

**THE TORONTO FIRE DEPARTMENT
SUPERANNUATION AND BENEFIT
FUND**

**REPORT ON THE ACTUARIAL VALUATION
AS AT DECEMBER 31, 2022**

**FINANCIAL SERVICES REGULATORY
AUTHORITY OF ONTARIO AND CANADA
REVENUE AGENCY**

REGISTRATION NO. 0351601

FINAL REPORT COMPLETED ON MAY 8, 2023

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I. EXECUTIVE SUMMARY

PURPOSE

At the request of the Benefit Fund Committee (the “Committee”) of The Toronto Fire Department Superannuation and Benefit Fund (the “Fund” or the “Plan”), we have prepared this report, which presents the results of an actuarial valuation conducted in respect of the Plan as at December 31, 2022. The previous valuation of the Plan was prepared as of December 31, 2021.

The purposes of this valuation are:

- (i) To determine the funded position of the Plan as at the valuation date on a going concern and a solvency basis;
- (ii) To establish and set out the Plan’s contribution requirements;
- (iii) To assess the financial position of the Plan in order to provide Cost of Living adjustment (“COLA”) to pensioners; and
- (iv) To provide all other pertinent information required in the administration of the Plan.

There have been no changes in the legislation and standards of practice that have an impact on the funded position of the Plan since last valuation. This report outlines the progress of the Plan since the previous valuation, and is intended for filing with the Financial Services Regulatory Authority of Ontario and with the Canada Revenue Agency to support funding payments and maintain the Plan’s registration under the Ontario Pension Benefits Act and Regulation thereunder (the “Act”) and the Income Tax Act (Canada) and Regulations thereunder (the “Income Tax Act”).

The intended users of this report include the Committee, the Financial Services Regulatory Authority of Ontario, and Canada Revenue Agency.

HIGHLIGHTS

The key results of the actuarial valuation as at December 31, 2022 with comparative results from the previous valuation as at December 31, 2021 are shown below:

	<u>December 31, 2022</u>	<u>December 31, 2021</u>
<u>Assets of the Plan</u>		
Adjusted market value of assets	\$161,183,000	\$199,600,000
Average annual yield on adjusted market value since previous valuation	-10.75%	9.45%
<u>Funded Position - Going Concern</u>		
Going concern assets	\$161,183,000	\$199,600,000
Going concern liabilities	\$128,341,000	\$145,423,000
Provision for adverse deviations	<u>\$11,551,000</u>	<u>\$14,542,000</u>
Going concern excess/(unfunded liability)	\$21,291,000	\$39,635,000
Going concern funded ratio (assets divided by liabilities)	125.6%	137.3%
<u>Funded Position - Solvency</u>		
(i) Solvency assets	\$161,183,000	\$199,600,000
(ii) Expense allowance	\$200,000	\$200,000
(iii) Solvency asset adjustment	\$0	\$0
(iv) Solvency liabilities	\$129,682,000	\$161,232,000
(v) Solvency liability adjustment	\$0	\$0
(vi) Prior year credit balance	<u>\$0</u>	\$0
(vii) Solvency excess/(deficiency)	\$31,301,000	\$38,168,000
(i) - (ii) + (iii) - (iv) - (v) - (vi)		
(viii) Reduced solvency excess/(deficiency)	\$50,753,000	\$62,353,000
(i) - (ii) + (iii) - 85% * [(iv) - (v)] - (vi)		
(viii) Transfer ratio	124.1%	123.7%
Solvency assets (net of expenses) in excess of solvency liabilities:	\$31,301,000	\$38,168,000

DISCUSSION

Assets of the Plan

Investment performance under the fund of the Plan has been lower than expected with an average rate of return on the adjusted market value of assets, net of expenses, of approximately -10.75% since the previous valuation as at December 31, 2021. This may be compared to the actuarial assumption of 4.30% used in the previous valuation of the Plan.

The adjusted market value of assets has decreased from \$199,600,000 at December 31, 2021 to \$161,183,000 at December 31, 2022. The rate of return and change in asset value is largely driven by unrealized losses as a result of market value adjustments.

Funded Position - Going Concern

The funded position of the Plan has changed from a funded ratio of 137.3% as at December 31, 2021 to a funded ratio of 125.6% as at December 31, 2022. There is a going concern excess of \$21,291,000 at December 31, 2022 as compared to the going concern excess of \$39,635,000 at December 31, 2021. The principal factors giving rise to this change are summarized in Section VI of this report.

Due to changes in the Act in May 2018, the going concern funded position at December 31, 2022 is based on the going concern liabilities plus a provision for adverse deviations calculated based on Section 11 of the regulations to the Act. See Section IV of this report for further details regarding the calculation of the provision for adverse deviations.

Funded Position - Solvency

The solvency position of the Plan has changed from a transfer ratio of 123.7% as at December 31, 2021 to a transfer ratio of 124.1% as at December 31, 2022.

If the Plan had been terminated at December 31, 2022, the market value of assets would have exceeded the wind up actuarial liabilities, net of estimated wind up expenses, by \$31,301,000. As at December 31, 2022, pursuant to the Act and changes made under Ontario Regulation 250/18, there is a reduced solvency excess of \$50,753,000. The reduced solvency excess, as defined in the Act, is measured based on an amount greater than 85% of the solvency liabilities and solvency liability adjustment, among other components as indicated in the above table.

The transfer ratio as defined by the Act is greater than 1.0 for the Plan at December 31, 2022.

Solvency – Incremental Cost to December 31, 2023

Given the Plan has met the minimum requirements under the Plan by-laws to grant cost-of-living adjustments at January 1, 2023, the incremental cost for the Plan on a solvency basis is \$1,154,000. The cost is based on an increase of 0.89% to pensions in payment. Please see further details below.

Discount Rate Sensitivity

Discount rate sensitivity analysis has been performed in accordance with the Canadian Institute of Actuaries (the “CIA”) Standards of Practice – Practice Specific Standards for Pension Plans (the “CIA Pension Standards”).

The increase in the going concern liabilities (including PfAD) as at December 31, 2022, which would result from a 1.0% decrease in the assumed going concern discount rate is \$8,441,000 or 6.0%.

The increase in the solvency liabilities as at December 31, 2022, which would result from a 1.0% decrease in the assumed solvency discount rate, is \$7,925,000 or 6.1%. For purposes of this calculation,

no changes were made to any of the other actuarial assumptions or actuarial methods. Additional sensitivity analysis details are provided in Section IV of this report.

Recommended Contribution

There are no current service contribution requirements under the Plan.

There is a going concern excess under the Plan and accordingly, there is no requirement to make any special contributions under the Plan on the basis of the going concern position of the Plan.

There is a reduced solvency excess under the Plan and accordingly, there is no requirement to make any special contributions under the Plan on the basis of the solvency position of the Plan.

Section V of this report displays the minimum and maximum contributions allowable under the Plan for the year commencing December 31, 2022.

Contributions must be remitted to the Fund in monthly installments, according to the minimum requirements of the Act. Advance payments to meet contribution requirements for the Plan year are also permitted.

Plan Membership

There has been an approximate 5.8% reduction in the number of pensioners and beneficiaries in the Plan since the previous valuation of the Plan at December 31, 2021. Along with the reduction seen in the previous year of 6.25%, the membership of the Plan has reduced by approximately 12% over the past two years. A reconciliation of membership data since the last valuation is summarized in Section IX of this report.

Cost of Living Increase

The Plan by-laws provide for future increases to pensioners including spouses of deceased retired members, based on the lesser of:

- a. The investment rate of return of Fund assets (using a 5-year smoothing technique) in excess of the rate of return required to maintain the actuarial solvency of the Benefit Fund as determined by the Actuary, and
- b. The increase in the year over year level of the average CPI, to the extent that actuarial surplus is available.

Based on the foregoing, pension in payments to pensioners and spouses that commenced prior to January 1, 2022 were increased by 3.36% effective January 1, 2022 through an automatic provision as per Council's governing by-law with respect to the Plan. This cost was \$5,375,000 as of January 1, 2022 on a going-concern basis (including PfAD) and \$5,416,000 on a solvency basis.

In respect of 2022, there is an excess investment return as outlined in (a) above, equal to 0.89%. The increase in the year over year level of the average CPI outlined in (b) above was 6.80%. Therefore, an automatic cost of living adjustment is warranted in respect of 2022 equal to 0.89%. The cost as at January 1, 2023 to provide a COLA equal to the lesser of (a) and (b) is \$1,245,000 on a going concern basis (including PfAD) and \$1,154,000 on a solvency basis. This increase is subject to City Council approval.

For information purposes only, the estimated cost at December 31, 2022 to provide anticipated future ad hoc pension increases each year to current pensioners (2.00% per annum assumption and 0.89%

increase at January 1, 2023) is \$18,387,000 (including PfAD) based on the current valuation data and going concern valuation assumptions.

Plan Provisions

This valuation reflects the Plan provisions as at December 31, 2022. The main Plan provisions are summarized in Section VIII of this report.

Actuarial Basis

The actuarial assumptions, valuation method and the asset valuation method used in this valuation are described in Section VII of this report. The following are the significant changes that have been made to the going concern actuarial assumptions since the previous valuation of the Plan as at December 31, 2021:

- Increase in the going concern interest rate from 4.30% at December, 31, 2021 to 5.20% at December, 31, 2022;
- Decrease in the PfAD percentage from 10% at December 31, 2021 to 9% at December 31, 2022;
- Removal of size adjustment factors from mortality table assumptions.

This valuation has been prepared in accordance with the CIA Pension Standards in effect at the valuation date of December, 31, 2022.

Pension Benefits Guarantee Fund (PBGF) Assessment

Under Section 47(1) of Regulation 909 of the Act, the pension benefits provided by this Plan are not guaranteed by the Pension Benefits Guarantee Fund and this Plan is exempt from any Guarantee Fund assessment.

Plausible Adverse Scenario Testing

In accordance with the CIA Pension Standards, included in Schedule B is a summary of the results of the application of plausible adverse scenarios which have been selected to assess risks to the Plan's financial condition. These include interest rate risk, deterioration of asset values, and longevity risk.

Government Filings

The previous valuation of the plan at December 31, 2021 was filed with the Financial Services Regulatory Authority of Ontario and with the Canada Revenue Agency, Taxation. The Act and the Income Tax Act require that the next valuation report to be filed with the Financial Services Regulatory Authority of Ontario and with Canada Revenue Agency, Taxation, must be conducted with a valuation date no later than December 31, 2024.

Terms of Engagement

Our actuarial valuation of the Plan is based on the following terms established by the Committee:

- It has been prepared in accordance with applicable pension legislation and actuarial standards of practice in Canada;
- The market value of assets were used for the going concern and solvency bases;
- This valuation reflects the application of the most current regulations to the Act introduced under Ontario Regulation 250/18 in May 2018; and
- This valuation includes assessment of the financial impact of providing COLA to pensioners.

Subsequent Events

This valuation was completed on May 8, 2023. To the best of our knowledge, there were no events that occurred between the valuation date and the date this valuation was completed, which would have a material impact on the results of the valuation.

II. ACTUARIAL OPINION

An actuarial valuation has been performed on the Toronto Fire Department Superannuation and Benefit Fund as at December 31, 2022 for the purposes described in Section I. The report and opinions given herein apply to the year following the valuation date. The next valuation of the Plan for the purposes stated in this report must be conducted with a valuation date no later than December 31, 2025, if this report is filed.

In accordance with the Canadian Institute of Actuaries Standard of Practice – Practice Specific Standards for Pension Plans which were in effect as at the valuation date of December 31, 2022, I hereby certify that in my opinion:

1. The membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation;
2. The assumptions are appropriate for the purposes of the valuation; and
3. The methods employed in this valuation are appropriate for the purposes of the valuation.

This report has been prepared and my opinion given in accordance with accepted actuarial practice in Canada.

RSM CANADA CONSULTING LP



Stanley Caravaggio, FSA, FCIA
Director

Toronto, Ontario

May 8, 2023

III. ASSETS OF THE PLAN

With respect to the assets of the Plan, we have relied upon financial statements and other confirmed transactions for 2022 provided by the Plan administrator without further verification. The custodian of the Plan assets is CIBC Mellon.

ASSET INFORMATION

Asset Reconciliation

The following table provides the asset values that were extracted from the Plan's financial statements. During the period from December 31, 2021 to December 31, 2022, the fund assets have changed as follows:

	<u>2022</u>
Adjusted market value of assets, beginning of year	199,600,000
Increase in assets:	
Investment income	4,487,000
Realized gain/(loss)	3,188,000
Unrealized gain/(loss)	(27,471,000)
	<u>(19,796,000)</u>
Decrease in assets:	
Pension benefits paid	17,193,000
Administrative expenses	558,000
	<u>17,751,000</u>
Increase/Decrease in assets	<u>(37,547,000)</u>
Market value of assets, end of year	<u>162,053,000</u>
Plus: Accounts receivable	13,000
Less: Accounts payable	883,000
Adjusted market value of assets, end of year	161,183,000

Pension Fund Investment Return

The pension fund of the Plan has earned an annualized rate of return of -10.75%, net of expenses, for the period from December 31, 2021 to December 31, 2022. This rate recognizes realized and unrealized capital gains and losses as well as investment income received. It was assumed that the incidence of payments into and out of the fund was distributed uniformly throughout the year.

The annual net return rates earned on the market value of the assets in the past five years are as follows:

Year	Net Return on Market Value
2022	(10.75)%
2021	9.45%
2020	9.15%
2019	12.96%
2018	(2.04)%
Five-year average	3.36%

Summary of Investments

The following table summarizes the allocation of the assets of the Plan to various investment categories:

	Actual Allocation as at December 31, 2022	Target Allocation as at December 31, 2022
Asset Mix (as percentage of invested assets)		
Money Market & Cash	4.0%	2.0%
Pooled Bond funds (Fixed income)	56.8%	58.0%
Canadian Equities	26.8%	16.0%
Pooled Equity Funds	12.4%	24.0%
Total	100%	100%

DEVELOPMENT OF SMOOTHED VALUE OF ASSETS

According to the Plan by-laws, Section XXIV A, (3b), Subject to subsections (3c) and (3d), the increase of pension to pensioners including spouses of deceased retired members shall be the lesser of:

- the investment rate of return of the Fund (using a five (5) year smoothing technique) in excess of the rate of return required to maintain the actuarial solvency of the Fund as determined by the Actuary; and
- the increase in the year over year level of the average CPI, to the extent that actuarial surplus is available.

The following tables outline the calculation of the smoothed value of assets at December 31, 2022, and the investment rate of return on smoothed value of assets.

Market value experience	2022	2021	2020
Discount Rate	4.30%	4.30%	4.90%
Expected net investment income	8,201,511	8,210,261	9,430,597
Actual net investment income	(20,494,026)	18,086,428	17,646,939
Market value investment gain/(loss)	(28,695,537)	9,876,167	8,216,342

Year End	Investment Gain/(Loss) \$	Percentage of Gain/(Loss) Deferred	Deferred Gain/(Loss) \$
2022	(28,695,537)	75%	(21,521,653)
2021	9,876,167	50%	4,938,084
2020	8,216,342	25%	2,054,085
Smoothed Value of Assets Adjustment			\$ (14,529,484)

Smoothed Value of Assets	December 31, 2022
Adjusted Market Value of Assets (AMV)	161,183,319
Less: Smoothed Value of Assets Adjustment	<u>(14,529,484)</u>
Smoothed Value of Assets (before limits)	175,712,803
Minimum Smoothed Value of Assets (95% of AMV)	153,124,153
Maximum Smoothed Value of Assets (110% of AMV)	177,301,651
Smoothed Value of Assets (after limits)	175,712,803

The annual net return rates earned on the smoothed market value of the assets in the past five years are as follows:

Year	Net Return on Smoothed Market Value
2022	2.22%
2021	9.74%
2020	6.81%
2019	5.87%
2018	4.50%
Five-year average	5.80%

IV. FUNDED POSITION

GOING CONCERN BASIS

A going concern valuation, which assumes that the Plan will continue indefinitely, was conducted to determine the funded position of the Plan at December 31, 2022 and to determine the ongoing past service contribution requirements of the Plan so that over the long term, the Plan will have sufficient assets to provide the defined benefits promised.

The following exhibit compares the funded position of the Plan on a going concern basis at December 31, 2022 and December 31, 2021. During the period since December 31, 2021, the funded position has changed from a going concern excess of \$39,635,000 to a going concern excess of \$21,291,000.

	<u>December 31, 2022</u>	<u>December 31, 2021</u>
A. <u>Going Concern Assets</u>		
Actuarial value of assets	\$161,183,000	\$199,600,000
PV of special payments in respect of:		
Any past service unfunded actuarial liability	0	0
Plan amendments	0	0
Going concern unfunded liability (that are scheduled for payment within one year after the valuation date that are disclosed in the previously filed report)	<u>0</u>	<u>0</u>
Going concern assets	\$161,183,000	\$199,600,000
B. <u>Going Concern liabilities</u>		
Going concern liabilities for service prior to the valuation date in respect of:		
- Pensioners	\$74,757,000	\$87,523,000
- Beneficiaries	<u>\$53,584,000</u>	<u>\$57,900,000</u>
Total going concern liabilities	\$128,341,000	\$145,423,000
Discount rate assumption	5.20%	4.30%
C. <u>Provision for Adverse Deviations</u>	\$11,551,000	\$14,542,000
D. <u>Prior Year Credit Balance</u>	\$0	\$0
E. <u>Funded Position</u>		
Going concern excess / (unfunded liability) [(A) – (B) – (C) – (D)]	\$21,291,000	\$39,635,000
F. <u>Going Concern Funded Ratio</u>		
Ratio of actuarial value of assets to going concern liabilities	125.6%	137.3%

Pursuant to the previously mentioned amendments made under the Act in Ontario Regulation 250/18 in May 2018, the provision for adverse deviations has been calculated, in accordance with Sections 11.1 and 11.2 of the Act, to be equal to 9.0% of the going concern liabilities. More specifically the following basis has been used for the calculations:

- The Plan is considered a closed plan as defined under the Act;
- Pursuant to Section 11.2 (11) of the Act, we have used the Plan's target asset allocation to the applicable investment categories on the valuation date of the report as set out in the Plan's statement of investment policy. The Plan's combined target asset allocation for fixed income assets is 60%; and,
- Plan benchmark discount rate of 6.68% calculated in accordance with Sections 11.2 (7) to 11.2 (12) of the Act.

The following table summarizes the derivation of the provision for adverse deviations.

Closed plan value (A)	5.00%
Adjustment per Section 11.2(3) of Act (B)	4.00%
Benchmark discount rate component (C)	0.00%
Provision for adverse deviation (A+B+C)	9.00%

Based on the previous December 31, 2021 actuarial valuation, there were no going concern special payments. As a result, there is no schedule of any previously established payments. Based on the current December 31, 2022 actuarial valuation, there is a going concern surplus. As a result, there is no schedule of going concern special payments.

In addition, in accordance with CIA Pension Standards, we have performed discount rate sensitivity analysis on the going concern liabilities as at the valuation date, i.e. we have measured the impact of a 1.0% increase and a 1.0% decrease in the going concern discount rate assumption with all other assumptions remaining unchanged. The results of the sensitivity analysis are summarized below:

December 31, 2022	Liabilities using Valuation Basis	Liabilities using an increase of 1.0% in Discount Rate	Liabilities using a decrease of 1.0% in Discount Rate	Decrease (%) In Liabilities	Increase (%) In Liabilities
Pensioners	\$74,757,000	\$70,641,000	\$79,364,000	-5.5%	6.2%
Beneficiaries	\$53,584,000	\$50,765,000	\$56,721,000	-5.3%	5.9%
Total Liabilities	\$128,341,000	\$121,406,000	\$136,085,000	-5.4%	6.0%
Total Liabilities (Incl. PfAD)	\$139,892,000	\$132,333,000	\$148,333,000	-5.4%	6.0%

SOLVENCY BASIS

A solvency valuation, which assumes that the Plan is terminated at the valuation date, was conducted in respect of the Plan, in accordance with the Act. If a solvency valuation reveals a reduced solvency deficiency, additional contributions are required in order to ensure that over the short term, the assets of the Plan are sufficient to provide for eighty-five percent (85%) of the benefits that would be payable if the Plan were wound up. Such contributions must be made over a period of five (5) years immediately following the date the reduced solvency deficiency is revealed. To determine the reduced solvency deficiency or reduced solvency excess, the Act permits certain adjustments to be made to the solvency assets and solvency liabilities, as shown in the following exhibit.

The following exhibit illustrates the solvency position of the Plan at December 31, 2022 and December 31, 2021.

	<u>December 31, 2022</u>	<u>December 31, 2021</u>
A. <u>Solvency Assets</u>		
Actuarial value of assets	\$161,183,000	\$199,600,000
Allowance for expenses	<u>\$200,000</u>	<u>\$200,000</u>
Total solvency assets net of expenses	\$160,983,000	\$199,400,000
B. <u>Solvency Asset Adjustment*</u>	\$0	\$0
C. <u>Solvency Liabilities</u>		
Solvency liabilities in respect of:		
- Pensioners	\$75,314,000	\$96,761,000
- Beneficiaries	<u>\$54,368,000</u>	<u>\$64,471,000</u>
Total solvency liabilities	\$129,682,000	\$161,232,000
Discount rate assumptions:		
- Annuity purchase	4.91%	2.49%
D. <u>Solvency Liability Adjustment</u>	\$0	\$0
E. <u>Prior Year Credit Balance</u>	\$0	\$0
F. <u>Solvency Excess/(Deficiency)</u>		
(A) + (B) – (C) – (D) – (E)	\$31,301,000	\$38,168,000
G. <u>Reduced Solvency Excess/(Deficiency)</u>		
(A) + (B) – 85% [(C) + (D)] – (E)	\$50,753,000	\$62,353,000
H. <u>Solvency Ratio</u>		
[(A) – (E)] / (C)	124.1%	123.7%
I. <u>Transfer Ratio</u>		
[(A) – (E)] / (C)	124.1%	123.7%
<u>Solvency Liabilities in excess of Solvency Assets</u>	\$31,301,000	\$38,168,000

The results show that if the Plan had been terminated at December 31, 2022, the wind up actuarial assets (which are equal to the solvency assets net of expenses of \$160,983,000) would have exceeded the available liabilities (i.e. the solvency liabilities of \$129,682,000) by \$31,301,000.

There is a solvency excess of \$31,301,000 and a reduced solvency excess of \$50,753,000 determined at December 31, 2022. As a result, there are no solvency special payments required as at the valuation date. Based on the previous December 31, 2021 actuarial valuation, there were no going concern or solvency special payments. As a result, there is no present value of any previously established payments.

The transfer ratio, as defined by the Act, is over 1.0 for the Plan at December 31, 2022. As a result, restrictions are not imposed by the Act on the lump sum portability transfers that may be made from the Plan until the next valuation is completed.

In addition, in accordance with actuarial standards, we have performed discount rate sensitivity analysis on the solvency liabilities as at the valuation date, i.e. we have measured the impact of a 1.0% increase and a 1.0% decrease in the solvency interest rate assumptions with all other assumptions remaining unchanged. The results of the sensitivity analysis are summarized below:

December 31, 2022	Liabilities using Valuation Basis	Liabilities using an increase of 1.0% in Discount Rate	Liabilities using a decrease of 1.0% in Discount Rate	Decrease (%) In Liabilities	Increase (%) In Liabilities
Pensioners	\$75,314,000	\$71,125,000	\$80,009,000	-5.6%	6.2%
Beneficiaries	\$54,368,000	\$51,470,000	\$57,598,000	-5.3%	5.9%
Total Liabilities	\$129,682,000	\$122,595,000	\$137,607,000	-5.5%	6.1%

PENSION BENEFITS GUARANTEE FUND (PBGF) ASSESSMENT BASE

Under Section 47(1) of Regulation 909 of the Pension Benefits Act, R.S.O. 1990, the pension benefits provided by this Plan are not guaranteed by the Pension Benefits Guarantee Fund and this Plan is exempt from any Guarantee Fund assessment.

PLAUSIBLE ADVERSE SCENARIO TESTING

In accordance with the CIA Pension Standards, we have prepared details of the results of the application of plausible adverse scenarios which have been selected to assess risks to the Plan's financial condition. These include interest rate risk, deterioration of asset values, and longevity risk.

Additional disclosure and details regarding the selected scenarios and results of our analysis are provided in Schedule B.

V. CONTRIBUTION REQUIREMENTS

The development of the recommended contributions for the year commencing December 31, 2022 is set out below.

CONTRIBUTIONS FOR CURRENT SERVICE

As the Plan no longer has active members, there are no current service cost contributions.

CONTRIBUTIONS FOR PAST SERVICE

There is a going concern excess under the Plan and accordingly, there is no requirement to make any special contributions under the Plan on the basis of the going concern position of the Plan.

There is a reduced solvency excess under the Plan and accordingly, there is no requirement to make any special contributions under the Plan on the basis of the solvency position of the Plan.

MINIMUM AND MAXIMUM EMPLOYER CONTRIBUTION

As the Plan no longer has active members, there is no employer current service cost. The plan is fully funded on a going concern and a solvency basis and therefore contributions are not required.

There is no excess actuarial surplus, pursuant to Section 147.2(2) of the Income Tax Act (Canada).

VI. EXPERIENCE ANALYSIS

FUNDED POSITION

The going concern funded position of the Plan has changed from a going concern surplus of \$39,635,000 (including PfAD) as at December 31, 2021 to a going concern surplus of \$21,291,000 (including PfAD) as at December 31, 2022. The following exhibit provides an approximate analysis of the major factors that have contributed to this change.

	<u>Before PfAD</u>	<u>PfAD</u>	<u>After PfAD</u>
Net actuarial surplus / (net unfunded actuarial liability) at December 31, 2021	54,177,000	(14,542,000)	39,635,000
Interest Earned on the net actuarial surplus / (net unfunded actuarial liability)	2,330,000	(625,000)	1,705,000
PfAD released from benefit payouts	-	1,827,000	1,827,000
Expected actuarial surplus / (net unfunded actuarial liability) at December 31, 2022	56,507,000	(13,340,000)	43,167,000
Gain/(Loss) from:			
Investment Income Other than Expected	(28,721,000)	-	(28,721,000)
Mortality Experience	2,939,000	294,000	3,233,000
2022 COLA	(5,104,000)	(510,000)	(5,614,000)
Change in Discount Rate Assumptions	6,930,000	693,000	7,623,000
Change in Mortality Assumptions	655,000	65,000	720,000
Change in PfAD Assumptions	-	1,283,000	1,283,000
Other Sources	(364,000)	(36,000)	(400,000)
Net actuarial surplus / (net unfunded actuarial liability) at December 31, 2022	32,842,000	(11,551,000)	21,291,000

For the gain/loss items due to assumptions updates, the details of changes are provided in Section VII. For the gain/loss items that are not due to assumptions updates, the further explanations are outlined below:

a. Investment experience

The Plan's actual return on the market value of assets of -10.75% per annum was lower than the expected investment return assumption of 4.30% per annum, net of all expenses, for the valuation period. This resulted in a loss of \$28,721,000.

b. Mortality experience

Since the last valuation, the mortality experience was favorable, resulting in a gain of \$3,233,000 (incl. PfAD).

c. Cost of living adjustment in 2022

Per the Plan by-law, an increase in post-retirement pensions of 3.36% per annum was granted effective January 1, 2022 to eligible pensioner and beneficiaries. The actual cost of this increase was \$5,614,000 including interest to the valuation date.

d. Other sources

There are a number of other sources of gain and loss items such as timing of cash flows, difference between the actual and expected pension payouts based on the 2022 cost of living adjustments. Combined, these other experience items have resulted in a loss of \$400,000 as of the valuation date.

VII. ACTUARIAL BASIS

GOING CONCERN ACTUARIAL BASIS

Introduction

Pension plans are long term financial commitments and the cost of these commitments (or liabilities) must be estimated in order to determine the amount of funds to be set aside to meet them. To estimate the cost of the future commitments, assumptions must be made about future events that will affect the cost.

These assumptions may be categorized as either economic or demographic assumptions. Economic assumptions pertain to factors such as the rate of inflation and the rate of investment return. Demographic assumptions pertain to events affecting the Plan members, such as terminations, mortality, and retirement.

The actuarial basis of calculation for this valuation is set out below. The actuarial basis includes the economic and demographic assumptions used to value the liabilities. It also includes the actuarial methods used to determine the actuarial value of assets and the allocation of costs to past and future service for determination of the funded position and contribution requirements. Actual costs may be higher or lower than the actuarial estimate since any difference between the Plan's actual experience and the actuarial assumptions will emerge as experience gains or losses in future valuations and will thus be reflected in the level of future contributions. In the long run, the cost of the Plan will ultimately be determined by the benefits provided and by the Plan's actual experience, not by the actuarial basis adopted from time to time by actuaries to estimate the cost.

We have considered the adequacy and appropriateness of the actuarial assumptions and methods that are currently in use for this valuation. Changes in the actuarial basis affect the funded position, and since stability of funding is highly desirable, major changes are not made frequently or without good reason. Rather, we expect to modify the actuarial basis in response to changing circumstances and experience, as well as the underlying objectives adopted by the plan sponsor for the funding of benefits.

The below table summarizes the going concern assumptions and methods used for the valuation:

	At December 2022	At December 2021
<u>Economic Assumptions</u>		
Investment return:	5.20% per annum, net of investment and administrative expenses	4.30% per annum, net of investment and administrative expenses
Provision for PfAD:	9.0% of going concern liabilities	10.0% of going concern liabilities
Post-retirement indexation:	Same	No provision has been made for future post-retirement ad hoc adjustments in the liabilities based on the cost-of-living provisions of the Plan by laws
<u>Demographic Assumptions</u>		
Mortality:	CPM 2014 Public table with CPM-B projection	CPM 2014 Public table with CPM-B projection with size adjustment factors of 0.9884 for males and 0.9878 for females
Marital status:	Same	Actual information
Spouse's age:	Actual information. For spouses with missing date of birth, we assume the spouse's age is same as the pensioner's age.	Actual information

	At December 2022	At December 2021
Actuarial Methods		
Actuarial cost method:	Same	Unit Credit The accrued liability for pensioners and beneficiaries is the present value of their respective benefits
Asset valuation method:	Same	Market value of assets

Economic Assumptions

Investment Return

Based upon the current allocation of the assets in the pension fund to various investment categories and the estimated returns for each of these asset classes (based on current market conditions), we have assumed that the Pension Fund will earn 5.83% per annum. We have also allowed for expenses based on the recent average expense levels incurred by the Plan. We have assumed a margin for adverse deviation of 0.45% per annum in addition to the PfAD described below. The underlying long-term investment rate of return of 5.20%, net after payment of all expenses and margin for adverse deviation, was assumed. The discount rate was developed as follows:

	Rate
Market Yield on Long Term Gov of Canada Bonds at December 31, 2022 (Cansim V122544)	3.28%
Plus:	
Weighted average of Risk Premia over Gov of Canada Bonds	2.25%
Addition for diversification effect	0.30%
Additional return due to active management net of investment expenses	0.00%
Less	
Non-investment admin fees	0.10%
Passive investment management fees	0.10%
Margin for adverse deviation	0.45%
Discount rate assumption	5.18%
Discount rate assumption, rounded to the nearest 0.10%	5.20%

These main economic actuarial assumptions may be characterized as reasonable long-term expectations for these factors, without undue weight being given to short term considerations. There is no assumed additional returns from active investment strategy included in the discount rate assumption.

Provision for Adverse Deviation (PfAD)

Pursuant to Ontario's Regulation 250/18, the level of the new PfAD depends on three plan specific factors: i) open or closed plan ii) asset mix and iii) the going concern discount rate. More specifically the following basis has been used for the calculations:

- The Plan is considered a closed plan as defined under the Act; and,
- Pursuant to Section 11.2(11) of the Act, we have used the Plan's target asset allocation to the applicable investment categories on the valuation date of the report as set out in the Plan's statement of investment policy. The Plan's combined target asset allocation for fixed income assets is 60.0%.

- Plan benchmark discount rate of 6.68% calculated in accordance with Sections 11.2 (7) to 11.2 (12) of the Act.

The following table summarizes the derivation of the provision for adverse deviations.

	Rate
Closed plan value (A)	5.00%
Adjustment per Section 11.2(3) of Act (B)	4.00%
Benchmark discount rate component (C)	0.00%
Provision for adverse deviation (A+B+C)	9.00%

Demographic Assumptions

Mortality

Due to the size of the Plan, there is no credible mortality experience. The mortality assumption is based on studies performed by the CIA regarding the development of mortality tables and projection scales based on Canadian pensioner mortality experience. Mortality rates were taken from the Canadian Pensioner's Mortality Registered Pension Plan Public Table ("CPM2014 Publ"), which reflects the mortality experience as of 2014 from a public sector analysis of members in Canadian registered pension plans. Sex-distinct rates were used.

In addition, a generational mortality improvement table was used with the mortality rates chosen based on the CPM-B scale provided by the Canadian Institute of Actuaries.

Compared to the previous valuation as at December 31, 2021, the size adjustment factors of 0.9884 for males and 0.9878 for females are removed in the current valuation.

Actuarial Methods

Actuarial cost method

The going concern valuation of the liabilities was conducted using the Unit Credit actuarial cost method. This method is designed to accumulate assets systematically to provide security for the benefits provided under the terms of the Plan in respect of service that has already been rendered, without further recourse to the assets of the Plan sponsor. However, the method does not ensure that, even if assets in the Fund are at least equal to the accrued actuarial liability, such assets will necessarily be sufficient in all circumstances to cover the cost of accrued benefits in the event the Plan is terminated.

Asset valuation method

The actuarial value of assets is equal to the market value of the Pension Fund plus any contributions receivable or payments payable after December 31, 2022 in respect of the period prior to December 31, 2022.

SOLVENCY ACTUARIAL BASIS

Introduction

As required by the Act, a solvency valuation was performed on the Plan as at December 31, 2022 in accordance with the standards prescribed by the Act. The purpose of a solvency valuation is to establish the minimum funding requirements for the Plan on a “plan wind up” basis.

The below table summarizes the actuarial assumptions and methods used for the solvency valuation:

	At December 2022	At December 2021
<u>Economic Assumptions</u>		
Annuities purchase rate:	4.91% per annum (Plan duration of 5.69 years)	2.49% per annum (Plan duration of 6.51 years)
Provision for wind up expenses:	Same	\$200,000.00
<u>Demographic Assumptions</u>		
Mortality:	Same	CPM 2014 Combined Table with CPM-B projection
Election experience:	Same	100% members assumed to have annuities purchased on their behalf
Marital status:	Same	Actual information
Spouse's age:	Actual information. For spouses with missing date of birth, we assume the spouse's age is same as the pensioner's age.	
<u>Actuarial Methods</u>		
Actuarial cost method:	Same	Present value of accrued benefits. No benefits payable on plan wind up were excluded from the valuation
Asset valuation method:	Same	Market value of assets

Assumptions

Annuity Purchase Rate

In accordance with the Memorandum entitled “Guidance for Assumptions for Hypothetical Wind-Up and Solvency Valuations Update – Effective December 31, 2022, and Applicable to Valuations with Effective Dates on or after December 31, 2022, and no later than December 30, 2023” dated January 25, 2023 from the Canadian Institute of Actuaries, the interest rate assumption is 4.91% per annum for benefits assumed to be settled by purchase of annuities.

Provision for windup expenses

Expenses associated with terminating the Plan in the amount of \$200,000 were assumed to be payable from the Plan. This expense has been applied against the solvency assets.

Mortality

In accordance with the guidance on annuity purchase assumptions from the CIA (see references above) at the valuation date, mortality rates were taken from the final report on Canadian Pensioners' Mortality (CPM2014 Combined) issued in February 2014, with generational mortality improvements projected using projection scale CPM Improvement Scale B.

Actuarial Methods

Actuarial cost method

The Unit Credit actuarial cost method was used to determine the solvency liabilities. Under this method, for each member, the accrued actuarial liabilities are determined as the present value of all benefits accrued to the valuation date.

Asset valuation method

Assets deemed to be available for purposes of the solvency valuation are equal to the sum of:

- (a) The market value of assets in the Pension Fund, adjusted for any receivables or payables; and,
- (b) A "Solvency Asset Adjustment" equal to the present value of admissible special payments as determined by Section 1 of the Regulation to the Act, discounted using the assumed interest rates applicable to the solvency actuarial basis.

VIII. SUMMARY OF MAIN PLAN PROVISIONS

The valuation is based on the Plan as amended to December 31, 2022. The following is a summary of Plan provisions that are pertinent to this valuation. For a detailed description of the benefits, please refer to the Plan by-laws document.

Plan members

All members of the Fire Department, except those who became members after May 8, 1961, at an age in excess of 26 years, or after July 1, 1968.

Post-retirement benefit

Normal form of pension:

- No spouse: Pension payable for life
- With a spouse: Pension with a spouse lifetime pension of 66-2/3% of the initial amount following the later of the member's death.

Ad hoc post-retirement adjustments

Commencing 1986, City Council adopted a policy of providing ad hoc increases in pensions to pensioners based upon an excess interest indexing methodology. Subject to City Council approval, each year, ad hoc increases in pension were provided, with a minimum increase of 50% of the increase in the Consumer Price Index (CPI) on a year over year basis, and a maximum increase of the lesser of the excess investment return on the Benefit Fund and 100% CPI.

Commencing 1997, the Plan by-laws were amended to provide for future increases to pensioners including spouses of deceased retired members, based on the lesser of:

- a. The investment rate of return of Fund assets (using a 5-year smoothing technique) in excess of the rate of return required to maintain the actuarial solvency of the Benefit Fund as determined by the Actuary, and
- b. The increase in the year over year level of the average CPI to the extent that actuarial surplus is available.

IX. SUMMARY OF MEMBERSHIP DATA

Membership data in respect of the Plan as at December 31, 2022 was received from the administrator and included information such as name, gender, age, pension amount and other applicable details for all Participants entitled to benefits under the Plan.

We have reviewed the data and compared it to the data used in the prior valuation for consistency and reliability for use in this valuation. The main tests of sufficiency and reliability that were conducted on the membership data are as follows:

- a reconciliation of Participant status from the prior valuation to the current valuation;
- a review of the consistency of individual data items and statistical summaries between the current and prior valuations; and
- a review of the reasonableness of changes in such information since the prior valuation.

The following exhibits summarize the data for Participants entitled to benefits under the Plan.

Summary of Plan Participants included in the valuation

	31-Dec-22	31-Dec-21
Pensioners		
Number	238	264
Average age (years)	84.3	83.6
Annual benefit	\$9,742,117	\$10,526,370
Average annual benefit	\$40,933	\$39,873
Beneficiaries		
Number	285	291
Average age (years)	83.9	83.3
Annual benefit	\$7,576,233	\$7,471,675
Average annual benefit	\$26,583	\$25,676

RECONCILIATION OF DATA

The following is a reconciliation of Participants entitled to pension benefits under the Plan from the previous valuation date to the current valuation date.

	Pensioners	Beneficiaries	Total
Number at December 31, 2021	264	291	555
Changes due to:			
Deaths	(27)	(20)	(47)
New survivor	-	14	14
Family law separation*	<u>1</u>	<u>=</u>	<u>1</u>
Total changes	(26)	(6)	(32)
Number at December 31, 2022	238	285	523

*Note: One pensioner has a separation agreement and his ex-spouse receives a portion of his pension, thus a second pensioner record was created for his ex-spouse in the database. In the previous valuation, these two pensioner records are considered as one. While, in the current valuation, these two pensioner records are considered separately.

X. ACTUARIAL COST CERTIFICATE

Based on the provisions of Toronto Fire Department Superannuation and Benefit Fund, the membership data at December 31, 2022, and on the actuarial basis described in Section VII, I hereby certify that:

- (a) Because the plan no longer has active members, there is no employer current service cost contribution requirements.
- (b) There is a going concern surplus of \$21,291,000 as at December 31, 2022.
- (c) There is a solvency excess of \$31,301,000, net of estimated expenses, as at December 31, 2022. There is a reduced solvency excess of \$50,753,000, net of estimated expenses, as at December 31, 2022.
- (d) No liabilities were excluded in the calculation of the solvency liabilities.
- (e) There are no going concern special payments required.
- (f) There are no solvency special payments required.
- (g) As at December 31, 2022, the transfer ratio is 124.1%
- (h) The requirements of Section 147.2(2)(a)(iii) and (iv) of the Income Tax Act (Canada) have been satisfied in the preparation of this valuation.
- (i) Under Section 47(1) of Regulation 909 of the Pension Benefit Act, R.S.O. 1990, the pension benefits provided by this Plan are not guaranteed by the Pension Benefits Guarantee Fund and this Plan is exempt from any Guarantee Fund assessment.
- (j) As at December 31, 2022, the prior year credit balance is nil.
- (k) The cost of providing the COLA according to the Plan by-law is \$1,245,000 on a going concern basis (including PfAD) and \$1,154,000 on a solvency basis as at January 1, 2023. In my opinion, the Plan will remain in a surplus position on a going concern and a solvency basis as at January 1, 2023, should the cost of the January 1, 2023 COLA be reflected in the current valuation results.
- (l) In my opinion, the assumptions used in this valuation are appropriate for the Plan and the valuation has been prepared using methods consistent with sound principles established by precedent or by common usage within the actuarial profession and with the requirements of the Act and Regulations thereunder.

Respectfully submitted,

RSM CANADA CONSULTING LP



Stanley Caravaggio, FSA., FCIA
Director

Toronto, Ontario

May 8, 2023

**SCHEDULE A –
EMPLOYER CERTIFICATION**

I hereby confirm as an authorized signing officer of the administrator of The Toronto Fire Department Superannuation and Benefit Fund that, to the best of my knowledge and belief, for the purposes of the valuation:

- (i) The membership data as described in Section IX is accurate and complete;
- (ii) The valuation reflects the terms of the Employers engagement with the actuary detailed in Section I;
- (iii) All events subsequent to the date of the valuation that may have an impact on the Plan have been communicated to the actuary; and,
- (iv) The summary of Main Plan Provisions contained in Section VIII of this report is an accurate and complete summary of the relevant terms of the Plan in effect on the date of valuation.

City of Toronto
Toronto Fire Department Superannuation and Benefit Fund
Canada Revenue Registration #0351601

May 10, 2023

Date



Signature

ANDREW FLYNN

Name

CONTROLLER

Title

SCHEDULE B – PLAUSIBLE ADVERSE SCENARIOS

In accordance with the CIA Pension Standards, we have performed an analysis of the impact of selected plausible adverse scenarios on the financial position of the plan. This is a stress-testing process on various risks to the funded status of the pension plan.

An adverse scenario is characterized as a plausible adverse scenario if it has non-trivial probability of occurring within the short term (i.e. immediately to one year). To meet this threshold, the adverse scenario would generally be consistent with the likelihood of between a 1 in 10 and 1 in 20 event, based on the opinion of the actuary. The following plausible adverse scenarios were selected for the valuation as at December 31, 2022.

Interest rate risk

This scenario measures the impact of an immediate change in market interest rates underlying fixed income investments. We have selected a plausible adverse scenario reflecting a reduction of 1.0% to fixed income market interest rates. This change in interest rates would impact both the Plan assets and liabilities.

The value of the fixed income portion of plan assets is expected to be positively impacted by a reduction in market interest rates. An estimate of the duration of the fixed income portion of Plan assets was used to determine the impact on the Plan's market value of assets at December 31, 2022.

Also, the reduction in market interest rates results in a drop of 1.0% in the discount rate for going concern valuation purposes from 5.2% to 4.2% and for solvency valuation purposes from 4.91% to 3.91% under this plausible adverse scenario. No changes to other asset values and economic assumptions.

The impact of the interest rate adverse scenario is an increase in the going concern liability (including PfAD) by \$8,441,000 and in the solvency liability by \$7,925,000. The market value of assets increases by \$6,178,000. Overall, the Plan remains in surplus position on a going concern basis and a solvency basis under this risk scenario.

Deterioration of asset values

This scenario measures the impact of a change in asset values only. We have selected a plausible adverse scenario reflecting a reduction in the value of the non-fixed income asset values of 20% at the valuation date. No changes to other asset values or to the plan liabilities are considered under this scenario.

The impact of such decrease results in a reduction of the market value of assets by \$12,706,000. As a result, the Plan remains in surplus position on a going concern basis and a solvency basis.

Longevity risk

This scenario measures the impact of a change in the mortality assumptions used in the valuation. We have selected a plausible adverse scenario which immediately reflects a more conservative mortality assumption than currently employed for the valuation, i.e. we have adjusted the base mortality table rates (CPM2014 Public table and CPM2014 Composite table) to be improved by 10% at all ages over current assumptions.

If mortality improved as contemplated under this scenario, there is an increase in the going concern liability (including PfAD) by \$7,399,000 and in the solvency liability by \$5,407,000. Overall, the Plan remains in surplus position on going concern basis and a solvency basis under this risk scenario.

The following exhibit summarizes the results and the impact that each of the plausible adverse scenarios above would have on the going concern funded position of the Plan at the date of the valuation.

PLAUSIBLE ADVERSE SCENARIO TESTING

		Plausible Adverse Scenarios			
		Deterioration of			
		Base	Interest Rate Risk	Asset Value	Logevity Risk
<u>Funded Position - Going Concern</u>					
Going concern assets		\$161,183,000	\$167,361,000	\$148,477,000	\$161,183,000
Going concern liabilities		\$128,341,000	\$136,085,000	\$128,341,000	\$135,129,000
Provision for adverse deviations		<u>\$11,551,000</u>	<u>\$12,248,000</u>	<u>\$11,551,000</u>	<u>\$12,162,000</u>
Going concern excess/(unfunded liability)		\$21,291,000	\$19,028,000	\$8,585,000	\$13,892,000
Going concern funded ratio (assets divided by liabilities)		125.6%	123.0%	115.7%	119.3%
<u>Funded Position Solvency</u>					
(i)	Solvency assets	\$161,183,000	\$167,361,000	\$148,477,000	\$161,183,000
(ii)	Expense allowance	\$200,000	\$200,000	\$200,000	\$200,000
(iii)	Solvency asset adjustment	\$0	\$0	\$0	\$0
(iv)	Solvency liabilities	\$129,682,000	\$137,607,000	\$129,682,000	\$135,089,000
(v)	Solvency liability adjustment	\$0	\$0	\$0	\$0
(vi)	Prior year credit balance	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
(vii)	Solvency excess/(deficiency)	\$31,301,000	\$29,554,000	\$18,595,000	\$25,894,000
	(i) - (ii) + (iii) - (iv) - (v) - (vi)				
(viii)	Reduced solvency excess/(deficiency)	\$50,753,000	\$50,195,000	\$38,047,000	\$46,157,000
	(i) - (ii) + (iii) - 85% * [(iv) - (v)] - (vi)				
(viii)	Transfer ratio	124.1%	121.5%	114.3%	119.2%



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