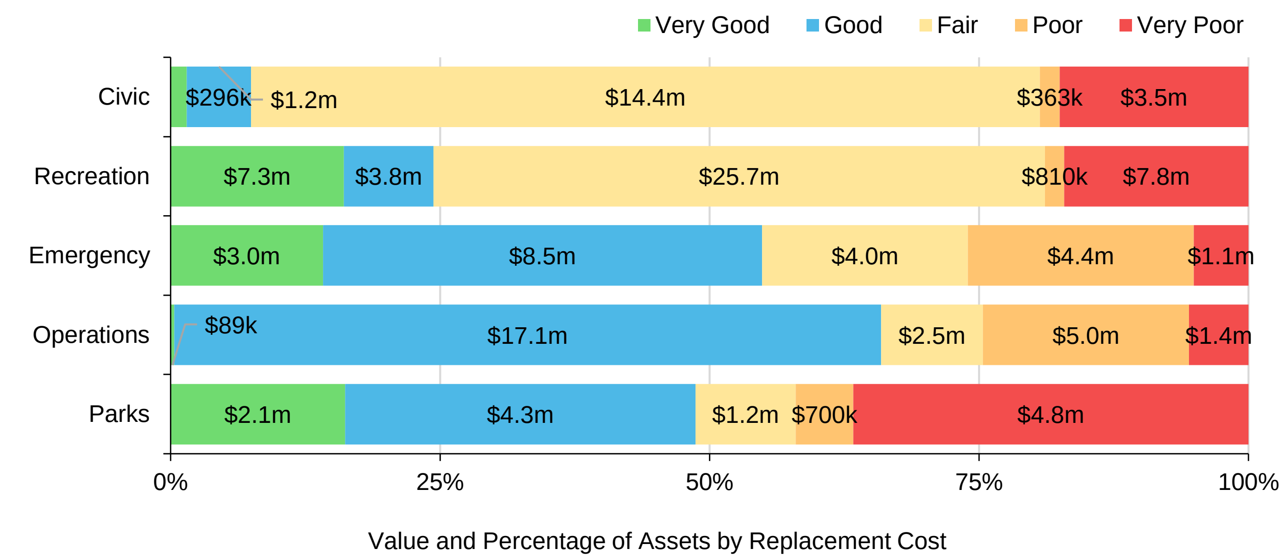
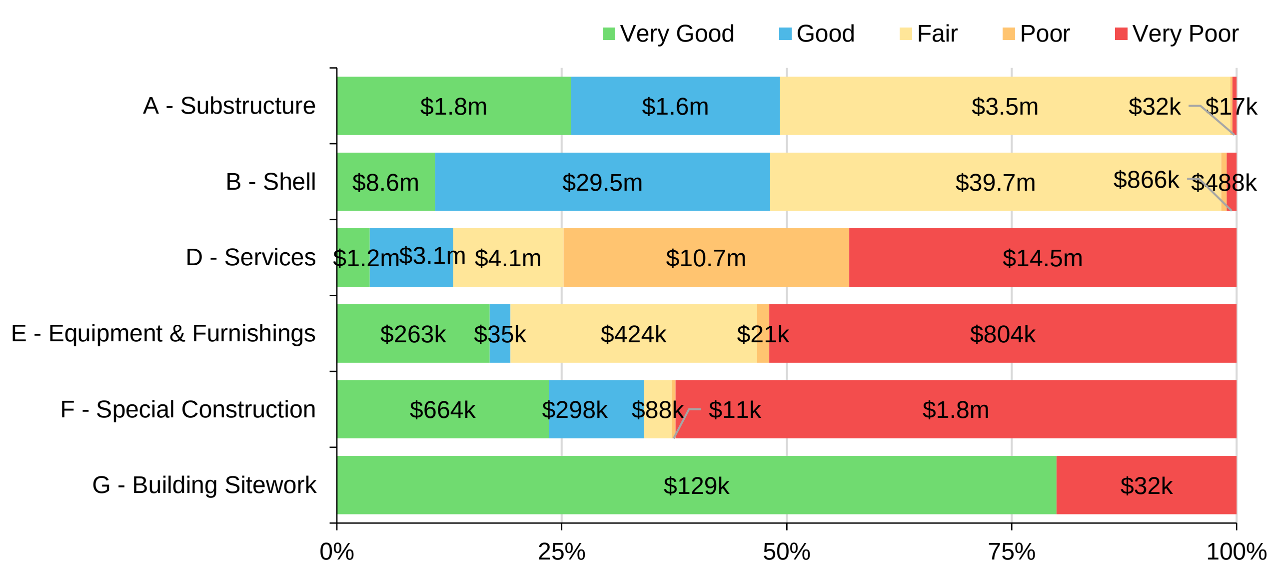


Figure 6 provides age-based condition details for all Facilities components using Uniformat II Code Level 1 classification. The analysis shows that 75% of Services assets with a current replacement cost of $25.2 million, are in poor or worse condition. Once again, we note that the PCCC has been excluded from this analysis given its recent construction.

Figure 6: Asset Condition – All Facilities Assets By Uniformat II Code Level 1



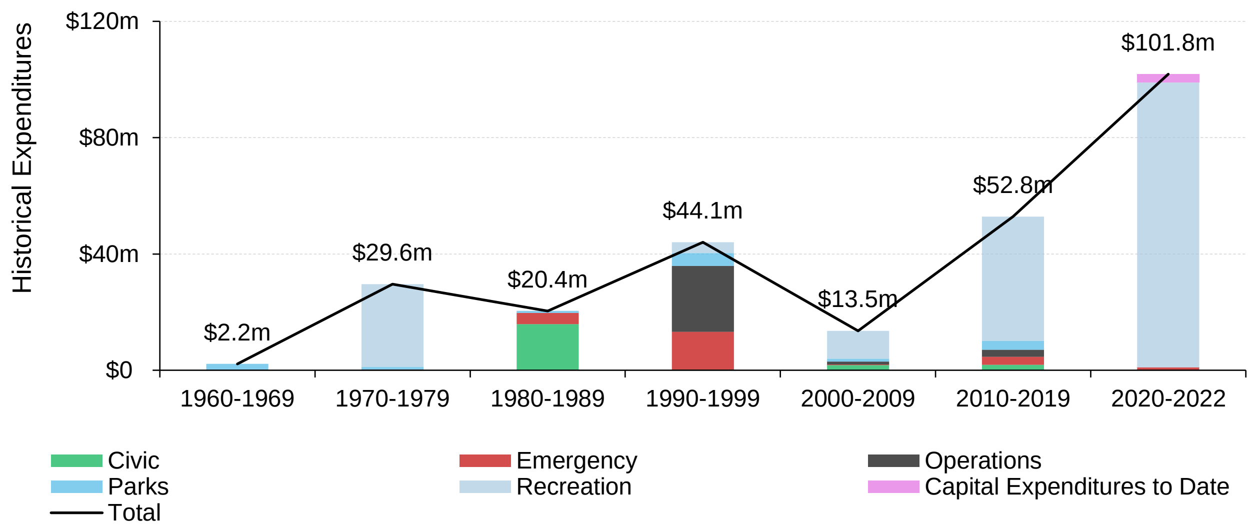
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 7 illustrates Port Coquitlam's historical expenditures on the construction or acquisition of Facilities assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 7: Historical Expenditures on Asset Construction or Acquisition



Expenditures on Facilities infrastructure averaged $37.8 million per decade over the last 60 years. The construction of the PCCC, fully placed into service in 2021, represents the largest investments made to date. The PCCC replaced the aging downtown recreation facilities and library, and includes a leisure pool, three ice sheets, library, multi-use spaces, games room and lounge, café, gym, fitness centre, parking, outdoor plazas, sport courts and more.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

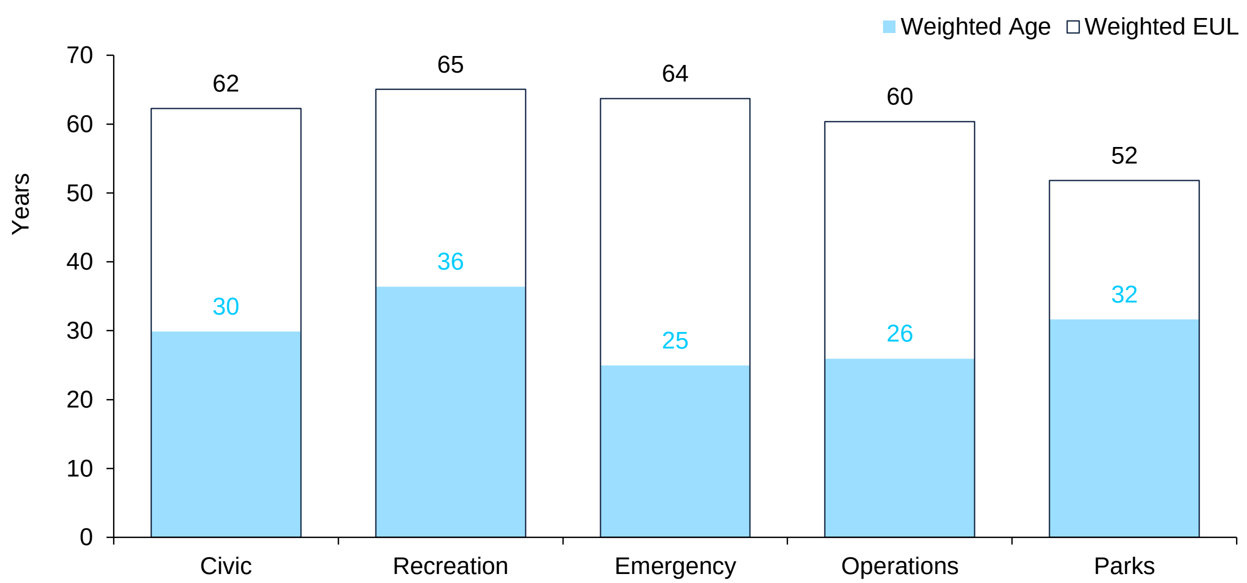
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 8 plots the average established useful life of Facilities assets against their current average age (PCCC excluded). Both values were weighted by the replacement cost of individual assets.

Figure 8: Average Asset Age vs. Estimated Useful Life – By Service



Age analysis indicates that, on average, most assets within the Facilities portfolio are in the latter stages of their lifecycle, having consumed more than 50% of their established lifespan.

Figure 9 shows a detailed distribution of the City's Facilities assets based on the portion of useful life consumed to date. The distribution shows that Recreation and Parks assets with a current replacement cost of $5 million and $3.6 million, respectively, remain in service beyond their estimated useful life.

Figure 9: Percentage of Estimated Useful Life Consumed – By Service

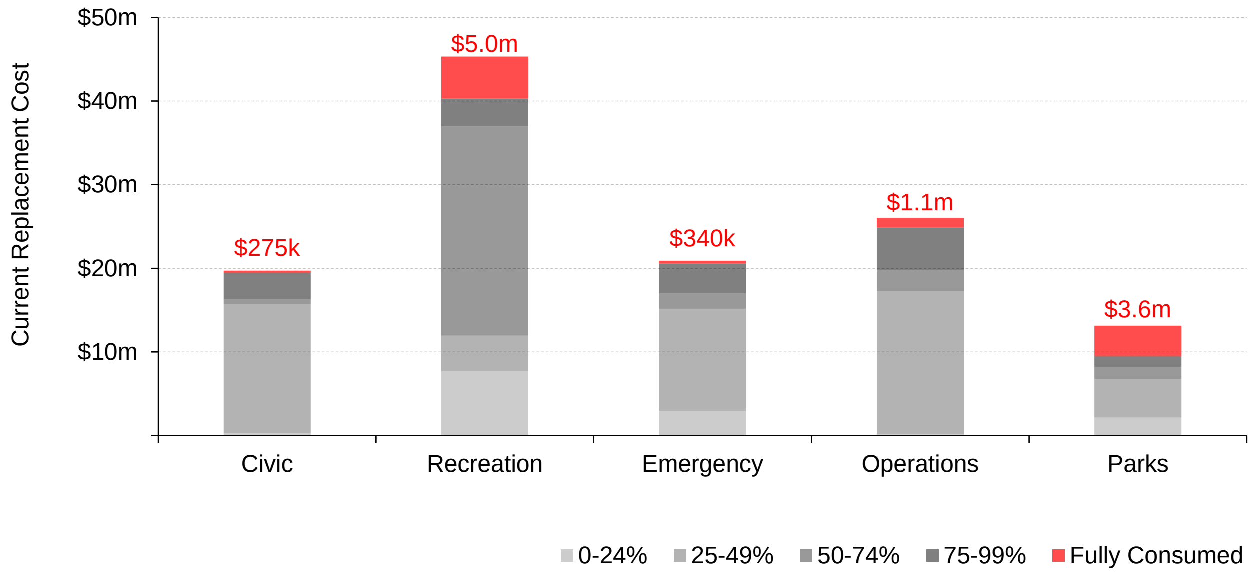


Figure 10 provides similar analysis using Uniformat classifications. The analysis shows that assets within Services and Equipment & Furnishings are near the end of their useful life. On average, Special Construction assets continue to remain in service beyond their established lifespans.

Figure 10: Average Asset Age vs. Estimated Useful Life – By Uniformat II Code Level 1

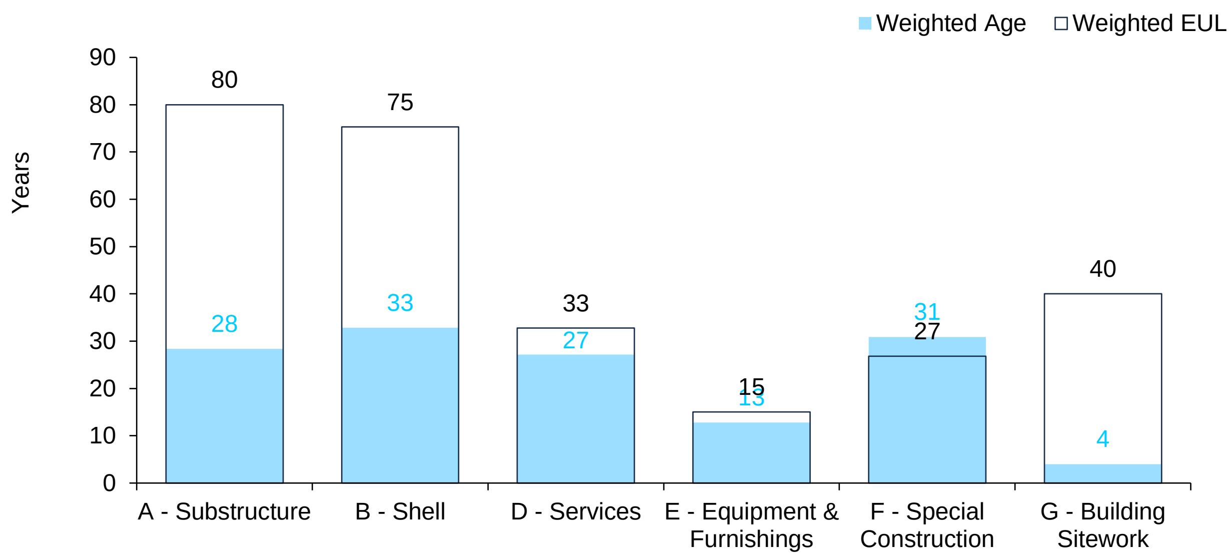
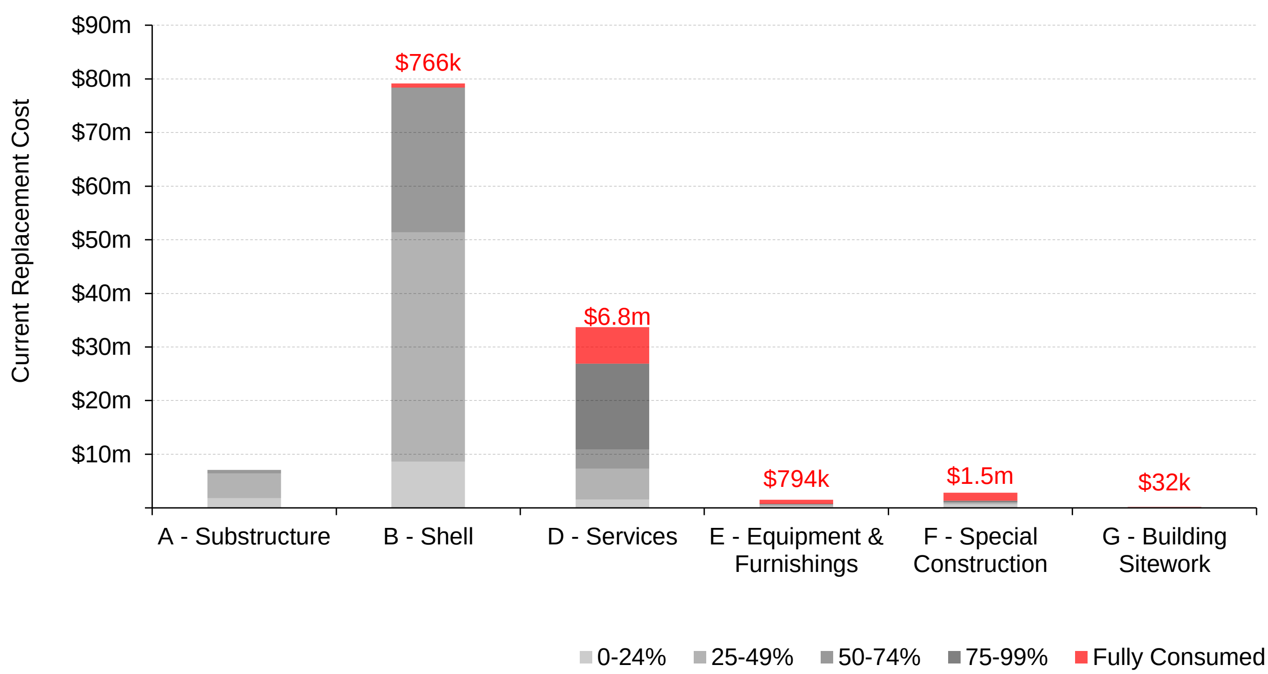


Figure 11 reveals that the current replacement cost of assets within Services that remain in operation beyond their established lifespan totals $6.8 million. These assets include HVAC systems, electrical and plumbing equipment, and elevators and lifts. Similarly, expired assets within Equipment & Furnishings total $794k in current replacement costs.

Figure 11: Percentage of Estimated Useful Life Consumed – By Uniformat II Code Level 1



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, repair, and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

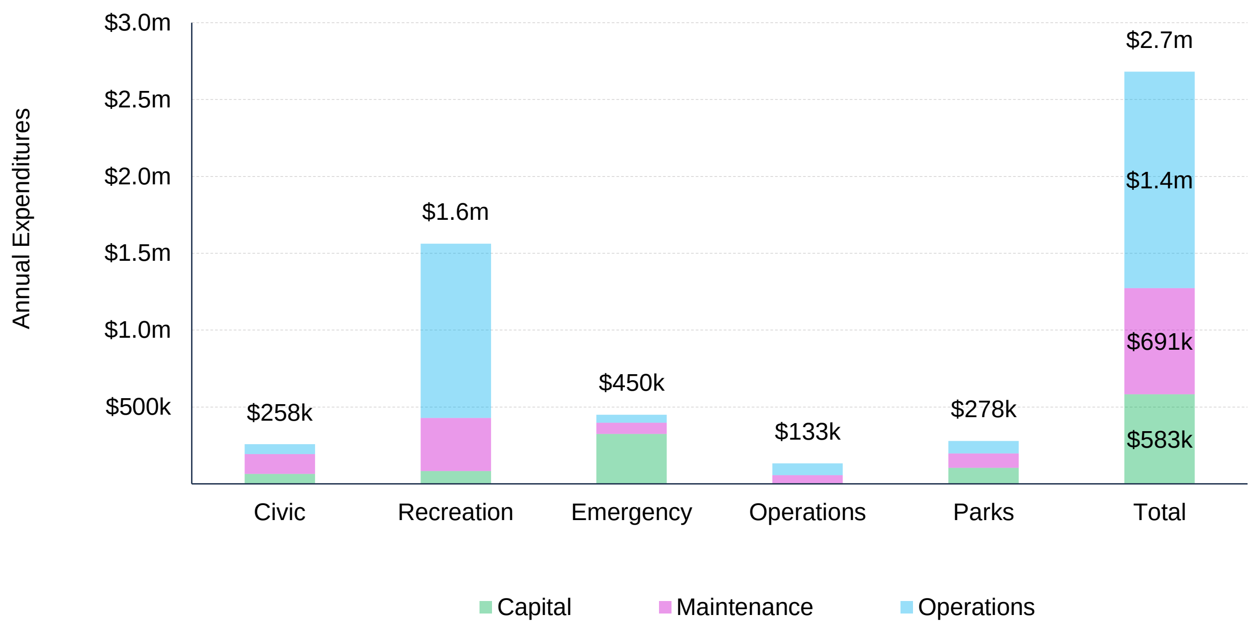
The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring. Lifecycle activities are employed to maximize the serviceable life of assets while maintaining acceptable levels of service and efficient operations. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 5.

Table 5: Components of a Lifecycle Framework

Component	Description		
Uniformat Level 1	Asset classification using Uniformat II Code system		
Activity and Average Expenditures	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Annual Budget	Typical funding available (actual spending may vary from year to year). Expenditure history from 2019, 2020, and 2021 was used to calculate a 3-year average.		
Reinvestment Rate	Annual capital budget as a portion of the total Facilities asset portfolio replacement cost of $262,262,312.		

Figure 12 summarizes annual expenditures by service and expenditure type. On average, the City allocates $2.7 million annually on Facilities infrastructure. Recreation facilities consume more than half of available funds, but also represent 70% of the facilities portfolio, by replacement cost.

Figure 12: Summary of Capital, Maintenance, and Operating Expenditures



Of the $2.7 million annual Facilities budget, approximately $1.3 million is spent on the inspection, maintenance, and replacement of assets. An additional $1.4 million per year is allocated towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., electricity, natural gas).

The following table outlines the City's current lifecycle framework for Facilities, summarized by service and Uniformat Level 1 classification. As Recreation and Parks facilities (pools and spray parks) were closed in 2019 and 2020 due to covid-19, the 2021 operational costs were used instead.

Table 6: Lifecycle Framework – Civic Facilities

Uniformat Level 1	Activity and Average Annual Expenditures (2019-2021)			Total Average Annual Expenditures
	Operations	Maintenance	Capital	
A - Substructure	$0	$0	$0	$0
B - Shell	$64,657	$14,468	$25,000	$104,125
C - Interiors	$0	$29,597	$0	$29,597
D - Services	$0	$82,136	$40,862	$122,998
E -Equipment and Furnishings	$0	$1,295		$1,295
F - Special Construction	$0	$0	$0	$0
G -Building Sitework	$0	$487		$487
Total	**$64,657**	**$127,983**	**$64,862**	**$258,502**

Table 7: Lifecycle Framework – Recreation Facilities

Uniformat Level 1	Activity and Average Annual Expenditures (2019-2021)			Total Average Annual Expenditures
	Operations	Maintenance	Capital	
A - Substructure	$0	$0	$0	$0
B - Shell	$1,133,962	$78,042	$0	$1,212,004
C - Interiors	$0	$64,123	$0	$64,123
D -Services	$0	$183,302	$0	$183,302
E - Equipment and Furnishings	$0	$12,970	$0	$12,970
F - Special Construction	$0	$0	$83,333	$83,333
G -Building Sitework	$0	$7,218	$0	$7,218
Total	**$1,133,962**	**$345,655**	**$83,333**	**$1,562,950**

Table 8: Lifecycle Framework – Emergency Facilities

Uniformat Level 1	Activity and Average Annual Expenditures (2019-2021)			Total Average Annual Expenditures
	Operations	Maintenance	Capital	
A - Substructure	$0	$0	$0	$0
B - Shell	$51,913	$31,522	$292,250	$395,387
C - Interiors	$0	$5,992	$0	$5,992
D = Services	$0	$28,928	$0	$28,928
E - Equipment and Furnishings	$0	$7,083	$2,667	$9750
F - Special Construction	$0	$0	$0	$0
G - Building Sitework	$0	$0	$30,000	$30,000
Total	**$51,913**	**$73,525**	**$324,917**	**$470,057**

Table 9: Lifecycle Framework – Operations Facilities

Uniformat Level 1	Activity and Average Annual Expenditures (2019-2021)			Total Average Annual Expenditures
	Operations	Maintenance	Capital	
A - Substructure	$0	$0	$0	$0
B - Shell	$76,934	$15,413	$5,000	$97,347
C - Interiors	$0	$6,758	$0	$6,758
D - Services	$0	$26,997	$0	$26,997
E - Equipment and Furnishings	$0	$172	$0	$172
F - Special Construction	$0	$0	$0	$0
G - Building Sitework	$0	$1,467	$0	$1,467
Total	**$76,934**	**$50,807**	**$5,000**	**$132,741**

Table 10: Lifecycle Framework – Parks Facilities

Uniformat Level 1	Lifecycle Activity and Average Expenditures (2019-2021)			Total Average Expenditures
	Operations	Maintenance	Capital	
A - Substructure	$0	$0	$0	
B - Shell	$80,599	$21,476	$0	$102,075
C - Interiors	$0	$0	$0	$0
D - Services	$0	$41,500	$0	$41,500
E - Equipment and Furnishings	$0	$4,025	$0	$4,025
F - Special Construction	$0	$0	$105,000	$105,000
G - Building Sitework	$0	$25,590	$0	$25,590
Total	**$80,599**	**$92,591**	**$105,000**	**$278,190**

Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 11 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 11**Error! Reference source not found.** shows that the City's annual Facilities capital expenditures of $583k yield an overall, service area reinvestment rate of 0.2%.

Table 11: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Civic	$64,862	0.3%	0.02%
Recreation	$83,333	0.0%	0.03%
Emergency	$324,917	1.6%	0.12%
Operations	$5,000	0.0%	0.00%
Parks	$105,000	0.8%	0.04%
Total	**$583,112**		**0.2%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

For general buildings, and sports and recreational facilities, the CIRC reinvestments ranged from 1.7% to 2.5%.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 12: System-generated Reinvestment Rates

Segment	AAR	System-generated TRR
Civic	$403,620	2.0%
Recreation	$2,881,920	1.6%
Emergency	$395,196	1.9%
Operations	$542,462	2.1%
Parks	$338,260	2.6%
Total	**$4,561,458**	**1.7%**

For Facilities, the average annual requirements total $4,561,458, for a system-generated target reinvestment rate of 1.7%.

Comparative Analysis

Table 13 compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide.

Table 13: Comparing Port Coquitlam's Current Reinvestment Rate Against Benchmarks

Benchmark	Assets Included	Target Reinvestment Range	2016 Municipal Average	Port Coquitlam Current Reinvestment Rate
CIRC	Buildings, Sports and Recreation	1.7%-2.5%	1.3%-1.7%	0.2%
Citywide Asset Manager	All Facilities	1.7%	1.3%-1.7%	

The analysis shows that Port Coquitlam's overall reinvestment rate is significantly lower than the CIRC range, municipal average, and system-generated level. The City is reinvesting 0.2% of the replacement cost of all facilities back into these assets each year, against a recommended rate of 1.7% to 2.5%.

Maintaining adequate reinvestment rates –whether through actual spending on infrastructure programs or allocating funds to reserves for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 14: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

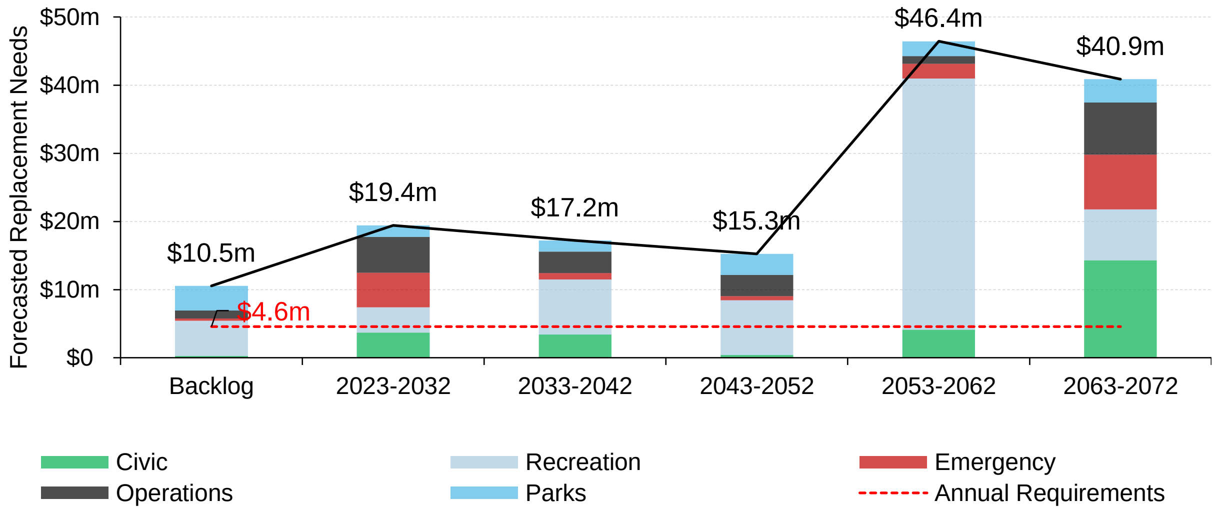
Forecasted Long-term Replacement Needs

In contrast to historical investments in infrastructure, Figure 13 illustrates the cyclical short-, medium- and long-term replacement requirements for Facilities assets over the coming decades. The City's average annual requirements for Facilities asset replacements total $4.6 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $583k per year on Facilities asset replacements are less than a quarter of the $4.6 million recommended to ensure that replacement needs are met.

The chart shows that replacement needs are stable for the next three decades, averaging approximately $9 million per 10-year period, but rise rapidly in the 2050s, peaking at nearly $29 million. However, additional componentization of facilities are needed to generate more reliable long-term forecasts.

Figure 13: Forecasted Long-term Replacement Needs



The chart also shows a Facilities age-based backlog of $10.5 million, comprising assets that have reached the end of their estimated useful life. However, this figure increases to $29.8 million when assets in poor or worse condition, or less than 40% service life remaining are included. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition. Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates.

The magnitude of capital needs typically far exceeds what most agencies can afford to fund.. A risk-based approach can be used to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 14: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, previous performance history, and any identified vulnerability to extreme weather events. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe. Failure or breakage of a small plumbing fixture may cause a leak in a facility that may be quickly isolated, resulting in minimal damage. However, failure of major components such as HVAC systems located in recreational facilities can lead to health and safety issues, loss of revenue through user fees, and reputational damage.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

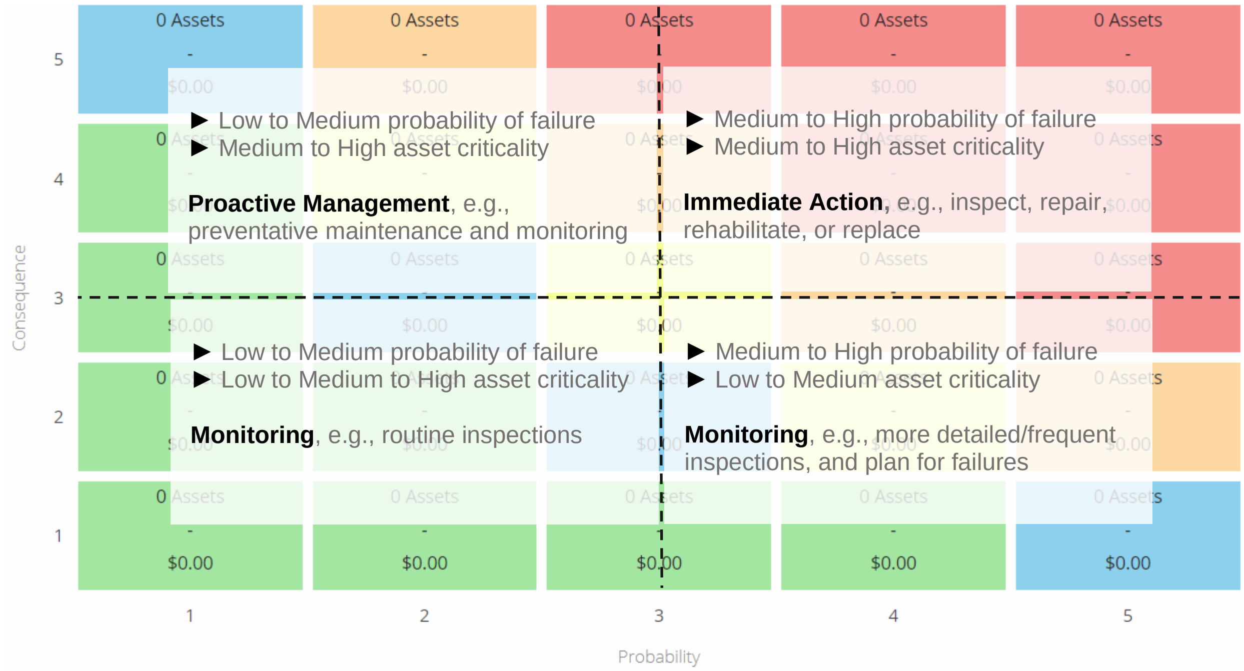
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 15: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for all Facilities assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 15.

Figure 15: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Facilities assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as the Facilities as a whole.

Two factors were used to help explain potential asset failure. These include the service life remaining of each asset and its age-based condition ratings. In the model below for probability of failure, the age-based condition is presumed to better estimate and explain an asset's likelihood of failure, receiving a high weighting.

Figure 16: Probability of Failure

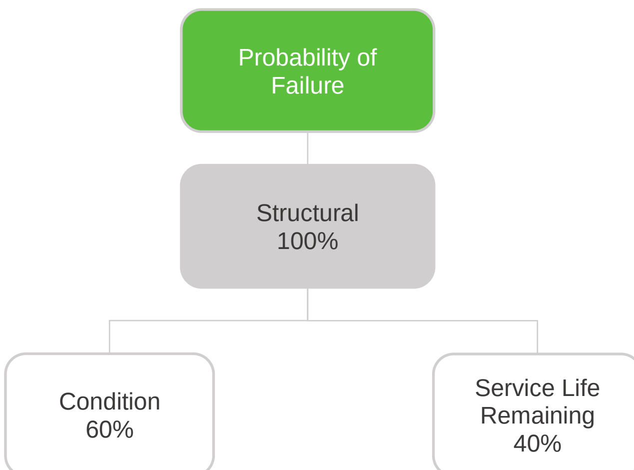


Table 16 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 16: Defining Probability of Failure Ranges

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

The model in Figure 17 outlines the type of potential consequences that may result from failure of a facility asset. Data for facilities includes the replacement cost of each asset, service or department, and its Uniformat classification. These attributes are used to assist in measuring and quantifying the direct financial, economic, health and safety, and socio-political consequences of potential asset failures.

Figure 17: Consequence of Failure

Table 17: Defining Consequence of Failure Ranges

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Socio-political	Service Area	Consequence of Failure
	Operations	2—Minor
	Parks and Civic	3—Moderate
	Recreation	4—Major
	Emergency – Fire and Police	5—Severe
Health and Safety	Service Area	Consequence of Failure
	All non-Emergency Services	1—Insignificant
	Emergency – Police	4—Major
	Emergency – Fire	5—Severe
	Building Element	Consequence of Failure
	Equipment & Furnishings	2—Minor
	Special Construction and Building Sitework	3—Moderate
	Shell and Services	4—Major
	Substructure	5—Severe
Economic	Service Area	Consequence of Failure
	Parks	2—Minor
	Civic, Operations, Recreation	3—Moderate
	Emergency – Police	4—Major
	Emergency – Fire	5—Severe

Risk Matrix

The risk matrix below is based on the previous risk model developed for Facilities. It is generated using available asset data.

Figure 18: Detailed Risk Matrix – All Facilities Assets

Consequence of Failure	1	2	3	4	5
5	7 Assets $105.8M	1 Asset $1.7M	0 Assets $0	0 Assets $0	0 Assets $0
4	33 Assets $43.7M	6 Assets $4.6M	3 Assets $25.8M	3 Assets $2.8M	6 Assets $6.7M
3	75 Assets $24.4M	41 Assets $19.9M	26 Assets $1.1M	11 Assets $5.2M	46 Assets $7.3M
2	334 Assets $5.3M	111 Assets $1.4M	72 Assets $1.2M	103 Assets $1.3M	303 Assets $3.6M
1	45 Assets $161.0K	49 Assets $185.7K	7 Assets $38.3K	6 Assets $40.9K	33 Assets $190.4K

Probability of Failure

The consolidated risk matrix in Figure 19 shows that 65 Facilities assets, with a combined replacement cost of $22.9 million have a very high risk rating. Of these, most are older Civic, Community and Recreation, and Emergency services assets—some with installation or construction dating back to 1940s and 1960s. This results in a high, presumed likelihood of failure that can yield a very high risk rating, particularly for older assets within Emergency services, which also carry a high consequence of failure.

An additional 429 assets, with a combined replacement cost of $33.8 million were assigned a high risk rating.

Figure 19: Consolidated Risk Matrix

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
518 Assets	207 Assets	102 Assets	429 Assets	65 Assets
$38,904,188	$147,633,472	$19,037,298	$33,812,540	$22,874,814

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 18: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 19 outlines the four core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 19: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and intended to summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Facilities, a total of 32 KPIs were selected. This included six KPIs to measure customer levels of service, and 26 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 20: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
% of facilities in poor or very poor condition	*	*	*	24	*
Maintenance					
# of calls for Parks facilities maintenance	109	103	34	89	↘
# of calls for Civic facilities maintenance	109	103	66	97	↘
# of calls for Recreation facilities maintenance	369	417	170	243	↘
# of calls for Emergency facilities maintenance	15	9	5	12	→
# of calls for Operations facilities maintenance	76	47	18	34	↘

Table 21: Technical Levels of Service

KPI	2021	Budget
Capital		
Fire Hall #2 - Building Upgrade Assessment		$75,000
City Hall Building Envelope Design		$75,000
City Hall Boiler Replacement		$122,587
Public Safety Building – Generator		$25,000
Public Safety Building – Equipment		$8,000
Public Safety Building - Loading Bay Paving		$90,000
Operations - Salt Shed Building		$15,000
Annual capital reinvestment	$410,587	
Maintenance		
Civic facilities - inspections and condition assessments	2	$17,158
Civic facilities - regular and preventative maintenance	100%	$77,060

KPI	2021	Budget
Parks facilities - inspections and condition assessments	1	$1,438
Parks facilities - regular and preventative maintenance	75%	$127,461
Recreation facilities - inspections and condition assessments	1	$4,650
Recreation facilities – regular and preventative maintenance	60%	$299,865
Emergency facilities - inspections and conditions assessments	2	$53,075
Emergency facilities - regular and preventative maintenance	50%	$65,470
Operations facilities - inspections and condition assessments	1	$2,100
Operations facilities - regular and preventative maintenance	100%	$62,325
Average annual maintenance expenditures	$710.602	
Operations		
Electric energy consumption (kilowatt hours) – Civic Facilities	TBD	$65,742
Electric energy consumption (kilowatt hours) – Parks Facilities	TBD	$80,599
Electric energy consumption (kilowatt hours) – Recreation Facilities	TBD	$1,133,962
Electric energy consumption (kilowatt hours) - Emergency Facilities	TBD	$56,165
Electric energy consumption (kilowatt hours) – Operations Facilities	TBD	$80,924
Average annual operations expenditures	$1,417,392	

Levels of Service Analysis

Customer levels of service data for facilities shows an overall decrease in the number of maintenance calls associated with most facilities. However, this likely reflects the fact that facilities were closed to the public in 2020 and 2021 due to Covid-19 and many staff were working remotely during the same period.

KPI data can be used to support decisions to maintain, increase or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions. For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 22 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Those service levels have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 22: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 23 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 23: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

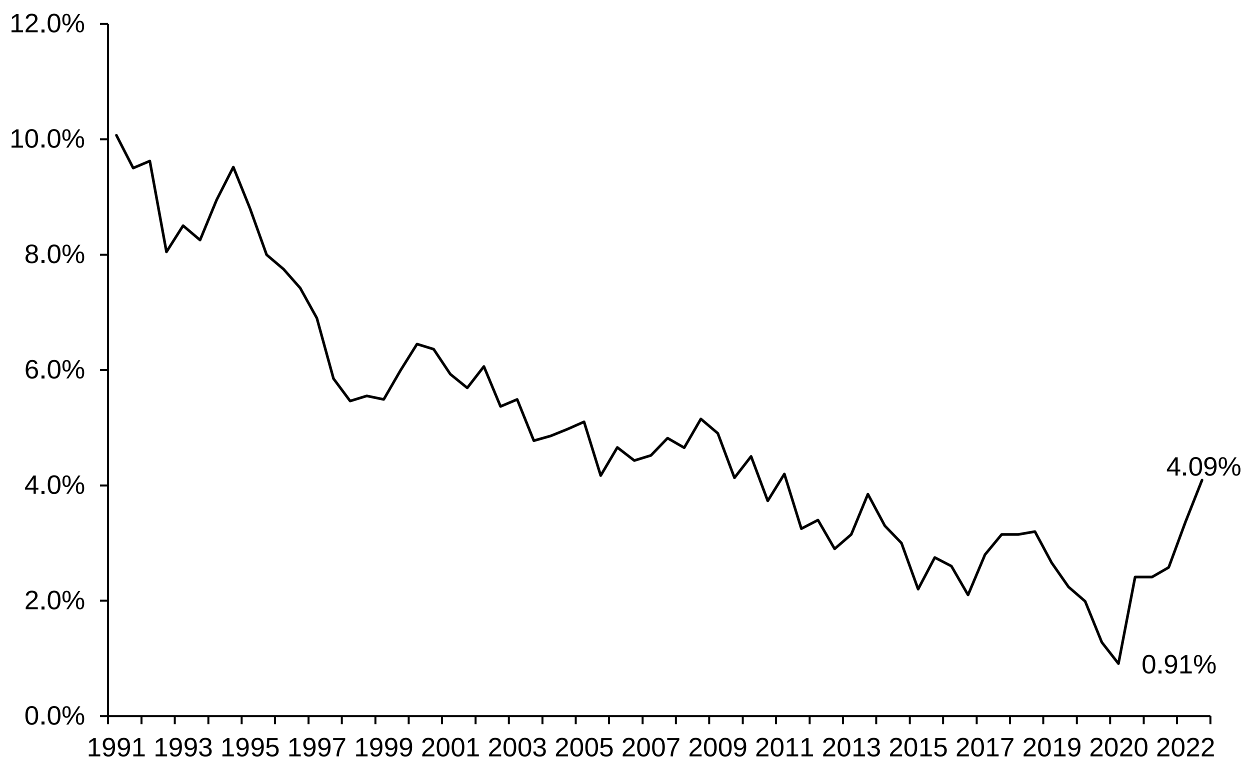
Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 20: Historical MFA Lending Rates[2]



Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."

[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 24: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

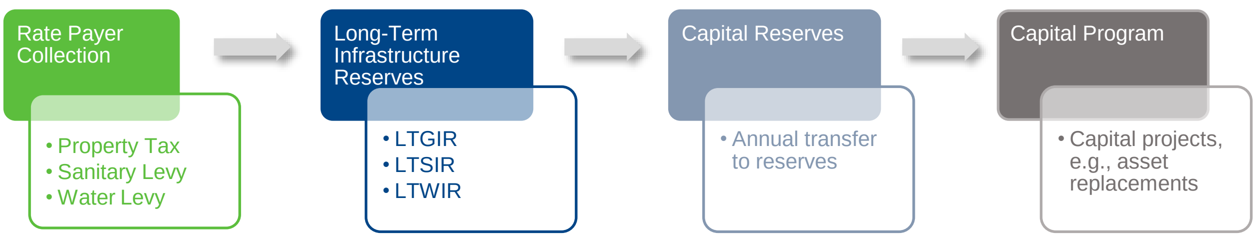
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 25: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 21: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 23. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies. The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 26, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 26: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 27, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

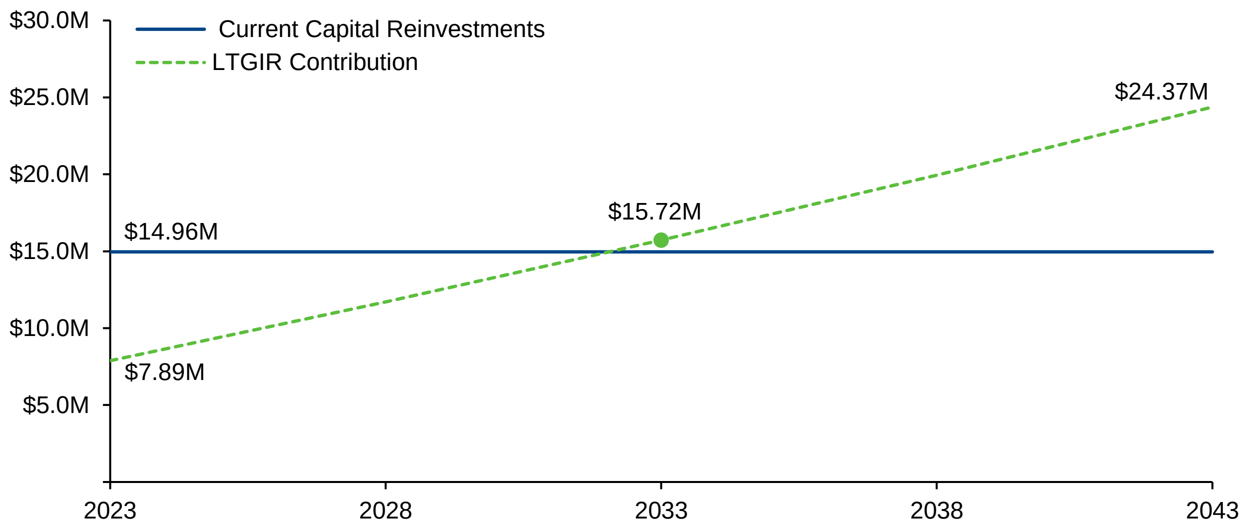
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 26 above as $15 million.

Table 27: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 22: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 26.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 27. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 28: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 29: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 30: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 30, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 31: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 32: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 23: Annual Contributions to the LTWIR vs. Annual Capital Spending

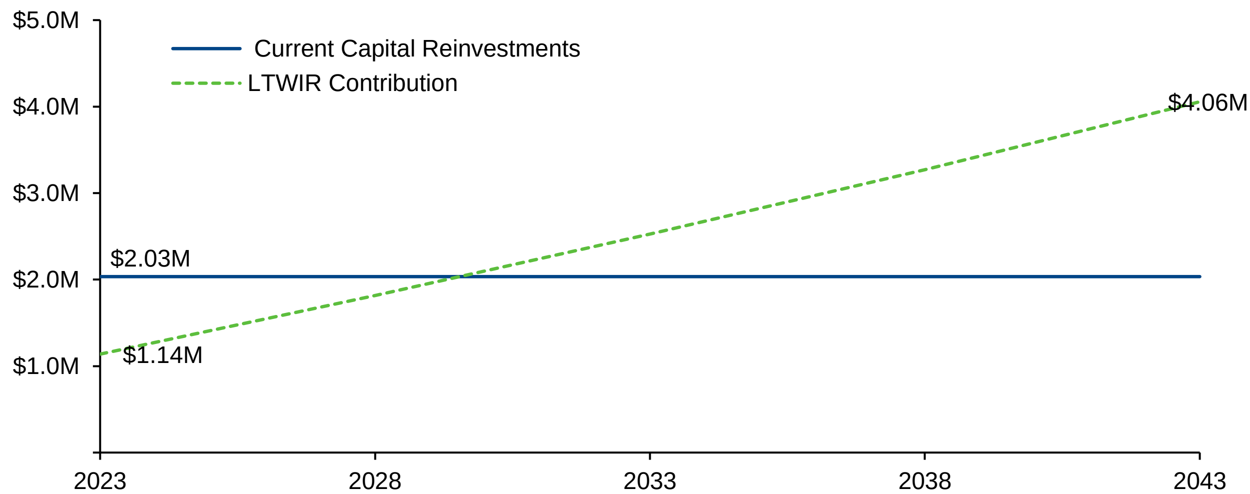
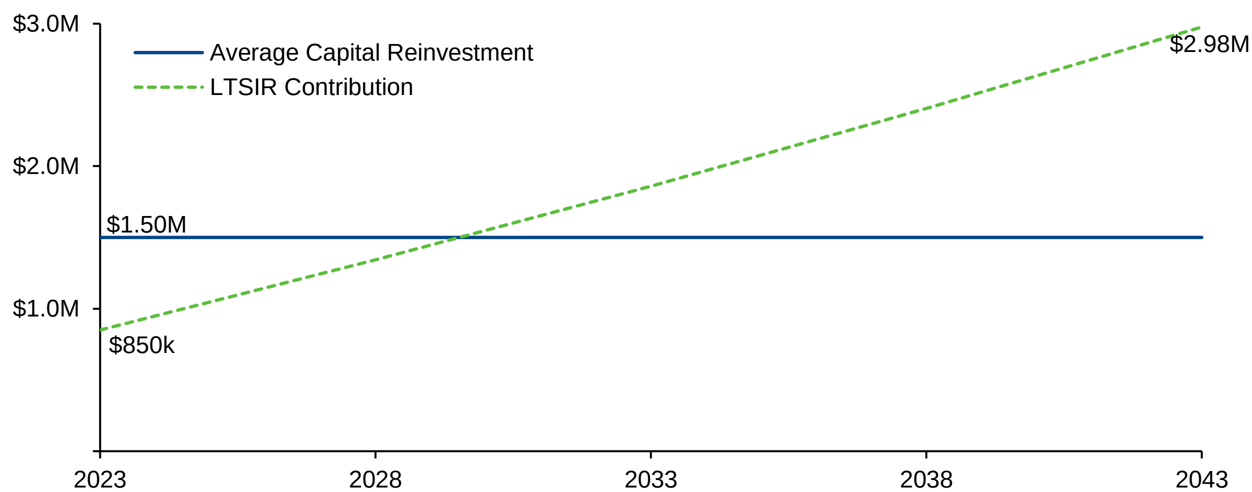


Figure 24: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 31, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 32 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 33: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 34: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 29: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 35: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 36: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 35, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 37 summarizes the infrastructure backlog for each service area.

Table 37: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 38 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 38: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 39: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 40: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.

- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.

- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Parks

Final Version
August 2024

Contents

Executive Summary 7

Approach and Methodology 12

Developing the Asset Management Plan 13

Build a comprehensive asset inventory 13

Conduct asset-level risk assessments and build risk models 14

Compile lifecycle activity data 14

Compile levels of service data 14

Develop financial strategy 14

Limitations and Constraints 15

State of the Infrastructure 16

Asset Hierarchy and Data Classification 17

Inventory and Valuation 18

Costing Methods 18

Asset Condition 20

Source of Condition Data 20

Condition Assessment Guidelines 21

Condition Rating System 22

Projected Asset Conditions 23

Age Profile 25

Historical Asset Expenditures 25

Serviceable Life vs. Current Asset Age 26

Lifecycle Management 28

Current Lifecycle Framework 29

Reinvestment Rates 33

Reinvestment Rate Benchmarks 34

Forecasted Long-term Replacement Needs 37

Risk Analysis 38

Calculating Asset Level Risk 39

Risk Models and Matrices 42

Risk Matrix 44

Levels of Service 45

Defining Levels of Service 46

Levels of Service Framework 46

Levels of Service Analysis 52

Financial Strategy 54

Approach and Methodology 55

Current Financial Planning Framework 56

Capital Budget 56

Debt 56
Senior Government Support 58
Sustainability 58
Reserves 59
Development Cost Charges (DCC) Program 61
Achieving Reinvestment Rate Targets 62
Tax-Funded Service Areas 63
Levy-Funded Service Areas 69
Infrastructure Backlogs 74
Using Reserves 75
Leveraging Development Cost Charges (DCC) 76
Recommendations 77
Tax Funded Service Areas 77
Levy-Funded Service Areas 77
Next Steps 79

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Asset Condition: All Parks Assets 23
Figure 5: Asset Condition – By Asset Segment 24
Figure 6: Historical Expenditures on Asset Construction or Acquisition 25
Figure 7: Average Asset Age vs. Estimated Useful Life 26
Figure 8: Percentage of Estimated Useful Life Consumed 27
Figure 9: Summary of Capital, Maintenance, and Operating Expenditures 30
Figure 10: Forecasted Long-term Replacement Needs 37
Figure 11: Calculating Risk Ratings 39
Figure 12: Generic Risk Matrix 41
Figure 13: Probability of Failure 42
Figure 14: Consequence of Failure 43
Figure 15: Detailed Risk Matrix 44
Figure 16: Consolidated Risk Matrix 44
Figure 17: Historical MFA Lending Rates 57
Figure 18: Funding Flow 60
Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending 64
Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending 70
Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending 70

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 20
Table 4: General Condition Rating Scale – All Assets 22
Table 5: Components of a Lifecycle Framework 29
Table 6: Lifecycle Framework 31
Table 7: Current Reinvestment Rates 33
Table 8: System-generated Reinvestment Rates 34
Table 9: Praks Capital Reinvestment Rate Comparison 35
Table 10: Purpose of Capital and Operating Budgets 36
Table 11: Types of Consequences of Asset Failure 40
Table 12: Defining Probability of Failure Ranges 42
Table 13: Defining Consequence of Failure Ranges 43
Table 14: Components of a Levels of Service Framework 46
Table 15: Core Values and Service Statements 47
Table 16: Customer Levels of Service 48
Table 17: Technical Levels of Service 50
Table 18: Trends in Customer Levels of Service KPIs – Asset Condition and Performance 52
Table 19: Trends in Customer Levels of Service KPIs – Service Delivery 52
Table 20: Balancing Cost, Performance, and Risk 53
Table 21: Service Area Replacement Costs and Target Reinvestment Rates 55
Table 22: Long-Term Infrastructure Reserve Balances 59
Table 23: Capital Reserve Balances 60
Table 24: Comparing Average Annual Requirements Against Current Capital Reinvestments 63
Table 25: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 63
Table 26: Funding Levels and Resulting Funding Deficits 65
Table 27: Risks and Benefits of Funding Models 66
Table 28: Tax Rate Increase Required to Achieve Funding Levels 67
Table 29: Comparing Average Annual Requirements Against Current Capital Reinvestments 69
Table 30: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 69
Table 31: Funding Levels and Resulting Funding Deficits: Water Services 71
Table 32: Funding Levels and Resulting Funding Deficits: Sanitary Services 71
Table 33: Utility Rate Increase Required to Achieve Funding Levels: Water 72
Table 34: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 72
Table 35: Age- and Condition-based Infrastructure Backlogs 74
Table 36: Long-Term Infrastructure Reserves vs. Backlogs 75
Table 37: Development Cost Charges (DCC) Program 76
Table 38: Overlap Between DCC Program and Assets in Backlog State 76

1,400	Number of assets on record in the Parks asset database
$41.1 million	2023 replacement cost of these assets
1990s	Decade with the highest capital expenditures on the construction or acquisition of Parks assets ($21.4M)
2020s	Decade with the first major forecasted asset replacement spike ($21.8M)
62%	Percentage of assets in poor or worse condition, or with less than 40% service life remaining.
$25.6 million	Current age- and condition-based infrastructure backlog
$20.9 million	Current replacement cost of assets with a very high risk rating
$5.9 million	Annual City spending on capital, maintenance, and operations related to Parks
4.1%	System-generated recommended capital reinvestment rate for Parks System infrastructure ($1.7M per year)
5.2%	Port Coquitlam's actual capital reinvestment rate ($2.2M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Parks assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios areas: Water, Sanitary, Drainage, Transportation, Parks, Parks, Fleet & Equipment, and Information Services.

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Parks portfolio has 1400 assets on record including various sports fields, courts, playground equipment, and pedestrian walkways and trails, as well as fencing and utilities assets. The total current replacement cost of all Parks assets is estimated at $41.1 million as of 2023, with Sports Fields & Courts comprising 53% of the portfolio.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

Based on a combination of field inspection data and age, 62% of all Parks assets, with a current replacement cost of $25.6 million, are in poor or worse condition or have less than 40% service life remaining. These assets may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure stock. Expenditures on Parks infrastructure averaged $6.3 million per decade over the last 60 years. The largest expenditures were made in the 1990s, dominated by sports fields. Based on current replacement costs, more than 50% of the current Parks asset portfolio was placed into service in the 1990s, a period during which the City experienced a 28% population growth rate, its largest in the last three decades. New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Parks totals $5.9 million annually. Of that, $3.5 million per year is spent on the inspection, maintenance, and replacement of Parks assets. An additional budget of $2.4 million per year is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. Analysis shows that the City is currently amidst the largest replacement spike in the 50-year forecast period, totaling nearly $22 million between 2023 and 2032. A second major replacement spike is expected in the 2050s, also totaling $20.8 million. Majority of these expenditures are associated with sports fields, courts, and fencing.

Deferring replacements can lead to infrastructure backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $2.8 million, comprising assets that have exceeded their useful life but still remain in service. However, this figure increases to $25.6 million when assets in poor or worse condition or with less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in user fees and tax rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 93 Parks assets, with a combined replacement cost of $20.9 million have a very high risk rating. Most of these assets are various sports fields and courts, and playground equipment assets, which carry a moderate to major consequence of failure. In addition, majority of the assets also had a high probability of failure, due to their poor condition ratings. An additional 114 assets, with a combined replacement cost of $10.4 million, were assigned a high risk rating. Many of these assets were also playground equipment assets, but utility assets and various parklands, paths, and trails were also included in this group.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators.

For Parks, a total of 81 key performance indicators (KPI) were selected—the most of any service area. This included 38 KPIs to measure customer levels of service, and 43 to track the City's technical levels of service. Technical levels of service can be thought of as the activities and steps the organization takes (inputs) to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, it is not possible to meet all expectations. Instead, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by either diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas
For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility
Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas
Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements.

While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

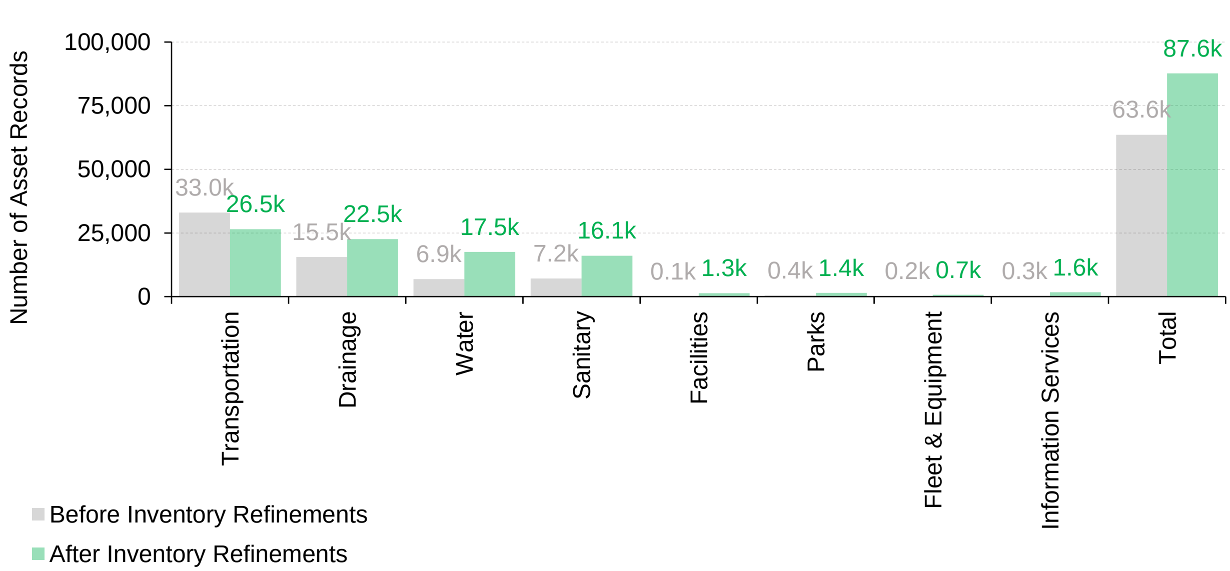
City staff manage multiple large-scale and complex infrastructure datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase in the number of total assets on record for all service areas, from 63,603 asset records to 87,647. For Parks, data refinements increased the number of assets on record from less than 400 to nearly 1,400—a 260% increase.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budget associated with each activity. Data in any available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., regular maintenance and repairs), activities that support the delivery and continuity of acceptable service levels were also included. For example, grass cutting, litter pick up, and graffiti removal do not have a direct impact on asset lifespan, but they are part of providing Parks services to residents.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable and practical. To track the performance of the Parks, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data ranging from 2018 to 2021. A total of 81 KPIs were selected, with 38 used for customer levels of service, and 43 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's infrastructure up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

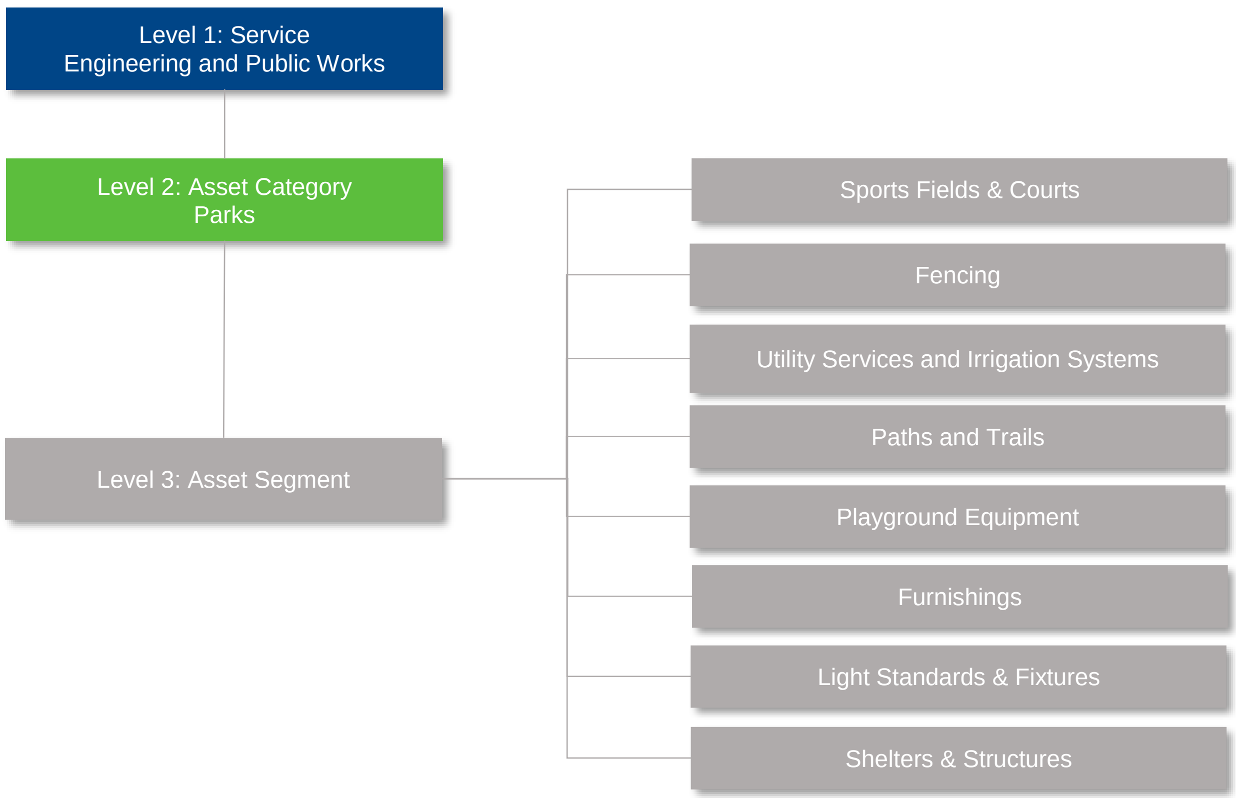
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of City of Port Coquitlam's Parks assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Parks database contains nearly 1,400 asset records including 49 sports fields and courts, more than 24km of paths and trails, as well as playground equipment, shelters, furnishings, lighting, and utilities. The total replacement cost was estimated at $41.1 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically can be applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets	High

Table 2 summarizes the quantity and current replacement cost of the City's Parks assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of nearly $22 million, the City's sports fields and courts are its largest asset group within Parks, making up 53% of the total portfolio.

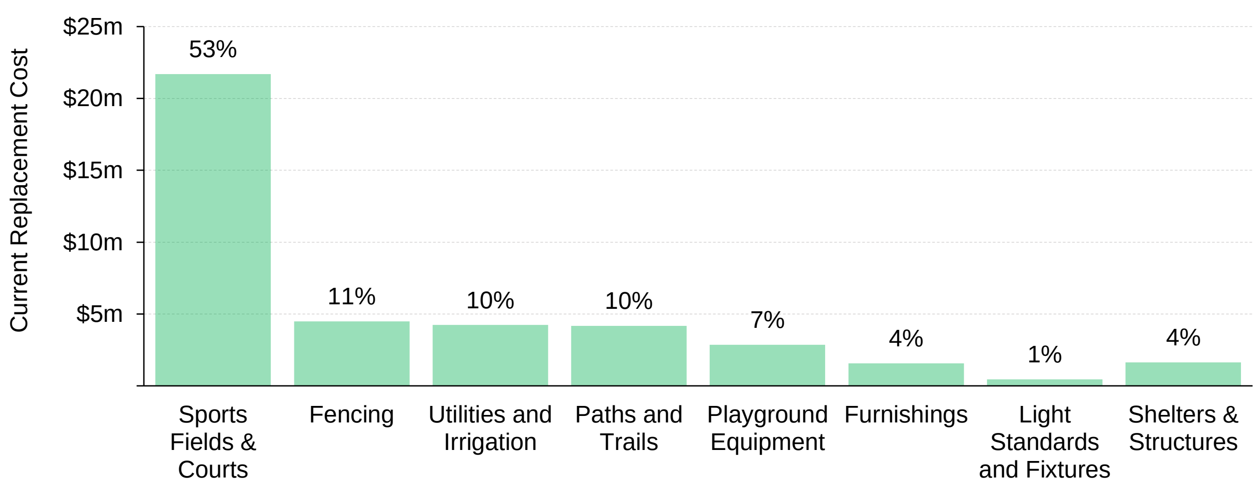
The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Sports Fields & Courts	49	$21,687,945	User-defined
Fencing	12,927m	$4,479,365	User-defined
Utilities & Irrigation	100	$4,231,144	User-defined
Paths & Trails	24,117km	$4,181,976	User-defined
Playground Equipment	100	$2,856,010	User-defined
Furnishings	1,041	$1,563,959	User-defined
Light Standards & Fixtures	120	$462,000	User-defined
Shelters & Structures	102	$1,626,544	User-defined
Total		**$41,088,943**	

Pools, spray parks and washroom facilities are included in the Facilities asset portfolio. Shelters and structures include skate parks, picnic tables, picnic shelters, and benches. Furnishings include garbage cans, bollards, and signs. These smaller assets were not fully inventoried at the time of this AMP but can be included as future work with the City's asset management program. Trees and other natural assets such as flower beds and landscaping were also not included with this AMP, but can be considered with the development of a future natural asset management strategy.

Figure 3: Portfolio Valuation



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

Based on replacement costs, 77% of Parks assets were included as part of condition assessments conducted in 2019 and 2020 of major assets such as playground equipment and sports fields. Age was used as an estimate for condition for the remaining 23% of assets.

Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source
Parks	Sports Fields & Courts	100%	2020 condition assessments
	Fencing	100%	2020 condition assessments
	Utilities and irrigation	0%	Age-based estimates only
	Parklands, Paths, Trails	29%	2019 condition assessments and age-based estimates
	Playground Equipment	100%	2020 Condition Assessments
	Furnishings	14%	2020 condition assessments and age-based estimates
	Light Standards and Fixtures	0%	Age-based estimates
	Shelters & Structures	0%	Age-based estimates
	Landscaping & Natural Capital	0%	Age-based estimates
Total		**77%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Parks assets to support the collection of condition data (Appendix A). It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey.

Table 4: General Condition Rating Scale – All Assets

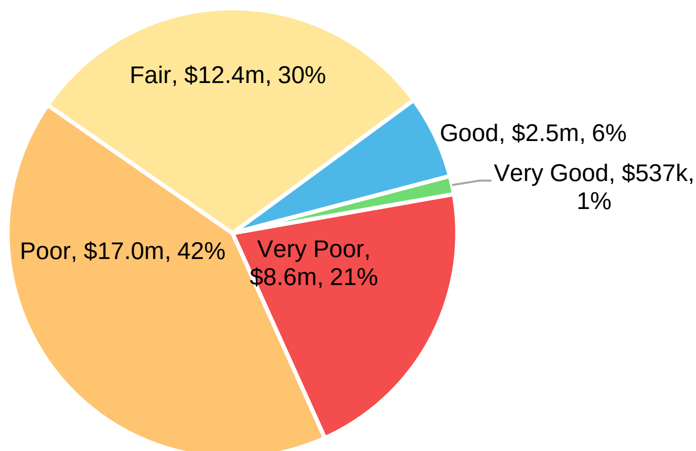
Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

Projected Asset Conditions

Figure 4 summarizes the replacement cost-weighted condition of all Parks assets. Based on in-field inspection and age data, 62% of assets with a current replacement cost of $25.6 million are in poor to very poor condition, or have less than 40% service life remaining. Additional detail is provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

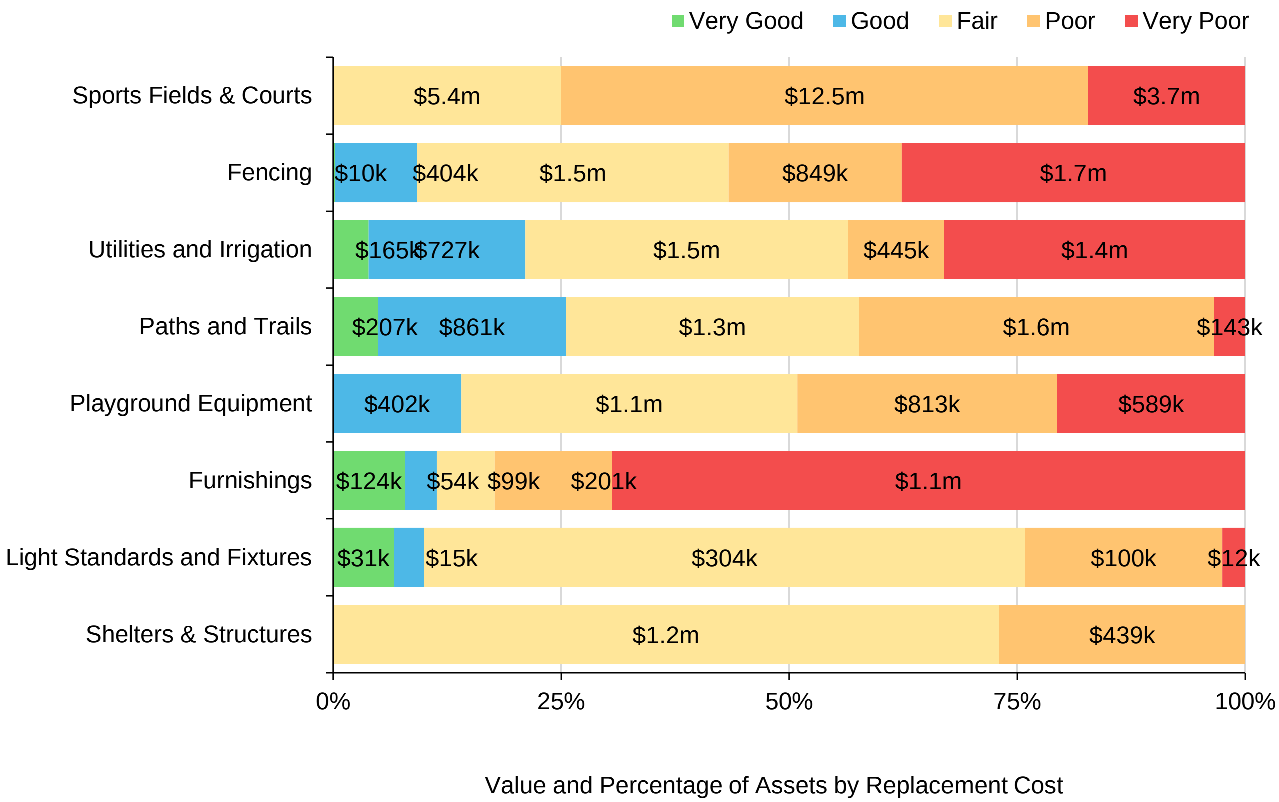
Figure 4: Asset Condition: All Parks Assets



It is often more economical to keep assets in at least fair or better condition. Smaller but more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

As illustrated in Figure 5, a substantial portion of assets within each group received a condition rating of poor or worse. Based on replacement costs, the largest of these assets are various sports fields and courts.

Figure 5: Asset Condition – By Asset Segment



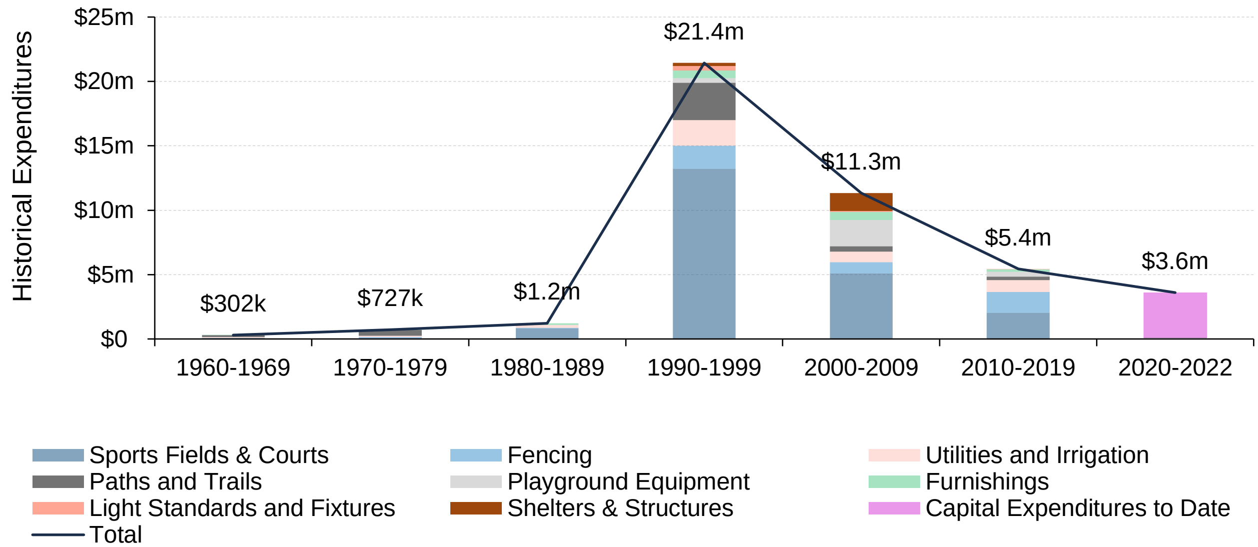
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 6 illustrates historical expenditures on the construction or acquisition of Parks assets since 1960. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 6: Historical Expenditures on Asset Construction or Acquisition



Expenditures on Parks infrastructure averaged $6.3 million per decade over the last 60 years. The largest expenditures were made in the 1990s, dominated by sports fields. Based on current replacement costs, more than 50% of the City's current Parks asset portfolio was placed into service in the 1990s, a period during which the City experienced a 28% population growth rate, its largest in the last three decades. In the current decade, the City has made capital investments of $3.6 million between 2020-2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

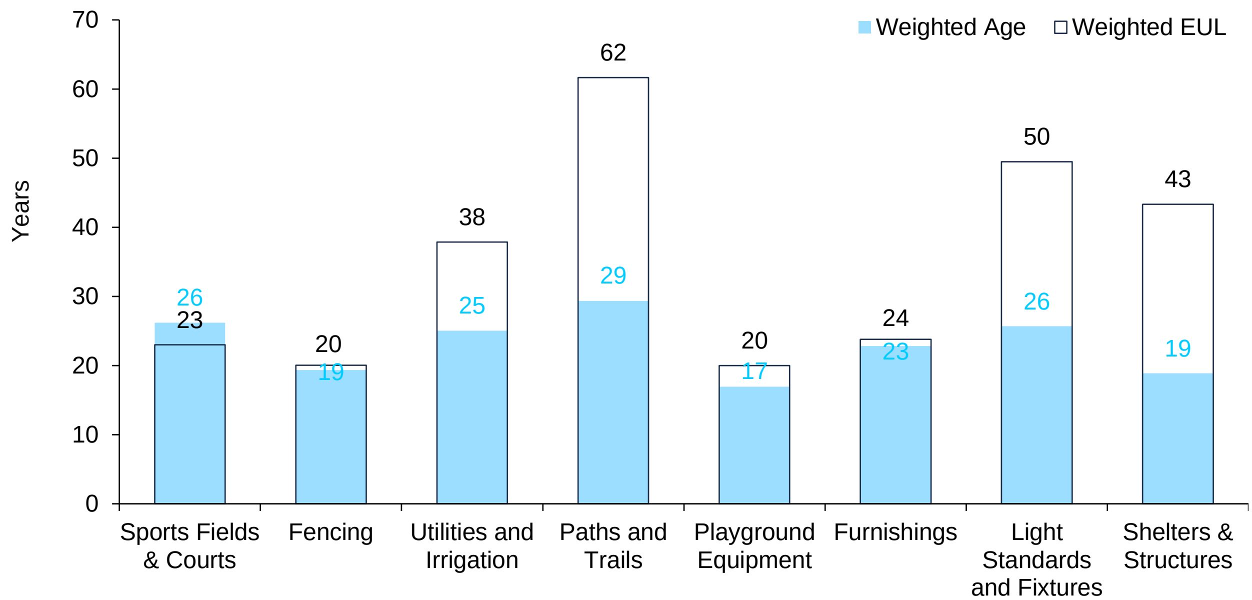
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 7 plots the average established useful life of Parks assets against their current average age. Both values were weighted by the replacement cost of individual assets.

Figure 7: Average Asset Age vs. Estimated Useful Life

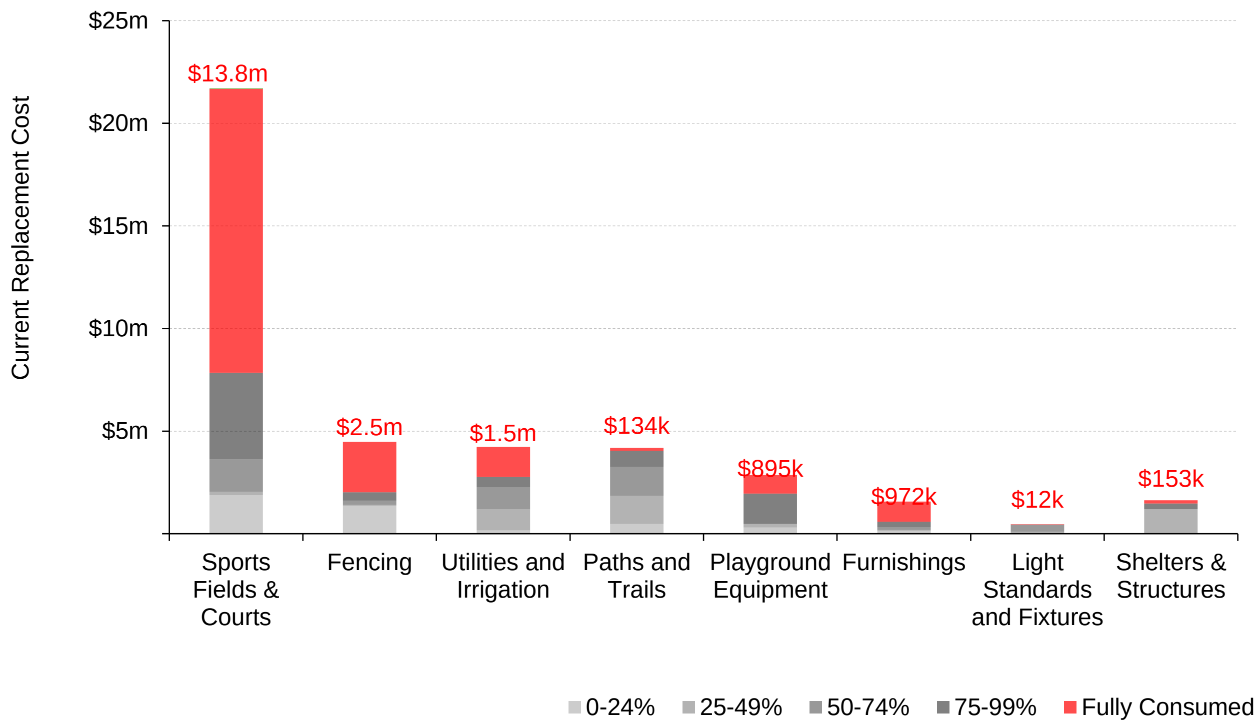


Age analysis suggests that major assets such as sports fields, courts, fencing, and utilities are either in the latter stages of their lifespan or remain in service beyond their established useful life. Given their nature, many of these assets, such as tennis courts and soccer fields, can continue to deliver their intended function safely and effectively, although at a lower service quality. Other aging assets, such as playground equipment, should be monitored more closely to ensure they do not pose safety risks.

Figure 8 shows a detailed distribution of the City's Parks assets based on the portion of useful life consumed to date. The distribution shows that more than half of Sports Fields and Courts, with a current replacement cost of $13.8 million, remain in service beyond their estimated useful life.

Similarly, more than 30% of Playground Equipment assets have also fully consumed their useful life but continue to remain in service. These assets include swings, slides, climbing apparatuses, and other play structures. Targeted inspections of these older assets are recommended to ensure they do not pose any safety risks to users.

Figure 8: Percentage of Estimated Useful Life Consumed



Lifecycle Management

The initial construction or acquisition of assets, particularly major infrastructure, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, repair, and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle costs include activities that have a direct, tangible impact on the asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to customer-oriented service levels and efficient operations.

Current Lifecycle Framework

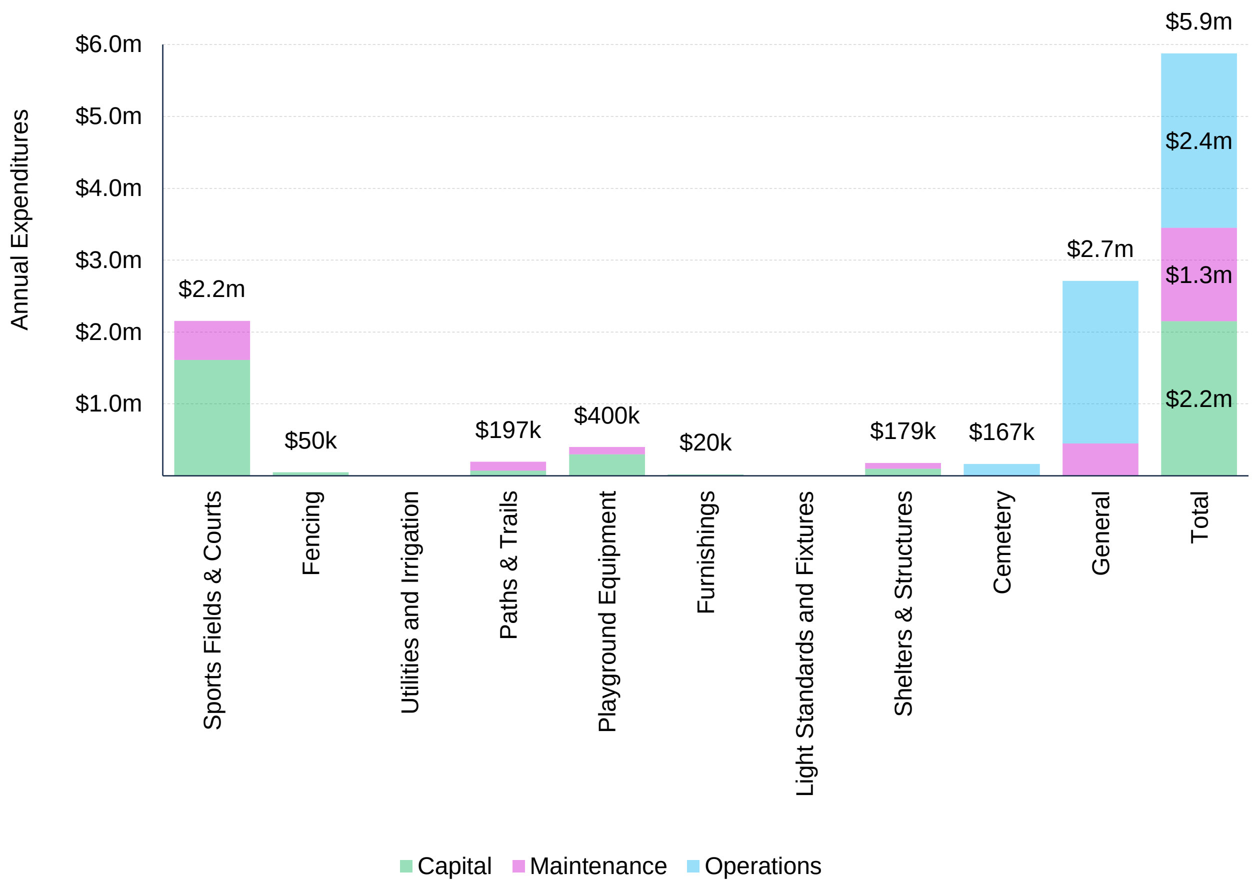
The City of Port Coquitlam's approach to lifecycle management is comprehensive. Maintenance, repair and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring. Lifecycle strategies are meant to ensure the City's Parks have minimum downtime and can safely and reliably deliver desired services to the community. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 5.

Table 5: Components of a Lifecycle Framework

Component	Description		
Activity	The treatment, event, or intervention implemented		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Activity Trigger	This can include an asset's age and/or a minimum condition threshold. Other triggers may include priority levels, service requests, and previously established frequency.		
Impact on Serviceable Life	Impact on an asset's serviceable lifespan resulting from the activity completed		
Annual Budget	Typical funding available (actual spending may vary from year to year). Expenditure history from 2019-2021 was used to calculate a 3-year average.		
Reinvestment Rate	Annual budget as a portion of the total Parks asset portfolio replacement cost of **$41,088,943**.		

Figure 9 summarizes annual expenditures by service and expenditure type. On average, the City allocates $5.9 million annually on Parks operations, maintenance, and asset replacements.

Figure 9: Summary of Capital, Maintenance, and Operating Expenditures



Of the $5.9 million annual Parks budget, $3.5 million is spent on the inspection, maintenance, and replacement of assets. An additional $2.4 million is allocated towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g. grass cutting, litter pick up, graffiti removal).

The following table outlines the City's current lifecycle framework for Parks.

Table 6: Lifecycle Framework

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Athletic Field Replacement	Capital	Condition	Extended by 25 years	$50,000
Barrier Fence Replacement	Capital	Condition	Extended by 20 years	$50,000
Court Resurfacing	Capital	Condition	Extended by 10 years	$30,000
Park Furniture Replacement	Capital	Condition	Extended by 20 years	$20,000
Playground Replacements	Capital	Condition	Extended by 20 years	$300,000
Secondary Path Resurfacing	Capital	Condition	Extended by 40 years	$30,000
Skate Bowl Resurfacing	Capital	Condition	Extended by 20 years	$100,000
Sport Court Components	Capital	Condition	Extended by 10 years	$30,000
Trail Resurfacing	Capital	Condition	Extended by 40 years	$40,000
Artificial Turf Replacement	Capital	Condition	No impact	$1,500,000
Sub-Total Capital				**$2,150,000**
Building Maintenance	Maintenance	Scheduled	Extended by 10 years	$78,900
Park Maintenance	Maintenance	Condition	Extended by 5 years	$329,100
Park Inspections	Maintenance	Scheduled	Extended by 5 years	$45,100
Ball Diamond Maintenance	Maintenance	Scheduled	Extended by 5 years	$146,500
Irrigation	Maintenance	Scheduled	Extended by 5 years	$76,700
Playground Inspection and Maintenance	Maintenance	Scheduled/Condition	Extended by 5 years	$100,300
Sport Court Maintenance	Maintenance	Scheduled/Condition	Extended by 5 years	$62,600
Sport Field Maintenance	Maintenance	Scheduled	Extended by 5 years	$269,600
Artificial Turf Maintenance	Maintenance	Scheduled	Extended by 5 years	$66,180
Pedestrian Route Inspection and Maintenance	Maintenance	Scheduled/Condition	Extended by 5 years	$18,500
Trail Inspection and Maintenance	Maintenance	Scheduled/Condition	Extended by 10 years	$108,200
Sub-Total Maintenance				**$1,301,680**

Activity	Type	Activity Trigger	Impact on Serviceable Life	Budget
Cemetery Internments	Operations	By request	No impact	$150,000
Cemetery Markers	Operations	By request	No impact	$16,560
Grass Fall/Winter Cleanup	Operations	Scheduled	No impact	$69,900
Grass Cutting	Operations	Scheduled	No impact	$281,400
Grass - Special Events	Operations	By request	No impact	$3,080
Horticulture Beds	Operations	Scheduled	No impact	$83,000
Hanging Baskets	Operations	Scheduled	No impact	$26,400
Shrub/Perennial Beds	Operations	Scheduled	No impact	$430,400
Overpass Banners	Operations	By request	No impact	$3,180
Graffiti/Pressure Washing	Operations	Scheduled	No impact	$120,300
Illegal Dumping	Operations	By request	No impact	$12,160
Janitorial	Operations	Scheduled	No impact	$158,870
Litter and Garbage	Operations	Scheduled	No Impact	$454,200
Vandalism	Operations	Condition	No impact	$73,980
Brushing and Clearing	Operations	Scheduled	No impact	$108,200
Invasive Species	Operations	Scheduled	No impact	$29,760
Tree Pruning and Maintenance	Operations	Scheduled/Condition	No impact	$80,200
Tree Planting	Operations	Scheduled/Condition	No impact	$36,200
Tree Removals	Operations	Condition	No impact	$163,200
Tree Watering	Operations	Scheduled	No impact	$43,700
Tree Inspections	Operations	Scheduled/Condition	No impact	$81,200
Sub-Total Operations				**$2,425,890**
Total				**$5,877,570**

Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 7 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 7 shows that the City's annual Parks capital expenditures of $2.2 million yield an overall, service area reinvestment rate of 5.2%.

Table 7: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Sports Fields & Courts	$1,610,000	7.4%	3.9%
Fencing	$50,000	1.1%	0.1%
Utilities & Irrigation	$0	0%	0%
Paths & Trails	$70,000	1.7%	0.2%
Playground Equipment	$300,000	10.5%	0.7%
Furnishings	$20,000	1.3%	0.0%
Light Standards & Fixtures	$0	0%	0%
Shelters & Structures	$100,000	6.1%	0.2%
Total	**$2,150,000**		**5.2%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

Rates for Parks assets were unavailable from CIRC, but an average of 1-3% is typically used for major infrastructure groups, such as roads, facilities, water, sanitary, and storm.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual infrastructure spending (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 8: System-generated Reinvestment Rates

Segment	AAR	System-generated TRR
Sports Fields & Courts	$954,707	4.4%
Fencing	$223,831	5.0%
Utilities and Irrigation	$157,862	3.7%
Paths and Trails	$81,209	1.9%
Playground Equipment	$142,801	5.0%
Furnishings	$71,191	4.6%
Light Standards and Fixtures	$9,394	2.0%
Shelters & Structures	$41,847	2.6%
Total	**$1,682,841**	**4.1%**

For Parks assets, the average annual requirements total $1,682,841 for a system-generated target reinvestment rate of 4.1%.

Comparative Analysis

Table 9 compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide.

Table 9: Parks Capital Reinvestment Rate Comparison

Benchmark	Assets Included	Target Reinvestment Range	2016 Municipal Average	Port Coquitlam Capital Reinvestment Rate (Segment	Port Coquitlam Capital Reinvestment Rate (Service Area)
CIRC	Major Infrastructure Assets	1-3%	0.7%-1.7%	NA	NA
Citywide Asset Manager	Sports Fields & Courts	4.4%	1.3-1.7%	7.4%	3.9%
	Fencing	5.0%	NA	1.1%	0.1%
	Utilities and Irrigation	3.7%	NA	0.0%	0.0%
	Paths and Trails	1.9%	NA	1.7%	0.2%
	Playground Equipment	5.0%	NA	10.5%	0.7%
	Furnishings	4.6%	NA	1.3%	0.0%
	Light Standards and Fixtures	2.0%	NA	0.0%	0.0%
	Shelters & Structures	2.6%	NA	6.1%	0.2%
	All Parks Assets	4.1%	NA		**5.2%**

The analysis shows that Port Coquitlam's overall reinvestment rate of 5.2% is higher than the CIRC's general target reinvestment rate of 1-3%, the 2016 municipal average for major infrastructure assets, and the system-generated recommended reinvestment rate of 4.1%.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 10: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

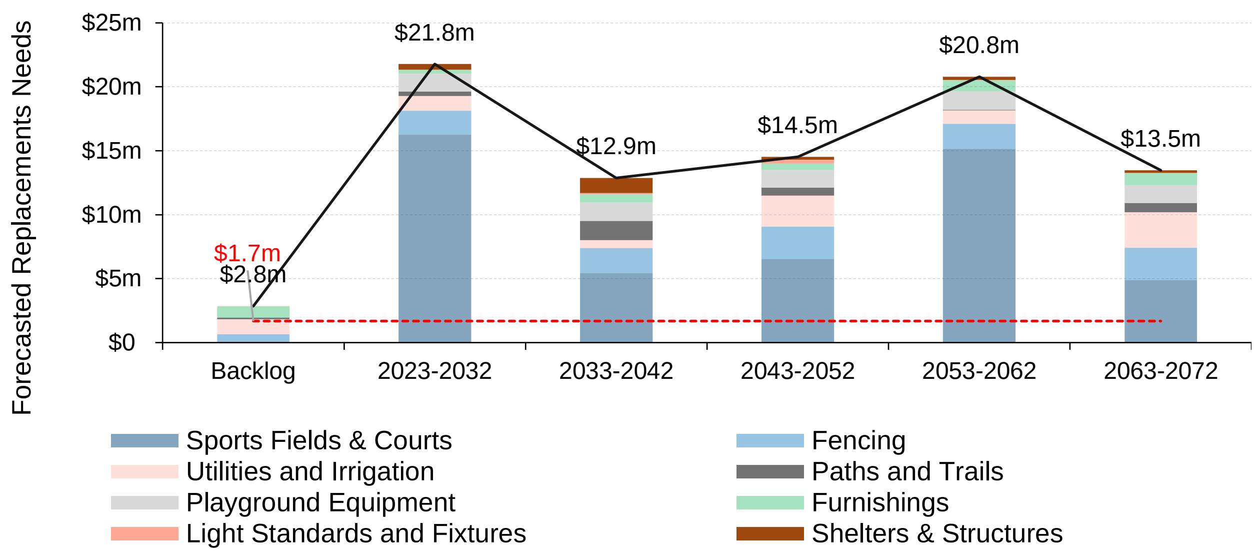
Forecasted Long-term Replacement Needs

In contrast to historical investments in infrastructure, Figure 10 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for Parks assets over the coming decades. The City's average annual requirements for Parks asset replacements total $1.7 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of approximately $2.2 million per year on Parks asset replacements are more than the target value of $1.7 million needed to ensure that replacement needs are met.

The chart shows that replacement needs are highest in the current decade, totaling $21.8 million between 2023 and 2032, and average $16.7 million per 10-year period through the forecast horizon. A second major spike is expected in the 2050s, totaling nearly $21 million.

Figure 10: Forecasted Long-term Replacement Needs



The chart also shows an age-based backlog of $2.8 million, comprising assets that have reached the end of their estimated useful life. However, previous condition analysis suggests that $25.6 million in assets are considered poor or worse condition, or have less than 40% service life remaining. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition. Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates.

The magnitude of capital needs typically far exceeds what most agencies can afford to fund. A risk-based approach can be used to direct funds to where they are needed most first in order to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders. Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 11: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, previous performance history, and any identified vulnerability to extreme weather events. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe. Cracks on a tennis court may be an inconvenience, however, defects on swing can lead to injury and expose the City to financial liabilities.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

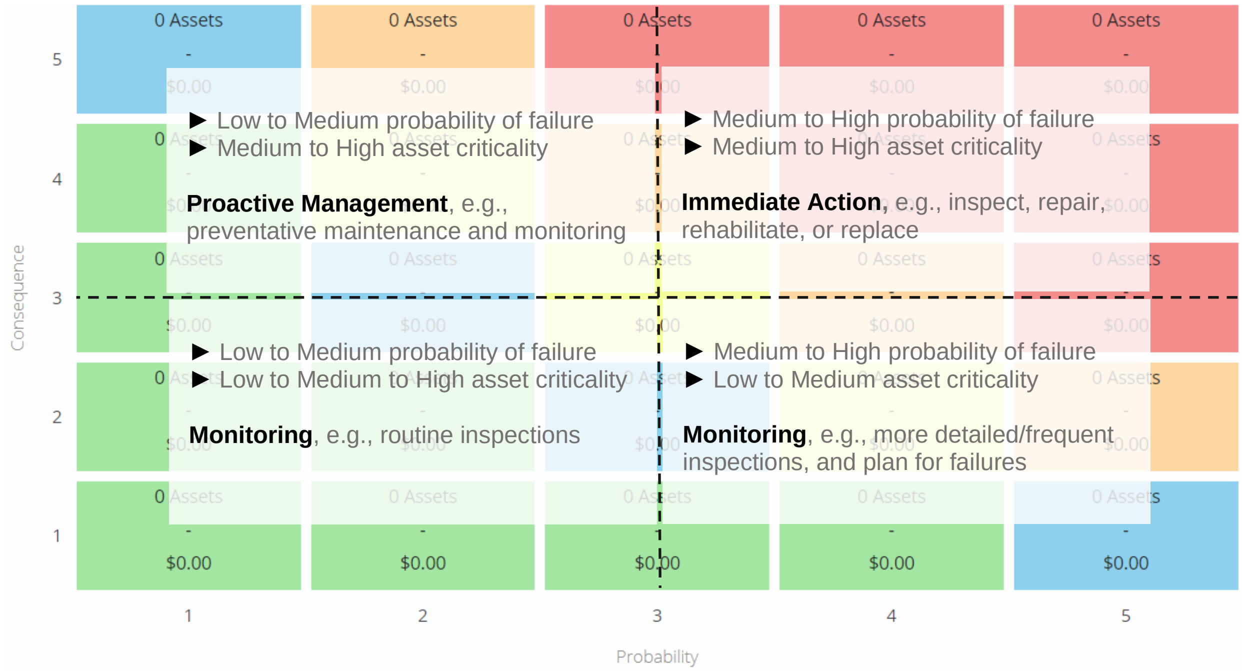
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 11: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for all Parks assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 12.

Figure 12: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Parks assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as the Parks as a whole.

Two factors were used to help explain potential asset failure. These include the service life remaining of each asset and its age-based condition ratings. In the model below for probability of failure, the age-based condition is presumed to better estimate and explain an asset's likelihood of failure, receiving a high weighting.

Figure 13: Probability of Failure

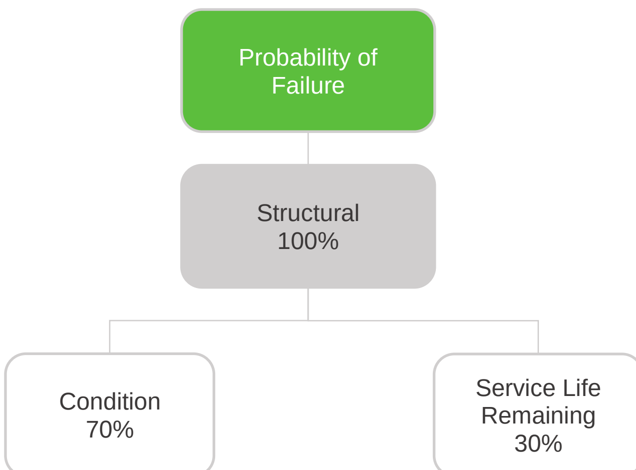


Table 12 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 12: Defining Probability of Failure Ranges

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

The model in Figure 14 outlines the type of potential consequences that may result from failure of a facility asset. Data for Parks includes the replacement cost of each asset and asset type. These attributes are used to assist in measuring and quantifying the direct financial, socio-political, and health and safety related consequences of potential asset failures.

Figure 14: Consequence of Failure

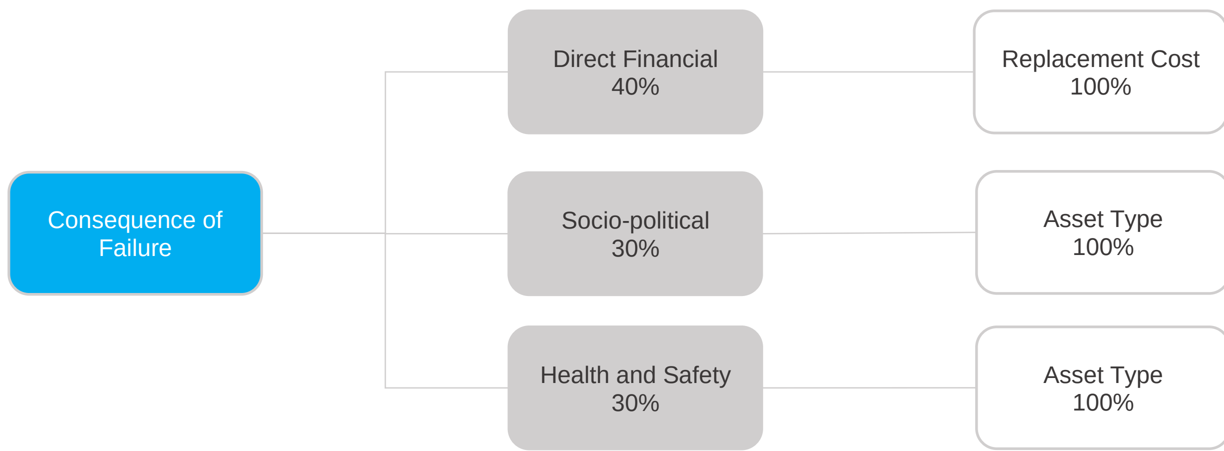


Table 13: Defining Consequence of Failure Ranges

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Socio-political	Asset Type	Consequence of Failure
	Fencing	1—Insignificant
	Parks Furnishings	2—Minor
	Park Lights, Paths & Trails	3—Moderate
	Sports Fields & Courts	4—Major
	Playground Equipment	5—Severe
Health and Safety	Asset Type	Consequence of Failure
	Fencing	1—Insignificant
	Parks Furnishings	2—Minor
	Park Lights, Paths & Trails	3—Moderate
	Sports Fields & Courts	4—Major
	Playground Equipment	5—Severe

Risk Matrix

The risk matrix below is based on the previous risk model developed for Parks. It is generated using available asset data.

Figure 15: Detailed Risk Matrix

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	1 Assets $203.5K	5 Assets $2.1M	19 Assets $8.8M	32 Assets $11.3M	16 Assets $3.7M
3	12 Assets $1.0M	17 Assets $2.1M	44 Assets $2.1M	25 Assets $904.2K	34 Assets $1.6M
2	24 Assets $804.5K	30 Assets $1.6M	18 Assets $834.5K	18 Assets $713.1K	18 Assets $1.4M
1	174 Assets $230.1K	44 Assets $168.8K	62 Assets $334.0K	88 Assets $663.5K	711 Assets $1.2M

Probability of Failure

The consolidated risk matrix in Figure 16 shows that 93 Parks assets, with a combined replacement cost of $20.9 million have a very high risk rating. Most of these assets are various sports fields and courts, and playground equipment assets, which carry a moderate to major consequence of failure. In addition, majority of the assets also had a high probability of failure, due to their poor condition ratings.

An additional 114 assets, with a combined replacement cost of $10.4 million were assigned a high risk rating. Many of these assets were also playground equipment assets, but utility assets and various parklands, paths, and trails were also included in this group.

Figure 16: Consolidated Risk Matrix

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
260 Assets	197 Assets	728 Assets	114 Assets	93 Assets
$1,555,499	$4,618,759	$3,600,314	$10,443,749	$20,870,622

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 14: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational Parks; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 15 outlines the four core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 15: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure services, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Parks, a total of 81 KPIs were selected. This included 38 KPIs to measure customer levels of service, and 43 to track the City's technical levels of service. A practical way to distinguish the between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service. Given their significance, historical data for the last four years was retrieved to illustrate performance trends for customer levels of service.

Table 16: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
% of parks assets in poor or very poor condition	*	*	*	62%	
% of playgrounds in poor or very poor condition	*	*	*	49%	
% of sport fields and courts in poor or very poor condition	*	*	*	75%	
% of park fencing in poor or very poor condition	*	*	*	57%	
% of park furniture in poor or very poor condition	*	*	*	82%	
% of trails/paths in poor or very poor condition	*	*	*	42%	
Maintenance					
# of pedestrian trail/path maintenance calls	103	190	270	314	↗
# of sport court maintenance calls	12	24	27	32	→
# of sports field maintenance calls	30	43	31	31	→
# of park maintenance calls	76	96	100	107	↗
# of bench, table and picnic structure maintenance calls	40	23	24	24	→
# of playground & exercise park maintenance calls	24	34	33	101	↗
# of park lighting calls	20	13	17	24	→
# of fence and bollard calls	39	35	18	24	→
# of irrigation calls	30	21	29	25	→
# of park drainage calls	7	7	5	8	→
# of cemetery maintenance calls	23	24	19	18	→
Operations					
# of leaf collection calls	NA	NA	2	12	↗
# of grass cutting calls (boulevard, parks, meadows)	46	57	29	5	↘
# of special events calls	10	6	3	12	→

KPI	2018	2019	2020	2021	Trend
# of garbage can and park litter calls	66	98	103	134	↗
# of sharps removal calls	13	23	34	40	↗
# of illegal dumping calls	31	63	75	96	↗
# of hanging basket calls	1	2	4	3	→
# of landscaping calls	23	34	44	49	↗
# of boulevard vegetation maintenance calls	90	103	122	129	↗
# of laneway vegetation maintenance calls	88	101	96	94	→
# of flail mowing calls	17	11	13	26	→
# of tree assessment calls	170	210	237	289	↗
# of tree pruning/removal calls	448	610	660	919	↗
# of tree watering calls	11	10	9	20	↗
# of Christmas decoration calls	NA	NA	1	5	↗
# of invasive species calls	48	55	49	68	→
# of skate park calls	0	3	4	1	→
# of dog park calls	30	43	44	56	↗
# of graffiti calls	37	61	66	89	↗
# of vandalism calls	9	13	15	15	→
# of locks and security calls	8	10	11	11	→

Table 17: Technical Levels of Service

KPI	2021	Budget
Capital		
Athletic Field Replacement		$50,000
Barrier Fence Replacement		$50,000
Court Resurfacing		$30,000
Park Furniture Replacement		$20,000
Playground Replacements		$300,000
Secondary Path Resurfacing		$30,000
Skate Bowl Resurfacing		$100,000
Sport Court Components		$30,000
Trail Resurfacing		$40,000
Artificial Turf Replacement		$1,500,000
Annual capital reinvestment		$2,150,000
Maintenance		
Building Maintenance		$78,900
Park Maintenance - maintenance, repairs, and cleaning (scheduled & reactive)	100%	$329,100
Park amenities inspections - scheduled per service levels A, B & C	100%	$45,100
Ball diamond maintenance - scheduled (weekly and monthly activities)	80%	$146,500
Irrigation maintenance - scheduled per service levels A, B & C	85%	$76,700
Playground inspections and maintenance - scheduled per service levels A and B	85%	$100,300
Sport court maintenance - scheduled per service levels A and B	100%	$62,600
Sport field maintenance - scheduled per service levels A, B & C	100%	$269,600
Artificial turf maintenance - scheduled (monthly and annual activities)	100%	$66,180
Trail/path inspections and maintenance - scheduled per service levels A, B & C	80%	$108,200
Pedestrian Route inspection and maintenance	100%	$18,500
Average annual maintenance expenditures		$1,301,680
Operations		
Fall/winter cleanup - as required for Priority 1, 2 and 3 areas	100%	$69,900

KPI	2021	Budget
Grass cutting - scheduled per service levels A, B & C	100%	$281,400
Grass cutting and parks maintenance for special events	100%	$3,080
Annual beds - scheduled maintenance	100%	$83,000
Hanging baskets - procurement and scheduled maintenance	100%	$26,400
Perennial bed maintenance - scheduled per Service Level A, B & C	100%	$430,400
Graffiti removal and pressure washing per service levels A, B & C	100%	$120,300
Illegal dumping in parks - removal of items as reported or observed	100%	$12,160
Litter and garbage in parks, fields, trails, paths - scheduled per service levels A, B & C	100%	$454,200
Janitorial	100%	$158,870
Vandalism prevention and repair	100%	$73,980
Brushing and Clearing - scheduled per service level A and B	100%	$108,200
Invasive species removal - scheduled per service level A and B	100%	$29,760
Overpass Banners - installation and removal	100%	$3,180
Tree pruning and maintenance - scheduled per age of tree (4847 trees)	200	$80,200
Number of trees planted or replaced - per inspection and assessment	80	$36,200
Tree removals	NA	$163,200
Tree watering - scheduled per service level A and B (276 trees)	100%	$43,700
Tree inspections and risk assessment - scheduled per tree monitor list and reactive	100%	$81,200
Cemetery - Interments (burials, cremations, niches)	129	$150,000
Cemetery - Markers (headstones, cemetery markers, graves)	81	$16,560
Average annual operations expenditures	$2,425,890	

Levels of Service Analysis

Table 18 shows the percentage change in service requests for KPI's that best align with asset condition and performance. These may be helpful indicators in determining if sufficient funding and resources are being allocated to the maintenance and replacement of assets.

Table 18: Trends in Customer Levels of Service KPIs – Asset Condition and Performance

KPI	Percentage change between 2018-2021
# of pedestrian trail/path maintenance calls	+205%
# of sport court maintenance calls	+167%
# of sports field maintenance calls	+3%
# of park maintenance calls	+41%

Table 19 shows the change in service requests for KPI's that best align with service delivery, but have no direct or tangible impact on asset lifespan. These may be helpful indicators in determining if sufficient funding and resources are being allocated towards service delivery.

Table 19: Trends in Customer Levels of Service KPIs – Service Delivery

KPI	Percentage change between 2018-2021
# grass cutting calls	-89%
# illegal dumping calls	+210%
# litter calls	+103%
# graffiti removal calls	+141%

KPI data can be used to support decisions to maintain, increase or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions. For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 20 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Those service levels have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 20: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 21 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 21: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 17: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: “New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years.”
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 22: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

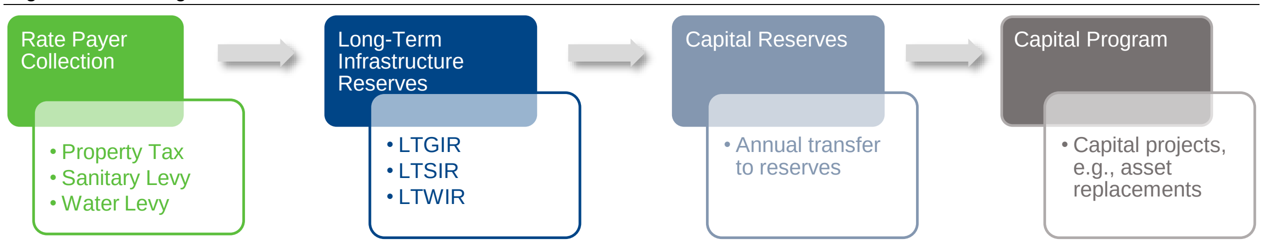
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 23: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 18: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 21. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies. The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 24, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 24: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 25, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

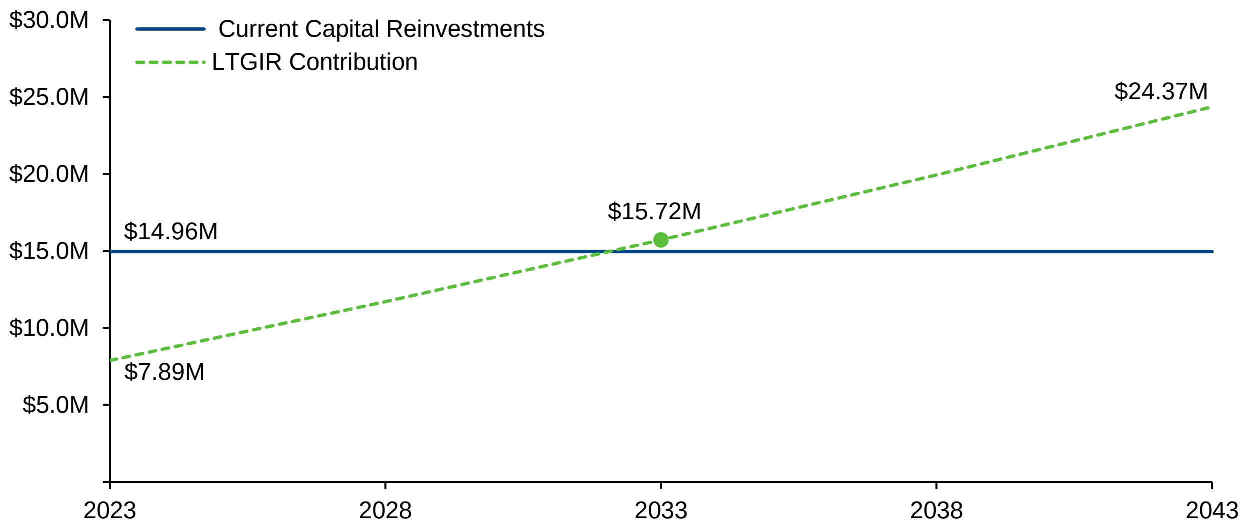
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 24 above as $15 million.

Table 25: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 24.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 25. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 26: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 27: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 28: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 28, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 29: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 30: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending

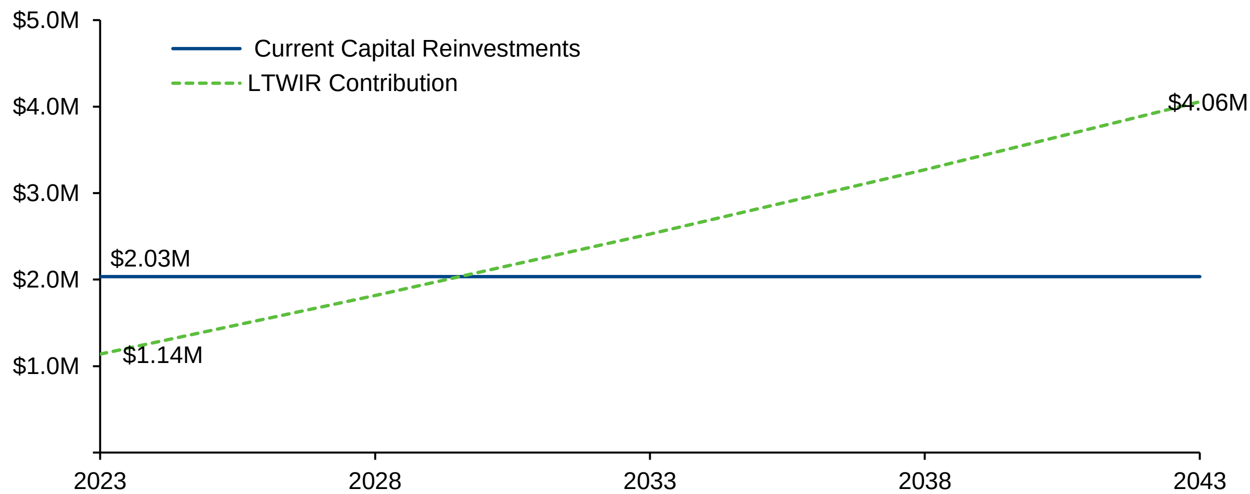
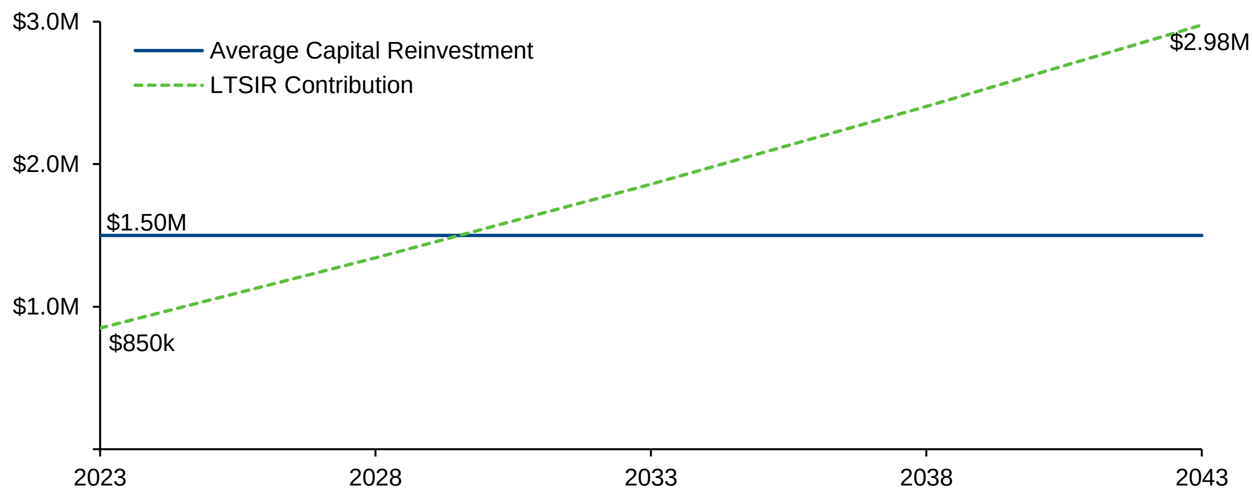


Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 29, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 30 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 31: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 32: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 27: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 33: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 34: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 33, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 35 summarizes the infrastructure backlog for each service area.

Table 35: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 36 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 36: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 37: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 38: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.

- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.

- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Fleet & Equipment

Final Version
August 2024

Contents

Executive Summary 6

Approach and Methodology 11
Developing the Asset Management Plan 12
Build a comprehensive asset inventory 12
Conduct asset-level risk assessments and build risk models 13
Compile lifecycle activity data 13
Compile levels of service data 13
Develop financial strategy 13
Limitations and Constraints 14

State of the Infrastructure 15
Asset Hierarchy and Data Classification 16
Inventory and Valuation 17
Costing Methods 17
Asset Condition 19
Source of Condition Data 19
Condition Assessment Guidelines 20
Condition Rating System 21
Projected Asset Conditions 22
Age Profile 24
Historical Asset Expenditures 24
Serviceable Life vs. Current Asset Age 25

Lifecycle Management 27
Current Lifecycle Framework 28
Reinvestment Rates 31
Reinvestment Rate Benchmarks 31
Forecasted Long-term Replacement Needs 35

Risk Analysis 36
Calculating Asset Level Risk 37
Risk Models and Matrices 40
Risk Matrix 42

Levels of Service 43
Defining Levels of Service 44
Levels of Service Framework 44
Levels of Service Analysis 47

Recommendations .... **Error! Bookmark not defined.**

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 12
Figure 2: Asset Hierarchy and Data Classification 16
Figure 3: Portfolio Valuation 18
Figure 4: Asset Condition: All Fleet & Equipment Assets 22
Figure 5: Asset Condition – By Segment 23
Figure 6: Historical Expenditures on Asset Acquisition 24
Figure 7: Average Asset Age vs. Estimated Useful Life 25
Figure 8: Percentage of Estimated Useful Life Consumed 26
Figure 9: Summary of Capital, Operating, and Maintenance Expenditures 29
Figure 10: Forecasted Long-term Replacement Needs 35
Figure 11: Calculating Risk Ratings 37
Figure 12: Generic Risk Matrix 39
Figure 13: Probability of Failure 40
Figure 14: Consequence of Failure 41
Figure 15: Detailed Risk Matrix 42
Figure 16: Consolidated Risk Matrix 42
Figure 17: Historical MFA Lending Rates 52
Figure 18: Funding Flow 55
Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending 59
Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending 65
Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending 65

List of Tables

Table 1: Methods for Establishing Replacement Costs 17
Table 2: Detailed Asset Inventory 18
Table 3: Source of Condition Data 19
Table 4: General Condition Rating Scale – All Assets 21
Table 5: Components of a Lifecycle Framework 28
Table 6: Lifecycle Framework 30
Table 7: Current Reinvestment Rates 31
Table 8: System-generated Reinvestment Rates 32
Table 9: Fleet & Equipment Capital Reinvestment Rate Comparison 33
Table 10: Purpose of Capital and Operating Budgets 34
Table 11: Types of Consequences of Asset Failure 38
Table 12: Defining Probability of Failure Ranges 40
Table 13: Defining Consequence of Failure Ranges 41
Table 14: Components of a Levels of Service Framework 44
Table 15: Core Values and Service Statements 45
Table 16: Customer Levels of Service 46
Table 17: Technical Levels of Service 46
Table 18: Balancing Cost, Performance, and Risk 48
Table 19: Service Area Replacement Costs and Target Reinvestment Rates 50
Table 20: Long-Term Infrastructure Reserve Balances 54
Table 21: Capital Reserve Balances 55
Table 22: Comparing Average Annual Requirements Against Current Capital Reinvestments 58
Table 23: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 58
Table 24: Funding Levels and Resulting Funding Deficits 60
Table 25: Risks and Benefits of Funding Models 61
Table 26: Tax Rate Increase Required to Achieve Funding Levels 62
Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments 64
Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 64
Table 29: Funding Levels and Resulting Funding Deficits: Water Services 66
Table 30: Funding Levels and Resulting Funding Deficits: Sanitary Services 66
Table 31: Utility Rate Increase Required to Achieve Funding Levels: Water 67
Table 32: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 67
Table 33: Age- and Condition-based Infrastructure Backlogs 69
Table 34: Long-Term Infrastructure Reserves vs. Backlogs 70
Table 35: Development Cost Charges (DCC) Program 71
Table 36: Overlap Between DCC Program and Assets in Backlog State 71

681	Number of assets on record in the Information Services asset database
$33.5 million	2023 replacement cost of these assets
2010s	Decade with the highest capital expenditures on the acquisition of Fleet & Equipment assets ($20M)
2030s	Decade with the first major forecasted asset replacement spike ($33M)
72%	Percentage of assets in poor or worse condition, or with less than 40% service life remaining
$24.2 million	Current age- and condition-based asset backlog
$19.2 million	Current replacement cost of assets with a very high risk rating
$4.7 million	Annual City spending on capital, maintenance, and operations related to Fleet & Equipment
9.4%	System-generated recommended capital reinvestment rate for replacement of Fleet & Equipment assets ($3.2M per year)
8.7%	Port Coquitlam's actual capital reinvestment rate ($2.9M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Fleet & Equipment assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios: Water, Sanitary, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services.

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Fleet & Equipment portfolio has nearly 700 vehicles and equipment assets on record that support the delivery of City services. The total current replacement cost of these assets, as analyzed in this AMP, was estimated at $33.5 million as of 2023, with Fire & Emergency Services and Sanitation assets comprising half of the fleet portfolio.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria.

Asset age is currently used to estimate the replacement year for Fleet & Equipment assets, with condition inspections and maintenance history used to support replacement decisions. Fleet and equipment assets with less than 40% of their service life remaining typically have increased maintenance costs worth 60-80% of their purchase costs, while those with less than 20% service life remaining have maintenance costs that are no longer economical (more than 80% of purchase costs).

Based on a combination of condition data and age, 72% of all Fleet & Equipment assets, with a current replacement cost of $24.2 million, are in poor or worse condition or have less than 40% service life remaining. Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance.

Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure and capital asset stock. Over the last 40 years, an average of $8 million per decade was spent on Fleet & Equipment assets. The largest expenditures were made in the 2010s, totaling nearly $20 million. Although new assets can be funded through development charges or through partners, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Assets require ongoing investments in operations, maintenance, and rehabilitation so that service level can be maintained and delivered consistently. The City's average annual budget for Fleet & Equipment totals $4.7 million annually. Of this, approximately $4 million per year is spent on the inspection, maintenance, and replacement of Fleet & Equipment assets. An additional $0.7 million is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life.

Eventually, aging assets must be replaced. Age analysis shows that replacement needs are expected to rise through the current decade, peaking at $33 million in the 2030s, and remain relatively steady thereafter, averaging $30.4 million per decade. Fire, Sanitation, and Public Works assets will account for the majority of replacement needs each decade.

Deferring replacements can lead to backlogs, which can cause a drop in the quality of service provided to residents. The City's current age-based backlog is $15.8 million, comprising assets that have exceeded their useful life but still remain in service—most within Sanitation services. However, this figure increases to $24.2 million when assets in poor or worse condition, or less than 40% service life remaining, are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of infrastructure needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in user fees and tax rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This analysis indicates that 130 Fleet & Equipment assets, with a combined replacement cost of $19.2 million have a very high risk rating. Many of these assets are Fire & Emergency Services assets, which carry a moderate to severe consequence of failure. Other assets within this group include garbage trucks, which, while carrying a moderate consequence of failure, were assigned a high probability of failure given their age and condition ratings. An additional 155 assets, with a combined replacement cost of $7.6M, have a high risk rating. This group includes heavy duty Public Works fleet assets including flush and dump trucks as well as loaders and backhoes.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Fleet & Equipment, a total of 15 KPIs were selected. This included four KPIs to measure customer levels of service, and 11 to track the City's technical levels of service. Technical levels of service can be thought of as the activities and steps (inputs) that an organization takes to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas

For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility

Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas

Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

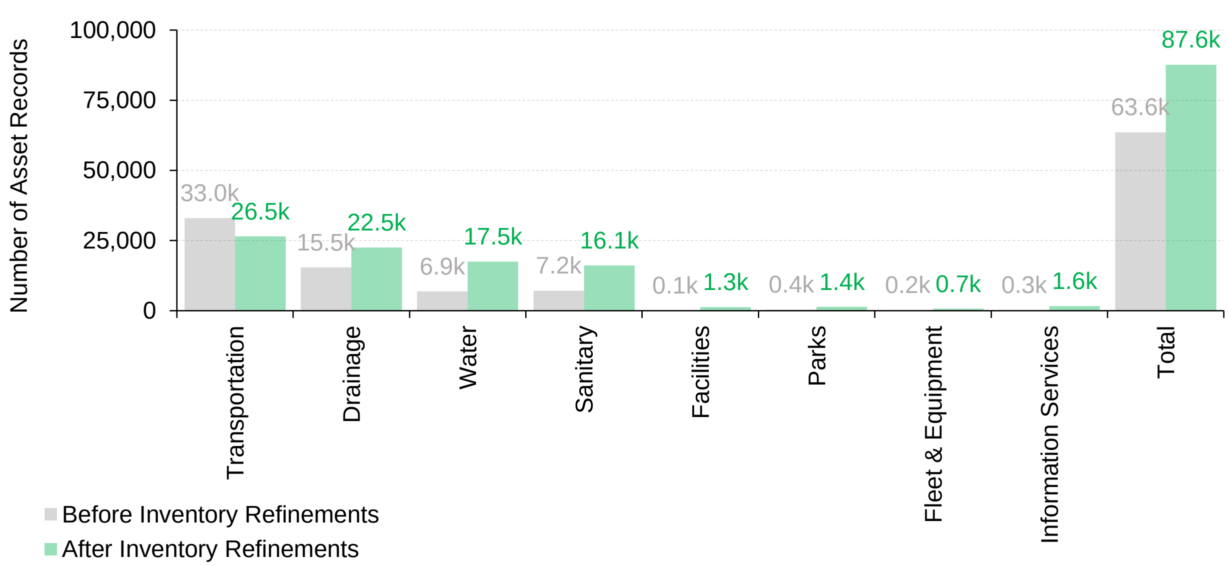
City staff manage multiple large-scale and complex infrastructure and capital asset datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase to the number of total assets, from 63,603 asset records to 87,647. For Fleet & Equipment, the number of assets on record increased from less than 250 to 681—an increase of 178%.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Staff provided feedback on various lifecycle interventions applied to major asset types; the triggers for each treatment and its impact; and typical budgets associated with each activity. Data in any available service level sheets was also reviewed and aggregated.

In addition to identifying lifecycle interventions that may help extend the life of the asset (e.g., regular maintenance and repairs), operational expenditures meant to ensure delivery and continuity of acceptable service levels were also included. For example, fuel and insurance costs do not have a direct impact on lifespan but they are part of providing Fleet & Equipment services.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable and practical. To track the performance of Fleet & Equipment, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data for 2021, as available. A total of 15 KPIs were selected, with four used for customer levels of service, and 11 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure that asset replacement needs are met as they arise. Key performance indicators can be helpful in determining how much to allocate to operational budgets in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's capital fleet and equipment assets up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

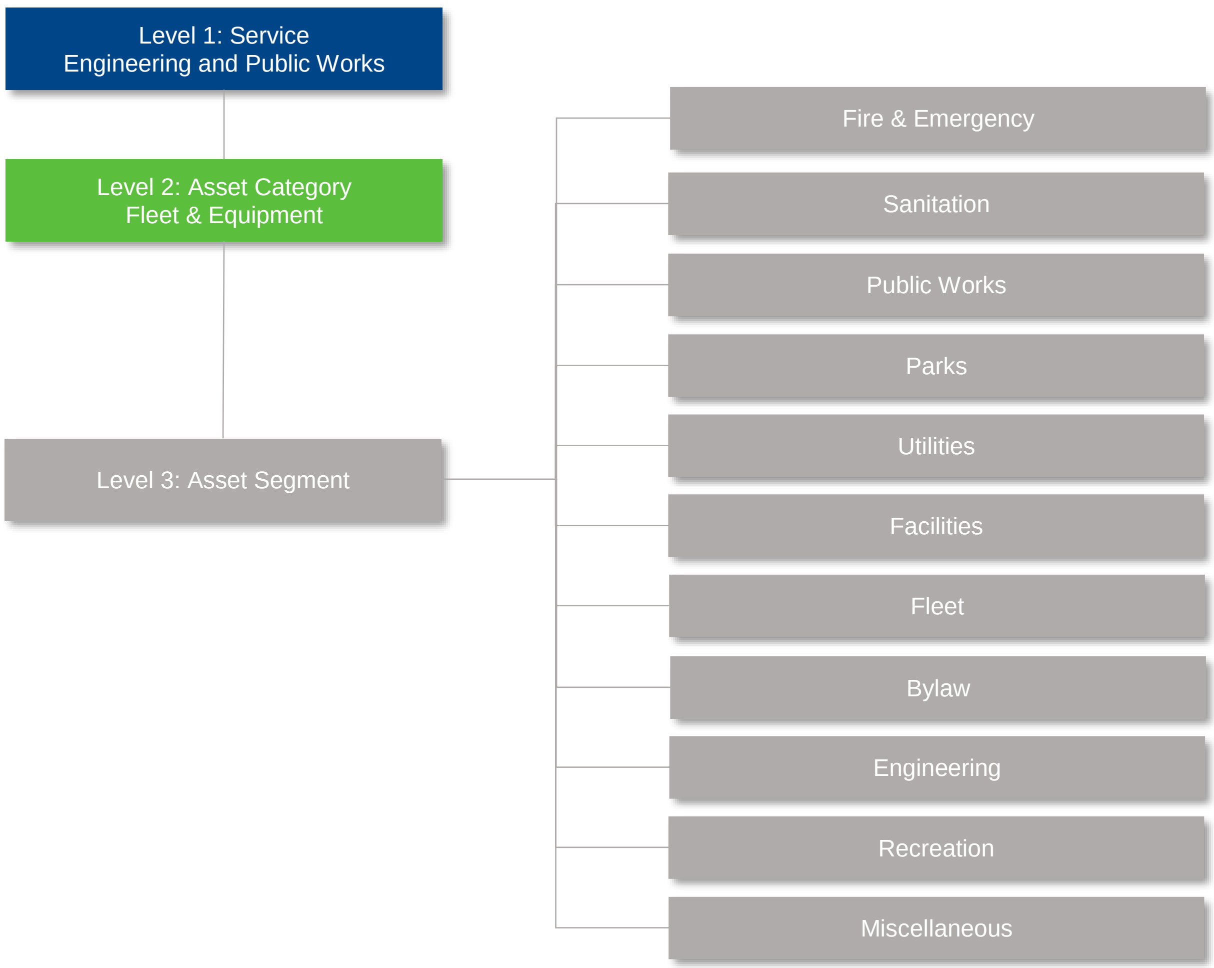
State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of City of Port Coquitlam's Fleet & Equipment assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Fleet & Equipment portfolio contains 617 vehicles and various equipment assets that support the delivery of City services. The total replacement cost was estimated to at $33.5 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

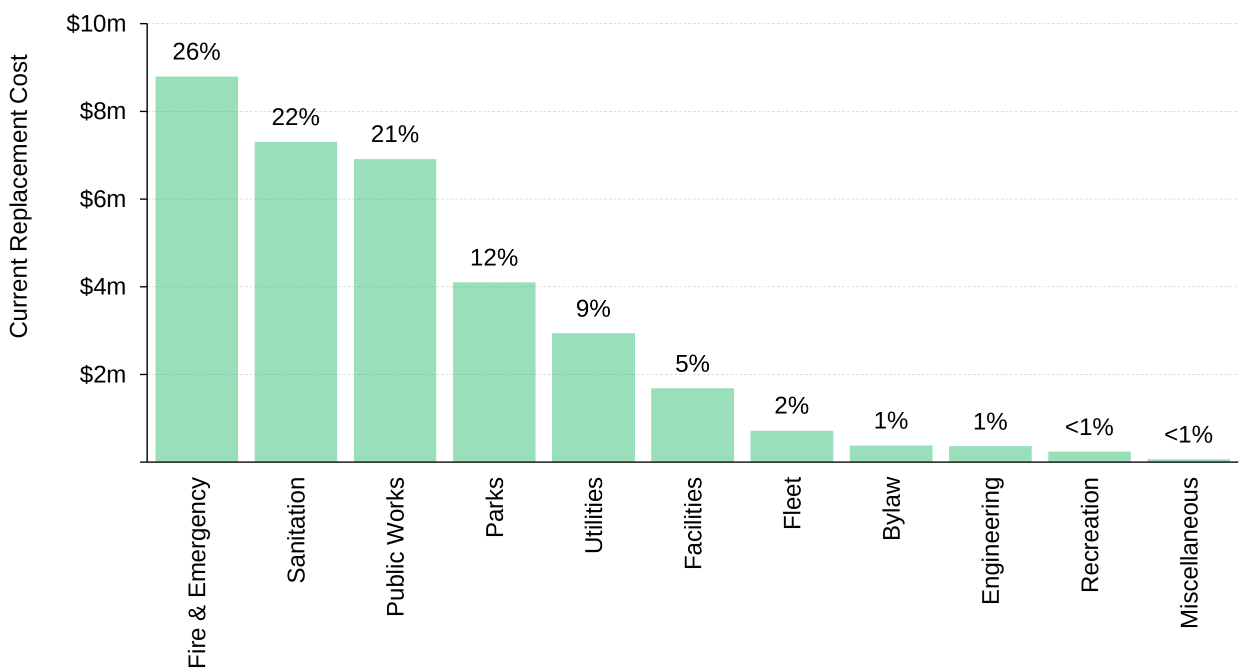
Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

Table 2 summarizes the quantity and current replacement cost of the City's Fleet & Equipment assets as managed in its primary asset management register, Citywide. With a combined current replacement cost of $8.8 million, Fire & Emergency assets comprise the largest share of the overall portfolio, at 26%.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Fire & Emergency	65	$8,795,160	User-defined
Sanitation	18	$7,304,328	User-defined
Public Works	156	$6,910,065	User-defined
Parks	171	$4,099,706	User-defined
Utilities	135	$2,937,226	User-defined
Facilities	16	$1,683,000	User-defined
Fleet	33	$716,925	User-defined
Bylaw	7	$379,500	User-defined
Engineering	7	$363,000	User-defined
Recreation	7	$236,500	User-defined
Miscellaneous	2	$63,214	User-defined
Total	**617**	**$33,488,624**	

Figure 3: Portfolio Valuation



Asset Condition

Reliable long-term planning for asset replacements hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

Asset age is currently used to estimate the replacement year for Fleet & Equipment assets, with condition inspections and maintenance history used to support replacement decisions.

Table 3: Source of Condition Data

Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Fire & Emergency Fleet & Equipment	42%	Age-and condition based estimates
General Fleet & Equipment	35%	Age-and condition based estimates
Total	**35%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Fleet & Equipment assets to support the collection of condition data (Appendix A). It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey.

Table 4: General Condition Rating Scale – All Assets

Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required. Maintenance costs of 20-40% of purchase cost.	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term. Maintenance costs of 40-60% of purchase cost.	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term. Maintenance costs of 60-80% of purchase cost.	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and require immediate replacement. Maintenance costs no longer economical - more than 80% of purchase cost. Potential health and safety Issues.	0-20

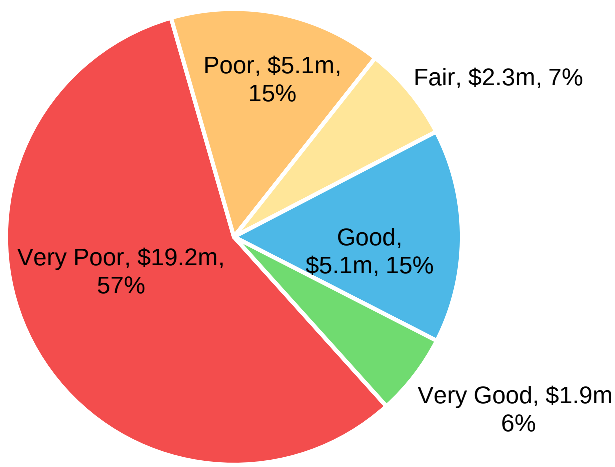
Fleet and equipment assets with less than 40% of their service life remaining typically have increased maintenance costs worth 60-80% of their purchase costs, while those with less than 20% service life remaining have maintenance costs that are no longer economical (more than 80% of purchase costs).

Projected Asset Conditions

Figure 4 summarizes the replacement cost-weighted condition of all Fleet & Equipment assets. Based only on age, 72% of assets with a current replacement cost of $24.2 million are estimated to be in poor to very poor condition, or have less than 40% service life remaining. Additional detail is provided in subsequent figures at the asset type or segment level.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

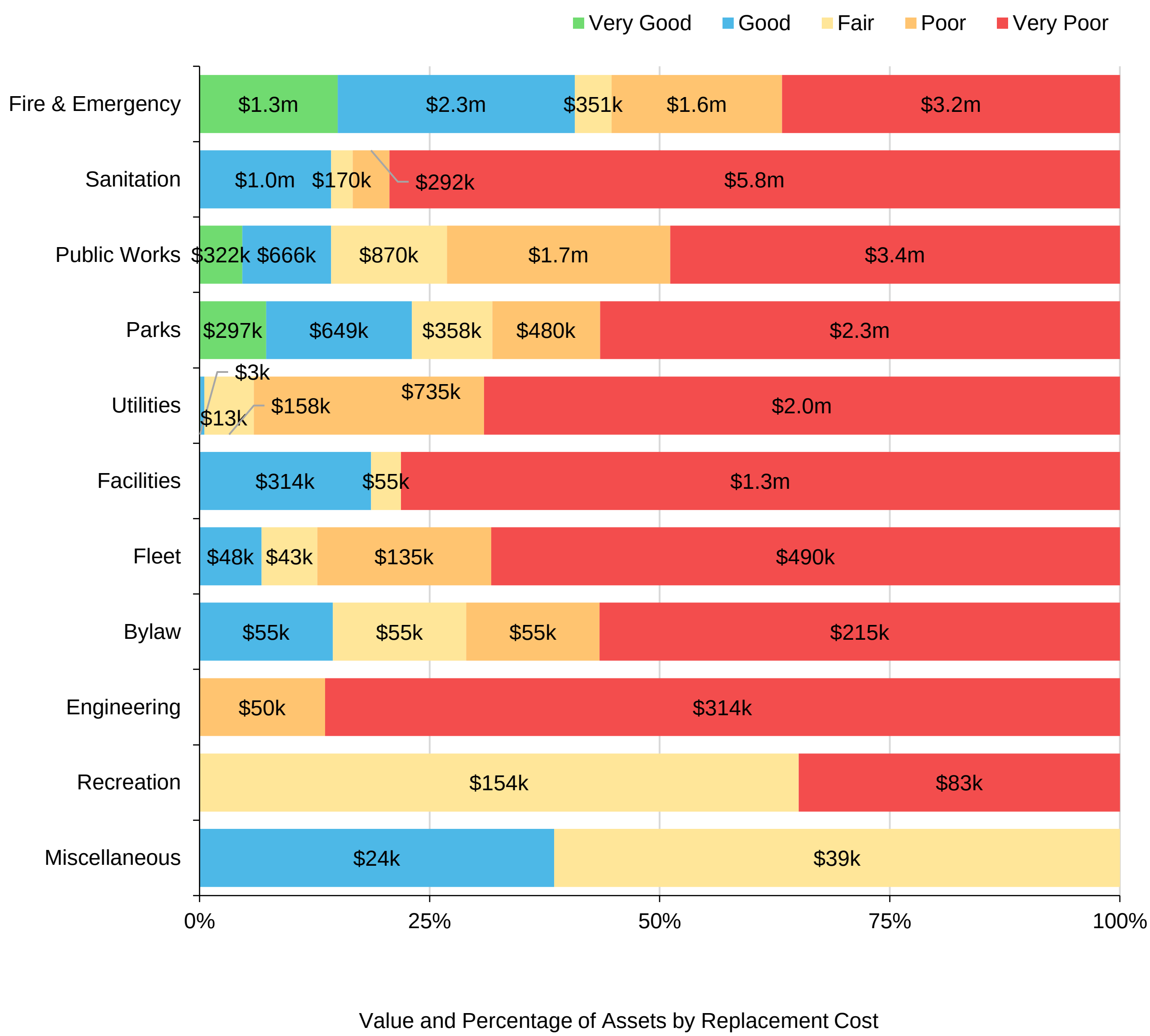
Figure 4: Asset Condition: All Fleet & Equipment Assets



It is often more economical to keep assets in at least fair or better condition. Smaller and more frequent investments in asset maintenance can extend its serviceable life, minimize lengthy and unexpected service disruptions, and help avoid more expensive repairs and renewals in the future. This approach also helps deliver more consistent and predictable service levels.

As illustrated in Figure 5, based on age data, a substantial portion of assets within each group are estimated to be poor or worse condition, or have less than 40% service life remaining. Although age-based condition ratings offer valuable insight, they may not reflect an asset's true condition and operability. Many assets may continue to perform their intended function safely and effectively, making condition assessments and maintenance history information I critical to decision making for asset replacements.

Figure 5: Asset Condition – By Segment



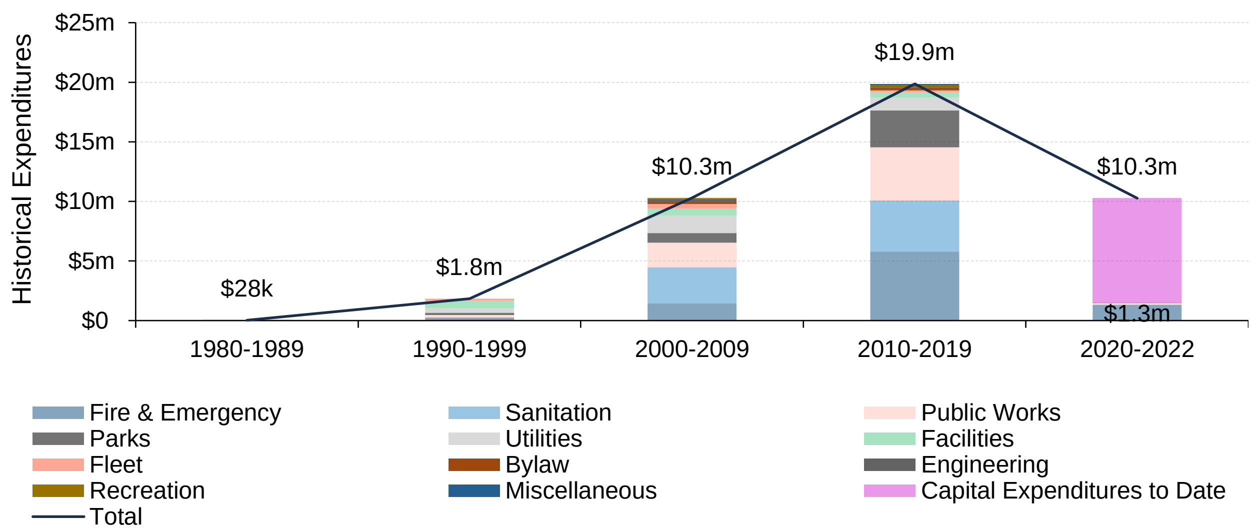
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Although imperfect on its own, asset age can help triage asset needs when used in conjunction with other data points, including condition, asset criticality, planned upgrades, project bundling, and prior failure history.

Historical Asset Expenditures

Figure 6 illustrates Port Coquitlam's historical expenditures on the acquisition of Fleet & Equipment assets since 1980. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Given their relatively short lifespans, vehicle, and equipment assets can go through many buy-replace cycles over span of a few decades. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 6: Historical Expenditures on Asset Acquisition



Expenditures on Fleet & Equipment assets averaged $8 million per decade over the last 40 years. Based on assets that are still in service, the largest expenditures were made in the 2010s, totaling nearly $20 million, distributed relatively evenly between Fire, Sanitation, and Public Works. In the current decade, the City has already made substantial capital investments of $11.6 million between 2020 and 2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

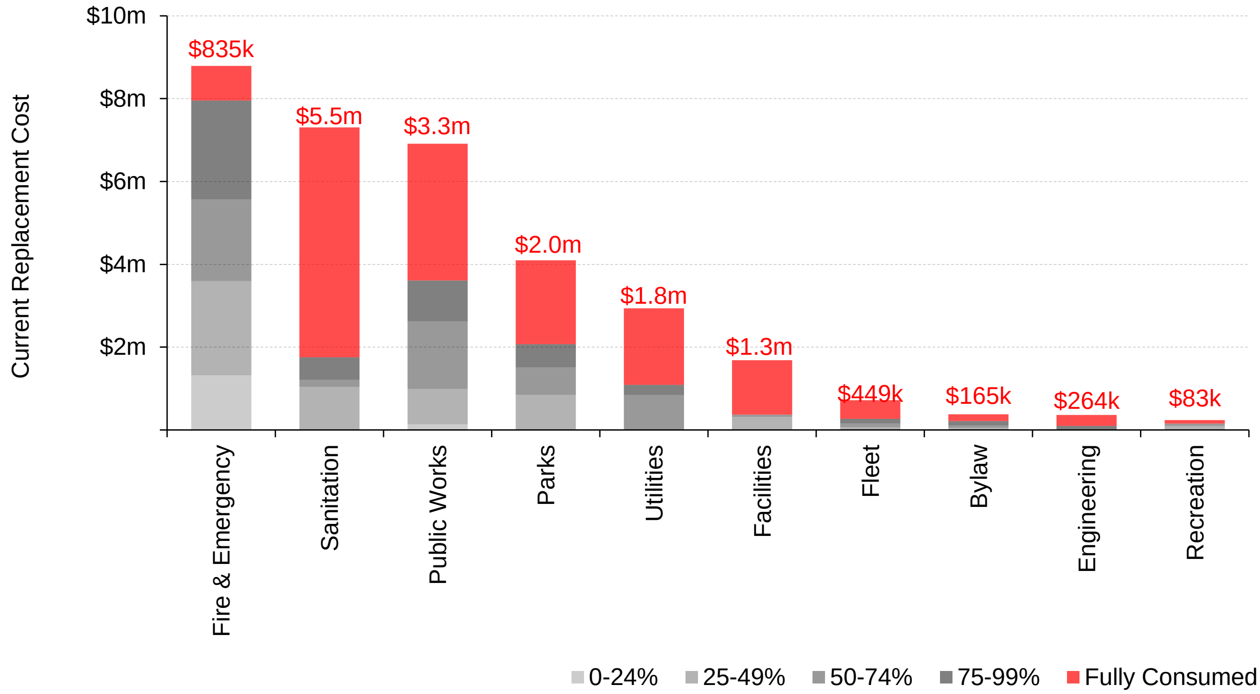
Figure 7 plots the average established useful life of Fleet & Equipment assets against their current average age. Both values were weighted by the replacement cost of individual assets.

Figure 7: Average Asset Age vs. Estimated Useful Life

In alignment with condition data, age analysis indicates that most vehicles and equipment assets across each service are either in the latter stages of their lifespan, or continue to remain in service beyond their estimated useful life. The oldest assets were found within Facilities, Fleet Services, and Utilities groups; the youngest in Fire & Emergency Services, with an average age of less than seven years.

Figure 8 shows a detailed distribution of the City's Fleet & Equipment assets based on the portion of useful life consumed to date. The distribution shows that nearly 80% of Sanitation and Facilities, and more than 60% of Utilities fleet and equipment assets continue to remain in service beyond their established lifespans.

Figure 8: Percentage of Estimated Useful Life Consumed



Lifecycle Management

The initial acquisition of assets, particularly major capital assets, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require maintenance, repair and replacement to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle activities and costs are those that have a direct and tangible impact on an asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Current Lifecycle Framework

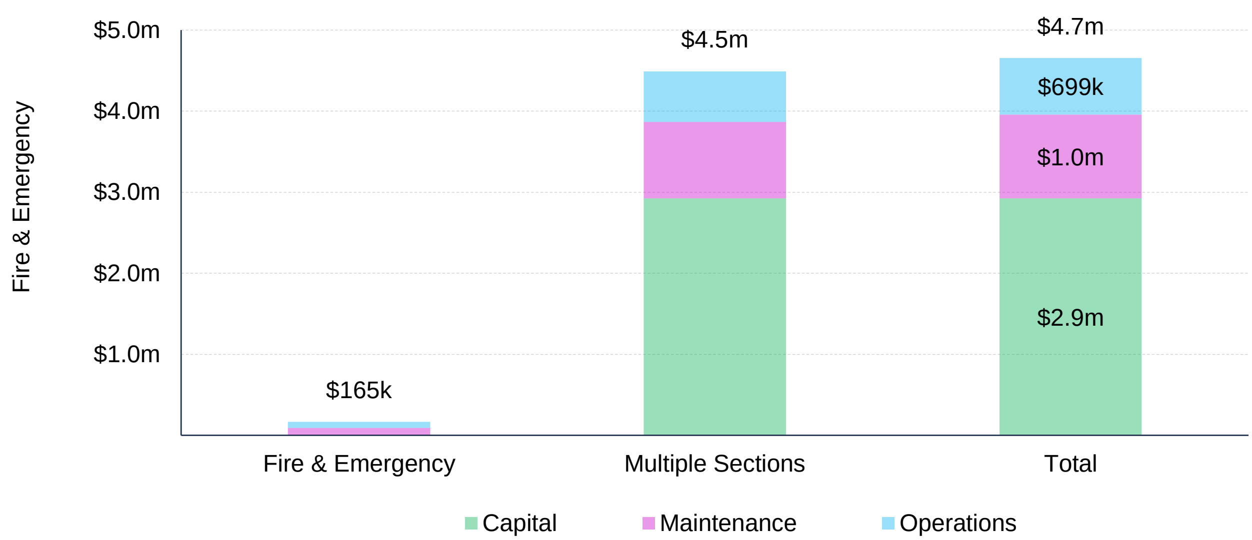
The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair, and replacement activities are guided by asset age, condition assessments, repair history, and staff judgment through routine monitoring. Lifecycle strategies are meant to ensure the City's Fleet & Equipment have minimum downtime and can safely and reliably deliver desired services to the community. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 5.

Table 5: Components of a Lifecycle Framework

Component	Description		
Service	Department or service area, e.g., Fire		
Activity	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	Maintenance Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Annual Budget	Typical funding available (actual spending may vary from year to year). Expenditure history from 2019, 2020, and 2021 was used to calculate a 3-year average.		
Reinvestment Rate	Annual capital budget as a portion of the total Fleet & Equipment portfolio replacement cost of **$33,488,624**.		

Figure 9 summarizes annual expenditures by service and expenditure type. Based on a 3-year average between 2019-2021, the City allocates $4.7 million annually on Fleet & Equipment operations, maintenance and asset replacements.

Figure 9: Summary of Capital, Operating, and Maintenance Expenditures



Of the $4.7 million annual Fleet & Equipment budget, approximately $4 million is spent on the inspection, maintenance, and replacement of assets. An additional $0.7 million per year is allocated towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., fuel and insurance costs).

The following table outline the City's lifecycle framework for Fleet & Equipment assets.

Table 6: Lifecycle Framework

Activity	Class	Segment	2019	2020	2021	Average
Fleet & Equipment Replacements	Capital	Multiple Sections	$1,721,000	$4,710,000	$2,335,500	$2,922,167
Sub-total Capital			**$1,721,000**	**$4,710,000**	**$2,335,500**	**$2,922,167**
Condition Assessment & Utilization Review	Maintenance	Multiple Sections	$0	$0	$0	$0
Scheduled Maintenance & Reactive Repair	Maintenance	Fire & Emergency	$93,040	$91,550	$86,576	$90,389
Scheduled Maintenance & Reactive Repair	Maintenance	Multiple Sections	$989,548	$961,110	$880,459	$943,706
Sub-total Maintenance			**$1,082,588**	**$1,052,660**	**$967,035**	**$1,034,095**
Fuel & Insurance	Operations	Fire & Emergency	$76,866	$75,060	$71,060	$74,329
Fuel & Insurance	Operations	Multiple Sections	$694,909	$600,495	$579,180	$624,861
Sub-total Operations			**$771,775**	**$675,555**	**$650,240**	**$699,190**
Total			**$3,575,363**	**$6,438,215**	**$3,952,775**	**$4,655,452**

Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 7 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 7**Error! Reference source not found.Error! Reference source not found.** shows that the City's annual Fleet & Equipment capital expenditures of $2.9 million yield an overall, service area reinvestment rate of 8.7%.

Table 7: Current Reinvestment Rates

Segment	Average Annual Capital Budget (2019-2021)	Service Area Reinvestment Rate
All Fleet	$2,922,167	8.7%
Total	**$2,922,167**	**8.7%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

Reinvestment levels range from 1-3% for major infrastructure groups, such as roads, facilities, water, wastewater, and storm. However, no reinvestment rate was available from CIRC specifically for Fleet & Equipment assets. Fleet and equipment typically have short lifespans and are costly investments, producing disproportionately high reinvestment requirements.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual spending on major capital assets (or allocations to reserves) to ensure that asset maintenance and replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 8: System-generated Reinvestment Rates

Segment	AAR	System-generated TRR
Fire & Emergency	$740,942	8.4%
Sanitation	$777,158	10.6%
Public Works	$677,226	9.8%
Parks	$413,888	10.1%
Utilities	$261,280	8.9%
Facilities	$150,673	9.0%
Fleet	$46,580	6.5%
Bylaw	$31,625	8.3%
Engineering	$30,250	8.3%
Recreation	$18,150	7.7%
Miscellaneous	$8,745	13.8%
Total	**$3,156,517**	**9.4%**

For Fleet & Equipment assets, the average annual capital replacement requirements total $3,156,517, for a system-generated target reinvestment rate of 9.4%.

Comparative Analysis

Error! Reference source not found. compares the City's current reinvestment rates against CIRC's 2016 guidelines and the system-generated reinvestment rates as found in Citywide. The analysis shows that Port Coquitlam's service area reinvestment rate is closely aligned with the system-generated target capital reinvestment rate. The City is reinvesting 8.7% of the replacement cost of all Fleet & Equipment assets against a target reinvestment rate of 9.4%.

Table 9: Fleet & Equipment Capital Reinvestment Rate Comparison

Benchmark	Assets Included	Target Capital Reinvestment	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
Citywide Asset Manager	All Fleet & Equipment	9.4%	NA	8.7%

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 10: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

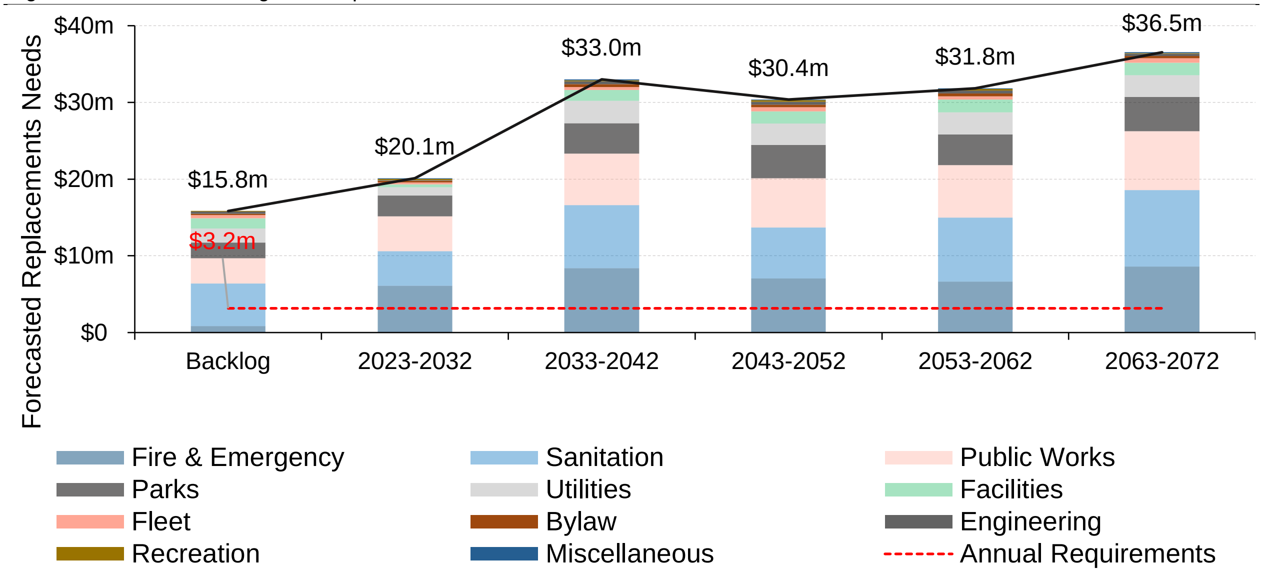
Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

Forecasted Long-term Replacement Needs

In contrast to historical investments in capital assets, Figure 10 illustrates the cyclical short-, medium- and long-term replacement requirements for Fleet & Equipment assets over the coming decades. The City's average annual requirements for Fleet & Equipment asset replacements total $3.2 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $2.9 million per year on Fleet & Equipment asset replacements are closely aligned with the benchmark of $3.2 million recommended to ensure that replacement needs are met. The chart shows that replacement needs are expected to rise through the current decade, peaking at more than $33 million in the 2030s, and remain relatively steady thereafter, averaging $30 million per decade.

Figure 10: Forecasted Long-term Replacement Needs



The chart also shows an age-based backlog of $15.8 million, comprising assets that have reached the end of their estimated useful life. However, the figure increases to $24.2 million when assets in poor or worse condition, or less than 40% service life remaining, are included. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition. Both age and condition should be used to forecast replacement needs and refine capital expenditure estimates.

The magnitude of capital needs typically far exceeds what most agencies can afford to fund. A risk-based approach can be used to direct funds where they are needed most first in order to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 11: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, and data on previous performance history. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe. An out-of-service Bylaw vehicle may be an inconvenience, but a malfunctioning fire rescue engine may jeopardize public health and safety.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

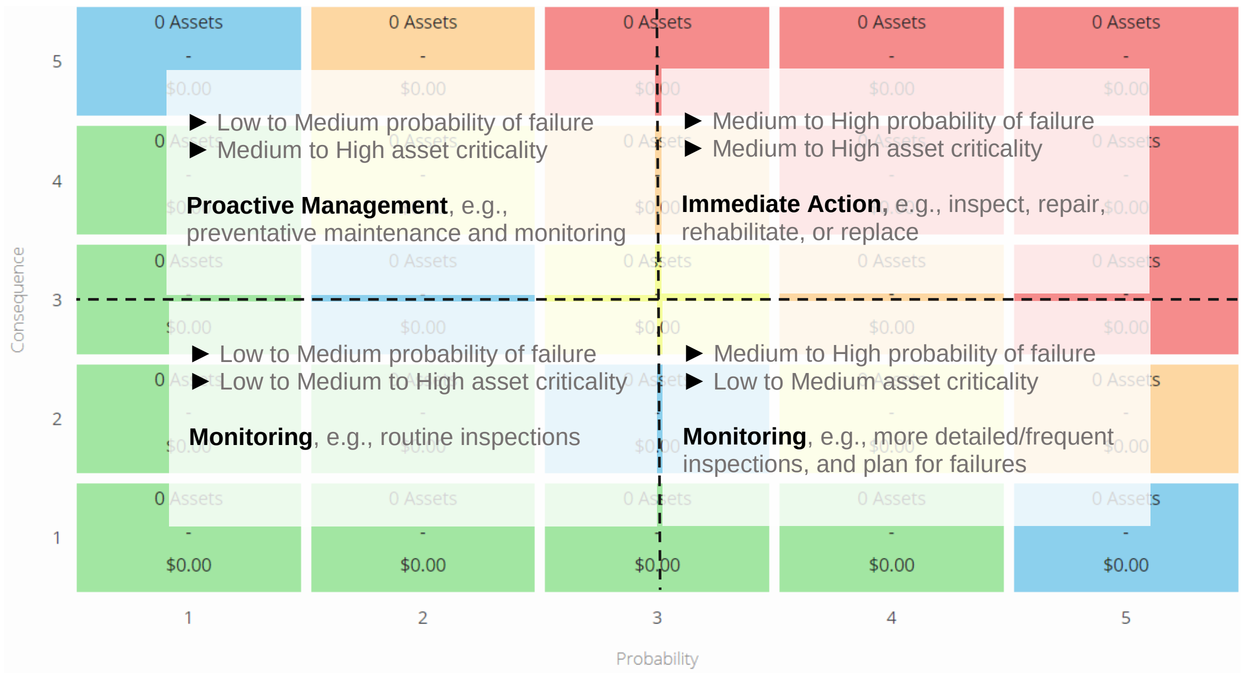
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 11: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for all Fleet & Equipment assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 12.

Figure 12: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Fleet & Equipment assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as Fleet & Equipment as a whole.

Two factors were used to help explain potential asset failure. These include the service life remaining of each asset and its age-based condition ratings. In the model below for probability of failure, the age-based condition is presumed to better estimate and explain an asset's likelihood of failure, receiving a high weighting.

Figure 13: Probability of Failure

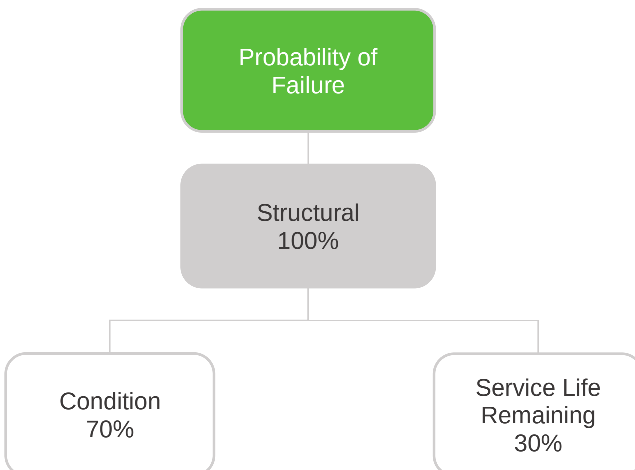


Table 12 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 12: Defining Probability of Failure Ranges

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

The model in Figure 14 outlines the type of potential consequences that may result from failure of a facility asset. Data for Fleet & Equipment includes the replacement cost of each asset and the service that each asset supports. These attributes are used to assist in measuring and quantifying the direct financial, socio-political, and health and safety related consequences of potential asset failures.

Figure 14: Consequence of Failure

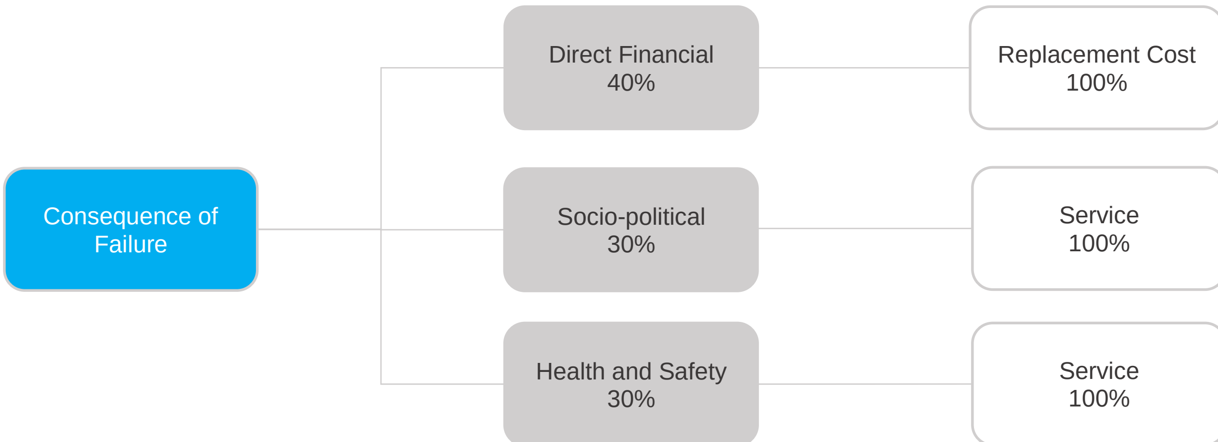


Table 13: Defining Consequence of Failure Ranges

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Socio-political	Service	Consequence of Failure
	Parks	1—Insignificant
	Facilities; Sanitation; Utilities; Recreation	2—Minor
	Fleet Services	3—Moderate
	Public Works	4—Major
	Fire and Emergency Services	5—Severe
Health and Safety	Service	Consequence of Failure
	Parks	1—Insignificant
	Facilities; Sanitation; Utilities; Recreation	2—Minor
	Fleet Services	3—Moderate
	Public Works	4—Major
	Fire and Emergency Services	5—Severe

Risk Matrix

The risk matrix below is based on the previous risk model developed for Fleet & Equipment. It is generated using available asset data.

Figure 15: Detailed Risk Matrix

Consequence of Failure	1	2	3	4	5
5	1 Asset $1.2M	1 Asset $1.5M	0 Assets $0	1 Asset $1.4M	2 Assets $2.1M
4	4 Assets $544.5K	2 Assets $440.0K	4 Assets $979.0K	4 Assets $830.5K	20 Assets $3.2M
3	5 Assets $475.8K	17 Assets $614.9K	9 Assets $1.3M	14 Assets $844.3K	99 Assets $10.7M
2	5 Assets $255.4K	15 Assets $720.0K	20 Assets $815.5K	8 Assets $239.3K	124 Assets $3.7M
1	3 Assets $68.8K	11 Assets $141.6K	21 Assets $175.7K	10 Assets $81.3K	212 Assets $1.0M

Probability of Failure

The consolidated risk matrix in Figure 16 shows that 130 Fleet & Equipment assets, with a combined replacement cost of $19.2 million have a very high risk rating. Many of these assets are Fire & Emergency Services assets, which carry a moderate to severe consequence of failure. Other assets within this group include garbage trucks, which, while carrying a moderate consequence of failure, were assigned a high probability of failure given their poor condition ratings.

An additional 155 assets, with a combined replacement cost of $7.6 million were assigned a high risk rating. This group includes heavy duty fleet assets under Utilities and Public Works, including tandem axel flush and dump trucks, as well as loaders and backhoes.

Figure 16: Consolidated Risk Matrix

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
36 Assets	271 Assets	20 Assets	155 Assets	130 Assets
$867,622	$3,069,000	$2,393,196	$7,984,383	$19,174,423

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 14: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help describe the **performance of the asset group or service area from an end-user perspective**. CLOS measure experiences, e.g., customer satisfaction with quality of recreational facilities; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the various **activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 15 outlines the four core values developed for service delivery across the City's eight asset portfolios. Service statements expand on the values to convert them into broader goals.

Table 15: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agree upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure and major capital assets, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Fleet & Equipment, a total of 15 KPIs were selected. This included four KPIs to measure customer levels of service, and 11 to track the City's technical levels of service. A practical way to distinguish the between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service.

Table 16: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
% of Fleet and equipment assets in poor or very poor condition, or less than 40% service life remaining	*	*	*	72	→
Average age of fleet and equipment assets (years)	*	*	*	10	→
Downtime % - Fire Fleet	NA	NA	NA	TBD	→
Downtime % - General Fleet	NA	NA	NA	TBD	→

Table 17: Technical Levels of Service

KPI	2021	Average Budget
Capital		
Average annual capital expenditures (replacements)	$2,335,500	$2,922,167
Maintenance		
Scheduled maintenance & reactive repair - Fire & ES Fleet & Equipment	87	$90,389
Scheduled maintenance & reactive repair – Multiple Sections Fleet & Equipment	787	$943,706
# of condition assessments completed - Fire & ES Fleet	27	$0
# of condition assessments completed – Multiple Sections Fleet	192	$0
Average annual maintenance expenditures	-	$1,034,095
Operations		
Annual fuel consumption - Fire & Emergency (volume)	N/A	$71,060
Annual fuel consumption – Multiple Sections (volume)	N/A	$579,180
Average annual operating expenditures	-	$699,190

Levels of Service Analysis

KPI data can be used to support decisions to maintain, increase or decrease levels of service to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions. For example, service level performance may be affected in a given year by weather, material pricing, supply chain issues, staff absences or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance, and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 18 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Those service levels have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 18: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different infrastructure programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 19 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 19: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

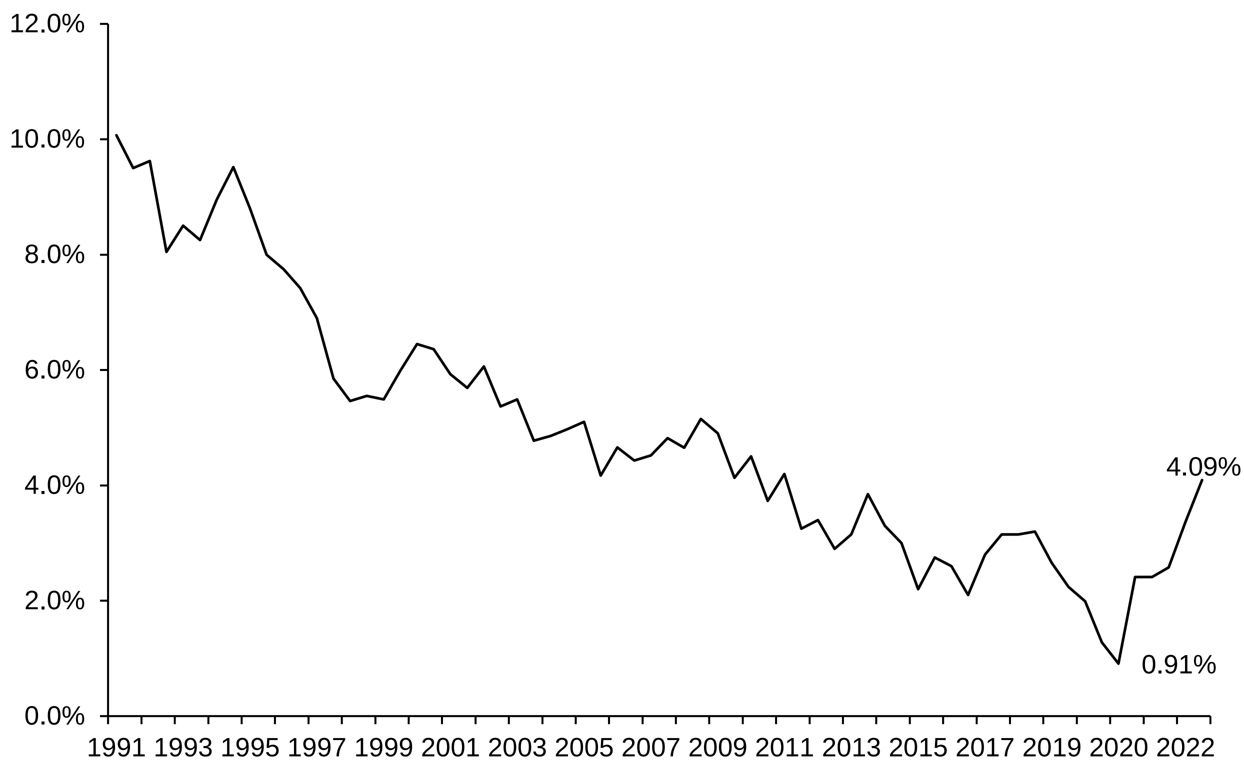
Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 17: Historical MFA Lending Rates[2]



Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 20: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

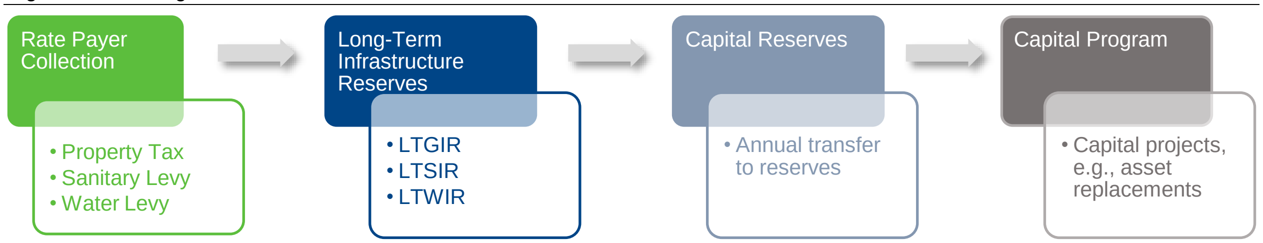
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 21: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 18: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 19. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies . The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 22, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 22: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 23, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

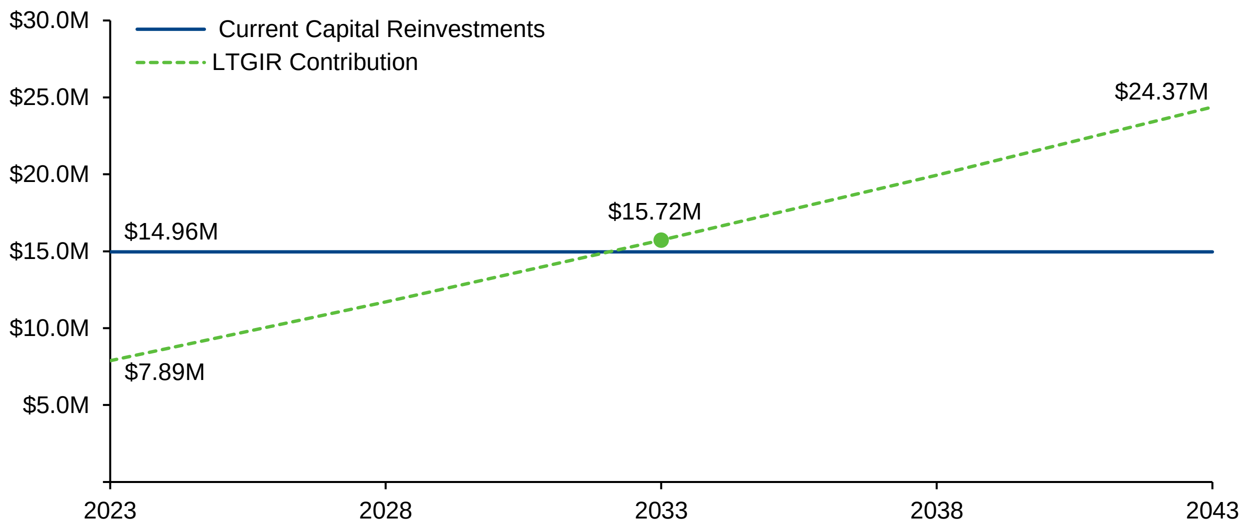
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 22 above as $15 million.

Table 23: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 22.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 23. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 24: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 25: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 26: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 26, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending

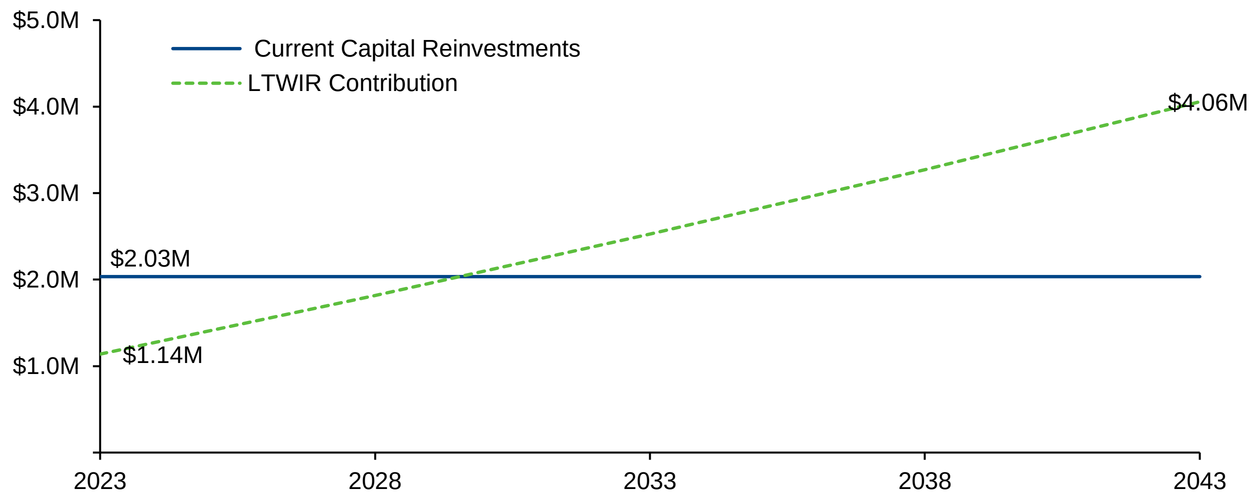
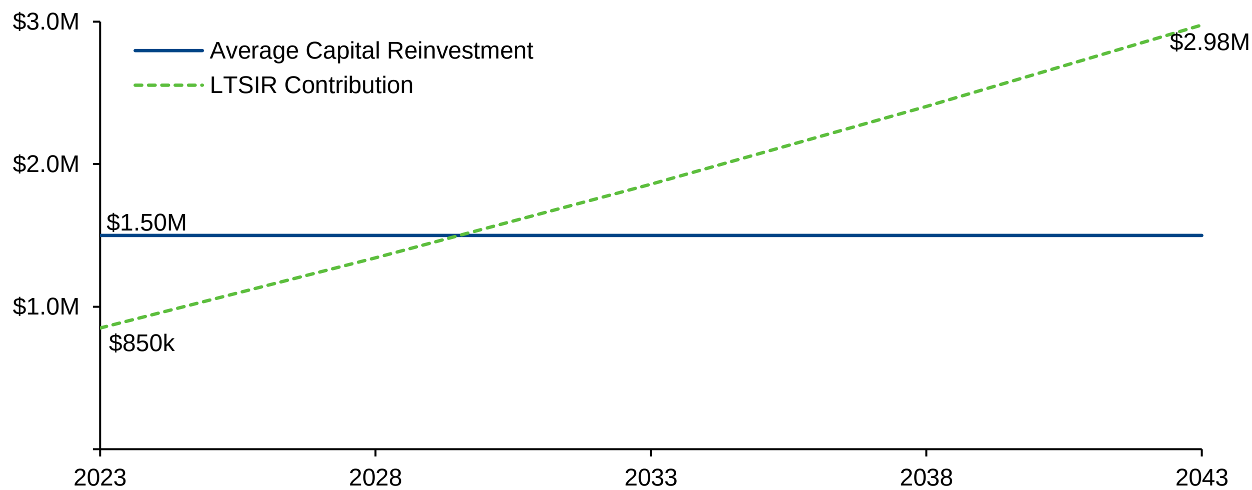


Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 27, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 28 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 29: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 30: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 25: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 31: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 32: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 31, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 33 summarizes the infrastructure backlog for each service area.

Table 33: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 34 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 34: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 35: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 36: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.

- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.

- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.

- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and above the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program

City of Port Coquitlam | Asset Management Plan

2024

Information Services

Final Version
August 2024

Contents

Executive Summary 7
Approach and Methodology 12
Developing the Asset Management Plan 13
Build a comprehensive asset inventory 13
Conduct asset-level risk assessments and build risk models 14
Compile lifecycle activity data 14
Compile levels of service data 14
Develop financial strategy 14
Limitations and Constraints 15
State of the Infrastructure 16
Asset Hierarchy and Data Classification 17
Inventory and Valuation 18
Costing Methods 18
Asset Condition 20
Source of Condition Data 20
Condition Assessment Guidelines 21
Condition Rating System 22
Projected Asset Conditions 23
Age Profile 24
Historical Asset Expenditures 24
Serviceable Life vs. Current Asset Age 25
Lifecycle Management 27
Current Lifecycle Framework 28
Reinvestment Rates 31
Reinvestment Rate Benchmarks 32
Forecasted Long-term Replacement Needs 35
Risk Analysis 36
Calculating Asset Level Risk 37
Risk Models and Matrices 40
Risk Matrix 42
Levels of Service 43
Defining Levels of Service 44
Levels of Service Framework 44
Levels of Service Analysis 47
Financial Strategy 49
Approach and Methodology 50
Current Financial Planning Framework 51
Capital Budget 51

Debt......51
Senior Government Support......53
Sustainability......53
Reserves......54
Development Cost Charges (DCC) Program......56
Achieving Reinvestment Rate Targets......57
Tax-Funded Service Areas......58
Levy-Funded Service Areas......64
Infrastructure Backlogs......69
Using Reserves......70
Leveraging Development Cost Charges (DCC)......71
Recommendations......72
Tax Funded Service Areas......72
Levy-Funded Service Areas......72
Next Steps......74

List of Figures

Figure 1: Number of Asset Records Before and After Inventory Refinements 13
Figure 2: Asset Hierarchy and Data Classification 17
Figure 3: Portfolio Valuation 19
Figure 4: Asset Condition: All Information Services Assets 23
Figure 5: Asset Condition – By Segment 23
Figure 6: Historical Expenditures on Asset Acquisition 24
Figure 7: Average Asset Age vs. Estimated Useful Life 25
Figure 8: Percentage of Estimated Useful Life Consumed 26
Figure 9: Summary of Capital, Operating, and Maintenance Expenditures 29
Figure 10: Forecasted Long-term Replacement Needs 35
Figure 11: Calculating Risk Ratings 37
Figure 12: Generic Risk Matrix 39
Figure 13: Probability of Failure 40
Figure 14: Consequence of Failure 41
Figure 15: Detailed Risk Matrix 42
Figure 16: Consolidated Risk Matrix 42
Figure 17: Historical MFA Lending Rates 52
Figure 18: Funding Flow 55
Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending 59
Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending 65
Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending 65

List of Tables

Table 1: Methods for Establishing Replacement Costs 18
Table 2: Detailed Asset Inventory 19
Table 3: Source of Condition Data 20
Table 4: General Condition Rating Scale – All Assets 22
Table 5: Components of a Lifecycle Framework 28
Table 6: Lifecycle Framework 30
Table 7: Current Reinvestment Rates 31
Table 8: System-generated Reinvestment Rates 32
Table 9: Information Services Capital Reinvestment Rate Comparison 33
Table 10: Purpose of Capital and Operating Budgets 34
Table 11: Types of Consequences of Asset Failure 38
Table 12: Defining Probability of Failure Ranges 40
Table 13: Defining Consequence of Failure Ranges 41
Table 14: Components of a Levels of Service Framework 44
Table 15: Core Values and Service Statements 45
Table 16: Customer Levels of Service 46
Table 17: Technical Levels of Service 46
Table 18: Balancing Cost, Performance, and Risk 48
Table 19: Service Area Replacement Costs and Target Reinvestment Rates 50
Table 20: Long-Term Infrastructure Reserve Balances 54
Table 21: Capital Reserve Balances 55
Table 22: Comparing Average Annual Requirements Against Current Capital Reinvestments 58
Table 23: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR 58
Table 24: Funding Levels and Resulting Funding Deficits 60
Table 25: Risks and Benefits of Funding Models 61
Table 26: Tax Rate Increase Required to Achieve Funding Levels 62
Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments 64
Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR 64
Table 29: Funding Levels and Resulting Funding Deficits: Water Services 66
Table 30: Funding Levels and Resulting Funding Deficits: Sanitary Services 66
Table 31: Utility Rate Increase Required to Achieve Funding Levels: Water 67
Table 32: Utility Rate Increase Required to Achieve Funding Levels: Sanitary 67
Table 33: Age- and Condition-based Infrastructure Backlogs 69
Table 34: Long-Term Infrastructure Reserves vs. Backlogs 70
Table 35: Development Cost Charges (DCC) Program 71
Table 36: Overlap Between DCC Program and Assets in Backlog State 71

1,600	Number of assets on record in the Information Services asset database
$9.6 million	2023 replacement cost of these assets
2010s	Decade with the highest capital expenditures on the acquisition of Information Services assets ($5.9M)
2020s	Decade with the first major forecasted asset replacement spike ($9.2M)
67%	Percentage of assets in poor or worse condition, or with less than 40% service life remaining
$6.4 million	Current age- and condition-based asset backlog
$6.5 million	Current replacement cost of assets with a very high risk rating
$1 million	Annual City spending on capital, maintenance, and operations related to Information Services
14%	System-generated recommended capital reinvestment rate for replacement of Information Services assets ($1.3M per year)
11.5%	Port Coquitlam's actual capital reinvestment rate ($1M per year)

Executive Summary

This asset management plan (AMP) for the City of Port Coquitlam provides a detailed cross-sectional analysis of the City's Information Services assets. It is a continuation of Port Coquitlam's efforts to build a formal and well-structured asset management program that began with the completion of an asset management strategy in 2019. The strategy identified the development of an AMP for each of the City's eight asset portfolios as a key priority. The service areas are: Water, Sanitary, Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services (IS).

Asset management plans help agencies develop a detailed understanding of their community infrastructure and major capital assets that support daily operations. This data-rich knowledge can support better decision-making and help maintain high but affordable service levels.

Valuation and Condition

Port Coquitlam's Information Services portfolio has more than 1,600 assets on record, including hardware, software and a fibre optic network. The total current replacement cost of all IS assets was estimated at $9.6 million as of 2023, with hardware comprising 49% of the portfolio, followed by software at 33%, and fibre optic network at 19%.

Keeping assets in good condition allows the City to deliver services to residents safely and effectively. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs.

Typically, condition ratings can be established in two ways. The age-based approach simply uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Condition data was not available for IS assets at the time of this AMP. However, Condition Assessment Guidelines were developed to support the collection of IS condition data moving forward.

Given the rapid pace of technological change, asset age is often used as the primary factor in determining upgrade and replacement needs for IS assets. This approach suggests that 67% of all Information Services assets, with a current replacement cost of $6.4 million have less than 40% of their service life remaining.

Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is also more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. Similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Lifecycle Management and Long-term Replacement Needs

As with most communities across Canada, Port Coquitlam is facing an aging infrastructure and capital asset stock. Expenditures on Information Services assets averaged $3 million per decade over the last 30 years. Based on assets that are still in service, the largest expenditures were made in the 2010s, totaling $5.9 million, dominated by hardware assets and enterprise software applications. New infrastructure is often funded or constructed by development, or partially funded by external partners. However, the ongoing maintenance and replacement costs are borne by the municipality as the asset owner. The initial cost for new assets is only a fraction of the entire lifecycle cost to operate, maintain and replace them. Consequently, the challenge for municipalities is the considerable lifecycle costs of many assets that now fall on taxpayers alone to fund.

As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life. Although most capital assets require ongoing investments to maintain and replace, technological equipment often follows a buy-replace cycle, rather than rigorous lifecycle management. The City's average budget for Information Services totals $1 million annually. This is spent on the inspection, maintenance, and replacement of IS assets, aside from $25,000 per year which is allocated to operational expenditures that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (internet services, security testing).

Eventually, aging assets and outdated applications must be replaced or updated. Age analysis shows that replacement needs are relatively steady through the forecast period, averaging approximately $12 million per decade. However, given the dynamic nature of technology, the City's IS equipment portfolio is unlikely to remain static over a multi-decade horizon.

Regular upgrades and replacements of IS assets are essential to avoid compatibility issues, minimize security threats, and reduce downtime. This is particularly important for public-facing assets and services. Deferring asset upgrades and replacements can lead to a backlog of needs that can become difficult to overcome.

The City's current age-based backlog is $4.9 million, comprising IS assets that have exceeded their useful life but still remain in service. However, this figure increases to $6.4 million when assets in poor or worse condition or with less than 40% service life are included in the backlog estimate.

Although not all assets forecasted for replacement will need to be replaced, having a multi-decade view of upcoming needs is essential for financial planning. A long-term view allows staff to prepare ahead of time for major capital works, avoid unplanned expenditures, and minimize extreme fluctuations in user fees and tax rates.

Applying a Risk-based Approach

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects, refine backlog and future needs, and channel funds to where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

This AMP applies a quantitative approach to risk for all assets. Data that can best explain the probability of asset failures and help approximate the various consequences of these failure events has been modeled to develop asset risk matrices. As risk is a product of the probability of an asset's failure and the overall consequence of the failure event, a high risk-rating does not necessarily suggest that an asset is unable to safely perform its intended function. Even new assets can carry a high risk rating, given their strategic, financial, economic, and socio-political importance to the community.

This approach identified 45 assets, with a current replacement cost of $6.5 million, that carry a very high risk rating. These include various hardware assets, including PCs, network infrastructure, as well as software assets. An additional 39 similar assets with a combined replacement cost of $946k, carry a high risk rating. While the consequence of failure rating for these asset groups typically ranges from minor to moderate, most have an age-based condition rating of poor to very poor or less than 40% service life remaining, which drives their overall risk rating. Other assets, such as firewalls and network servers, have a severe consequence of failure.

Delivering Affordable Levels of service

Together with risk assessments, levels of service offer another lever that the City can use to deliver high-quality but affordable infrastructure programs. Levels of service describe how well agencies deliver services and whether service quality meets the expectations of the community. They can be measured using key performance indicators (KPIs).

For Information Services, a total of 16 KPIs were selected. This included six KPIs to measure customer levels of service, and 10 to track the City's technical levels of service. Technical levels of service can be thought of as the activities and steps the organization takes (inputs) to deliver customer levels of service (outputs). KPI data can be used to inform decisions to maintain, increase or decrease levels of service. Investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and improve customer levels of service. However, adjusting levels of service must be considered in light of cost, performance and risk.

Residents expect only the highest levels of service. However, as funds are limited, customer satisfaction must be balanced with the cost to deliver services and the risk posed to organization. Higher service levels come at a higher price, and can only be provided by diverting funds from one program to another (tradeoff), or by increasing tax or utility rates. Conversely, lower service levels may reduce funding needs, but can pose greater risk to the organization and the public.

Financial Strategy: Implementing the Asset Management Plan

The financial strategy provides a consolidated analysis for the City's eight service areas. They are grouped based on how assets within each service area are funded. Tax-funded service areas rely on property tax revenues, and include Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Water and Sanitary services are funded directly through their respective utility levies.

Although senior government grants are used to supplement the City's infrastructure spending needs, these are not included in the financial strategy. The aim of the financial strategy is to allow the City to build a sustainable infrastructure program using its own permanent and predictable sources of funding, namely, property taxes and utility levies. It will position Port Coquitlam to gradually eliminate annual funding deficits and achieve full, annual capital funding requirements for both tax- and levy-funded service areas.

Tax-Funded Service Areas

For tax-funded services, the annual average capital requirements total $33.8 million. The City currently contributes $7.9 million annually to its Long-Term General Infrastructure Reserve (LTGIR), creating a combined annual funding deficit of $25.9 million for these six service areas.

To close this gap for tax-funded assets, the City's property taxes would need to increase by 35%, based on 2023 revenues of $74.9 million. As this is not feasible, it is recommended that the City adopt a 15-year phase-in period, requiring a 1.00% annual increase to property taxes each year over this time period. This additional revenue would be fully allocated to the LTGIR. We note that the City already increases annual contributions to the LTGIR by 1% per year based on prior year's levy. As such, the recommended 1.00% increase would be over and above this existing annual increase, for a combined annual increase of 2.00% over the next 15 years.

Drainage Utility

Currently, drainage infrastructure is funded through property taxes. However, there is strong rationale for implementing a dedicated drainage utility levy, and municipalities across Canada have begun to implement this fee structure. Contributing factors include climate change impacts that are driving the need for new or upgraded drainage infrastructure and flood protection, and the higher relative lifecycle costs of drainage assets compared to water and sanitary infrastructure. These expenditures also reduce funds available for other tax-funded assets. If a drainage utility is established, a Long-Term Drainage Infrastructure Reserve (LTDIR) would be created, with annual contributions to this reserve funded through the levy rather than property taxes.

Levy-Funded Service Areas

Similar analysis was conducted for levy-funded services. For water and sanitary, average annual capital requirements total $4.5 million and $4.2 million, respectively. The City currently allocates $1.1 million to the Long-Term Water Infrastructure Reserve (LTWIR), generating an annual funding deficit of $3.4 million. Current allocations to the Long-Term Sewer Infrastructure Reserve (LTSIR) total $850 thousand, also resulting in an annual funding deficit of $3.4 million.

In 2023, Port Coquitlam's water and sanitary revenues totaled $13.1 million and $9.6 million, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR. For water, this would require a one-time levy increase of 26%, specifically for the purpose of phasing in full funding for water. Similarly, achieving full funding for sanitary services would require a one-time levy increase of 35%.

Consistent with tax-funded service areas, it is recommended that the City adopt a 15-year phase-in period to gradually achieve full funding for water and sanitary services. Under this model, water rates would see an annual increase of 0.55% for each year over the phase-in period; sanitary rates would require an increase of 1.03% annually. As with tax-funded services, these increases are in addition to the existing 1% annual increase for each service area.

For both tax- and levy-funded services, these models seek to eliminate annual funding deficits and achieve full funding. Alternative models are also illustrated, with target funding levels set at 75% and 50% of annual capital requirements. While achieving these lower targets may reduce the impact on property tax rates and utility levies, they may perpetuate infrastructure challenges and reduce service levels. Additional financial, economic, social, reputational, and public health and safety risks may also increase as a result of inadequate funding.

As such, it is recommended that the City endeavour to achieve full funding for both tax- and levy-funded service areas. The recommendations presented do not account for inflation; staff should periodically consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR, the LTWIR, and the LTSIR to maintain fiscal strength. Further, addressing the infrastructure backlog requires the strategic use of reserves and the City's development cost charges. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt may be used as supplementary, viable options.

Approach and Methodology

This asset management plan (AMP) was developed as part of the City of Port Coquitlam's current engagement with PSD Citywide. Individual AMPs were developed for each of the City's eight service areas, requiring substantial effort and collaboration over three years.

Developing the Asset Management Plan

The contents in this document were developed in five steps, summarized below.

Build a comprehensive asset inventory

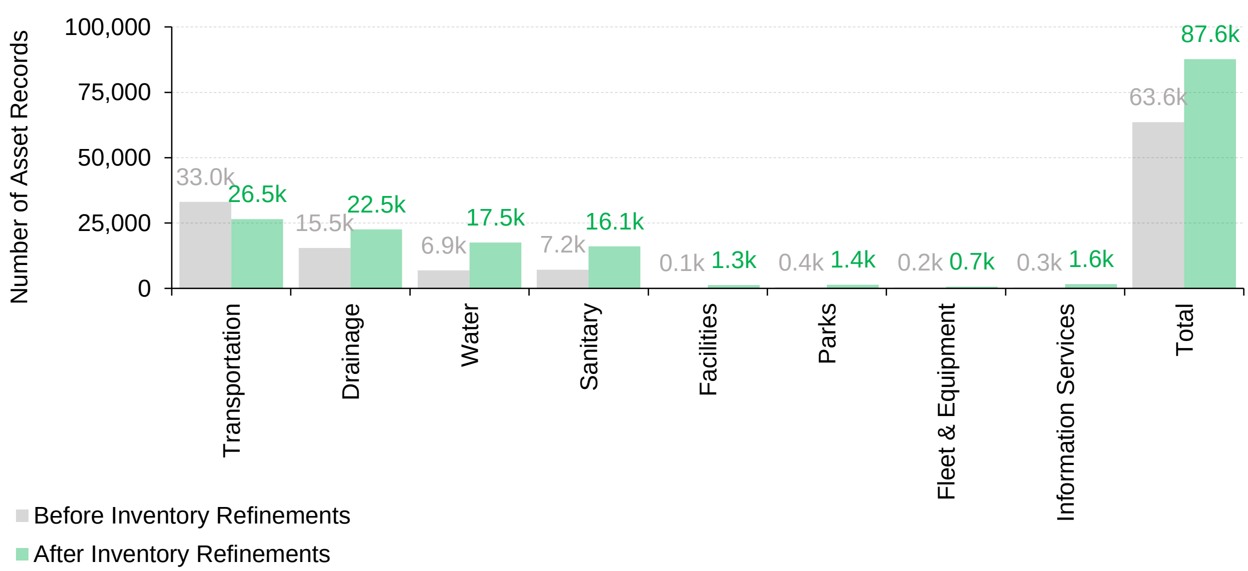
City staff manage multiple large-scale and complex infrastructure and capital asset datasets, found across different departments and in multiple formats. These datasets contain primary and secondary asset data. Primary data includes asset valuations, such as historical and current replacement costs; in-service dates; useful life estimates; quantities; and condition data. It is virtually impossible to produce any asset management-related reporting without this prerequisite information.

Secondary data provides more contextual information about an asset, such as its location, failure history, size, type, material, etc. These fields are used to establish an asset's criticality and develop risk models.

Both datasets were analyzed, refined, and verified through rigorous staff reviews. Identified gaps were closed through desktop research and/or physical in-field data collection by City staff. All new and existing datasets were ultimately consolidated to build a single source of truth (SST). A sharp focus was placed on data accuracy and currency, in particular, asset replacement costs and useful life estimates. These are key inputs for long-term financial planning and are necessary for determining the magnitude and timing of investments.

This finalized data was then uploaded into Citywide, the City's primary asset management software application. The inventory refinements resulted in a 38% increase to the number of total assets, from 63,603 asset records to 87,647. For Information Services, a total of 1,600 assets are currently managed in the inventory.

Figure 1: Number of Asset Records Before and After Inventory Refinements



Conduct asset-level risk assessments and build risk models

Preliminary risk models were developed for each asset class to establish asset risk ratings based on their probability and consequence of failure. Staff reviewed all risk models and provided feedback on the parameters used, including the suitability of parameters and how they were ranked and weighted. Once finalized, these models were built in Citywide and applied to all relevant assets to generate risk matrices.

Compile lifecycle activity data

To better understand the total cost of ownership of all assets, annual operating, maintenance, and capital spends were analyzed. Given their relatively low replacement costs when contrasted against major infrastructure, most IS assets do not undergo rigorous lifecycle management. Instead, they are simply replaced as they approach the end of their useful life, or in coordination with a broader, corporate IS strategy that may include proactive upgrades or changes in service providers.

Compile levels of service data

Four core values were established across each of the City's eight asset portfolios to ensure that the delivery of services are reliable, safe, affordable and practical. To track the performance of Information Services, technical and customer-oriented key performance indicators (KPIs) were selected and populated with data for 2021, as available. A total of 16 KPIs were selected, with six used for customer levels of service, and 10 for technical levels of service.

Develop financial strategy

The preceding content and information are used to develop a financial strategy. The strategy outlines the City's current funding position for each asset category and a path to reach sustainability by closing any identified funding gaps. Development of the strategy involves a comprehensive review of all pertinent financial documents, including audited statements, and collaboration with Finance staff.

Information from asset management plans can be used to determine appropriate levels of funding for capital and operational budgets. Reinvestment rates can be used to determine how much to spend on maintenance and replacement activities each year in order to maximize and extend the life of assets, and plan for their replacement. Key performance indicators can be tracked and used to determine how much to spend on operational activities to maintain acceptable levels of service and efficient operations.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.

2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce highly inaccurate estimates. It was not deployed in this AMP.

3. An asset's condition is essential for estimating its current and future performance, and the investments that may be required to bring it back to a state of good repair. When actual, in-field condition assessment data isn't available, the asset's age can be used to approximate its condition. Although asset age is integral to asset management planning, it can produce an over- or understatement of asset needs. As a result, financial requirements generated through age analysis can differ from those produced by staff using field observations.

4. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

5. The AMP is cross-sectional, offering a synopsis of the City's Information Services assets up to a given time period. Some information may become outdated quickly. This can result from new condition assessments, or acquisition or disposal of assets that was not reflected at the time the AMP was developed.

It is quite common for municipalities to experience these limitations as they develop their first asset management plan. Although many data gaps were closed during this project, some may still persist. Closing these data gaps and overcoming limitations is an iterative process, requiring dedicated staff time and other resources. Staff will continue to refine the City's asset inventory to further enhance data quality and integrity for future iterations of this AMP and all asset management reporting.

State of the Infrastructure

The state of the infrastructure (SOTI) provides a detailed overview of City of Port Coquitlam's Information Services assets. It identifies how assets were classified as part of a larger network and system of assets; the current quantity and replacement value of all assets; and, a detailed age and condition profile.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is reported and interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key details are summarized at the asset segment level.

Information Services contains a variety of different assets, such as telephones, computers, printers, servers, firewalls, software and fibre optic network. These assets were grouped into segments of hardware, software and fibre optics.

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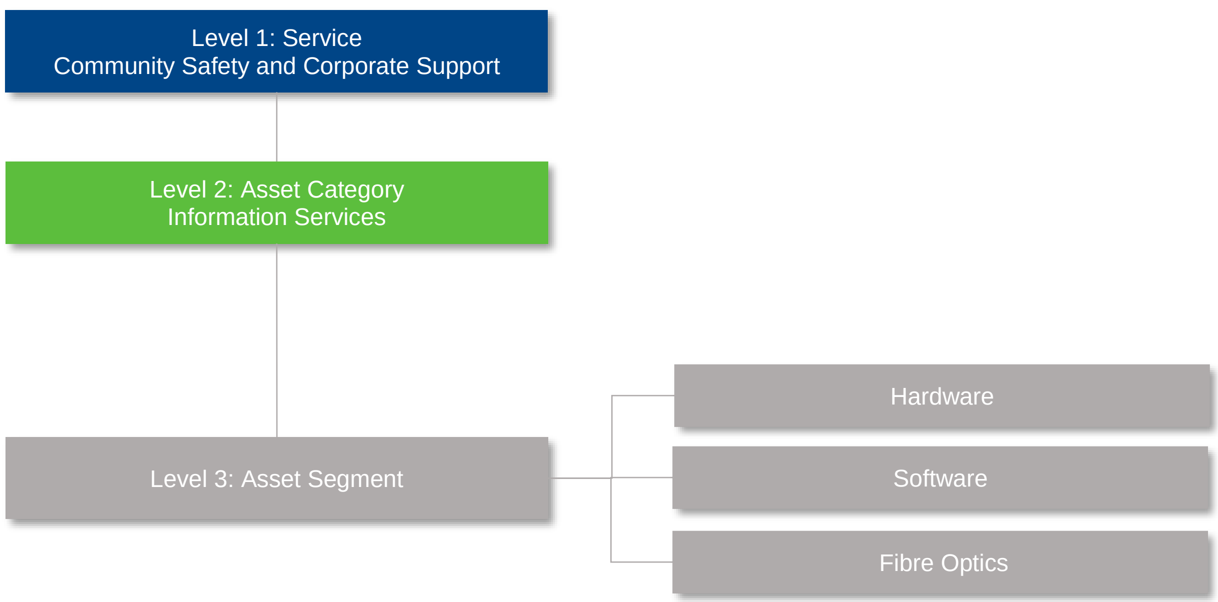
Figure 2: Asset Hierarchy and Data Classification



Inventory and Valuation

The City of Port Coquitlam's Information Services database contains more than 1,600 assets including hardware, software, and a fibre optic network. The total replacement cost was estimated at $9.6 million as of 2023.

Costing Methods

As part of compliance with PSAB 3150, municipalities across Canada were required to establish historical costs for all capital assets. However, asset management analysis and reporting require accurate current replacement costs. Several approaches can be taken to estimate the cost of replacing a like-for-like asset that offers identical or similar service levels. These are illustrated in Table 1.

Table 1: Methods for Establishing Replacement Costs

Costing Method	Description	Accuracy
CPI	Historical or acquisition costs are inflated to current day using available inflation indices. Given its tendency to provide inaccurate estimates for older assets, this approach is used when other methods cannot be applied with reasonable confidence.	Low
Cost Per Unit	Using procurement data from recent projects, including invoices, quotes, and/or tenders, the unit cost of an asset is applied to all asset types (segments) to establish total current replacement costs. This method is typically applied to linear assets.	High
User-defined	Similar to the cost per unit approach, this method also requires procurement data and staff judgement to estimate an asset's current acquisition cost. This method is typically applied to non-linear or point assets.	High

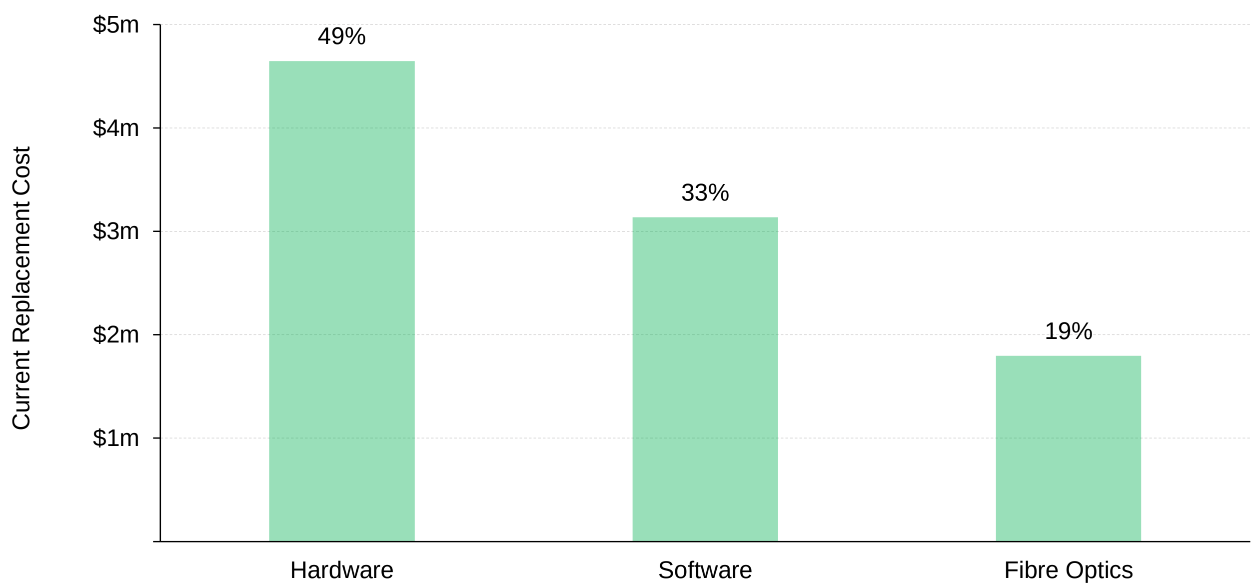
Table 2 summarizes the quantity and current replacement cost of the City's Information Services assets as managed in its primary asset management register, Citywide. Hardware comprises 50% of the IS portfolio, and includes assets such as telephones, computers, printers, servers and firewalls. Software includes programs and licenses such as Agresso, Tempest, Active Net, Laserfiche, Microsoft Office and PoCoMap, which together make up 33% of Information Service assets. Fibre Optic assets include chambers and ducts typically situated in road rights-of-ways.

The replacement costs outlined below were initially established by staff in 2021. They were then increased in 2023 by 10% to reflect prevailing market conditions and account for inflation over the last two years.

Table 2: Detailed Asset Inventory

Segment	Quantity	Replacement Cost	Primary Costing Method
Hardware	986	$4,647,827	User-defined
Software	456	$3,135,848	User-defined
Fibre Optics	206	$1,796,798	CPI
Total	**1,648**	**$9,580,473**	

Figure 3: Portfolio Valuation



Asset Condition

Reliable long-term planning for capital assets hinges on accurate current condition ratings. Condition data helps to prevent premature and costly rehabilitation or replacements, and ensures that lifecycle activities occur at the right time to maximize asset value and useful life while minimizing costs. In the case of IT assets, however, rigorous condition assessments may be limited to major infrastructure and network components. Visual inspections and testing can be conducted as part of routine maintenance and operations.

Source of Condition Data

Typically, condition ratings can be established in two ways. The age-based approach uses an asset's age as a proxy for its condition: older assets have less service life remaining than newer ones, and are assumed to be in poorer shape. In contrast, in-field condition assessments rely on detailed inspections by qualified staff who assess each asset against robust, technical criteria. Both age and in-field condition ratings provide useful data to refine long-term projections.

As no equipment condition assessment data was available, age was used as an estimate for condition for all assets. This is a standard approach that is applied to technology equipment.

Table 3: Source of Condition Data

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source
Information Services	Hardware	0%	Age-based estimates
Total		**0%**	

Condition Assessment Guidelines

Condition Assessment Guidelines were developed for Information Services assets to support the collection of condition data (Appendix A). It is recommended that the guidelines be used to complete some assessments each year, and the collected data be uploaded to Citywide, the City's asset management software.

Condition Rating System

A condition rating scale provides a standardized and descriptive framework that can be used to assign a condition score to all assets, typically on a range of 0-100. This AMP uses a general condition rating scale, aligned with the federal Canadian Core Public Infrastructure Survey.

Table 4: General Condition Rating Scale – All Assets

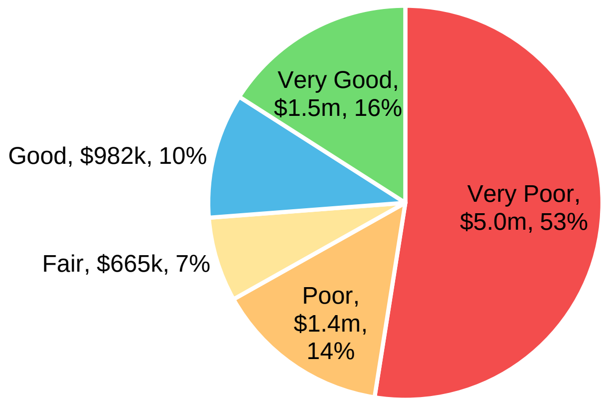
Condition Rating	Description	Criteria	Service Life Remaining (%)
Very Good (80-100)	Fit for the future	Asset is new or recently rehabilitated	80-100
Good (60-80)	Adequate for now	Asset is performing well; minor defects; only regular maintenance required	60-80
Fair (40-60)	Requires attention	Asset is operational, but signs of deterioration evident; some elements exhibit significant deficiencies; renewal upgrade, or replacement required in the medium term	40-60
Poor (20-40)	Increasing potential of service disruption	Asset approaching end of service life; condition below standard; significant deterioration; renewal, upgrade, or replacement in the short term	20-40
Very Poor (0-20)	Unfit for sustained service	Service life is fully consumed; asset remains in service beyond service life; widespread and advanced deterioration; may be unusable and requires immediate replacement	0-20

Projected Asset Conditions

Figure 4 summarizes the replacement cost-weighted condition of all Information Services assets. Based only on age, 67% of assets with a current replacement cost of more than $6.4 million are in poor to very poor condition, or have less than 40% service life remaining. Additional detail is provided in subsequent figures at the asset type or segment level.

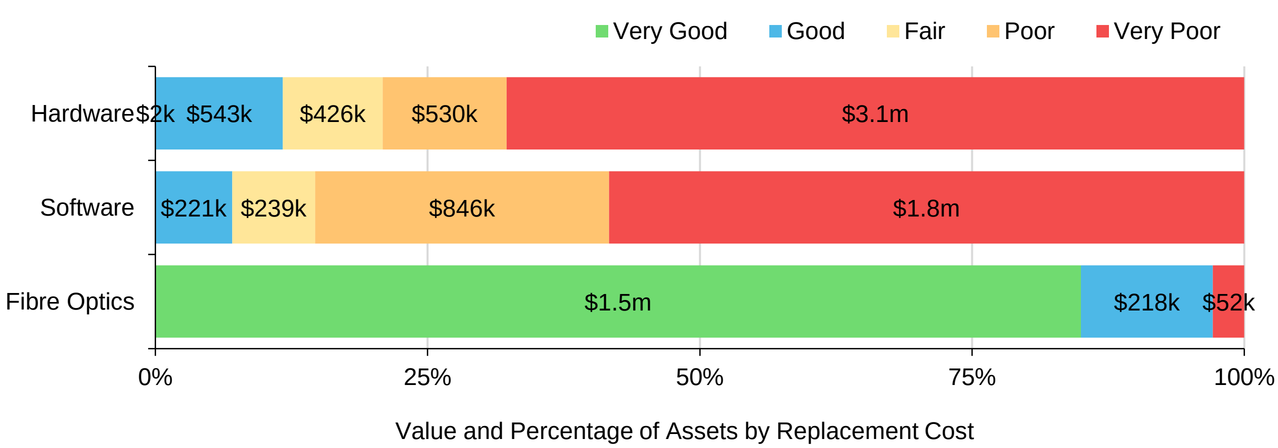
Assets in poor or worse condition may be candidates for replacement in the immediate or short term and should be monitored closely to avoid costly failures that may disrupt service and pose a risk to public health and safety. It is often more economical to keep assets in at least fair or better condition, with smaller and more frequent maintenance. However, most IS assets have relatively short lifespans, and may be upgraded or replaced proactively despite their physical condition ratings.

Figure 4: Asset Condition: All Information Services Assets



As illustrated in Figure 5, based on age data, a substantial portion of hardware and software assets are in poor or worse condition, or have less than 40% useful life remaining. Although software assets do not physically deteriorate, older applications may become obsolete or pose compatibility issues. Based on replacement cost, most fibre optics assets are in good to very good condition.

Figure 5: Asset Condition – By Segment



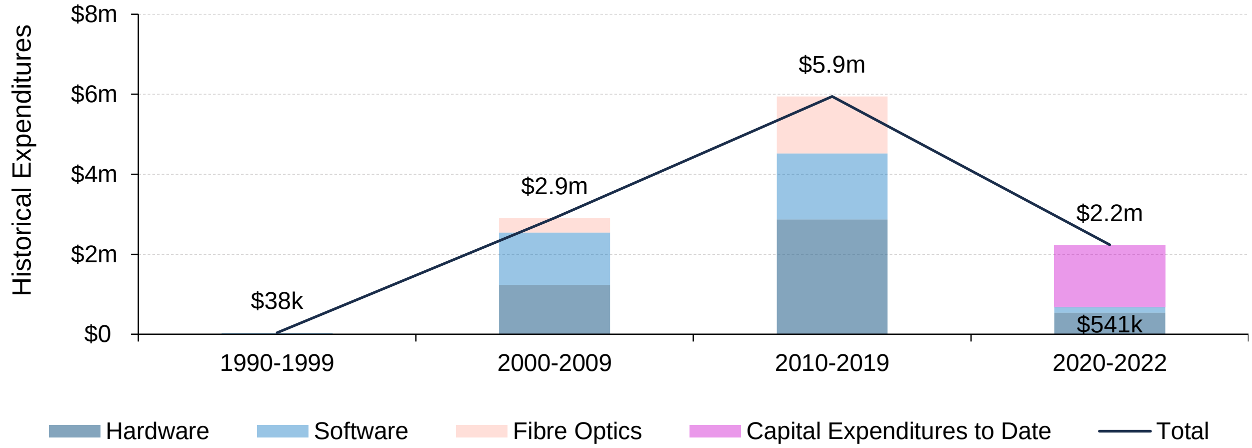
Age Profile

An asset's age profile provides valuable insights and can help identify assets that may be candidates for further evaluation through condition assessment programs; inform the selection of lifecycle strategies; and improve planning for potential replacement spikes. Age is particularly important for IS assets, many of whom face planned obsolescence, with potential compatibility issues.

Historical Asset Expenditures

Figure 6 illustrates Port Coquitlam's historical expenditures on the construction or acquisition of Information Services assets since 1990. The data reflects the City's current or active inventory only; assets that have been disposed of or decommissioned over time are not included. Given their relatively short lifespans, IS assets can go through many buy-replace cycles over the span of a few decades. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

Figure 6: Historical Expenditures on Asset Acquisition



Expenditures on Information Services assets averaged $3 million per decade between 1990 and 2019. Based on assets that are still in service, the largest expenditures were made in the 2010s, totaling $5.9 million, dominated by acquisition of hardware assets. In the current decade, the City has made capital investments of $2.7 million between 2020 and 2022.

Historical spending, when combined with an asset's established design life, can be used to forecast upcoming replacement needs across long-term, often multi-decade time horizons.

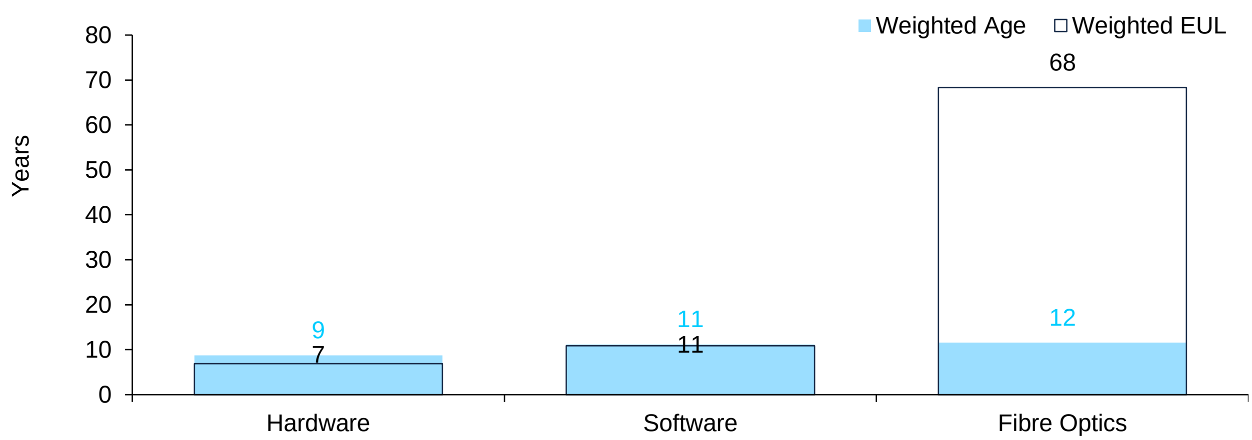
Serviceable Life vs. Current Asset Age

An asset's estimated useful life (EUL) is the serviceable lifespan of an asset during which it can be expected to deliver its intended function safely and effectively. As assets age, their performance diminishes, often more rapidly as they approach the final quarter of their design life.

Determining accurate EULs for all assets is essential for building reliable long-term forecasts and informing condition assessment programs. EULs for all assets were established and verified by staff to ensure they are aligned with broader industry standards, but also reflect typical asset performance and expectations in Port Coquitlam.

Figure 7 plots the average established useful life of Information Services assets against their current average age. Both values were weighted by the replacement cost of individual assets.

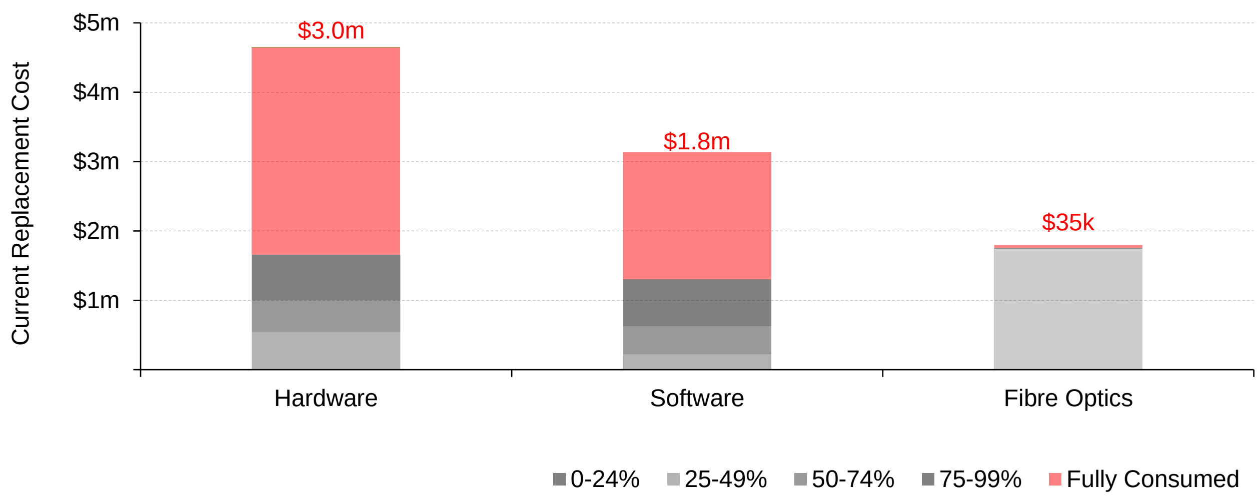
Figure 7: Average Asset Age vs. Estimated Useful Life



Age analysis indicates that most hardware and software assets remain in service beyond their established lifespan. However, fibre optics are still within the earlier stages of their lifespans.

Figure 8 shows a detailed distribution of the City's Information Services assets based on the portion of useful life consumed to date. The distribution shows that approximately 60% of hardware and software assets remain in services beyond their established lifespans. For software assets, reference to useful life consumption may pertain to previously established licensing terms or prior upgrade plans.

Figure 8: Percentage of Estimated Useful Life Consumed



Lifecycle Management

The initial acquisition of assets, particularly major capital assets, represents only a fraction of the total cost of ownership that agencies can expect to incur. Assets require ongoing operations, maintenance, and replacements to ensure they can continue to deliver their intended functions. These reinvestments back into infrastructure are necessary through the life of the asset.

Lifecycle costs include activities that have a direct and tangible impact on the asset's lifespan such as maintenance, repairs, and replacements. Additional operational costs are also needed to maintain customer-oriented service levels and efficient operations.

Information technology equipment is typically subject to a buy-replace cycle, rather than comprehensive and on-going lifecycle management. This ensures that vital hardware and software assets remain current and compatible with evolving technology and service platforms.

Current Lifecycle Framework

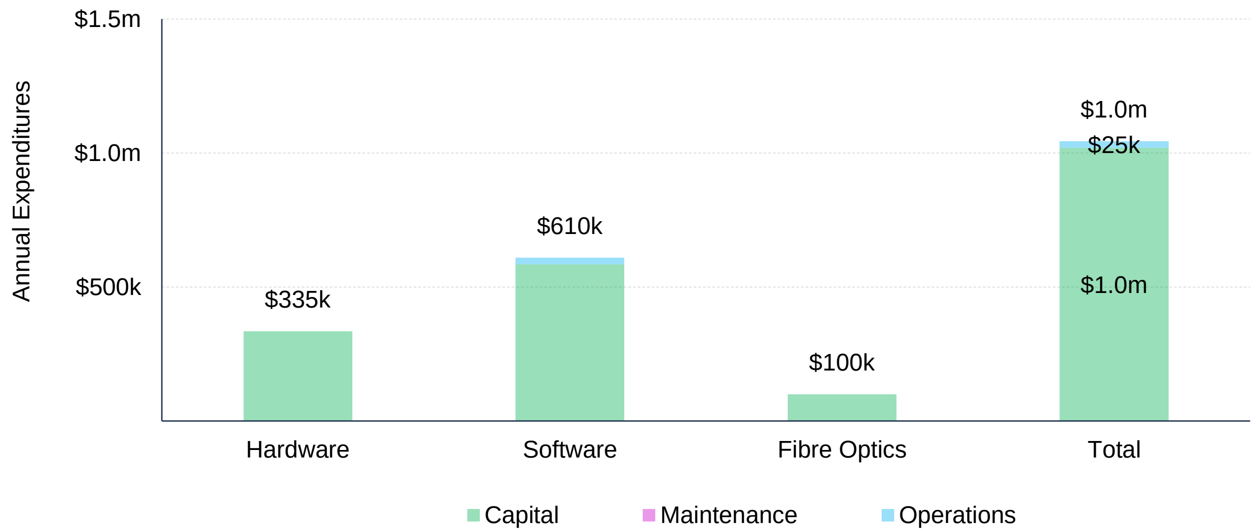
The City of Port Coquitlam's approach to asset lifecycle management is comprehensive. Maintenance, repair and replacement activities are guided by inspections, asset age, and staff judgment through routine monitoring and in alignment with any corporate strategies for broader IS upgrades and service changes. Lifecycle strategies are meant to ensure continuity of operations, minimize downtime, and prevent security issues. This section summarizes the City's lifecycle framework for each asset segment, modeled on Table 5.

Table 5: Components of a Lifecycle Framework

Component	Description		
Segment	Asset segment – hardware, software, fibre optic network		
Activity Type	**Capital** Major repairs, renewals, rehabilitations, upgrades, and replacements	**Maintenance** Activities that have a direct and tangible impact on asset lifespan such as inspections, maintenance and minor repairs.	**Operations** Activities and costs needed to maintain acceptable service levels and efficient operations. No impact on asset lifespan.
Annual Budget	Typical funding available (actual spending may vary from year to year). Expenditure history from 2019-2021 was used to calculate a 3-year average.		
Reinvestment Rate	Annual capital budget as a portion of the total Information Services portfolio replacement cost of **$9,580,473**.		

Figure 9 summarizes annual expenditures by service and expenditure type. Based on a 3-year average between 2019-2021, the City allocates $1.0 million annually on Information Services operations, maintenance, and asset replacements.

Figure 9: Summary of Capital, Operating, and Maintenance Expenditures



Of the $1.0 million annual IS budget, the majority is spent on the inspection, maintenance, and replacement of assets. About $25,000 is allocated annually towards operational expenses that maintain acceptable levels of service and efficient operations, but have no direct impact on asset life (e.g., internet and security testing).

Table 6 outlines the City's lifecycle framework for Information Services assets.

Table 6: Lifecycle Framework

Activity	Segment	Class	2019	2020	2021	Average
Disk Storage	Hardware	Capital	$300,000	$0	$0	$100,000
Software Upgrades	Software	Capital	$100,000	$200,000	$50,000	$116,667
Telephone System	Hardware	Capital	$50,000	$100,000	$0	$50,000
Servers	Hardware	Capital	$150,000	$0	$0	$50,000
Software Licenses	Software	Capital	$385,000	$498,000	$520,000	$467,667
Personal Computers	Hardware	Capital	$50,000	$140,000	80,000	$90,000
Network Infrastructure	Hardware	Capital	$100,000	$100,000	$50,000	$$83,333
Laptop and Tablet Replacement	Hardware	Capital	$50,000	$0	$85,000	$45,000
Fibre Optic	Fibre Optic	Capital	100,000	$100,000	$100,000	$100,000
Sub-Total Capital			$1,285,000	$1,138,000	$885,000	**$1,019,334**
Internet Services	Software	Operations	$10,000	$21,000	$25,000	$18,667
Security Audit and Testing	Software	Operations	$0	15,000	$5,000	$6,667
Sub-Total Operations			$10,000	$36,000	$30,000	$25,334
Total			**$1,295,000**	**$1,174,000**	**$915,000**	**$1,044,668**

Reinvestment Rates

Capital reinvestment rates, expressed as a percentage of asset replacement costs, offer valuable information about the financial sustainability of infrastructure assets. Reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reserves, to ensure asset replacement needs are met as they arise.

Maintenance and operational costs are not reflected in reinvestment rates, but are important considerations for operational budgeting in order to maximize the life of assets while maintaining acceptable levels of service and efficient operations.

Table 7 illustrates two types of reinvestment rates: segment and service area. The segment-level reinvestment is calculated by dividing the total capital expenditures of an asset segment by the replacement cost of that particular asset segment. The service area reinvestment rate is calculated by dividing capital expenditures for each asset segment over the total replacement cost of the service area as a whole. The overall, combined service area reinvestment rate can be used for long-term financial planning and strategic decision-making.

Table 7**Error! Reference source not found.** shows that the City's annual Information Services capital expenditures of $1 million yield an overall, service area reinvestment rate of 10.6%.

Table 7: Current Reinvestment Rates

Segment	Annual Capital Budget	Segment Capital Reinvestment Rate	Service Area Capital Reinvestment Rate
Hardware	$335,000	7%	3.5%
Software	$584,334	19%	6.1%
Fibre Optics	$100,000	6%	1.0%
Total	**$1,019,334**		**10.6%**

Reinvestment Rate Benchmarks

Although there is no scientific or industry consensus on how much an agency should spend or allocate to reserves each year for asset replacements, some benchmarking is available to provide guidance on adequate reinvestment levels, or target reinvestment rates (TRR).

Inconsistencies in methodologies and incomplete details make for imperfect comparisons but can still be very useful. Actual reinvestments also vary considerably across municipalities, and reflect many factors, including current asset conditions, financial capacity, and council priorities.

Canadian Infrastructure Report Card

In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card contained recommended reinvestment rates that can serve as benchmarks for municipalities. The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as actual municipal averages.

Reinvestment levels range from 1-3% for major infrastructure groups, such as roads, facilities, water, wastewater, and storm. However, no reinvestment rate was available from CIRC specifically for Information Services assets. IS assets typically have short lifespans and are costly investments, producing disproportionately high reinvestment requirements.

System Generated Reinvestment Rates

Using the City's inventory data, Citywide Asset Manager generates the average annual requirements (AAR) associated with each asset. The AAR is calculated by dividing the replacement cost of an asset by its established useful life. This can then be aggregated for all assets to derive category level reinvestment rates.

The AAR serves as a benchmark for annual spending on major capital assets (or allocations to reserves) to ensure that asset replacement needs are met as they arise. AAR value is then divided by the total replacement cost of the service area or category to calculate target reinvestment rates.

Table 8: System-generated Reinvestment Rates

Segment	AAR	System-generated TRR
Road Network	$809,261	17%
Bridges	$459,190	15%
Sidewalks	$29,557	2%
Total	**$1,298,008**	**14%**

For Information Services assets, the average annual capital replacement requirements total $1,298,008 for a system-generated target reinvestment rate of 14%.

Table 9 compares the City's current reinvestment rates against the system-generated reinvestment rates as found in Citywide. As noted above, IS asset data was not available from CIRC or other municipalities at the time of this AMP.

Table 9: Information Services Capital Reinvestment Rate Comparison

Benchmark	Assets Included	Target Capital Reinvestment	Port Coquitlam Capital Reinvestment Rate (Segment)	Port Coquitlam Capital Reinvestment Rate (Service Area)
Citywide Asset Manager	Hardware	17%	7%	3.5%
Citywide Asset Manager	Software	15%	19%	6.1%
Citywide Asset Manager	Fibre Optics	2%	6%	1.0%
Citywide Asset Manager	**All IS Assets**	**14%**		**10.6%**

The analysis shows that Port Coquitlam's overall reinvestment rate of 10.6% is lower than the system-generated reinvestment rate of 14%.

Maintaining adequate reinvestment rates –whether through actual spending on infrastructure programs or earmarking funds for future investments—ensures that service levels are maintained, and replacement needs can be met as they arise.

Capital and Operational Budgeting

Information from asset management plans can be used to determine appropriate levels of funding for capital and operating budgets, which serve different purposes.

Table 10: Purpose of Capital and Operating Budgets

Budget	Role in Infrastructure Programs
Capital	The capital budget includes funds to replace existing assets and acquire new, non-growth related assets. Asset replacements are funded by taxpayers and can be determined by reinvestment rates. Growth-related assets and capacity upgrades are partially funded by Development Cost Charges or external parties, or constructed by development. These are determined by growth projects and infrastructure capacity assessments.
Operational	The operational budget includes funds to maintain assets and deliver services. Maintenance costs include activities and expenditures that have a direct impact on assets by prolonging and maximizing their service life or deferring their replacement. These expenditures are informed by asset management plans and key performance indicators. Operational costs include activities and expenditures that maintain acceptable levels of service and efficient operations but have no direct or tangible impact on asset lifespan.

Capital reinvestment rates can be used to determine annual capital expenditure targets, or allocations to reservices, to ensure asset replacements needs are met as they arise.

Key performance indicators can be tracked and used to determine how much to spend on maintenance and operational activities in order to maximize the service life of assets while maintaining acceptable levels of service and efficient operations.

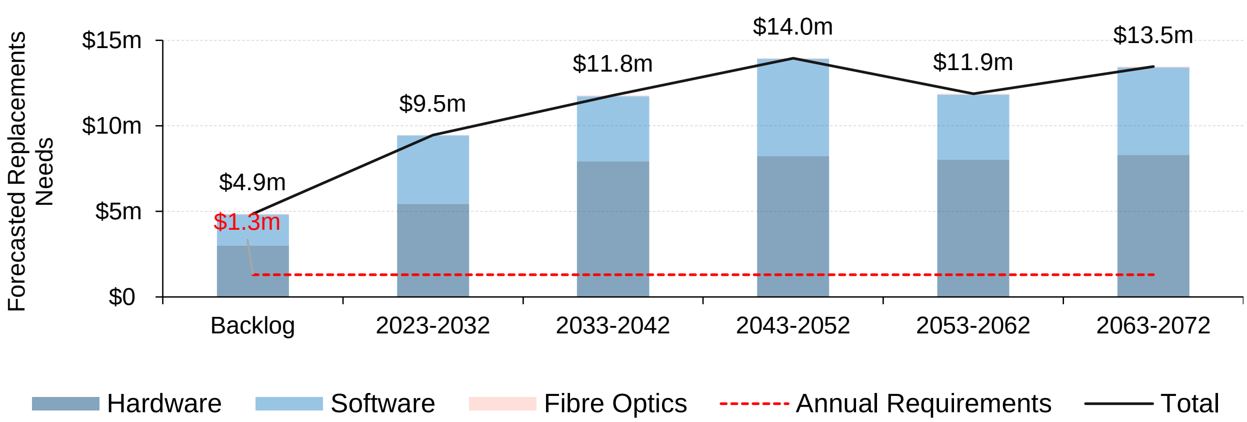
Forecasted Long-term Replacement Needs

In contrast to historical investments in capital assets, Figure 10 illustrates the cyclical short-, medium- and long-term replacement requirements for Information Services assets over the coming decades. The City's average annual requirements for Information Services asset replacements total $1.3 million (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The City's current capital expenditures of $1 million per year on IS asset replacements are well aligned with the benchmark of $1.3 million recommended to ensure that replacement needs are met.

The chart shows that replacement needs are relatively steady through the forecast period, averaging approximately $12 million per decade. However, given the rapidly changing and dynamic nature of information technology, the City's IS portfolio is unlikely to remain static over a multi-decade horizon.

Figure 10: Forecasted Long-term Replacement Needs



The chart also shows an age-based backlog of $4.9 million, comprising assets that have reached the end of their estimated useful life. However, the figure increases to $6.4 million when assets in poor or worse condition or with less than 40% service life remaining, are included in the backlog estimate. These assets may also already be candidates for immediate or short-term replacement because of their assumed condition. For IS assets, age is a particularly useful indicator of replacement or upgrade needs given the rapid pace of technological change.

The magnitude of capital needs typically far exceeds what most agencies can afford to fund. It is also unlikely that all assets deemed as candidates for replacement will require replacement. A risk-based approach can be used to direct funds where they are needed most first in order to strategically address age- and condition-based backlogs.

Risk Analysis

The level of risk an asset carries determines how closely it is monitored and maintained, including the frequency of various lifecycle activities, and the investments it requires on an ongoing basis.

Some assets are also more important to the community than others, based on their financial and economic significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders. Although public health and safety is paramount, many factors other than an asset's age or condition must be considered when prioritizing investments in infrastructure and making the most of limited funds.

Keeping up with replacement needs poses a substantial challenge for most local governments and public agencies across Canada. A risk-based approach to infrastructure spending can help prioritize capital projects to channel funds where they are needed most. Rather than taking the worst-first approach, a risk-based approach ranks assets based on their condition/performance as well as their criticality—providing a more complete rationale for project selection.

Calculating Asset Level Risk

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

The approach used in this asset management plan relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Figure 11: Calculating Risk Ratings

Risk	=	Probability of Failure	x	Consequence of Failure

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure. Typically, these can include the asset's condition, age, and any data on previous performance history. Each of these factors and individual attributes must also be weighted based on how well it can predict and explain the likelihood of asset failure. Most hardware or software is updated before the end of service life to avoid compatibility issues i.e., failures.

Consequence of Failure

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from insignificant and minor, to severe. Failure of a single PC within a non-critical service area may affect one employee and cause inconvenience. However, a network wide data breach across the City may affect all staff and disrupt customer service. Similarly, a cyber security breach of private information could compromise the organization or the public.

The parameters used to describe and measure an asset's consequence of failure will aim to align with the Triple Bottom Line (economic, social, environmental) approach to risk management as well as other considerations including regulatory, health and safety, and strategic.

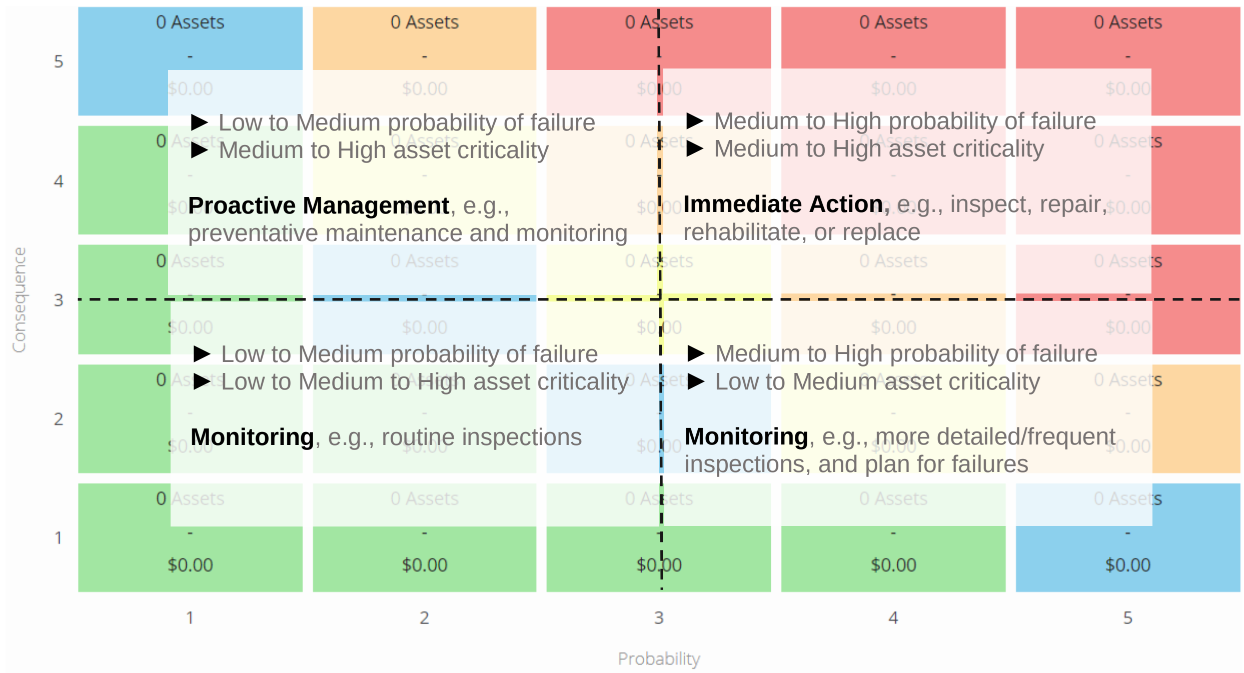
When various types of consequences that the organization and community may face from an asset's failure are identified and properly weighted based on their relative magnitudes, an asset's criticality can be approximated.

Table 11: Types of Consequences of Asset Failure

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the City.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Individual risk models are developed for all Information Services assets, and applied to the City's inventory within Citywide to establish asset risk ratings. These risk indices or ratings are then used to stratify assets within a risk matrix, as illustrated in Figure 12.

Figure 12: Generic Risk Matrix



Since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets in very good condition can receive a moderate to high risk rating despite a low probability of failure. These assets may be deemed as highly critical to the City based on their costs, economic importance, social significance, and other factors.

Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

Risk Models and Matrices

The following section outlines the proposed risk models for Information Services assets. Factors and weights used in both the probability of failure and consequence of failures are outlined, along with the associated ranges that will be used to classify individual assets. Resulting risk matrices are also illustrated for each major asset type, as well as Information Services as a whole.

Two factors were used to help explain potential asset failure. These include the service life remaining of each asset and its age-based condition ratings. In the model below for probability of failure, the age-based condition is presumed to better estimate and explain an asset's likelihood of failure, receiving a high weighting.

Figure 13: Probability of Failure

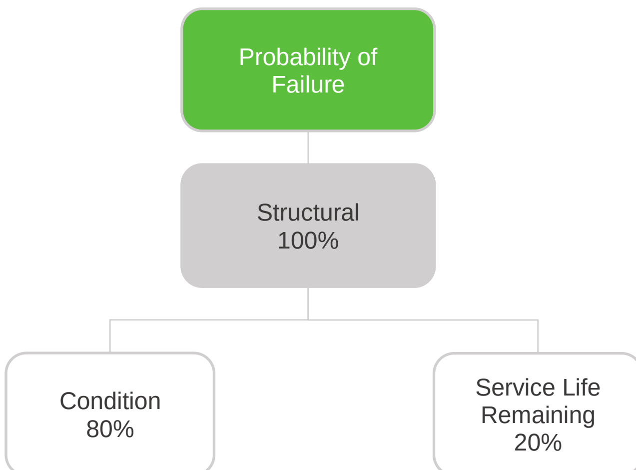


Table 12 outlines the relationship between the probability of failure and the ranges used for each of the above factors. Assets with a condition rating of 20% or less, or with a remaining service life of less than 10%, have the highest likelihood of failure, i.e., 'Almost Certain'.

Table 12: Defining Probability of Failure Ranges

Factor	Range (0-100%)	Probability of Failure
Condition (%)	Greater than 80	1—Rare
	60 - 80	2—Unlikely
	40 - 60	3—Possible
	20 - 40	4—Likely or Probable
	0 – 20	5—Almost Certain
Service Life Remaining (%)	Greater than 40	1—Rare
	30 - 40	2—Unlikely
	20 - 30	3—Possible
	10 - 20	4—Likely or Probable
	0 - 10	5—Almost Certain

The model in Figure 14 outlines the type of potential consequences that may result from failure of a facility asset. Data for Information Services includes the replacement cost and type of each asset. These attributes are used to assist in measuring and quantifying the direct financial, socio-political, and health and safety related consequences of potential asset failures.

Figure 14: Consequence of Failure

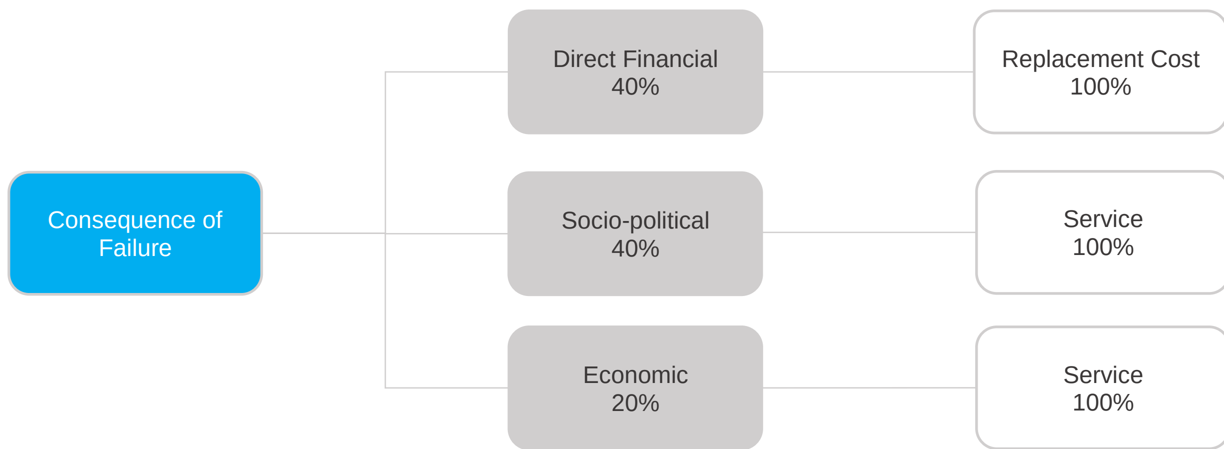


Table 13: Defining Consequence of Failure Ranges

Type of Consequence	Measure	
Direct Financial	Replacement Cost	Consequence of Failure
	Less than $10,000	1—Insignificant
	$$10,000 - $50,000	2—Minor
	$50,000 - $100,000	3—Moderate
	$100,000 - $500,000	4—Major
	Greater than $500,000	5—Severe
Socio-political	Segment	Consequence of Failure
	Hardware	3—Moderate
	Software	4—Major
	Fibre Optics. Firewalls, Servers	5—Severe
Economic	Segment	Consequence of Failure
	Hardware	3—Moderate
	Software	4—Major
	Fibre Optics, Firewalls, Servers	5—Severe

Risk Matrix

The risk matrix below is based on the previous risk model developed for Information Services. It is generated using available asset data.

Figure 15: Detailed Risk Matrix

Consequence of Failure	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	7 Assets $692.9K	0 Assets $0	1 Asset $110.0K	2 Assets $890.3K	4 Assets $1.4M
3	197 Assets $1.1M	5 Assets $331.3K	2 Assets $151.1K	6 Assets $902.0K	35 Assets $3.5M
2	1 Asset $1.6K	2 Assets $29.1K	2 Assets $21.8K	9 Assets $135.7K	24 Assets $359.6K
1	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0

Probability of Failure

The consolidated risk matrix in Figure 16 shows that 45 assets, with a current replacement cost of $6.5 million, carry a very high risk rating. These include various hardware assets, including PCs, network infrastructure, as well as software assets. An additional 39 similar assets, with a combined replacement cost of $946k, carry a high risk rating. Although the typical consequence of failure rating for both of these asset groups ranges from minor to moderate, most have an age-based condition rating of poor to very poor, which drives their overall risk rating.

Figure 16: Consolidated Risk Matrix

Very Low (1 - 4)	Low (5 - 7)	Moderate (8 - 9)	High (10 - 14)	Very High (15 - 25)
144 Assets	63 Assets	6 Assets	39 Assets	45 Assets
$1,427,506	$348,383	$344,467	$946,515	$6,513,602

Levels of Service

Levels of service (LOS) measure the quality and quantity of service provided, and offer direction for infrastructure investments. They are necessary for performance tracking and reporting. Many agencies attempt to deliver levels of service that cannot be sustainably funded by the existing tax base. This can lead to an eventual drop in quality of service, or increases to tax and utility rates to fund higher service levels.

LOS should be affordable and aligned with the community's long-term vision for itself and the service attributes it most values for different infrastructure programs.

Defining Levels of Service

Levels of service measure the quality, function, and capacity of an asset class or service area. LOS is an internationally recognized concept, employed across a variety of sectors, including public infrastructure. The International Standards Organization's ISO 55000 defines levels of service as the "parameters, or combination of parameters, which reflect the social, political, environmental, and economic outcomes that the organization delivers."

Levels of Service Framework

A typical levels of service framework includes several common components, as outlined in the table below.

Table 14: Components of a Levels of Service Framework

Component	Description and Purpose
Core Value	Typical core values that can be used for infrastructure programs include safety, reliability, efficiency, sustainability, and affordability.
Levels of Service Statement	The LOS statement expands on each core value and converts it into an objective for each service area.
Customer Levels of Service	CLOS are measurements or qualitative descriptions that help **describe the performance of the asset group or service area from an end-user perspective**. CLOS are generally related to residents, but can be used for staff. CLOS measure experiences, e.g., customer satisfaction with quality of recreational services; average travel times between major residential and commercial centres; watermain breaks; sewage backups; and, health and safety incidents.
Technical Levels of Service	TLOS are typically more operational in nature and are designed to measure the **various activities and steps that the organization takes to deliver the customer-oriented levels of service**. They can include data on maintenance activities and different condition assessment programs. TLOS are often seen as inputs whereas CLOS are viewed as outputs. Some KPIs can be both customer and technical oriented.
Key Performance Indicators	For both CLOS and TLOS, suitable key performance indicators (KPIs) must be selected to support reporting and tracking of each.

Core Values and Service Statements

Table 15 outlines four core values developed for service delivery across each of the City's asset portfolios. Service statements expand the values to convert them into broader goals.

Table 15: Core Values and Service Statements

Core Value	Service Statement
Reliable	Service delivery is reliable and provided with minimal service disruption to meet agreed upon levels of service.
Safe	All safety standards and regulatory requirements are met to protect public health, safety, and the environment.
Affordable	Services are affordable, fair, and equitable, accounting for the full cost of service delivery at agreed upon levels of service.
Practical	Resources are prioritized towards the delivery of basic infrastructure and services first.

Selecting Suitable KPIs

Given the complexity of infrastructure and major capital assets, countless customer and technical levels of service KPIs can be used to monitor performance, and ultimately, adjust the cost, performance, and risk associated with different assets. For the purpose of asset management planning, KPIs selected should be higher-level in nature and summarize the performance of the asset group as a whole rather than enumerate hundreds of daily, operational indicators.

The KPIs should also be aligned with corporate goals and initiatives. This maintains a 'line of sight' between staff activities, end-user experiences, and council direction as typically illustrated in strategic planning documents, i.e., measuring what matters most to Port Coquitlam residents. In addition, rather than generating new metrics, the selected KPIs should first maximize data already available. Often, available data can be readily converted into meaningful KPIs.

For Information Services, a total of 16 KPIs were selected. This included six KPIs to measure customer levels of service, and 10 to track the City's technical levels of service. A practical way to distinguish between the two is to think of technical levels of service as the activities and steps the organization takes to deliver customer levels of service.

Table 16: Customer Levels of Service

KPI	2018	2019	2020	2021	Trend
Capital					
Percentage of IS assets in poor or very poor condition, or with less than 40% service life remaining	*	*	*	67	→
Maintenance					
Number of public facing IS incidents	*	*	*	38	→
Hours of unplanned downtime due to IS incidents	*	*	*	43	→
Number of IS hardware requests	*	*	*	TBD	→
Number of IS software requests	*	*	*	TBD	→
Number of cyber threats prevented	*	*	*	3,024	→

Table 17: Technical Levels of Service

KPI	2021	Average Annual Budget
Capital		
Enterprise Systems & Software Licenses (# support contracts/applications)	43	$520,000
Laptop and Tablet Replacement (# of laptops/tablets)	21	$85,000
Inspections and condition assessments	2	$0
PC Replacements	40	$80,000
Software Purchases	1	$50,000
Network Infrastructure Replacement (cables, transceivers, connectivity devices)	NA	$50,000
Fibre Optic	NA	$100,000
Annual capital expenditures	$885,000	
Operations		
Internet Services		$25,000
Security Audit and Testing		$5,000
Annual operating expenditures	$30,000	

Levels of Service Analysis

KPI data can be used to support decisions to maintain, increase or decrease levels of service. As customer levels of service data is collected and tracked for IS, investments in capital and/or maintenance related activities may be adjusted to reduce the frequency of requests and incidents. Trends should be considered in further detail with knowledgeable staff to understand potential influences and context before making decisions.

For example, expenditures or service level performance may be affected in a given year by material pricing, supply chain issues, staff absences, or contractor availability. These factors should be taken into account to determine if the effects are temporary, or longer term and potentially warranting adjustment. Adjusting levels of service must also be considered in light of cost, performance and risk, as further explained below.

Balancing Cost, Performance and Risk

Levels of service are fundamentally about balancing three key parameters: cost, performance, and risk. Any adjustment to one of these parameters will have a direct impact on the other two. High performance and low risk may require a substantial budget. In contrast, if constituents can tolerate lower performance from community assets, they incur a lower cost but assume a higher risk.

Table 18 briefly outlines how these parameters change when maintenance or capital related service levels are maintained, increased, or decreased. Those service levels have a direct impact on assets by maximizing their service life or deferring their replacement.

Table 18: Balancing Cost, Performance, and Risk

Levels of Service Goal	Impact on Cost	Impact on Asset Performance	Impact on Risk
Maintain	Minimum impact on cost; possible escalation due to market conditions	No expected change beyond typical deterioration	No expected change in asset risk rating
Increase	• Costs increase due to more frequent maintenance, rehabilitation, and/or replacement cycles • Tax rates and utility rates may increase • Increasing asset capacity or enhancing functionality may further escalate costs	• Assets are maintained at a higher condition, delivering higher expected performance • User experience and quality of life may improve	• With a more robust lifecycle program, asset failure may be reduced, resulting in a lower risk rating • User safety and environmental protection may improve
Decrease	• Costs may decrease as lifecycle programs are reduced and services are eliminated	• Assts may deteriorate faster and fail earlier than expected due to deferral of maintenance needs • User experience and quality of life may worsen	• Deferred maintenance may lead to higher failure rates, resulting in higher exposure • User safety and environmental protection may decrease

A sustainable levels of service approach requires municipalities to periodically recalibrate these parameters. Ultimately, trade-offs must be made between different programs based on demand, and between service quality and cost to constituents.

Financial Strategy

Each year, the City of Port Coquitlam makes important investments in its infrastructure to ensure assets deliver their intended function safely and efficiently. These efforts contribute to making Port Coquitlam a highly desirable place to live. The 2023 ranking of The 100 Most Livable Cities in Canada by the *Globe and Mail* placed the City at 17th.

Given the magnitude of infrastructure needs, it is common for municipalities, including Port Coquitlam, to experience annual shortages in funding. This creates annual funding deficits, requiring projects to be deferred to later years. This, in turn, creates long-term infrastructure backlogs.

Achieving full-funding for infrastructure programs is a substantial challenge for municipalities across Canada. Closing annual funding gaps and avoiding long-term backlogs can take many years.

This financial strategy provides a consolidated analysis of the City's eight service areas, and is designed to support the implementation of asset management plans and gradually eliminate gaps identified in the City's annual reinvestment rates.

The financial strategy also provides support for the development of 10-20 year capital plans for each asset group with the City's asset management program.

Approach and Methodology

The assets included in the City of Port Coquitlam's eight service areas have a combined 2023 replacement cost of $1.9 billion, as illustrated in Table 19 below. The table also summarizes the average annual requirements (AAR) for each service area, and the equivalent system-generated target, capital reinvestment rate (TRIR). The City's overall AARs total $42.5 million, generating an equivalent reinvestment rate of 2.2%. To put this differently, the City should invest, on average, 2.2% of the overall current replacement costs of its infrastructure portfolio back into these assets to remain current with replacement needs.

Table 19: Service Area Replacement Costs and Target Reinvestment Rates

Service Area	Replacement Cost	Average Annual Requirements (AAR)	System-generated Target Capital Reinvestment Rate (TRIR)
Transportation	$533,082,256	$15,648,055	2.9%
Drainage	$446,128,207	$7,406,986	1.7%
Water	$303,278,014	$4,541,037	1.5%
Sanitary	$266,373,836	$4,214,139	1.6%
Facilities	$262,262,312	$4,561,458	1.7%
Parks	$41,088,943	$1,682,841	4.1%
Fleet & Equipment	$33,488,624	$3,156,517	9.4%
Information Services	$9,580,473	$1,298,008	13.5%
Total	**$1,895,282,667**	**$42,509,042**	**2.2%**

The overall and individual, service area reinvestment rates serve as critical benchmarks, ensuring that asset replacements needs are met as they arise, and projects are not deferred. However, this 'full funding' is difficult to achieve for most municipalities across Canada, leading to annual infrastructure deficits, which can in turn accumulate to create long-term infrastructure backlogs.

The purpose of the financial strategy is to position Port Coquitlam to meet its target reinvestment rates as outlined above. This is done by examining the City's current funding levels for each service area, quantifying funding gaps, and identifying a roadmap to close these gaps. To ensure fiscal prudence, only those funding sources considered sustainable are integrated with the strategy. The concept of sustainable funding is discussed in more detail.

Current Financial Planning Framework

Port Coquitlam is a growing city. The community saw a growth rate of 4.9% between 2016 and 2021, and has a current population of more than 61,000 residents. Different funding and financing mechanisms are used to ensure that the City's infrastructure portfolio can continue to meet the needs of a growing and evolving population. The focus of the asset management plans and the financial strategy is the City's current asset portfolio.

Capital Budget

The City's capital budget is a forward-looking document that is used to plan for long-term investments, including infrastructure, that provide benefits to Port Coquitlam over time and support service delivery. The capital budget is traditionally funded from tax levies, user fees, senior government transfers and grants, development cost charges (DCCs), debt, and reserves. These funds are used to cover the expenses of maintenance, replacement, and expansion of the asset base which is tied to the level of services provided by the City.

The distinction must be made between the replacement of exiting assets and investments in new assets, including upgrades and expansions. Asset management plans and this financial strategy pertain to the replacement of existing assets. New assets are purchased, built, developed, or contributed to or by the City to specifically accommodate the growth of population or the expansion of services or service levels.

Debt

Debt can be used as a strategic funding source for major public works. The benefits of leveraging debt judiciously for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and uncontrollable factors,
- equitable distribution of the cost and benefits of infrastructure over its useful life,
- a secure source of funding,
- the ability to proceed with projects sooner than waiting to save enough in cash or grants to pay for the project all at once and,
- flexibility in cash flow management.

Following an initial reduction in interest rates amid the Covid-19 pandemic, interest rates have risen steadily since. As a result, the cost of servicing the debt through interest payment has

increased substantially, making its use for infrastructure projects less compelling. The following graph shows the historical changes to Municipal Finance Authority of BC (MFA) lending rates[1].

Figure 17: Historical MFA Lending Rates[2]

Port Coquitlam currently has $17.6 million (2023 opening balance) of net debt outstanding for the Coast Meridian Overpass. This debt has an annual principal and interest payments of $1.0 million, which are expected to continue until 2039. The City also has outstanding debt for the Port Coquitlam Community Centre which currently has $48.8 million outstanding and carries an annual principal and interest payment of $2.3 million, which expires in 2049.

The funding options outlined in this plan allow Port Coquitlam to fully fund the long-term infrastructure replacement requirements without further use of debt.

[1] https://mfa.bc.ca/clients/long-term-borrowing: "New Issues are often funded by issuing a 10 year bond, locking in a fixed interest rate for ten years. As clients may borrow for up to thirty years, loans longer than ten years a typically refinanced every five years, following the initial ten years."
[2] The illustration does not consider actuarial adjustments.

Senior Government Support

Given the magnitude of investments needed in infrastructure, municipalities often rely on senior government programs to supplement their funding for capital projects and capacity building initiatives. These programs are subject to change with evolving federal and policy landscape, and therefore, create some vulnerability for municipalities that may rely heavily on these funding streams.

Of particular importance is the Canada Community-Building Fund (CCBF), formerly the federal Gas Tax Fund. In the past, municipalities have considered the CCBF a sustainable funding source used for infrastructure projects. Administered through a 10-year tripartite agreement (2014-2024) with the Government of British Columbia and the Union of British Columbia Municipalities (UBCM), the CCBF provides all municipalities with a permanent, predictable, and indexed source of infrastructure funding.

Port Coquitlam received $241k from the CCBF in 2022. Although historically stable, the City should actively monitor and evaluate the potential repercussions of a newly elected government on the CCBF and other senior government funding streams, considering the potential impact on funding priorities, allocations, and eligibility criteria.

While the structure of the transfers may evolve, both the province and federal governments continue to provide reliable sources of funding for asset management and infrastructure programs. When possible, transfers should be leveraged by the City to address the backlog of existing assets that have exceeded their service life.

Sustainability

Although senior government transfers—both recurring such as the CCBF, and one-time, project-specific grants and transfers—can be used to augment the City's fiscal capacity, this funding strategy relies only on the City's own-source revenues. These are limited to property taxes and utility levies. While a stable funding stream, the City typically earmarks the CCBF to fund new assets; as such, it was not integrated with the financial strategy. However, the City should consider allocating these funds to the replacement of existing assets, at least until the backlog has been addressed.

Reserves

Reserves play a critical, often primary, role in long-term financial planning for infrastructure investments. The benefits of having reserves available for infrastructure planning include:

- the ability to stabilize tax and user rates when dealing with variable and sometimes uncontrollable factors;
- financing one-time or short-term investments;
- accumulating the funding for significant future infrastructure investments;
- managing the use of debt; and,
- normalizing infrastructure funding requirement.

Long-Term Infrastructure Reserves

The City of Port Coquitlam's dedicated, long-term infrastructure reserves include the Long-Term General Infrastructure Reserve (LTGIR), the Long-Term Sewer Infrastructure Reserve (LTSIR), and the Long-Term Water Infrastructure Reserve (LTWIR). These reserves are funded through property taxes and utility levies. The current balance of these reserves totals $24.1 million.

Table 20: Long-Term Infrastructure Reserve Balances

Reserve	Balance
Long-Term General Infrastructure Reserve (LTGIR)	$15,688,227
Long-Term Water Infrastructure Reserve (LTWIR)	$4,816,463
Long-Term Sewer Infrastructure Reserve (LTSIR)	$3,619,233
Total	**$24,123,923**

Since 2010, the City has consistently made annual contributions, calculated as the prior year's amount plus an additional 1% of the prior year's taxation or utility levy. The intent of these reserves is to ensure the City can fund future asset replacement requirements in the short and long terms. This is accomplished through annual transfers to the Capital Reserves to complete work identified in the Annual Capital Programs.

Capital Reserves

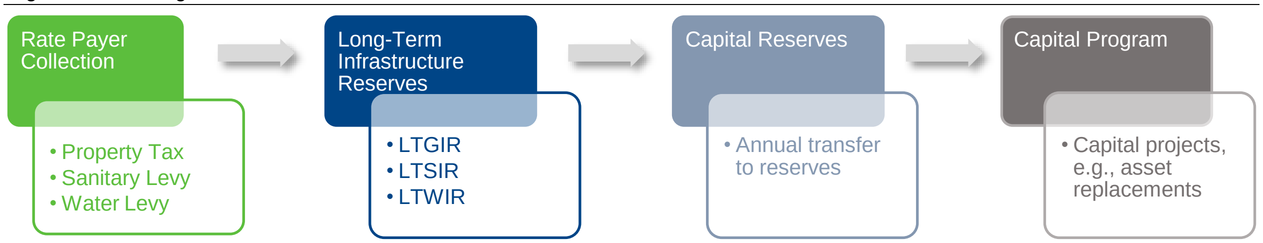
In addition to the long-term infrastructure reserves, Port Coquitlam also has other capital reserves used to implement the capital program. These reserves are funded by property taxation, utility levies, and the sale of land or assets. While these are predominately intended to support either new assets or the expansion of existing assets, the City can still draw from these reserves to address the backlog in the short term and support the reduction of any deficits over time. The forecasted balance of these reserves as of December 31, 2023, is $25.3 million.

Table 21: Capital Reserve Balances

Reserve	Balance
General Capital	$2,712,053
Sewer Infrastructure	$1,017,166
Water Infrastructure	$14,888,201
Land Sale	$3,326,828
Equipment Replacement	$2,079,097
Cart Replacement	$1,254,886
Total	**$25,278,231**

The figure below illustrates the flow of funding at the City, from collection of property taxes and utility levies, to implementation of the capital program.

Figure 18: Funding Flow



Since the annual capital program is funded through reserves, the aim of the financial strategy is to synchronize long-term infrastructure reserve contributions with the average annual requirements identified for the eight service areas, as illustrated in Table 19. As such, the recommendations focus on the incremental increases to the annual long-term infrastructure reserves contributions.

Development Cost Charges (DCC) Program

Port Coquitlam's DCC bylaws are regulated by the province through the *Local Government Act*. The City uses DCCs collected to finance a portion of upcoming infrastructure costs associated with the growth of new developments. The program is designed to ensure that the benefiters (new development) contribute to the installation costs.

The City's DCC Program encompasses infrastructure earmarked for both replacement and expansion. Recognizing that existing rate payers may receive benefit from the construction or expansion of infrastructure, the capital costs are partially reduced from DCC collections and supplemented by alternative funding sources. Because of this, the DCC contributions are limited to fund specified infrastructure projects used to establish the DCC fees in the in the Bylaws.

As such, whenever possible, the DCC contributions should be leveraged by the City to provide funding for assets slated for replacement and expansion when addressing the current asset backlog. This maximizes the value of the investment by achieving two goals with one asset replacement: replacement for condition/age and upgrading for additional capacity.

Achieving Reinvestment Rate Targets

This section identifies annual infrastructure and annual funding deficits for each of the City's eight service areas. The system-generated average annual requirements are contrasted against two figures. The first is the City's actual annual reinvestments into its assets, calculated by aggregating capital expenditures on various lifecycle programs for each service area. The second is its annual contributions to long-term infrastructure reserves (LTIRs).

We make a distinction between actual reinvestments on infrastructure each year which may be funded and financed through various streams, and annual contributions to the LTIRs funded only through sustainable sources, i.e., property taxation or utility levies . The recommendations in the financial strategy hinge on the latter, i.e., adjusting annual contributions to the LTIRs to achieve target reinvestment rates.

Separate analysis is presented for tax-funded and rate-funded service areas. Tax funded service areas are funded by property taxes and collected as general revenue. Rate funded service areas are those funded by the collection of utility fees. Tax-funded service areas include: Drainage, Transportation, Parks, Facilities, Fleet & Equipment, and Information Services. Utility Levy -funded service areas include: Water and Sanitary Services.

Tax-Funded Service Areas

As illustrated in Table 22, the City's average annual requirements for its six tax-funded service areas total $33.8 million. Annual capital expenditures total approximately $15 million for these assets, creating an infrastructure deficit of $18.8 million.

Table 22: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Drainage	$7,406,986	$2,500,000	$4,906,986
Transportation	$15,648,055	$5,784,500	$9,863,555
Parks	$1,682,841	$2,150,000	$(467,159)
Facilities	$4,561,458	$583,112	$3,978,346
Fleet and Equipment	$3,156,517	$2,922,167	$234,350
Information Services	$1,298,008	$1,019,334	$278,674
Total	**$33,753,865**	**$14,959,113**	**$18,794,752**

The current capital reinvestments listed above are funded through both own-source revenues, e.g., property taxation, and other streams. Table 23, however, quantifies the City's contributions to the LTGIR. The City's ability to make consistent contributions to the LTGIR will determine how sustainable infrastructure programs are. These contributions will build up the LTGIR and are necessary for gradually eliminating the annual infrastructure deficit, as well as managing persistent backlogs.

LTGIR contributions are funded from the City's property taxation revenue—the primary, predictable, and sustainable (See the Sustainability section) source of funding for infrastructure needs.

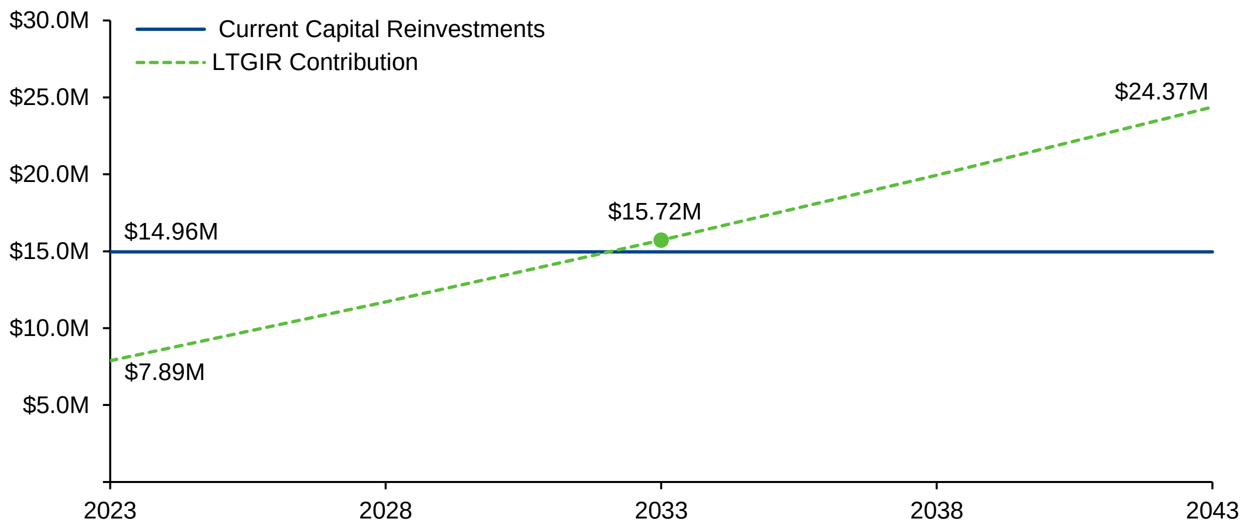
This analysis shows that based on its current annual contributions of $7.9 million to the LTGIR, an annual funding deficit of $25.9 million is generated each year. These annual contributions outpace the City's actual capital spending each year, illustrated in Table 22 above as $15 million.

Table 23: Comparing Average Annual Requirements Against Annual Contributions to the LTGIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTGIR	Annual Capital Funding Deficit	Funding Level
Tax-Funded	$33,753,865	$7,885,600	$25,868,265	23%

The City increases annual contributions to the LTGIR each year by an additional 1% of the prior year's tax levy. At this rate, contributions will total more than $24 million by 2043. However, under the current funding framework for existing assets, despite this judicial strategy, annual capital spending on tax-funded service areas will continue to outpace these annual contributions until 2033.

Figure 19: Annual Contributions to the LTGIR vs. Annual Capital Spending



This illustration does not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Although infrastructure spending can be supplemented by other streams, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., property taxation.

Annual Deficits

The City currently faces two types of deficits. The infrastructure deficit is the gap between average annual requirements and current capital expenditures. This gap currently stands at $18.8 million, as illustrated in Table 22.

The second, the annual capital funding deficit, is the gap between average annual requirements and contributions to the LTGIR, calculated as $25.9 million as illustrated in Table 23. Before the annual infrastructure deficit can be addressed, the funding deficit must first be closed by increasing contributions to the LTGIR. As such, it is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting rate increases to allow the City to close the annual contribution deficit for LTGIR.

At the full-funding level, the City would need to meet the full $33.8 million annual requirements, and close a $25.9 million current funding gap. Understanding that the financial impact on rate payers may be difficult, options to reduce the annual funding to a level of 75% and 50% of the AAR are included.

Table 24: Funding Levels and Resulting Funding Deficits

Model	Funding Goal	Current Contributions to the LTGIR	Resulting Funding Deficit
Fully Funded	$33.8M	$7.9M	$25.9M
75%	$25.3M	$7.9M	$17.4M
50%	$16.9M	$7.9M	$9.0M

Each model has risks and benefits, as outlined below. The right model balances the burden placed between generations of residents while realizing the highest value from infrastructure assets.

Table 25: Risks and Benefits of Funding Models

Model	Potential Risks	Potential Benefits
Fully Funded	– Higher financial impact on taxpayers – Limited financial flexibility for other programs and services	– Avoid further accumulation of backlog – Potential long-term costs savings – High economic and social benefits, including ability to attract more investments and businesses – Less vulnerability to evolving provincial and federal policy and funding programs
75%	– Further accumulation of existing infrastructure backlog – Lower, overall levels of service – Potential safety implications – Higher indirect economic, social, and reputational risks resulting from infrastructure disrepair – Higher vulnerability to evolving provincial and federal policy and funding programs	– Lower impact on taxpayers – More budget flexibility for other programs and service
50%	– Further, more rapid accumulation of existing backlogs – Potentially high safety implications – Low service levels – Lower quality of life and potential loss of local economic activity – Higher reputational damage – High dependence on other sources of funding – High vulnerability to unexpected asset failures	– Lowest impact on taxpayers

Eliminating the Annual Deficit

In 2023, Port Coquitlam's property taxation revenues totaled $74,880,000. To eliminate the funding deficit, additional contributions are needed to the LTGIR. The following table outlines the tax increases required to support these additional contributions, depending on the funding model selected. In addition to these models, three phase-in periods are presented, allowing the City to achieve the desired funding goal between five and 20 years.

The City already increases annual contributions to the LTGIR by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished mechanism.

Table 26: Tax Rate Increase Required to Achieve Funding Levels

Model	Overall Tax Rate Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.11%	↑2.01%	↑1.00%	↑0.49%
75%	23%	↑3.27%	↑1.11%	↑0.40%	↑0.05%
50%	12%	↑1.29%	↑0.14%	↓0.24%	↓0.43%

As illustrated in Table 26, achieving full funding would require a one-time tax increase of 35%, or 5.11% per year over a five-year phase-in period, over and above the existing 1% annual increase. In contrast, a 50% funding model would see the City reduce tax rates over a 15-year phase in period. This option is not recommended.

As with funding models, phase-in periods also carry similar risk and benefits. Shorter time frames would reduce the pace of accumulating backlogs and help address infrastructure needs more quickly. However, they may place heavy burden on rate-payers. More protracted funding periods reduce rate-payer obligation, but may cause more rapid and further asset disrepair.

It is recommended that the City adopt the full-funding model over a 15-year phase-in period, with aim of meeting 100% of the $33.8 million annual requirements. This would require further increasing the LTGIR contribution by an additional 1.00% per year over the phase-in period, over and above the existing annual increase of 1%.

Drainage Utility Levy

The City should also consider the establishment of a drainage utility levy, coupled with the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR).

Several municipalities have established a drainage utility levy as the design and costs of drainage systems have changed significantly over the years. Contributing factors include:

i. climate change impacts (sea level rise, increased rainfall, higher intensity storms) driving the need for new or upgraded drainage infrastructure and flood protection;

ii. mitigation of environmental impacts and protection of watercourses driving the need for green infrastructure and enhancement projects;

iii. drainage infrastructure costing significantly more than water or sanitary infrastructure to construct and maintain;

iv. drainage assets currently being funded by General Revenue, which reduces the amount available for all of the other tax-funded assets.

If a Drainage Utility is established, a Long Term Drainage Infrastructure Reserve (LTDIR) would also be established with annual contributions funded through Drainage utility levies rather than property taxes.

Levy-Funded Service Areas

The analysis presented in this section includes Port Coquitlam's water and sanitary services, and is similar to the tax-funded service areas. The average annual requirements for the two levy -funded service areas total $8.8 million, against annual capital expenditures of $3.5 million. This creates an annual infrastructure deficit of $5.2 million.

Table 27: Comparing Average Annual Requirements Against Current Capital Reinvestments

Service Area	Average Annual Requirements	Current Capital Reinvestments	Annual Infrastructure Deficit
Water	$4,541,037	$2,034,200	$2,506,837
Sanitary	$4,214,139	$1,500,000	$2,714,139
Total	**$8,755,177**	**$3,534,200**	**$5,220,977**

As with tax-funded assets, the City contributes to long-term infrastructure reserves for both water and sanitary services, managed in the Long-Term Water Infrastructure Reserve (LTWIR) and the Long-Term Sanitary Infrastructure Reserve (LTSIR).

Based on the City's current contributions levels to the LTWIR and LTSIR, water services are currently meeting 25% of their average annual requirements, with sanitary at 20%. These funding levels create an annual capital funding deficit of $3.4 million each for water and sanitary services.

Table 28: Comparing Average Annual Requirements Against Annual Contributions to the LTWIR and LTSIR

Service Areas	Total Average Annual Requirements	Annual Contributions to LTWIR/LTSIR	Annual Capital Funding Deficit	Funding Level
Water	$4,541,037	$1,138,300	$3,402,737	25%
Sanitary	$4,214,139	$850,000	$3,364,139	20%
Total	**$8,755,177**	**$1,988,300**	**$6,766,877**	**23%**

As with the LTGIR, the City's contributions to both the LTWIR and LTSIR are increased each year by 1% of the prior year utility levy for each service area. At this growth rate, annual contributions to the LTWIR and LTSIR will become sufficient to fund current capital expenditures for each service area between 2029 and 2030. However, as current capital expenditures are below average annual requirements, the annual infrastructure gap will still persist beyond the 20-year horizon illustrated.

Figure 20: Annual Contributions to the LTWIR vs. Annual Capital Spending

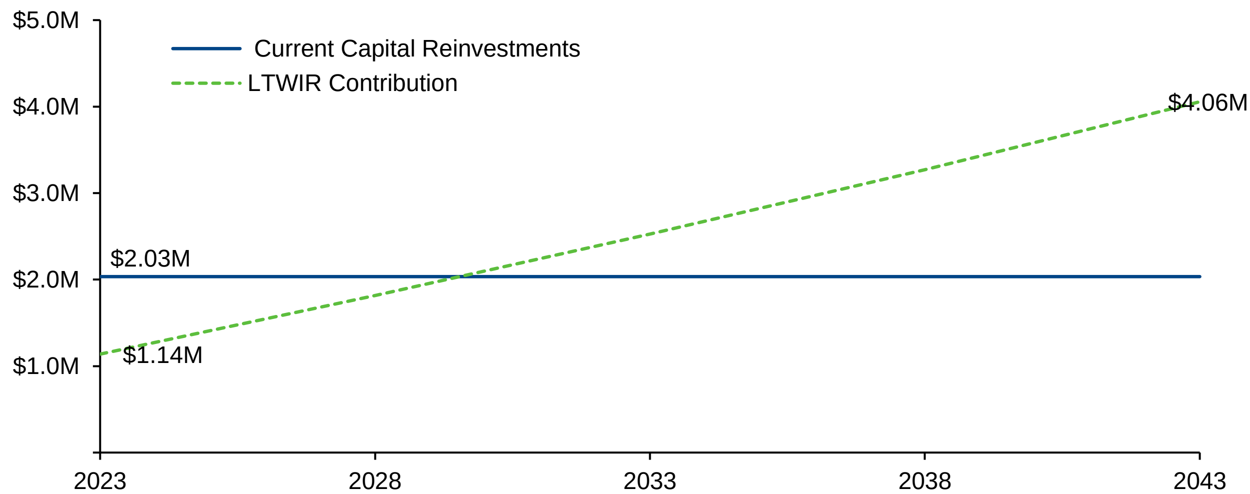
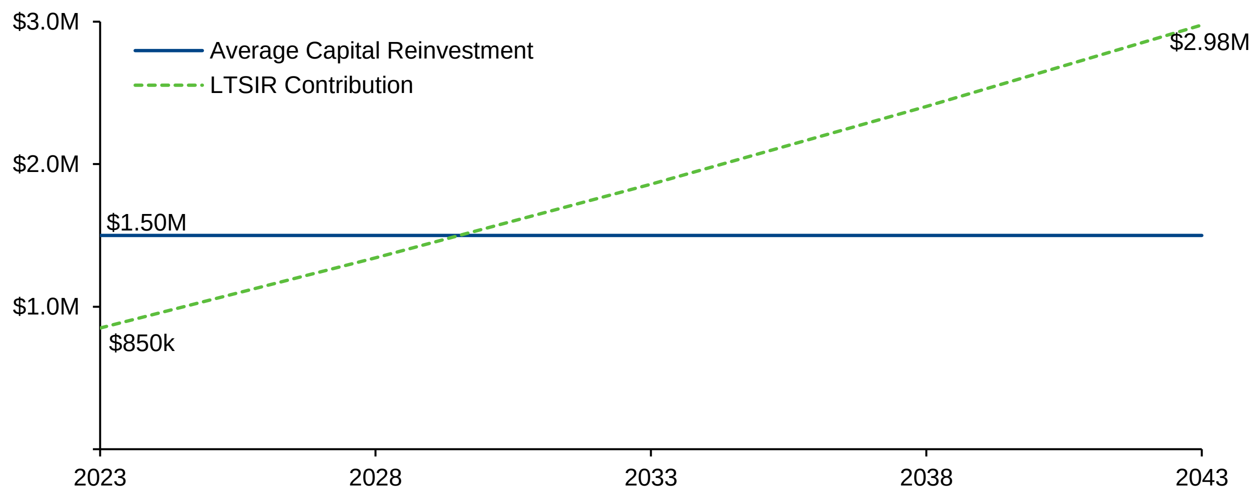


Figure 21: Annual Contributions to the LTSIR vs. Annual Capital Spending



These illustrations do not account for inflationary increase to annual capital expenditures or other market pressures, which would increase the gap between annual contributions and current reinvestments, and extend the timeline of fully funding capital spends through annual contributions. Similar to tax-funded assets, infrastructure spending can be supplemented by other streams; however, a more sustainable funding framework would see the City increase its fiscal capacity through own-source revenues, i.e., water and sanitary utility revenues.

Annual Deficits

Similar to tax-funded asset categories, the City faces two types of deficits. The first, illustrated in Table 27, is the gap between average annual requirements and actual current capital reinvestments.

The second, referred to as the annual capital funding deficit, is the gap between the same average annual requirements and annual contributions to the Long-Term Water Infrastructure Reserve and the Long-Term Sanitary Infrastructure Reserve. This gap, totaling $6.8 million, is illustrated in Table 28 for both water and sanitary services, and is the target of the financial strategy.

Funding Models

The funding models presented below outline funding goals, and how the annual deficit decreases with reductions in these targets. These deficit figures are used to calculate resulting levy increases to allow the City to close the annual contribution deficit for LTWIR and LTSIR.

At the full-funding level, the City would need to meet the full $8.8 million annual requirements for water and sanitary, and close the combined funding deficit of $6.8 million. Understanding that the financial impact on levy payers may be difficult, options to reduce the annual funding targets to a level of 75% and 50% of the AAR are included for both water and sanitary.

Table 29: Funding Levels and Resulting Funding Deficits: Water Services

Model	Funding Goal	Contributions to the LTWIR	Resulting Funding Deficit
Fully Funded	$4,541,037	$1,138,300	$3,402,737
75%	$3,405,777	$1,138,300	$2,267,478
50%	$2,270,518	$1,138,300	$1,132,219

Table 30: Funding Levels and Resulting Funding Deficits: Sanitary Services

Model	Funding Goal	Contributions to the LTSIR	Resulting Funding Deficit
Fully Funded	$4,214,139	$850,000	$3,364,139
75%	$3,160,604	$850,000	$2,310,605
50%	$2,107,069	$850,000	$1,257,070

In selecting the appropriate funding target, careful consideration of the risk and benefits of each need to be evaluated. See Table 25: Risks and Benefits of Funding .

Eliminating Annual Deficits

In 2023, Port Coquitlam's water and sanitary revenues totaled $13,120,000 and $9,560,000, respectively. To eliminate the funding deficit for each service area, additional contributions are needed to the LTWIR and LTSIR.

The following tables outlines the water and sanitary levy increases required to support these additional contributions, depending on the funding model selected. Similar to tax-funded assets, three phase-in periods are presented, allowing the City to achieve its desired funding levels between five and 20 years.

The City already increases annual contributions to each utility reserve by an additional 1% per year based on prior year's levy. As such, the rate increases presented for the three phase-in periods are over and above this preestablished goal.

Table 31: Utility Rate Increase Required to Achieve Funding Levels: Water

Model	Overall Water Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	26%	↑3.72%	↑1.33%	↑0.55%	↑0.16%
75%	17%	↑2.24%	↑0.61%	↑0.07%	↓0.20%
50%	9%	↑0.67%	↓0.17%	↓0.45%	↓0.59%

Table 32: Utility Rate Increase Required to Achieve Funding Levels: Sanitary

Model	Overall Sanitary Levy Increase Required	5 Years	10 Years	15 Years	20 Years
Fully Funded	35%	↑5.22%	↑2.06%	↑1.03%	↑0.52%
75%	24%	↑3.42%	↑1.19%	↑0.45%	↑0.09%
50%	13%	↑1.50%	↑0.24%	↓0.17%	↓0.38%

As illustrated in Table 31, achieving full funding for water would require a one-time levy increase of 26%, or 3.72% per year over a five-year phase-in period, over and above the existing 1% annual increase. Similarly, achieving full funding for sanitary would require a one-time levy increase of 35%, or 5.22% per year over a five-year phase-in period, over and above the existing 1% annual increase.

In contrast, a 50% funding model would see the City reduce water levies over a 20-year phase-in period, and sanitary levies over the 15-year phase-in period. This option is not recommended.

Consistent with the approach for tax-funded service areas, it is recommended that the City adopt the full-funding model for both water and sanitary, with the aim of achieving 100% of the $8.8 million combined annual requirements over a 15-year phase-in period.

For water services, this would require further increasing contributions to the LTWIR by an additional 0.55% annually, over and above the existing annual increase of 1%. Similarly, for sanitary services, the LTSIR would see annual contributions increase by an additional 1.03%, over and above the existing 1% annual increase.

Infrastructure Backlogs

The models presented above would allow the City of Port Coquitlam to gradually increase its annual contribution to long-term infrastructure reserves for both tax- and levy -funded service areas. This strategy would address annual infrastructure deficits.

In addition to these deficits, most communities in Canada also have persistent infrastructure backlogs, accumulated over many decades. As projects are deferred, assets requiring replacements continue to remain in service beyond their design life and despite their poor condition ratings. Table 33 summarizes the infrastructure backlog for each service area.

Table 33: Age- and Condition-based Infrastructure Backlogs

Service Area	Infrastructure Backlog
Drainage	$162.1M
Transportation	$160.2M
Parks	$25.6M
Facilities	$29.8M
Fleet & Equipment	$24.2M
Information Services	$6.4M
Water	$109.7M
Sanitary	$99.5M
Total	**$617.4M**

Using Reserves

Addressing existing backlogs requires strategic use of funding sources and a risk-based prioritization of projects, to channel funding where they are needed most. Theoretically, the City can use existing long-term infrastructure reserves to partially tackle a portion of this backlog. However, Table 34 shows that even if long-term infrastructure reserves were fully depleted, less than 4% of the total infrastructure backlog would be eliminated. Of note, backlogs should be refined through regular in-field condition assessments and prioritized through risk and asset criticality assessments.

Table 34: Long-Term Infrastructure Reserves vs. Backlogs

Reserve	Forecasted Closing Balance, December 31, 2023	Infrastructure Backlog	Reserves to Backlog Ratio
General (Tax Funded)	$15.7M	$408.3M	3.8%
Water (Rate Funded)	$4.8M	$109.7M	4.4%
Sanitary (Rate Funded)	$3.6M	$99.5M	3.6%
Total	**$24.1M**	**$617.4M**	**3.9%**

To put this in perspective, a typical homeowner with a property value assessed at $969,000 would have $37,800 on hand for major home repairs. Although there is no scientific consensus on optimal reserve levels, whether a 3.9% ratio is sufficient will depend on individual (council) risk appetite, current asset conditions, and forecasted future needs.

Leveraging Development Cost Charges (DCC)

Port Coquitlam is also a growing city, and there is an opportunity to strategically leverage the City's DCC program to address existing asset backlogs. The City's current DCC program totals nearly $219 million, distributed over 20 years. Given their benefits to existing residents, the City would be required to contribute $117.8 million, or 53% of the total project cost estimates. This figure includes a 1% municipal assist factor for growth-related projects.

Table 35: Development Cost Charges (DCC) Program

Service Area	Total DCC Project Value	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$47,196,403	$27,297,598
Transportation	$100,400,000	$43,283,930	$57,116,070
Water	$16,467,760	$9,478,459	$6,989,301
Sanitary	$27,547,840	$17,811,128	$9,736,712
Total	**$218,909,601**	**$117,769,920**	**$101,139,680**

Analysis shows that there is a significant overlap between projects slated to be completed as part of the DCC program (capacity upgrades to support growth) and assets that are currently in a backlog state (beyond their service life and due for replacement due to age/condition). As illustrated below, 56% of projects, by current cost estimates, will result in the replacement of assets currently considered in a backlog state. These replacements are designed to meet higher demand and usage, and will result in capacity upgrades and or higher functionality—resulting in higher overall service levels.

Table 36: Overlap Between DCC Program and Assets in Backlog State

Service Area	Total DCC Project Value	Projects Addressing Backlog ($)	Projects Addressing Backlog (%)	Port Coquitlam Contribution	DCC Recoverable
Drainage	$74,494,000	$39,636,026	53%	$23,748,706	$15,887,320
Transportation	$100,400,000	$60,900,000	61%	$30,107,040	$30,792,960
Water	$16,467,760	$11,407,760	69%	$7,522,109	$3,885,651
Sanitary	$27,547,840	$10,957,151	40%	$6,723,966	$4,233,185
Total	**$218,909,601**	**$122,900,937**	**56%**	**$68,101,820**	**$54,799,117**

Recommendations

Given the risks and benefits associated with different funding levels and phase-in period, the following approach is recommended to address annual infrastructure deficits.

Tax Funded Service Areas

- The City should endeavour to achieve full-funding for its tax-funded service areas, requiring $33.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended to allow for an equitable distribution of financial burden between current and future residents.
- This would require further incrementally increasing the LTGIR contribution by an additional 1.00% of the budgeted prior year's taxation levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for the tax funded assets. This is in addition to the existing annual increase of 1%.

This would increase individual property taxes by a further $21.30, based on a home assessed at $969,000. This increase would be over and above the higher taxes resulting from the 1% annual increase already implemented, and estimated at $21.35.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTGIR to maintain fiscal strength.
- Should the City establish a drainage utility levy, the creation of a dedicated Long-Term Drainage Infrastructure Reserve Fund (LTDIR) should also be established. Annual contributions towards the LTDIR should then be funded through the newly established utility levy equivalent to the amount funded through property taxes. This would reduce the average annual requirements for tax-funded assets by 22%.

Levy-Funded Service Areas

- The City should endeavour to achieve full-funding for its water and sanitary service areas, requiring $8.8 million on an annual basis to meet the replacement needs of its existing asset portfolio.
- To achieve this, a 15-year phase-in period is recommended for both water and sanitary, consistent with tax-funded phase-in period, allowing for an equitable distribution of financial burden between current and future residents.

- For water services, this would require further incrementally increasing contribution to the LTWIR by an additional 0.55% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual water levies by a further $2.73. This increase would be over and above the higher water levies resulting from the 1% annual increase already implemented, and estimated at $4.98

- For sanitary services, the 15-year, full-funding model would require further incrementally increasing contribution to the LTSIR by an additional 1.03% of the budgeted prior year's utility levy each year over the 15-year phase-in period, solely for the purpose of phasing in full funding for water. This is in addition to the existing annual increase of 1%.

  This would increase individual sanitary levies by a further $3.71. This increase would be over and the higher sanitary levies resulting from the 1% annual increase already implemented, and estimated at $3.60.

- The recommendations presented do not account for inflation. Staff should consider the impacts of inflation on both annual capital expenditures, and additional contributions required to the LTWIR and LTSIR to maintain fiscal strength.

- Addressing the infrastructure backlog requires the strategic use of reserves and the City's DCC program. In addition, asset criticality and risk analysis should be used to prioritize projects.

As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place. However, it can be used to help close the infrastructure gap more quickly, or lower the long-term impact on tax and utility levies. It should be noted that the above recommendations do not include the use of reserves or debt. Depending on the urgency of projects and the impact on levels of services, reserves and debt can be viable, supplemental options.

Next Steps

Asset management does not stop with the completion of asset management plans. An asset management program is an ongoing effort to responsibly manage City assets from procurement, through their full lifecycle, to replacement. The work completed with the asset management plans sets a strong foundation for the City to move forward in this regard, and is intended to be refined and built on with future work.

Future work includes items outlined in the City's asset management strategy, such as:

- Developing 10-20 year capital plans for each asset portfolio using the high risk assets identified in each plan to prioritize projects
- Reconciling assets updated in the Citywide asset register with the PSAB asset register used for financial reporting
- Training staff on the Citywide asset management software and keeping the database up to date
- Working with staff in each asset group to update asset inventories, complete condition assessments, update replacement value estimates, refine risk assessments, and periodically review lifecycle activities and service levels
- Considering natural assets and climate change in the City's asset management program