

New Brunswick Teachers' Pension Plan

Actuarial Valuation Report as at August 31, 2019

Report prepared in May 2020

Registration numbers:	Canada Revenue Agency:	0293696
	NB Superintendent of Pensions:	0293696

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Introduction

This report was prepared for the Board of Trustees (“Trustees”) of the New Brunswick Teachers’ Pension Plan (“NBTPP”) for the following purposes:

- to document the results of the funding valuation, as required under subsection 17(1) of the New Brunswick Teachers’ Pension Plan Act (“TPPA”) and provide the related actuarial opinion;
- to document the results of the going-concern actuarial valuation required under subsection 16(1) of the TPPA in order to determine the maximum eligible employer contribution to the NBTPP under subsection 147.2(2) of the Income Tax Act (Canada) (“ITA”) and provide the related actuarial opinion;
- to document the results of a hypothetical wind-up valuation of the NBTPP as required under the Canadian Institute of Actuaries Standards of Practice, and provide the related actuarial opinion; and
- to document the results of the risk management procedures as required under section 15 of the TPPA.

The Board of Trustees is also seeking the approval of the Superintendent of Pensions for the following items, as required under the TPPA, the Pension Benefits Act (“PBA”) and accompanying Regulations:

- approval of the generational mortality table used in the funding valuation as required under sub-paragraph 17(9)(c)(ii) of the TPPA;
- approval of the asset liability model used, as described in Section 4 of the report, including the stochastic projection assumptions found under Appendix C, as required under subsection 15(1) of Regulation 2012-75; and
- approval of the economic assumptions used in the asset liability model, as described under Appendix C, as required under subsection 15(3) of Regulation 2012-75.

The Trustees for the NBTPP retained the services of Morneau Shepell Ltd (“Morneau Shepell”) to prepare this report. The report is suitable for filing with the Superintendent of Pensions and with the Canada Revenue Agency.

The last actuarial valuation report prepared for the NBTPP and filed with both the Superintendent of Pensions and the Canada Revenue Agency was performed as at August 31, 2016.

The next actuarial valuation report for the NBTPP will be due no later than August 31, 2022.

Subsequent Events

On March 11, 2020, the World Health Organization declared that COVID-19 was a pandemic. This public health crisis caused significant economic and social disruptions worldwide.

- The COVID-19 pandemic resulted in higher deaths for the population in general as measured by public health officials. The effect of the outbreak on the mortality incidence for the Plan is unknown at this time and no adjustments to the mortality assumption have been made in this report. The effect on the Plan if any, will be recognized in the gains or losses of future reports as the experience emerges.

- Economic conditions have also changed with a significant reduction in asset values and strained liquidity occurring in the month of March. Sustained lowered economic activity could also impact the Plan's economic assumptions. No adjustments on the Plan assets nor to any of the economic assumptions have been made or anticipated in this report.


We are not aware of any other events subsequent to the valuation date which may have a material impact on the results of this valuation.

The recommendations and opinions are given exclusively from a financial viewpoint. This valuation report does not constitute a legal opinion on the rights and duties of the Trustees or the members of the Plan over the pension fund.

Actuarial valuation results are only estimates. Actuarial valuations are performed based on assumptions and methods that are in accordance with sound actuarial principles. Emerging experience differing from these assumptions will result in gains or losses, which will be revealed in future valuations.

The undersigned is available to provide supplementary information and explanation as appropriate, concerning this report.


Respectfully submitted,



Yves Plourde, FSA, FCIA

July 3, 2020

Date



Randy Pelletier, ACIA

July 3, 2020

Date

This report has been peer reviewed by Daniel Dine, FSA, FCIA.

Section 1 – Funding Valuation

A funding valuation is required under subsection 17(1) of the TPPA. The results of the funding valuation of the NBTPP as at August 31, 2019 are found below.

The funding valuation results presented in this section are based on asset information found in Appendix A, membership data found in Appendix B, and Plan provisions summarized in Appendix D. The methods and assumptions used in the funding valuation are presented later in this section.

Funding Valuation Funded Status

The funding valuation funded status of the NBTPP is determined by comparing the fair market value of the assets to the funding valuation actuarial liabilities. The funding valuation actuarial liabilities are based on the benefits earned up to the valuation date assuming the Plan continues indefinitely.

Table 1.1 – Funding Valuation Funded Status

	August 31, 2019	August 31, 2016
	\$M	\$M
Actuarial value of assets		
• Fair market value of assets	\$6,139.2	\$5,481.7
Funding valuation actuarial liabilities		
• Active members	1,852.3	1,634.1
• Retirees and survivors	3,707.0	3,494.7
• Deferred vested and suspended members	77.6	59.9
• Total	\$5,636.9	\$5,188.7
Funding valuation excess (unfunded liability)	\$502.3	\$293.0
Termination value funded ratio [calculated in accordance with subsection 17(7) of the TPPA]	108.9%	105.6%

The termination value funded ratio is used in the calculation of the “termination value” of any individual’s pension benefits at termination of employment, death, marriage breakdown, or retirement, as the case may be, in accordance with the terms of the Plan. It is calculated in accordance with subsection 17(7) of the TPPA.

Funding Valuation Normal Cost and Excess Contributions

The table below provides the funding valuation normal cost, being the value of the pension benefits accrued in the twelve-month period after the valuation date. It compares the funding valuation normal cost to the level of member and employer contributions in order to determine the level of contributions being made to the NBTPP in excess of the funding valuation normal cost. Results for the year following August 31, 2019 are presented below, along with the results found in the previous actuarial valuation as at August 31, 2016.

Table 1.2 – Funding Valuation Normal Cost and Excess Contributions

	Year following August 31, 2019 ⁽²⁾		Year following August 31, 2016 ⁽¹⁾	
	\$M	% of payroll	\$M	% of payroll
A. Funding valuation normal cost	\$113.4	17.11%	\$103.4	16.91%
B. Contributions:				
• Members	\$69.5	10.49%	\$61.1	10.00%
• Employer initial contributions	64.6	9.75%	59.6	9.75%
• Employer temporary contributions:				
- for 5 years after 1.7.2014	0.0	0.00%	4.6	0.75%
- for 10 years after 1.7.2014	5.0	0.75%	4.6	0.75%
- for 15 years after 1.7.2014	<u>5.0</u>	<u>0.75%</u>	<u>4.6</u>	<u>0.75%</u>
Total	\$144.1	21.74%	\$134.5	22.00%
C. Excess contributions (B. – A.)	\$30.7	4.63%	\$31.1	5.09%
Estimated payroll for following year	\$662.8 M		\$611.4 M	

⁽¹⁾ The contribution rates shown are those effective from July 1, 2016.

⁽²⁾ The contribution rates shown are those effective from July 1, 2019.

Reconciliation of Funding Valuation Funded Status with Previous Valuation

The table below describes the change in the Plan's funded status between the last funding valuation as at August 31, 2016 to this funding valuation as at August 31, 2019:

Table 1.3 – Reconciliation of Funded Status

	\$M	\$M
Funding valuation excess (unfunded liability) as at August 31, 2016		\$293.0
Expected changes in funded status		
• Interest on funding excess (unfunded liability)	54.5	
• Total contributions in excess of normal cost (shortfall) with interest	116.8	
• Total		\$171.3
Expected funding valuation excess (unfunded liability) as at August 31, 2019		\$464.3
Experience gains (losses) due to the following factors:		
• Investment return on actuarial value of assets different than assumed	129.1	
• Incidence of retirement	(12.0)	
• Incidence of termination of employment	3.2	
• Incidence of mortality	(17.6)	
• Incidence of disability	8.8	
• Indexing of accrued pensions and pensions in payment different than assumed	71.4	
• Other factors	9.0	
• Total		\$191.9
Impact of changes in actuarial assumptions		(\$153.9)
Funding valuation excess (unfunded liability) as at August 31, 2019		502.3

Reconciliation of Total Normal Cost

The factors contributing to the change in the total normal cost from the last funding valuation as at August 31, 2016 to this funding valuation as at August 31, 2019 are shown below:

Table 1.4 – Reconciliation of Total Normal Cost

	% of payroll
Total normal cost as at August 31, 2016	16.91%
Impact of changes in demographics	(0.18%)
Impact of changes in assumptions	0.38%
Total normal cost as at August 31, 2019 (see Table 1.2)	17.11%

Funding Valuation Actuarial Methods

Asset Valuation Method

The assets used for the funding valuation are equal to the fair market value of the assets.

Actuarial Cost Method

The funding valuation actuarial liabilities and normal cost were calculated using the accrued benefit (or unit credit) actuarial cost method in accordance with the requirements of subsection 17(9) of the TPPA.

The funding valuation actuarial liabilities are equal to the actuarial present value of benefits earned by members for services prior to the valuation date, taking into account the actuarial assumptions as indicated hereafter. The actuarial liabilities take into account future increases in accrued pensions due to regular cost-of-living adjustments granted to active and retired members.

The funding valuation normal cost is equal to the actuarial present value of benefits expected to be earned by members in the year following the valuation date. A salary increase has been estimated for the year following the valuation date to calculate the estimated normal cost and estimated member and employer contributions for the year following the valuation date.

The ratio of the total normal cost to the covered payroll for the period will tend to stabilize over time if the demographic characteristics of the active members remain stable. All other things being equal, an increase in the average age of the active members will result in an increase in this ratio.

For valuation purposes, to determine eligibility for benefits and for any other use, the age used is the age on the date of the nearest birthday.

Funding Valuation Actuarial Assumptions

The main actuarial assumptions employed for the funding valuation are summarized in the following table. Emerging experience differing from these assumptions will result in gains or losses, which will be revealed in future funding valuations. Experience gains and losses emerging in future funding valuations will impact the funded ratio of the Plan, which in turn will impact the types and timing of any actions to be taken by the Trustees in accordance with the Funding Policy. All rates and percentages are annualized unless otherwise noted.

Table 1.5 – Funding Valuation Actuarial Assumptions

	August 31, 2019	August 31, 2016
Discount rate	5.80% per annum	5.85% per annum
Inflation	2.10% per annum	2.25% per annum
Indexing of active members accrued pensions	100% of inflation ⁽¹⁾	100% of inflation ⁽¹⁾
Indexing of retiree pensions and other inactive members accrued pension	75% of inflation ⁽¹⁾	75% of inflation ⁽¹⁾
Salary increase for year following valuation (for normal cost purposes only)	2.60% plus merit and promotion based on service	2.75% plus merit and promotion based on age
YMPE increase for year following valuation (for normal cost purposes only)	2.60%	2.75%
Mortality	<p>Regular Members: CPM2014 Public Sector generational mortality using improvement scale CPM-B, adjusted by 0.90 for males and 0.90 for females</p> <p>Disabled Members: CPM2014 Public Sector generational mortality using improvement scale CPM-B, adjusted by 1.50 for males and 1.50 for females</p>	<p>Regular Members: CPM2014 Public Sector generational mortality using improvement scale CPM-B, adjusted by 0.90 for males and 0.90 for females</p> <p>Disabled Members: GAM71</p>
Spousal age difference	Males 2 years older than females	Males 3 years older than females
Retirement ⁽³⁾	<p>If unreduced retirement age⁽²⁾ attained within 10 years of 1.1.2014:</p> <p>20% at 81 points 35% at 85 points 35% at 87 points 10% at 90 points</p> <p>but not later than attainment of 35 years of service or age 60</p>	<p>If unreduced retirement age⁽²⁾ attained within 5 years of 1.1.2014:</p> <p>45% at 85 points 45% at 87 points 10% at 90 points</p> <p>but not later than attainment of 35 years of service or age 60</p>
	<p>If unreduced retirement age⁽²⁾ attained after 10 years of 1.1.2014:</p> <p>20% at 81 points 40% at 89 points 40% at 91 points</p> <p>but not later than attainment of 35 years of service or age 62</p>	<p>If unreduced retirement age⁽²⁾ attained after 5 years of 1.1.2014:</p> <p>45% at 89 points 45% at 91 points 10% at 94 points</p> <p>but not later than attainment of 37 years of service or age 62</p>

	August 31, 2019			August 31, 2016	
Disability (sample annual rates)	Age	Male	Female	Age	Rate
	25 - 29	0.01%	0.01%		
	30 - 34	0.03%	0.02%	30	0.08%
	35 - 39	0.06%	0.03%	35	0.11%
	40 - 44	0.08%	0.05%	40	0.17%
	45 - 49	0.11%	0.07%	45	0.27%
	50 - 54	0.17%	0.12%	50	0.45%
	55 - 59	0.25%	0.21%	55	0.76%
	60 and over	0.30%	0.30%	60	1.22%
Proportion of members with a spouse or common-law partner	Active males: 85% Active females: 75% Deferred and pensioners: Varies by age			Active males: 80% Active females: 70% Deferred and pensioners: Varies by age	

⁽¹⁾ Inflation is adjusted down by 0.10% per annum at August 31, 2019 (0.15% per annum at August 31, 2016) for purposes of indexing to take into account the impact of the 4.75% cap applied under the Plan for indexing purposes.

⁽²⁾ Unreduced retirement age determined in accordance with the provisions of the Plan applicable to service before July 1, 2014.

⁽³⁾ Members who have attained assumed retirement age are assumed to retire in one year from the valuation date.

Rationale for Material Actuarial Assumptions

The assumptions have been reviewed in light of current economic and demographic conditions.

Inflation

Given the historical increases in consumer prices in Canada, the rates expected by the market, the portfolio managers' expectation, the Bank of Canada policy and the long-term forecasts of the Conference Board of Canada, Morneau Shepell believes that the expected long-term rate of inflation should be between 1.75% and 2.25%.

Consistent with this range, we have used an inflation assumption of 2.10% per annum.

Discount Rate Development

The elements considered in the development of the discount rate assumption for purposes of the funding valuation are summarized in the table below.

Table 1.6 – Development of Funding Valuation Discount Rate

	%
Expected long-term nominal return (based on the long-term target asset mix, including impact of rebalancing and diversification, and added value for active management)	6.00
Expected investment and administration expenses paid from the fund	(0.2)
Discount rate	5.80

The long-term target asset mix used in our analysis is found in Table A.4 and is in accordance with the Statement of Investment Policies adopted by the Trustees for the NBTPP. The expected long-term nominal return by asset class is provided in Appendix C. It should be noted that the return assumptions for bonds has been determined mainly on current market conditions while the return assumptions for equities and alternative investments are based more on long-term expectations.

Expenses

The allowance for investment management and administrative expenses paid from the fund built into the discount rate is 0.20% of assets based on recent Plan history and our expectation for future expenses.

Rate of Salary Increase

Salary increases consist of a combination of inflation, productivity growth (i.e. real increase in average employment earnings in excess of inflation) and merit and promotional increase.

We use a salary increase assumption of 2.60% per annum, based on a difference of 0.5% per annum above inflation.

In addition to the above salary increase, we include a promotional scale to reflect the various steps in pay scales and promotions during the career of a member. The recommended promotional salary scale varies by service and is greater early in a career in order to reflect the seniority increases typically granted in accordance with the collective agreement. The recommended scale was developed using the Teachers' most recent collective agreement, where the increases reflect the negotiated increases over and above inflationary increases for teachers in the first 10 years of employment, as well as a long-term merit scale assumption for teachers who move between different certification levels over their careers. This is a change from the previous valuation where the promotional scale assumption varied by age.

The promotion scale assumption employed is summarized in the following table.

Table 1.7 – Promotional and Merit Scale as at August 31, 2019

Years of Service	Merit and Promotion
0 – 4	5.0% per annum
5 – 10	4.0% per annum
11+	0.1% per annum

Mortality

To take into account the improved life expectancy of Canadian pensioners as identified by the Canadian Institute of Actuaries in its Canadian Pensioners' Mortality Report released on February 13, 2014, this valuation report uses the mortality table CPM-2014Publ with mortality improvement scale CPM-B, varying by gender, age and calendar year. Adjustment factors of 90% for males and 90% for females were used for this valuation. This is the same mortality assumption as used in the previous valuation.

The mortality rates described above result in the following life expectancies for females and males.

Table 1.8 - Life Expectancy for Females and Males

Females	Life expectancy by Age in Year...				
Age	2019	2024	2029	2034	2039
55	35.2	35.4	35.7	35.9	36.1
60	30.3	30.5	30.7	31.0	31.2
65	25.5	25.7	26.0	26.2	26.4
70	20.9	21.1	21.3	21.6	21.8
75	16.5	16.7	16.9	17.1	17.3
80	12.4	12.6	12.8	12.9	13.1
Males	Life expectancy by Age in Year...				
Age	2019	2024	2029	2034	2039
55	33.0	33.3	33.6	33.8	34.1
60	28.3	28.6	28.8	29.1	29.3
65	23.6	23.9	24.1	24.4	24.6
70	19.1	19.4	19.6	19.8	20.0
75	14.8	15.1	15.3	15.5	15.6
80	10.9	11.1	11.3	11.4	11.6

For existing disability pensioners, a mortality study was undertaken using the Plan experience from 2013 to 2019. This study revealed mortality rates that were lower than those produced by the mortality table used in the previous valuation, but still well above the mortality rates observed for regular teachers. As a result, this valuation report adopted the mortality table CPM-2014Publ with mortality improvement scale CPM-B, varying by gender, age and calendar year, with adjustment factors of 150% for males and 150% for females.

Rate of Increase in YMPE

We have continued to assume in this valuation that the YMPE will increase at the same rate as salary (before merit and promotional increase). As a result, we have used a rate of 2.60% per annum. The YMPE is automatically updated to its revised base level at each valuation date.

Retirement

The retirement assumption last set at July 1, 2014 expected that Teachers would start delaying retirement age due to amendments made to the Plan, and in line with general population behavior over the recent decade. A review of Plan experience since 2014 suggests that this delay in retirement age has not yet happened. In fact, there was a reduction in average retirement age over the last 5 years, which was only reversed in 2019. As a result, retirement age assumption was amended for this valuation to incorporate a further delay for when retirements for teachers would start occurring later, as well as a change in our retirement assumptions for each subgroup of the membership in accordance with observed plan experience. We will continue to monitor this assumption for reasonableness.

Difference in Age between Spouses

The assumed age difference between spouses is used for active, deferred and suspended members as well as some retirees. A review of recent Plan experience has indicated that the difference between the ages of spouses has been decreasing. Reflecting this analysis, the assumed spousal age difference is now for males to be 2 years older than females. The assumption used for the actuarial valuation as at August 31, 2016 was for males to be 3 years older than females.

Proportion with a Spouse or Common-law Partner

The assumption for proportion of active members with a spouse or common-law partner at retirement was also updated this valuation, to 85% of males and 75% of females. The corresponding assumptions used in our previous valuation were 80% of males and 70% of females.

The assumed proportion of deceased retirees with a spouse or common-law partner at death was also updated, developed in-line with the current mortality assumption for both members and spouses, and is found in table 1.9 below.

Table 1.9 – Proportion of Deceased Retirees With a Spouse or Common-law Partner at Death

	August 31, 2019		August 31, 2016	
Ages	Males	Females	Males	Females
59 or younger	85.0%	75.0%	90.0%	90.0%
60-64	85.0%	75.0%	77.5%	65.0%
65-69	82.5%	72.5%	75.0%	57.5%
70-74	80.0%	70.0%	70.0%	45.0%
75-79	77.5%	60.0%	65.0%	35.0%
80-84	72.5%	50.0%	60.0%	17.5%
85-89	60.0%	35.0%	45.0%	10.0%
90-94	45.0%	17.5%	45.0%	10.0%
95 or older	10.0%	5.0%	45.0%	10.0%

Opinion on Funding Valuation


In our opinion, for the purposes of the funding valuation section of the report:

- The membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation.
- The assumptions are appropriate for the purposes of the valuation.
- The methods employed in the valuation are appropriate for the purposes of the valuation.

This funding valuation report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

The assumptions used under the funding valuation of this report were reasonable and consistent with the objectives of the Plan at the time this actuarial valuation report was prepared. The funding valuation assumptions are consistent with the stochastic model inputs.


Respectfully submitted,



Yves Plourde, FSA, FCIA

July 3, 2020

Date



Randy Pelletier, ACIA

July 3, 2020

Date

Section 2 – Going-Concern Valuation

The going-concern valuation is conducted in accordance with subsection 16(1) of the TPPA in order to determine the maximum eligible employer contribution to the NBTPP under subsection 147.2(2) of the *Income Tax Act (Canada)* (“ITA”) and provide the required actuarial opinion.

The going-concern valuation results presented in this section are based on asset information found in Appendix A, membership data found in Appendix B, and Plan provisions as summarized under Appendix D. The methods and assumptions used in the going-concern valuation are described later in this section.

Going-Concern Funded Status

The funded status of the Plan on the going-concern basis is determined by comparing the actuarial value of the assets to the actuarial liabilities. The actuarial liabilities are based on the benefits earned up to the valuation date assuming the Plan continues indefinitely. It also has a provision for future regular cost-of-living adjustments to be provided by the Trustees in accordance with the Plan terms and the Funding Policy. Such a provision is acceptable under paragraph 147.2(2)(c) of the ITA.

Table 2.1 – Going-Concern Funded Status

	August 31, 2019	August 31, 2016
	\$M	\$M
Actuarial value of assets		
• Fair market value of assets	6,139.2	5,481.7
Going-concern actuarial liabilities		
• Active members	2,174.0	1,981.3
• Retirees and survivors	3,999.2	3,812.8
• Deferred vested and suspended members	91.2	73.3
• Total	6,264.4	5,867.4
Going-concern valuation excess (unfunded liability)	(125.2)	(385.7)
Going-concern funded ratio	98.0%	93.4%

Going-Concern Residual Normal Cost

The table below summarizes the estimated going-concern residual normal cost of pension benefits being earned in the twelve-month period after the valuation date.

Table 2.2 – Going-Concern Residual Normal Cost

	As at August 31, 2019		As at August 31, 2016	
	\$M	% of payroll	\$M	% of payroll
Total normal cost	132.5	20.0	124.7	20.4
Less Member contributions	69.5	10.5	61.1	10.0
Residual normal cost	63.0	9.5	63.6	10.4
Estimated payroll for the following year	662.8		611.4	

Maximum Eligible Employer Contribution Under the Income Tax Act

The maximum eligible employer contribution in accordance with the ITA is equal to the residual normal cost, plus the greater of the going-concern unfunded liability and the hypothetical wind-up deficiency. Under a plan allowed under the TPPA, the hypothetical wind-up liability will typically be nil. However, the anti-avoidance rule under section 16 of Regulation 2012-75 may be triggered if a wind-up occurs in the first 10 years following the plan conversion allowed under the TPPA. For purposes of calculating the maximum eligible employer contribution, we have ignored the hypothetical wind-up deficiency that could exist for the first 10 years after conversion.

On the basis of the methods and assumptions in this report, the maximum eligible employer contribution for the year following August 31, 2019 is equal to \$188.2M (representing \$63.0M of residual normal cost and \$125.2M of going-concern unfunded liability).

When spreading the going-concern unfunded liability over the next three years (period for which this going-concern valuation is valid under the PBA), the maximum eligible employer contribution for the three years following August 31, 2019 (ignoring interest and salary increases) would be as follows:

Table 2.3 – Maximum Eligible Employer Contributions Spread Over Three Years

Year following	Gong-Concern Unfunded Liability	Residual Normal Cost	Total	
	\$M	\$M	\$M	% of payroll
August 31, 2019	41.7	63.0	104.7	15.8
August 31, 2020	41.7	63.0	104.7	15.8
August 31, 2021	41.7	63.0	104.7	15.8

Based on the above, the employer contribution requirements under the terms of the NBTPP of 11.25% of payroll (comprised of 9.75% of earnings in initial contributions, and 1.50% of earnings in temporary contributions) are eligible contributions under the ITA. Furthermore, should employer contributions be increased by a maximum of 1.5% of earnings as may be required under the Funding Policy if a deficit recovery plan is applied, those higher employer contributions would also be eligible contributions under the ITA up to the date of the next going-concern valuation scheduled for no later than August 31, 2022.

Going-Concern Valuation Actuarial Methods

The asset valuation method and the actuarial cost method under the going-concern valuation are identical to the asset valuation method and the actuarial cost method under the funding valuation. The going-concern valuation assumptions are also identical, except for the discount rate.

Discount Rate

In order to balance the need to fund intended benefits in a secure and responsible manner, while recognizing the necessity for CRA to monitor the impact of over-conservatism in assumptions, we developed a methodology to select an appropriate discount rate which we believe will balance those concerns. The discount rate selected is determined by using the nominal investment return expected from the long-term asset mix of the NBTPP over the next 20 years at its 75th percentile. This leads to a nominal discount rate of 5.00% per year.

Other going-concern actuarial assumptions

All other assumptions in our going-concern valuation are identical to the assumptions used under the funding valuation detailed in Table 1.5 of Section 1 of this report, and the rationale for the choice of those assumptions also applies for the going-concern valuation.

Emerging experience differing from these assumptions will result in gains or losses, which will be revealed in future going-concern valuations.

Opinion on Going-Concern Valuation

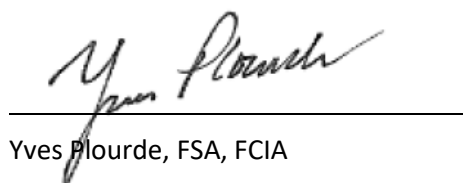
In our opinion, for the purposes of the going-concern valuation section of the report:

- The membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation.
- The assumptions are appropriate for the purposes of the valuation.
- The methods employed in the valuation are appropriate for the purposes of the valuation.

This going-concern valuation report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

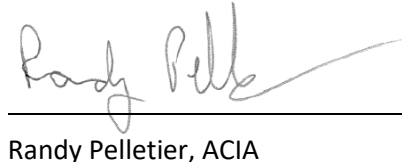
The assumptions used under the going-concern valuation of this report were reasonable at the time this actuarial valuation report was prepared.

Respectfully submitted,



Yves Plourde, FSA, FCIA

July 3, 2020
Date



Randy Pelletier, ACIA

July 3, 2020
Date

Section 3 – Hypothetical Wind-Up Valuation

A hypothetical wind-up valuation assumes that the Plan is wound-up on the valuation date and member's benefit entitlements are calculated as of that date. Although this type of valuation is not required under Part 2 of the *New Brunswick Pension Benefits Act* for a plan allowed under the TPPA, the Standards of Practice of the Canadian Institute of Actuaries require that actuarial valuation reports provide information with respect to hypothetical wind-up situations.

Subsection 16(3) of Regulations 2012-75 under the PBA prescribes that if a shared risk plan is wound-up by the persons who established the plan within 5 years of its conversion date, the conversion of the plan is void and the plan has to be wound-up as a defined benefit plan under Part 1 of the PBA. In addition, effective January 1, 2018, subsection 16(3.1) of Regulation 2012-75 provides that if the wind-up occurs between 5 and 10 years after the plan conversion date, the Superintendent may determine that the conversion is void and may require that the plan be wound-up as a defined benefit plan under Part I of the PBA.

In conducting the hypothetical wind-up valuation as at August 31, 2019, we therefore made the assumption that the conversion to a plan allowed under the TPPA would be void, and that the Plan would be wound-up as at August 31, 2019 in accordance with rules found under Part 1 of the PBA. This assumption has been made solely on the basis that subsection 16(3) would apply, and does not represent a legal opinion on the validity of this scenario.

We have valued the hypothetical wind-up liability using discount rates consistent with the requirements of the PBA for plan wind-ups under Part 1. The PBA requires that benefits paid out to each member upon wind-up be not less than the cost to purchase an annuity for that member. Accordingly, we have followed the Canadian Institute of Actuaries' recommendations for the estimated cost of fully indexed annuity purchases as at August 31, 2019.

Hypothetical Wind-Up Funded Status

The hypothetical wind-up funded status under the scenario postulated above, including the results of the last hypothetical wind-up valuation, is as follows:

Table 3.1 – Hypothetical Wind-Up Funded Status

	August 31, 2019	August 31, 2016
	\$M	\$M
Assets		
• Fair market value of assets	6,139.2	5,481.7
• Provision for wind-up expenses	(3.0)	(2.5)
• Total	6,136.2	5,479.2
Hypothetical wind-up liabilities		
• Active members	4,676.5	4,285.1
• Retirees and survivors	6,074.1	5,795.9
• Deferred vested and suspended members	204.0	170.7
• Total	10,954.6	10,251.7
Assets less liabilities on the hypothetical wind-up basis	(4,818.4)	(4,772.5)

The hypothetical wind-up funded status is presented for information purposes. There is no requirement under the TPPA or PBA to fund the hypothetical wind-up deficit of the NBTPP while it is not in a wind-up state.

Incremental Cost on the Hypothetical Wind-up Basis

The incremental cost on the hypothetical wind-up basis represents the present value of the expected aggregate change in the actuarial liabilities from August 31, 2019 to August 31, 2020, adjusted for expected benefit payments in the inter-valuation period. This incremental cost is estimated to be \$303.4M as at August 31, 2019.

Hypothetical Wind-up Asset Valuation Method

Hypothetical wind-up assets are equal to the fair market value of assets less and allowance for wind-up expenses. This valuation method is the same as the one used in the last valuation.

Hypothetical Wind-up Actuarial Cost Method

The hypothetical wind-up liabilities are determined using the accrued benefit (or unit credit) actuarial cost method. The hypothetical wind-up liabilities are equal to the actuarial present value of all benefits earned by members for services prior to the valuation date assuming the Plan is wound up on the valuation date. This method is the same as the one used in the last valuation.

For valuation purposes, to determine eligibility for benefits and for any other uses, the age used is the age on the date of the nearest birthday. This method is the same as the one used in the last valuation. Retirees' pensions were not adjusted to take into account any difference in indexing provided since conversion date to the valuation date which may occur if the Plan is wound-up.

Hypothetical Wind-up Actuarial Assumptions

The main actuarial assumptions used in the hypothetical wind-up valuation correspond to those prescribed by the PBA.

Although the Former TPA was not subject to the PBA before it was converted to the NBTPP, in the absence of specific direction to the contrary in the Former TPA, we have valued the hypothetical wind-up liability using discount rates consistent with the requirements of the PBA if the Plan were to be wound up under Part 1. The PBA requires that benefits paid out to each member upon wind-up be not less than the cost to purchase an annuity for that member. Accordingly, we have followed the Canadian Institute of Actuaries' recommendations for the estimated cost of fully indexing annuity purchases as at August 31, 2019.

The primary actuarial assumptions employed for the hypothetical wind-up valuation are summarized in the following table. All rates and percentages are annualized unless otherwise noted. The rates in brackets represent the estimated annuity purchase rates for fully indexed annuities.

Table 3.2 – Hypothetical Wind-Up Actuarial Assumptions

	August 31, 2019	August 31, 2016
Interest rate		
• Interest rate for active members and deferred vested members under 55	2.49% per annum (-0.50% per annum when net of assumed cost-of-living increases)	2.83% per annum (-0.48% per annum when net of assumed cost-of-living increases)
• Interest rate for retired members and those 55 and over	2.49% per annum (-0.50% per annum when net of assumed cost-of-living increases)	2.83% per annum (-0.48% per annum when net of assumed cost-of-living increases)
Salary increases	None	None
Mortality	CPM2014 generational mortality using improvement scale CPM-B	CPM2014 generational mortality using improvement scale CPM-B
Wind-up expenses	\$3,000,000	\$2,500,000
Retirement	Age which maximizes the value of the pension	Age which maximizes the value of the pension

Allowance has been made for administrative, actuarial and legal costs which would be incurred if the Plan were to be wound up in full or in part. No allowance has been made for costs which may be incurred in respect of resolving surplus or deficit issues on Plan wind up or the costs in respect of assets which cannot be readily realized.

The Canadian Institute of Actuaries ("CIA") collects data annually from insurance companies and annually determines interest rates suitable for estimating the cost of single premium group annuities in hypothetical wind-up valuations. For pensioners and for active members and deferred vested members eligible for immediate retirement at the valuation date, the interest rate used in the present hypothetical wind-up valuation is an estimate of the rate that would be used by insurance companies in pricing single premium fully indexed group annuities for annuitants already retired, based on the suggested rates for such annuitants published by the CIA.

The discount rate used for active members and deferred vested members not eligible for immediate retirement is the rate used for pensioners without adjustment, as suggested by the CIA as an appropriate estimate of the cost of fully indexed deferred annuities based on their survey data from insurance companies.

Emerging experience differing from these assumptions will result in gains or losses, which will be revealed in future hypothetical wind-up actuarial valuations.

Termination Scenario

The termination scenario used in the hypothetical wind-up valuation includes the following assumptions:

- Plan wind-up would not result from employer insolvency.
- All assets could be realized at their reported market value.
- NBTPP conversion would be void and the Plan would be wound-up under Part 1 of the PBA.

Margin for Adverse Deviations

As specified by the Standards of Practice of the Canadian Institute of Actuaries, the hypothetical wind-up assumptions do not include a margin for adverse deviations.

Provision for Fees

Allowance has been made for administrative, actuarial and legal costs that would be incurred if the Plan were to be wound up, based on sufficient and reliable data. It is assumed that the wind-up date, the calculation date and the settlement date are coincident, and as such, expenses related to investment policy reviews, investment and custodial fees are not included. Expenses related to the resolution of surplus and deficit issues are not taken into account. The amount of expenses is only an approximation and may differ significantly from real expenses incurred on Plan wind-up, for example, in case of litigation, bankruptcy and eventual replacement by a third-party administrator.

Hypothetical Wind-up Incremental Cost

The method used to calculate the hypothetical wind-up incremental cost may be described as follows:

1. Present value of expected benefit payments between August 31, 2019 and August 31, 2020, discounted to August 31, 2019;

Plus
2. Projected hypothetical wind-up liabilities as at August 31, 2020, discounted to August 31, 2019;

Less
3. Hypothetical wind-up liabilities as at August 31, 2019.

Opinion on Hypothetical Wind-up Valuation


In our opinion, for the purposes of the hypothetical wind-up valuation section of the report:

- The membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation.
- The assumptions are appropriate for the purposes of the valuation.
- The methods employed in the valuation are appropriate for the purposes of the valuation.

This hypothetical wind-up valuation report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

The assumptions used under the hypothetical wind-up valuation of this report were reasonable at the time this actuarial valuation report was prepared.


Respectfully submitted,



Yves Plourde, FSA, FCIA

July 3, 2020

Date



Randy Pelletier, ACIA

July 3, 2020

Date

Section 4 – Risk Management Goals and Procedures

Meeting Risk Management Goal

The NBTPP was designed to achieve or exceed the risk management goal prescribed under the TPPA. Certain procedures were developed to test whether this goal can be achieved. The goal and procedures are described separately below, along with the relevant results of the stochastic analysis required under the TPPA as at August 31, 2019.

Risk Management Goal

The risk management goal under the TPPA is to achieve a 97.5% probability that past base benefits at the end of each year will not be reduced over the 20 years following the valuation.

The goal is measured by taking into account the following funding management plans:

1. the funding deficit recovery plan except for reduction in past base benefits, and
2. the funding excess utilization plan excluding permanent benefit changes.

The funding deficit recovery plan and the funding excess utilization plan are described in Sections IV and V of the Funding Policy, respectively.

For the purposes of meeting this goal, base benefits include the accrual of extra service of members and any regular indexing insofar as it is based on the financial performance represented by each scenario tested.

If as a result, through the testing process, a scenario allows for indexing in a given future year, then this regular indexing amount becomes part of the base benefits that is to be protected. In other words, the base benefit is dynamically adjusted based on the stochastic results for each economic scenario tested.

Risk Management Procedures

The risk management goal is measured using an asset liability model with future economic scenarios developed using a stochastic process. The asset liability model and its inputs are further described in Appendix C.

The risk management goal was tested as at August 31, 2019. The result of this test combined with the results of the funding valuation at the same date will determine the actions the Board of Trustees are required to take, or can consider, under the terms of the Funding Policy.

The risk management goal must be achieved or exceeded:

- At July 1, 2014;
- At the date a permanent benefit change as defined in the Regulations is made;
- At the date a benefit improvement as defined in the Regulations is made excluding any catch-up related to the level of regular indexing; or

- At the date the contribution adjustments exceeding those set out in the Funding Policy are applied.

The definitions of permanent benefit change and benefit improvement are as follows:

- “permanent benefit change” means a change that is intended to permanently change the formula for the calculation of the base benefits or ancillary benefits after the date of the change, including a change made in accordance with the funding excess utilization plan.
- “benefit improvement” means an escalated adjustment for past periods, other than an improvement in scheduled escalated adjustments, or an increase in other ancillary benefits allowed under the Funding Policy.

Additional Assumptions on a Funding Basis for Purpose of the Stochastic Analysis

Other assumptions are needed for the stochastic analysis required under the risk management procedures for the Plan. These additional assumptions are used to establish future Plan membership as well as future earnings, so as to determine the level of future cash flows to and from the Plan, such as member and employer contributions, normal costs, benefit payments and expenses for the next 20 years. These cash flows are calculated on a deterministic basis for each year following the valuation date for a period of 20 years, and allow the determination of the funding liability and assets at each future date, as well as the present value of possible future funding corrections set out in the Funding Policy.

Table 4.1 – Additional Assumptions for Purpose of the Stochastic Analysis

	August 31, 2019		
New entrants	New entrants replace active members at death or retirement such that the total active population under the NBTTP remains stable thereafter.		
Distribution of new entrants and salary at entry	Age	Distribution	Average Salary at Entry
	23	25.0%	\$56,000
	26	25.0%	\$56,000
	30	25.0%	\$56,000
	40	25.0%	\$56,000
Salary at Entry increases	2.60% per annum		
Salary increases (after entry)	2.60% per annum plus merit and promotions as described under the funding valuation		
YMPE increases	2.60% per annum		

Results of Stochastic Analysis as at August 31, 2019

The stochastic analysis undertaken as at August 31, 2019, took into account the main following items:

- Membership Data as at August 31, 2019 summarized in Appendix B;
- Economic and demographic assumptions as at August 31, 2019 for the funding valuation summarized in Section 1 and the additional assumptions in Table 4.1;
- Pension fund target asset mix as summarized in Table A.4 of Appendix A;
- Stochastic projection assumptions as summarized in Appendix C;
- Risk management procedures described above;
- NBTPP provisions summarized in Appendix D;
- Funding deficit recovery plan found under Section IV of the NBTPP's Funding Policy (except for reduction in past base benefits);
- Funding excess utilization plan found under Section V of the NBTPP's Funding Policy (excluding permanent benefit changes).

Based on the above, the result of the stochastic analysis for the risk management goal as at August 31, 2019 is as follows:

Table 4.2 – Risk Management Goal

	Minimum Requirement under TPPA	Result for NBTPP as at August 31, 2019
Risk Management Goal [Subsection 11(1) of TPPA] - There is at least a 97.5% probability that the past base benefits at the end of each year will not be reduced over a 20-year period	97.5%	99.65% PASSED

As indicated in the table above, the risk management goal under the TPPA was achieved as at August 31, 2019, since the 99.65% probability exceeds the minimum requirement of 97.5% under the TPPA.

Section 5 – Plausible Adverse Scenarios

Effective for funding valuations on or after March 1, 2019, the plan actuary is required to select Plausible Adverse Scenarios for various risks underlying the Plan, and disclose in the report the impact such scenarios would have on the funded status and risk management test results of the Plan. The results of this analysis are contained in this Section 5.

The Standards of the CIA continue to require that valuation reports disclose the sensitivity of the liabilities to changes in the discount rate assumption. Previously, the discount rate sensitivity results for the funding valuation, going concern, and hypothetical wind-up bases were contained in Sections 1, 2, and 3 of the actuarial valuation report, respectively. As these sensitivities are also a form of stress test, we have included them in this Section 5 for completeness.

Description of the Plausible Adverse Scenarios

The Standards of the CIA require valuation reports to disclose the results of stress tests on Plausible Adverse Scenarios. A Plausible Adverse Scenario would be a scenario of adverse but plausible assumptions relative to the best estimate assumptions outlined in Section 1 of this report. As a result, these scenarios are stress tests on a selection of risks to which the Plan is subject. This selection is not meant to consider all of the risks to which the Plan is subject.

The following is a description of the four scenarios analyzed.

Scenario I - Interest Rate Risk

In this Scenario, we will model the impact of a sudden drop in fixed income yield, which will impact the level of the discount rate, and the value of the fixed income assets in the Fund. The magnitude of the drop will be such that there is a 1 in 10 likelihood of such a reduction happening in accordance with our economic model underlying our stochastic analysis.

Based on the outcome with a 1 in 10 likelihood of occurrence under our economic model, yields on fixed income assets are assumed to decrease by 0.56% immediately, leading to a 0.21% decrease in the expected return of the Plan's investments. We have not reflected any change of the assumed margin for adverse deviation to compensate for the decrease in expected return and have therefore reflected a decrease in the discount rate to 5.60% per annum for this valuation. While the Funding Policy states that intent of the discount rate is to remain stable over time, we have illustrated the impact should the Board of Trustees change the discount rate.

In valuing the effect of this change on the Plan assets, the impact of the interest rate risk was restricted to the asset classes deemed to be fixed income investments, and results in a 9.10% increase on the market value of the affected asset classes, which translates into a 3.40% increase on the market value of the Fund as a whole.

All other assumptions and methods used for this valuation were maintained, and no other compensating adjustments were made.

Scenario II - Deterioration of Asset Values

In this Scenario, we will model the impact of a sudden drop in the value of assets other than fixed income assets, with no change in the level of the discount rate or any other assumptions. The magnitude of the drop will be

such that there is a 1 in 10 likelihood of such a reduction happening for such asset classes in accordance with our economic model underlying our stochastic analysis.

Based on the outcome with a 1 in 10 likelihood of occurrence under our economic model, all assets other than fixed income assets were assumed to decrease by 10.70% immediately, resulting in a 6.70% decrease on the market value of the total Fund. No changes to funding valuation actuarial liabilities and normal cost were considered under this scenario. All assumptions and methods used for this valuation were maintained.

Scenario III - Longevity Risk

In this Scenario, we will model the impact of an increase in the average life expectancy of all plan members relative to our assumption used in our valuation. The magnitude of the increase will be such that the life expectancy is increased by 10% from the underlying mortality table assumption used in our valuation.

To test the impact of an average life expectancy increase of 10% for all ages over the current assumption on the funding valuation actuarial liabilities and normal cost, a multiplier of 0.7 was applied to all mortality rates used for this valuation. All other assumptions and methods used for this valuation were maintained.

Scenario IV - Decrease in Contribution Base

In this Scenario, we will model the impact of a decrease in contribution base, where an undefined event triggers an immediate 10% reduction in active members contributing and accumulating benefits under the plan.

A decrease of 10% in payroll for the year following the valuation date is assumed. We assume that the demographic profile of the active membership is unchanged as a result of the decrease in payroll. For purposes of this scenario, we assume that the market value of assets and funding valuation actuarial liabilities are unchanged, and due to the decrease in payroll we assume a 10% reduction in contributions and normal cost for each year following the valuation date. All other assumptions and methods used for this valuation were maintained.

Plausible Adverse Scenarios - Funding Valuation

The following table illustrates the impact of certain plausible adverse scenarios on the funding valuation liabilities and corresponding funded statuses and legislated risk management test. The scenarios have been applied and reported on separately.

Table 5.1 – Plausible Adverse Scenarios Impact on the Funding Valuation Results

	Funding Valuation Results as at August 31, 2019	Plausible Adverse Scenario Results as at August 31, 2019			
		Scenario I Interest Rate Risk	Scenario II Deterioration of Asset Values	Scenario III Longevity Risk	Scenario IV Decrease in Contribution Base
	\$	\$	\$	\$	\$
Market value of assets	6,139.2	6,347.9	5,727.9	6,139.2	6,139.2
Funding valuation actuarial liabilities	5,636.9	5,787.2	5,636.9	5,975.1	5,636.9
Funding valuation excess (unfunded liability)	502.3	560.7	91.0	164.1	502.3
Impact on funding valuation excess		58.4	(411.3)	(338.2)	---
Termination value funded ratio	108.9%	109.7%	101.6%	102.7%	108.9%
Funding valuation normal cost	113.4	118.5	113.4	117.4	102.0
Impact on funding valuation normal cost		5.1	---	4.0	(11.4)
Results of stochastic analysis for the risk management goal					
<ul style="list-style-type: none"> Risk Management Goal [Subsection 11(1) of TPPA] 	99.65%	99.70%	99.35%	98.95%	99.55%

Discount Rate Sensitivity Results

The Standards of the CIA require that valuation reports disclose the sensitivity of the liabilities to changes in the discount rate assumption. The discount rate sensitivity results for the funding valuation, going concern, and hypothetical wind-up bases are presented below.

Sensitivity Analysis on the Funding Valuation Basis

The table below illustrates the effect of a 1% decrease in the discount rate on the funding valuation actuarial liabilities. With the exception of the discount rate, all other assumptions and methods used for this valuation were maintained.

Table 5.2 – Sensitivity of Actuarial Liabilities on the Funding Valuation Basis

	August 31, 2019	Discount Rate 1% Lower
	\$	\$
Funding valuation actuarial liabilities		
• Active members	1,852.3	2,266.6
• Retirees and survivors	3,707.0	4,078.6
• Deferred vested and suspended members	77.6	95.1
• Total funding valuation actuarial liabilities	5,636.9	6,440.3
Increase in actuarial liabilities		803.4

Sensitivity Analysis on the Funding Valuation Total Normal Cost

The table below illustrates the effect on the total normal cost of using a discount rate 1% lower than the one used for the funding valuation. All other assumptions and methods, as used in this valuation, were maintained.

Table 5.3 – Sensitivity of Funding Valuation Total Normal Cost

	August 31, 2019		Discount Rate 1% lower	
	\$	% of payroll	\$	% of payroll
Total normal cost	113.4	17.1	142.6	21.5
Increase in total normal cost			29.2	4.4

Sensitivity Analysis on the Going Concern Basis

The table below illustrates the effect of 1% decrease in the discount rate on the going concern actuarial liabilities. With the exception of the discount rate, all other assumptions and methods used for this valuation were maintained.

Table 5.4 – Sensitivity of Actuarial Liabilities on the Going Concern Basis

	August 31, 2019	Discount Rate 1% Lower
	\$	\$
Going concern actuarial liabilities		
• Active members	2,174.0	2,696.3
• Retirees and survivors	3,999.2	4,425.4
• Deferred vested and suspended members	91.2	113.6
• Total	6,264.4	7,235.3
Increase in actuarial liabilities		970.9

Sensitivity Analysis on the Going Concern Normal Cost

The table below illustrates the effect on the normal cost of using a discount rate 1% lower than the one used for the going concern valuation. All other assumptions and methods, as used in this valuation, were maintained.

Table 5.5 – Sensitivity of Going Concern Residual Normal Cost

	Year Following August 31, 2019		Discount Rate 1% Lower	
	\$	% of payroll	\$	% of payroll
Total normal cost	132.5	20.0	170.6	25.7
Less member contributions	69.5	10.5	69.5	10.5
Residual normal cost	63.0	9.5	101.1	15.2
Increase in residual normal cost			38.1	5.7

Sensitivity Analysis on the Hypothetical Wind-up Basis

The table below illustrates the effect on the actuarial liabilities of using discount rates 1% lower than those used for the hypothetical wind-up valuation. All other assumptions and methods, as used in this valuation, were maintained.

Table 5.6 – Sensitivity of Actuarial Liabilities on the Hypothetical Wind-up Basis

	August 31, 2019	Discount Rate 1% Lower
	\$	\$
Actuarial liabilities		
• Active members	4,676.5	6,325.5
• Retirees and survivors	6,074.1	6,926.8
• Deferred vested and suspended members	204.0	279.0
• Total	10,954.6	13,531.3
Increase in actuarial liabilities		2,576.7

Appendix A – Assets

Description of Plan Assets

The assets of the Plan are held in a trust fund and are being managed by Vestcor Inc. ("Vestcor"). Vestcor provided the information on fund assets as at August 31, 2019.

Statement of Market Value

The following table shows the market value of the assets split by broad investment categories as identified in the Plan's unaudited financial statements provided by Vestcor as at August 31, 2019.

Table A.1 – Statement of Market Value

	August 31, 2019
	\$M
Market value of assets	
• Fixed income	1,930.7
• Equities	2,478.6
• Inflation-linked assets	926.3
• Alternative pools	803.0
• Cash	0.6
Total market value of assets	6,139.2

Changes to Plan Assets

The following table shows changes to the NBTPP assets during the inter-valuation period, based on market values. The reconciliation from August 31, 2016 to August 31, 2019 is based on unaudited financial statements issued by Vestcor.

Table A.2 – Reconciliation of Assets

	Sept 1, 2018 to August 31, 2019 (\$M)	Sept 1, 2017 to August 31, 2018 (\$M)	Sept 1, 2016 to August 31, 2017 (\$M)
Assets at beginning of period	5,878.0	5,596.5	5,481.7
Receipts			
• Member contributions	70.2	61.6	64.2
• Employer contributions	77.9	75.2	75.0
• Investment income plus realized and unrealized capital appreciation and depreciation	420.5	446.4	270.7
• Total receipts	568.6	583.2	409.9
Disbursements			
• Pensions paid and refunds	297.7	291.3	285.6
• Expenses (fees)	9.7	10.4	9.5
• Total disbursements	307.4	301.7	295.1
Assets at end of period	6,139.2	5,878.0	5,596.5

Return on Assets

The Plan assets earned the following rates of return, net of investment management fees and other expenses charged to the Fund, based on our calculations which assume cash flow occurred in the middle of the period:

Table A.3 – Net Investment Return

Year	%
September 1, 2016 to August 31, 2017	4.8%
September 1, 2017 to August 31, 2018	7.9%
September 1, 2018 to August 31, 2019	7.1%
September 1, 2016 to August 31, 2019 (annualized)	6.6%

Target Asset Mix under the Plan

The Statement of Investment Policies for the NBTPP, as adopted by the Board of Trustees, provides for the following long-term target asset mix.

Table A.4 – Target Asset Mix

	Target Allocation (%)
Asset classes	
Fixed income:	
• Short term assets	1.0%
• Government bonds	15.7%
• Corporate bonds	15.7%
Inflation linked:	
• Real return bonds	5.0%
• Real estate	5.0%
• Infrastructure	5.0%
Public equity (market capitalization):	
• Canadian equities	6.0%
• Canadian small cap equities	1.0%
• US equities	6.0%
• EAFE equities	6.0%
Public equity (low volatility):	
• Canadian equities	5.0%
• US equities	6.3%
• EAFE equities	6.3%
• Emerging markets equity	4.0%
• Private equity	4.0%
Absolute return strategy	8.0%
Total	100.0%

This target asset mix was used to conduct the stochastic analysis required under the NBTPP to assess the risk management goal.

Appendix B – Membership Data

Description of Membership Data

Data on Plan membership was obtained from the PIBA pension system maintained by Vestcor. The data was provided as at August 31, 2019.

The data was matched and reconciled with the data provided for the previous valuation as at August 31, 2016. Basic data checks were performed to ensure that age, salary and service data were reasonable for the purposes of the valuation and to ensure that the data was accurate, complete and consistent with previous data.

The data for accrued pensions of terminated and suspended members did not include the applicable pre-retirement indexing from date of termination to the date of conversion. The correct accrued pensions at date of valuation in respect of pre-conversion service was estimated for valuation purposes for these groups using the accrued pension data provided, adjusted for pre-retirement indexing using a date field provided by Vestcor for this purpose.

Summary of Membership Data

The following tables were prepared using data provided by Vestcor as at August 31, 2019.

These tables show the following:

- B.1 Summary of Membership Data
- B.2 Changes in Plan Membership
- B.3 Age/Service Distribution for Active Members as at August 31, 2019
- B.4 Distribution of Retirees and Survivors by Age Groups as at August 31, 2019
- B.5 Distribution of Deferred Vested and Suspended Members by Age Groups as at August 31, 2019

Table B.1 –Summary of Membership Data

		August 31, 2019	August 31, 2016
Active members	Number	8,413	8,121
	Total covered payroll	\$661,477,600	\$612,391,500
	Average salary	\$78,600	\$75,400
	Average accrued lifetime pension	\$16,200	\$15,800
	Average accrued bridge pension	\$5,200	\$5,000
	Average age	43.1	42.8
	Average credited service	13.6 years	13.7 years
Retirees and survivors	Number	9,450	9,052
	Average annual lifetime pension	\$29,900	\$29,000
	Average annual bridge benefit ¹	\$10,300	\$10,000
	Average age	72.1 years	71.0 years
Deferred vested and suspended members	Number	1,583	1,563
	Average accrued lifetime pension	\$3,900	\$3,400
	Average accrued bridge pension	\$1,500	\$1,400
	Average age	46.8 years	45.1 years

¹ Average for those entitled to or receiving a bridging benefit.

Table B.2 – Changes in Plan Membership

	Active Members	Retirees and Survivors	Deferred Vested and Suspended Members	Total
Members at August 31, 2016	8,121	9,052	1,563	18,736
New members	1,224	-	-	1,224
Retirements	(717)	777	(60)	-
Members who returned to active status	326	(1)	(325)	-
Terminations				
• with refunds or transfers out	(48)	-	(73)	(121)
• with deferred pensions	-	-	-	-
• suspended	(480)	-	480	-
Deaths				
• with survivor benefits	(12)	(203)	(1)	(216)
• with no continuing benefits	(1)	(390)	(1)	(392)
New survivor pensions	-	216	-	216
Adjustments	-	(1)	-	(1)
Members at August 31, 2019	8,413	9,450	1,583	19,446

Table B.3 – Age/Service Distribution for Active Members as at August 31, 2019

Age											
Years of Service		Under 25	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 and over	Total
0 - 4	Number	94	539	468	254	123	94	63	29	13	1,677
	Tot. Sal.	4,673,113	30,676,374	28,504,988	15,304,008	7,800,166	5,812,577	4,046,892	1,740,489	778,720	99,337,327
	Avg. Sal.	49,714	56,913	60,908	60,252	63,416	61,836	64,236	60,017	59,902	59,235
5 - 9	Number	0	55	460	381	129	83	47	18	9	1,182
	Tot. Sal.	0	3,826,334	34,985,728	29,471,379	9,908,822	6,241,564	3,628,895	1,327,014	595,129	89,984,865
	Avg. Sal.	0	69,570	76,056	77,353	76,813	75,200	77,211	73,723	66,125	76,129
10 - 14	Number	0	0	85	815	459	234	125	62	19	1,799
	Tot. Sal.	0	0	7,171,409	68,584,226	38,494,916	19,180,169	10,327,036	5,132,779	1,541,228	150,431,763
	Avg. Sal.	0	0	84,370	84,152	83,867	81,967	82,616	82,787	81,117	83,620
15 - 19	Number	0	0	0	85	621	517	207	113	42	1,585
	Tot. Sal.	0	0	0	7,351,950	53,185,949	43,253,495	17,348,718	9,349,459	3,451,970	133,941,541
	Avg. Sal.	0	0	0	86,494	85,646	83,662	83,810	82,739	82,190	84,506
20 - 24	Number	0	0	0	0	96	656	264	85	28	1,129
	Tot. Sal.	0	0	0	0	8,419,824	56,360,307	22,672,393	7,227,555	2,370,619	97,050,698
	Avg. Sal.	0	0	0	0	87,707	85,915	85,880	85,030	84,665	85,962
25 - 29	Number	0	0	0	0	0	125	473	157	10	765
	Tot. Sal.	0	0	0	0	0	10,870,919	40,930,643	13,399,936	820,143	66,021,641
	Avg. Sal.	0	0	0	0	0	86,967	86,534	85,350	82,014	86,303
30 - 34	Number	0	0	0	0	0	0	131	122	12	265
	Tot. Sal.	0	0	0	0	0	0	11,730,405	10,829,841	1,036,367	23,596,613
	Avg. Sal.	0	0	0	0	0	0	89,545	88,769	86,364	89,044
35 and over	Number	0	0	0	0	0	0	0	2	9	11
	Tot. Sal.	0	0	0	0	0	0	0	***	932,240	***
	Avg. Sal.	0	0	0	0	0	0	0	***	103,582	***
Total number		94	594	1,013	1,535	1,428	1,709	1,310	588	142	8,413
Total salaries		4,673,113	34,502,708	70,662,125	120,711,563	117,809,677	141,719,031	110,684,982	***	11,526,416	661,477,599
Average of salaries		49,714	58,085	69,755	78,639	82,500	82,925	84,492	***	81,172	78,626

Average age: 43.1 years

Average number of years of service: 13.6 years

Notes:

The age is computed at the nearest birthday.

The salary used is the member's salary rate as at August 31, 2019.

Years of service means the number of years credited for pension plan purposes, fractional parts being rounded to the nearest integer.

Membership for active members is composed of 1,951 males and 6,462 females.

Table B.4 – Distribution of Retirees and Survivors by Age Groups as at August 31, 2019

Age Group	Number	Total Annual Payments	
		Lifetime	Bridge
Under 55	127	\$2,788,636	\$675,200
55 - 59	639	\$21,830,683	\$6,413,018
60 - 64	1,134	\$36,255,065	\$10,596,955
65 - 69	2,024	\$60,446,238	---
70 - 74	2,296	\$66,420,853	---
75 - 79	1,533	\$44,782,181	---
80 - 84	930	\$28,434,010	---
85 - 89	479	\$13,994,993	---
90 and over	288	\$7,787,086	---
Total	9,450	\$282,739,745	\$17,685,173

Average age: 72.1 years

Note: Age groups are based on exact age. The pension used is the pension payable as at August 31, 2019. Membership for pensioners is composed of 3,254 males and 6,196 females.

Table B.5 – Distribution of Deferred Vested and Suspended Members by Age Groups as at August 31, 2019

Age Group	Number	Total Annual Deferred Payments	
		Lifetime	Bridge
Under 25	---	---	---
25-29	51	\$42,483	\$21,271
30-34	209	\$444,845	\$199,330
35-39	272	\$823,661	\$344,151
40-44	209	\$825,716	\$321,669
45-49	231	\$1,198,056	\$443,084
50 - 54	243	\$1,400,702	\$502,186
55 - 59	212	\$806,972	\$328,783
60 and over	156	\$433,492	\$173,302
Total	1,583	\$5,975,927	\$2,333,776

Average age: 46.8 years

Note: Age groups are based on exact age. Membership for deferred pensioners is composed of 353 males and 1,230 females.

Appendix C – Stochastic Projections Assumptions and Disclosures

The model inputs for our stochastic analysis are built each year using Conference Board of Canada (CBoC) forecasts, internal research, inflation expectations and by surveying the asset manager universe. This ensures we are not using inputs that are out of touch with broader expectations. We strive for accuracy in our assumptions, as high or low expectations can lead to biased results. However, when deciding between equally reasonable modeling choices, we err on the side of conservatism.

The methodology used to develop key assumptions used within the model is described below.

Economic Assumptions

Economic stochastic projection assumptions are updated annually by Morneau Shepell Asset and Risk Management using a multi-stage process.

Inflation

We select a long-term inflation rate assumption based primarily on the current Bank of Canada Monetary Policy. Volatility for inflation is based on historical data since the early 1990's when the current monetary policy was introduced. Historical volatility is used to estimate consumer price index volatility for future years. We also develop an assumption for market implied inflation which is used to determine fixed-income yields in any given year. We use current market data for the initial rate and then use an autoregressive time-series model to determine the market implied inflation assumption rates over the first ten projection years, at which point the rate remains stable, such that the long-term implied market inflation is consistent with our assumption for the change in the consumer price index.

Table C.1 – Market implied inflation

August 31	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029 and after
Market implied inflation (%)	1.27	1.37	1.47	1.57	1.67	1.77	1.88	1.98	2.08	2.18	2.28

Interest Rates

We use a building block approach to estimate the long-term interest rates for government bonds and Canadian bond indices. The three components that make up the long-term interest rate estimate are: Inflation, real return, and credit spread. After careful consideration, we assume that both real yields and credit spreads revert to projected long-term rates. Although some research papers suggest that the possibility that interest rates follow a random walk process (that is, they do not mean-revert) cannot be rejected, mean reversion is intuitive and increases the likelihood that rates will remain within a reasonable range. Therefore, we assume each building block moves from the value in the market as of the valuation date towards its long-term level over a projected period of 10 years (and remains at the long-term level thereafter). Each of the building blocks follow a

modified discrete version of the Vasicek model, using an instantaneous volatility determined from historical data.

Canadian Bond Indices

We generate expected return levels and standard deviations for Canadian bond indices in a stochastic simulation approach. We assume that the only components needed to model the returns are: yield and variation of interest rates. We make the assumption that interest rates follow a Vasicek model. To determine the impact of yield variation on return we extract the duration and convexity as of the valuation date for the FTSE Canadian bond indices and assume that it will remain constant in the future. Using the Vasicek model, we simulate 2,000 interest rate paths which we use to create 2,000 return series for various Canadian bond indices. The geometric average of the 2,000 simulated returns is taken as the return level assumption. The mean annual standard deviation of returns is taken as the standard deviation of returns.

Fixed income asset classes that were used in our modeling include, but are not limited to Canadian federal, provincial, and corporate bond indices. The following initial and ultimate average credit spreads and average nominal yields were used as at August 31, 2019.

Table C.2 – Credit Spreads and Yields by Bond Index

Asset Class	Initial Credit Spread	Ultimate Credit Spread	Initial Yield	Ultimate Yield
FTSE Canada Federal Bonds	n/a	n/a	1.59%	3.20%
FTSE Canada Federal Short Term Bonds	n/a	n/a	1.60%	2.84%
FTSE Canada Federal Mid Term Bonds	n/a	n/a	1.55%	3.43%
FTSE Canada Federal Long Term Bonds	n/a	n/a	1.57%	3.94%
FTSE Canada Corporate Bonds	1.14%	1.05%	2.73%	4.25%
FTSE Canada Short Term Corporate Bonds	0.77%	0.82%	2.38%	3.66%
FTSE Canada Mid Term Corporate Bonds	1.27%	1.06%	2.82%	4.49%
FTSE Canada Long Term Corporate Bonds	1.70%	1.36%	3.27%	5.30%
FTSE Canada Universe Provincial Bonds	0.57%	0.74%	2.15%	3.94%
FTSE Canada Short Term Provincial Bonds	0.19%	0.25%	1.79%	3.09%
FTSE Canada Mid Term Provincial Bonds	0.45%	0.44%	2.00%	3.87%
FTSE Canada Long Term Provincial Bonds	0.80%	0.68%	2.38%	4.62%

The credit spread reflects the excess average yield for the index over the federal bond index of similar maturity.

Fixed income asset classes' returns and standard deviations must be consistent. We perform a check on the relationships between indices and sub-indices, and make adjustments if necessary.

Equity

The process for determining the nominal equity return assumptions uses a forward-looking building block approach. We utilize multiple sources of information, including our inflation assumptions, historical data, GDP and other economic data, growth forecasts and dividend information.

The building blocks are the change in the consumer price index assumptions determined above, the expected dividend yield for the index (adjusted for share issues and buy-backs), and Consensus Economics' GDP forecasts.

The building block approach results in equity return assumptions in the local currency of the asset classes. For foreign equity, we used Consensus Economics' estimates for purchasing power parity between the local currency and the Canadian dollars. We assume that the current exchange rate will trend linearly towards purchasing power parity over a period of 10 years.

Standard deviations and correlations of equity returns are mainly derived from historical data. To ensure consistency between indices covering different regions, we use an iterative calibration process.

We also consider differences in capitalization levels and investment styles. Small-cap equities and large-cap equities have different risk-return profiles. We use historical data to measure the return and volatility spreads between small-cap and large-cap equities.

Alternative Asset Classes

Alternative asset classes include real estate, infrastructure, hedge funds, private equity, foreign fixed income and high yield bonds.

Real estate indices do not include leverage; however, some real estate funds and strategies use leverage. Moreover, some real estate indices are only updated quarterly, resulting in an appraisal lag. Other indices are transaction based rather than appraisal based. Therefore, we must exercise some subjective judgement to estimate return levels, standard deviations and correlations.

Hedge fund indices usually include survivorship and backfill biases. Moreover, hedge fund strategies can differ from the index due to their characteristics. Most hedge funds have an absolute return target that can guide in the selection of the assumption.

Private equity may be viewed as public equity, adjusted with a liquidity risk premium. Private equity managers usually target a spread of 3% to 5% over public equities.

Infrastructure return level assumption is based on the 10-year Government of Canada bond returns, plus a spread. The spread varies on whether the investment is in infrastructure debt or in infrastructure equity.

For foreign fixed income, we utilize the same model used for Canadian fixed income except that the credit spread and real yield components are not separated due to a lack of reliable data.

Correlations & Standard Deviations

Correlations and standard deviations are mainly derived from historical data. However, recent trends and experience can potentially lead us to perform modifications on the historical correlations. Although exchange rates have little impact on long-term equity return levels, they do have an impact on correlations.

Correlations between certain pairs of asset classes are unstable through time, particularly for alternative asset classes. Historical correlations may show a large diversifying advantage for certain assets, which may not be properly supported by theoretical evidence. In cases of a strong negative correlation, we consider whether this correlation should be trended back towards zero.

The correlation matrix must be consistent. Consistency is required for theoretical accuracy and in stochastic simulations. We use an algorithmic approach to ensure consistency of the correlation matrix.

Returns, Volatility, and Correlations by Asset Class

The following expected return and volatility by asset class were used as at August 31, 2019. For reference, we have also included the return and volatility as at the date of the previous valuation, August 31, 2016.

Table C.3 – Expected Long-term Return and Volatility (standard deviation) by Asset Class

	August 31, 2019		August 31, 2016	
	Expected Annualized Long-term Return	Volatility of Annual Return	Expected Annualized Long-term Return	Volatility of Annual Return
Inflation (change in the consumer price index)	2.10%	1.30%	2.25%	1.20%
Asset Classes				
Fixed income:				
• Short term assets	2.10%	1.20%	1.80%	1.60%
• Government bonds	2.60%	7.40%	2.75%	7.60%
• Corporate bonds	3.50%	5.70%	3.60%	6.30%
Inflation linked:				
• Real return bonds	2.15%	12.65%	2.55%	13.40%
• Real estate	6.10%	9.90%	6.25%	10.50%
• Infrastructure	6.15%	13.00%	6.90%	13.6%
Public equity (market capitalization):				
• Canadian equities	6.95%	16.30%	6.70%	16.70%
• Canadian small cap equities	7.20%	19.90%	-	-
• US equities	6.65%	17.10%	6.70%	17.40%
• EAFE equities	7.45%	15.10%	7.30%	16.20%
Public equity (low volatility) ¹ :				
• Canadian low vol	6.45%	13.05%	6.20%	13.40%
• US low vol	6.15%	13.70%	6.20%	13.90%
• EAFE low vol	6.95%	12.10%	6.80%	13.00%
• Emerging market low vol	9.65%	19.50%	9.50%	24.90%
Private equity	10.05%	23.80%	10.25%	24.20%
Absolute return strategy	6.10%	10.30%	5.90%	10.50%

¹ For purposes of our stochastic analysis at August 31, 2019, specific assumptions were made for the public equities (low volatility) strategies. The methodology for deriving assumptions for such strategies was approved by the Superintendent of Pensions in a letter dated August 18, 2015. The conditions ultimately imposed by the Superintendent of Pensions for such strategies are as follows:

- Expected long term rate of return of 0.25% to 0.5% lower than regular market capitalization index.
- Volatility of 80% of the regular market capitalization index
- Correlation of 30% lower than regular market capitalization index
- Maximum of 25% of the funds in such strategies for modeling purposes, with any excess modeled using the regular market capitalization index assumptions

The following is the correlation among the various asset classes and fixed-income building blocks used as inputs in the simulation.

Table C.4 – Simulation Correlations Among Asset Classes and Fixed Income Building Blocks

Asset Classes	Inflation	Short Term Assets	Real Return Bonds	Government Bonds	Corporate Bonds	Canadian Equities	Canadian Low Vol	Canadian small cap	US Equities	EAFE Equities	Real Estate	Infrastructure	Private Equity	Absolute Return	US Low Vol	EAFE Low Vol	Emerging Market Low Vol
Inflation	1.00	0.01	0.55	-0.11	-0.10	0.12	0.09	0.01	-0.21	-0.16	0.10	0.27	-0.04	0.19	-0.14	-0.11	0.03
Short Term Assets		1.00	0.02	-0.23	-0.25	-0.02	-0.01	-0.10	-0.07	-0.05	0.31	0.01	-0.04	0.12	-0.05	-0.03	-0.16
Real Return Bonds			1.00	-0.21	-0.08	-0.09	-0.06	-0.08	-0.28	-0.44	0.11	0.47	-0.13	0.12	-0.19	-0.31	-0.08
Government Bonds				1.00	0.83	0.56	0.39	0.69	0.22	0.49	0.01	-0.10	0.34	0.36	0.16	0.35	0.47
Corporate Bonds					1.00	0.63	0.44	0.76	0.27	0.42	-0.25	-0.04	0.40	0.47	0.19	0.30	0.45
Canadian Equities						1.00	0.70	0.75	0.41	0.53	0.12	0.13	0.54	0.74	0.29	0.37	0.50
Canadian Low Vol							1.00	0.53	0.29	0.37	0.08	0.09	0.38	0.52	0.20	0.26	0.35
Canadian small cap								1.00	0.23	0.36	-0.14	0.08	0.43	0.59	0.16	0.25	0.43
US Equities									1.00	0.72	0.05	-0.08	0.62	0.43	0.70	0.51	0.08
EAFE Equities										1.00	0.21	-0.12	0.56	0.40	0.51	0.70	0.36
Real Estate											1.00	0.02	0.06	0.20	0.03	0.14	0.05
Infrastructure												1.00	0.04	0.13	-0.05	-0.08	0.01
Private Equity													1.00	0.55	0.43	0.39	0.23
Absolute Return														1.00	0.30	0.28	0.38
US Low Vol															1.00	0.35	0.06
EAFE Low Vol																1.00	0.25
Emerging Market Low Vol																	1.00

The correlations are assumed to remain constant over the entire projection period.

Forecasted Funding Valuation Liabilities

As required under paragraph 15(2)(c) of Regulation 2012-75, the projection of the liability and future cash flows under the stochastic analysis uses the same demographic assumptions as used for the calculation of the funding valuation liability. As such, the funding valuation assumptions are used to project the demographics of the Plan on a deterministic basis 20 years into the future. Both the economic and demographic assumptions in Table 1.5 and Table 4.1 are used to project the number of members and their salaries, with each active member being replaced at death or retirement by a new entrant, resulting in the membership profile outlined herein. The following table contains the results of the deterministic projection, in particular the number of active members, along with their average credited service, average age, and average pensionable earnings for the year for each of the 20 years in the projection period.

Table C.5 – Projection Statistics for Active Members

Date	Active Members	Average Age (years)	Average Pensionable Service (years)	Average Salary ⁽¹⁾ (\$)
31-Aug-2020	8,413	44.0	14.5	\$ 81,587
31-Aug-2021	8,413	42.9	13.4	\$ 82,307
31-Aug-2022	8,413	43.2	13.7	\$ 84,680
31-Aug-2023	8,413	43.5	14.0	\$ 87,138
31-Aug-2024	8,413	43.8	14.3	\$ 89,825
31-Aug-2025	8,413	44.4	14.9	\$ 92,842
31-Aug-2026	8,413	44.8	15.4	\$ 95,718
31-Aug-2027	8,413	45.0	15.5	\$ 98,276
31-Aug-2028	8,413	45.0	15.6	\$ 100,818
31-Aug-2029	8,413	45.0	15.5	\$ 103,297
31-Aug-2030	8,413	44.9	15.4	\$ 105,670
31-Aug-2031	8,413	44.7	15.2	\$ 108,099
31-Aug-2032	8,413	44.4	15.0	\$ 110,413
31-Aug-2033	8,413	44.3	14.8	\$ 113,002
31-Aug-2034	8,413	44.2	14.7	\$ 115,703
31-Aug-2035	8,413	44.1	14.6	\$ 118,454
31-Aug-2036	8,413	44.0	14.5	\$ 121,575
31-Aug-2037	8,413	44.0	14.5	\$ 124,826
31-Aug-2038	8,413	44.0	14.4	\$ 128,209
31-Aug-2039	8,413	44.0	14.3	\$ 131,652

⁽¹⁾ These are average salaries in each year reflecting the expected salary increase. The inflationary component of actual salary increases for a particular simulation are adjusted to be consistent with the inflationary increase within that simulation.

The following table contains the results of the deterministic projection, in particular the number of inactive members, along with the total expected benefits in payment to inactive members over the projection period. Note that inactive members include all members who are not active members (including but not limited to deferred vested members and pensioners). In addition, the benefit payments outlined in the table below include future expected scheduled escalated adjustments.

Table C.6 – Projection Statistics for Inactive Members

Date	Inactive Members	Inactive Benefits in Payment (\$ thousands)
31-Aug-2020	15,555	304,819
31-Aug-2021	15,419	326,781
31-Aug-2022	15,616	334,177
31-Aug-2023	15,602	341,730
31-Aug-2024	15,547	347,794
31-Aug-2025	15,464	350,986
31-Aug-2026	15,362	355,639
31-Aug-2027	15,241	364,289
31-Aug-2028	15,097	374,724
31-Aug-2029	14,930	385,749
31-Aug-2030	14,740	397,919
31-Aug-2031	14,537	411,963
31-Aug-2032	14,305	426,646
31-Aug-2033	14,046	439,155
31-Aug-2034	13,760	450,771
31-Aug-2035	13,449	461,548
31-Aug-2036	13,121	470,794
31-Aug-2037	12,764	478,978
31-Aug-2038	12,386	487,344
31-Aug-2039	11,974	496,053

The following table contains the results of the deterministic projection, in particular the total liability at the beginning of each year. The total liability is further split by actives and inactives. The liabilities outlined in the table below include expected future scheduled escalated adjustments and are all calculated using the funding valuation discount rate.

Table C.7 – Projection of Actuarial Liabilities (\$ millions)

Date	Total Liability	Active Liability	Inactive Liability
31-Aug-2020	5,770	2,070	3,700
31-Aug-2021	5,881	1,857	4,024
31-Aug-2022	5,994	1,923	4,071
31-Aug-2023	6,110	1,995	4,115
31-Aug-2024	6,232	2,105	4,127
31-Aug-2025	6,365	2,273	4,092
31-Aug-2026	6,508	2,426	4,082
31-Aug-2027	6,653	2,512	4,141
31-Aug-2028	6,802	2,581	4,221
31-Aug-2029	6,951	2,637	4,314
31-Aug-2030	7,099	2,675	4,424
31-Aug-2031	7,245	2,683	4,562
31-Aug-2032	7,386	2,686	4,700
31-Aug-2033	7,526	2,712	4,814
31-Aug-2034	7,665	2,742	4,923
31-Aug-2035	7,803	2,770	5,033
31-Aug-2036	7,944	2,819	5,125
31-Aug-2037	8,089	2,870	5,219
31-Aug-2038	8,238	2,924	5,314
31-Aug-2039	8,392	2,962	5,430

Stochastic Model Projection Methodology

The economic assumptions and forecasted funding valuation liabilities outlined above are combined together to form an asset-liability model and used in a Monte Carlo simulation technique to model 2,000 series of alternative economic scenarios over 20 years (this exceeds the minimum requirements under the PBA of 1,000 series of economic scenarios for 20 years). This model is used to measure whether the Plan achieves its risk management goals.

For each of these scenarios and for each year, the financial position of the Plan is measured. For each of these measurements, a decision consistent with the funding deficit recovery plan or the funding excess utilization plan, as applicable, is modeled. Notably, only step 1 and step 2 of the funding excess utilization plan and steps 1

through 5 of the funding deficit recovery plan are modeled. When modeling the funding deficit recovery plan actions over the 20-year period of each economic scenario, each of the five steps identified in the funding deficit recovery plan under Section IV of the Funding Policy is implemented in sequence until such time as the Plan expects to achieve a closed group funded ratio of 100% over a period of no more than 15 years . A “benefit reduction trial” is recorded (for purposes of the primary risk management goal calculation) when step 6 or 7 of the funding deficit recovery plan found in Section IV of the Funding Policy is triggered (i.e. a reduction in past base benefits) at any point in the 20-year period of an economic scenario. The primary risk management measure is therefore the proportion of those 2,000 scenarios that do not lead to a base benefit reduction over a 20-year period. In order to pass the primary risk management goal, at least 1,950 of those 2,000 scenarios must not trigger a “benefit reduction trial” at any point over the 20-year period.

For every year in the 20-year projection, passive investment management and non-investment expenses are deducted from the expected return to account for the payment of expenses from the Plan. We assume the additional cost of any active management activities is expected to be offset by additional returns over the expected returns shown above, and it is therefore not included in the analysis. The amount of annual expenses deducted from the expected return are outlined the following table.

Table C.8 – Annual expenses deducted from projected stochastic returns

Expenses type	Annual expense
Passive investment management	0.08% of assets
Non-investment	0.04% of assets

For the purpose of the stochastic analysis, the funding valuation discount rate remains fixed at 5.80% per annum throughout the projection period. The funding valuation discount rate is used to project the funding valuation liability and determine the value of any funding correction under the Funding Policy. The projection of the liability and future cash flows under the stochastic analysis uses the same demographic assumptions as used for the calculation of the funding valuation liability, as required under paragraph 15(2)(c) of Regulation 2012-75 and which are shown above.

Stochastic Model Projection Outputs

The following tables were prepared using the outputs of the stochastic projection model. They represent key portfolio statistics of return on assets net of investment expenses, total funding valuation liabilities, total market value of assets, and closed group funded ratio. The distribution of results is summarized by the use of percentiles, mean, standard deviation, and Conditional Tail Expectation (“CTE”). The CTE reflects the average result of the worst-case scenarios for the indicated percentile.

The summary statistics shown in Table C.9 below for the Fund return are shown for each year as well as over a 20-year period.

Table C.9 – Distribution of Projected Fund Return (Net of Investment Expenses)

Plan Year (September 1 / August 31)	2.5% CTE	5% CTE	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Mean	Standard Deviation
2019/2020	-8.23%	-6.64%	-4.14%	1.40%	5.45%	9.65%	15.31%	5.58%	5.99%
2020/2021	-9.02%	-7.20%	-4.45%	1.51%	5.88%	9.71%	15.76%	5.66%	6.13%
2021/2022	-8.39%	-6.89%	-4.68%	1.59%	5.80%	9.94%	15.69%	5.71%	6.23%
2022/2023	-9.05%	-7.25%	-4.61%	1.85%	5.76%	9.97%	15.96%	5.77%	6.19%
2023/2024	-8.09%	-6.50%	-3.99%	1.68%	5.82%	9.79%	16.41%	5.80%	6.08%
2024/2025	-8.48%	-6.81%	-4.03%	1.75%	6.04%	9.78%	15.59%	5.83%	6.09%
2025/2026	-7.62%	-6.11%	-3.75%	1.92%	5.94%	9.87%	15.45%	5.87%	5.94%
2026/2027	-8.46%	-6.78%	-4.38%	1.71%	5.91%	10.05%	16.13%	5.91%	6.18%
2027/2028	-8.43%	-6.69%	-4.21%	1.72%	5.80%	10.34%	16.10%	5.94%	6.21%
2028/2029	-8.60%	-6.61%	-3.90%	1.76%	6.04%	10.27%	15.71%	5.97%	6.15%
2029/2030	-8.54%	-6.89%	-4.46%	1.97%	6.37%	10.76%	16.62%	6.31%	6.39%
2030/2031	-8.97%	-6.94%	-4.06%	2.26%	6.40%	10.45%	16.26%	6.31%	6.22%
2031/2032	-7.91%	-6.27%	-3.79%	1.91%	6.25%	10.58%	17.32%	6.32%	6.39%
2032/2033	-7.74%	-6.10%	-3.63%	2.10%	6.29%	10.54%	16.39%	6.31%	6.14%
2033/2034	-8.29%	-6.52%	-3.86%	2.07%	6.18%	10.53%	16.74%	6.32%	6.27%
2034/2035	-8.09%	-6.41%	-3.78%	2.11%	6.20%	10.62%	16.53%	6.31%	6.22%
2035/2036	-8.03%	-6.56%	-4.20%	2.15%	6.37%	10.48%	16.70%	6.32%	6.27%
2036/2037	-7.93%	-6.32%	-3.80%	2.16%	6.43%	10.39%	16.33%	6.32%	6.15%
2037/2038	-8.04%	-6.54%	-4.25%	2.23%	6.25%	10.51%	16.76%	6.32%	6.24%
2038/2039	-8.06%	-6.44%	-3.94%	2.10%	6.32%	10.54%	16.31%	6.32%	6.12%
Total (annualized)	2.46%	2.90%	3.54%	4.94%	5.88%	6.80%	8.29%	5.89%	1.42%

The stochastic model projects a distribution of the total funding valuation liabilities and assets for the portfolio over the projection period. The liabilities include scheduled escalated adjustments and exclude any reduction in past base benefits.

Table C.10 – Distribution of Projected Total Funding Valuation Liability (\$ millions)

Date	2.5% CTE*	5% CTE*	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Mean	Standard Deviation
31-Aug-2020	5,770	5,770	5,770	5,770	5,770	5,770	5,770	5,770	0
31-Aug-2021	5,881	5,881	5,881	5,881	5,881	5,881	5,881	5,881	0
31-Aug-2022	5,990	5,992	5,994	5,994	5,994	5,994	5,994	5,994	3
31-Aug-2023	6,052	6,081	6,110	6,110	6,110	6,110	6,110	6,109	16
31-Aug-2024	6,073	6,151	6,232	6,232	6,232	6,232	6,232	6,228	31
31-Aug-2025	6,089	6,206	6,365	6,365	6,365	6,365	6,365	6,357	48
31-Aug-2026	6,129	6,248	6,434	6,508	6,508	6,508	6,508	6,494	67
31-Aug-2027	6,167	6,297	6,508	6,653	6,653	6,653	6,653	6,633	88
31-Aug-2028	6,192	6,351	6,574	6,802	6,802	6,802	6,802	6,774	113
31-Aug-2029	6,211	6,389	6,663	6,951	6,951	6,951	6,951	6,914	140
31-Aug-2030	6,243	6,442	6,730	7,099	7,099	7,099	7,099	7,055	164
31-Aug-2031	6,284	6,504	6,829	7,245	7,245	7,245	7,245	7,193	185
31-Aug-2032	6,309	6,559	6,889	7,386	7,386	7,386	7,386	7,326	209
31-Aug-2033	6,311	6,591	6,988	7,526	7,526	7,526	7,526	7,458	235
31-Aug-2034	6,326	6,630	7,058	7,665	7,665	7,665	7,665	7,590	257
31-Aug-2035	6,345	6,665	7,123	7,803	7,803	7,803	7,803	7,720	280
31-Aug-2036	6,370	6,712	7,254	7,944	7,944	7,944	7,944	7,853	302
31-Aug-2037	6,420	6,789	7,321	8,089	8,089	8,089	8,089	7,990	319
31-Aug-2038	6,524	6,892	7,415	8,238	8,238	8,238	8,238	8,134	330
31-Aug-2039	6,539	6,949	7,525	8,392	8,392	8,392	8,392	8,277	355

*Note that the CTE is calculated on the lowest liability scenarios, since scenarios where the liability is reduced due to the funding deficit recovery plan represent scenarios that have had more negative investment returns.

The stochastic model produces a distribution of the market value of assets over the projection period. The following table shows a summary of the projected distribution for each year.

Table C.11 – Distribution of Projected Market Value of Assets (\$ millions)

Date	2.5% CTE	5% CTE	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Mean	Standard Deviation
31-Aug-2020	5,485	5,581	5,733	6,068	6,314	6,569	6,912	6,322	363
31-Aug-2021	5,263	5,413	5,623	6,114	6,476	6,849	7,396	6,486	543
31-Aug-2022	5,096	5,270	5,550	6,154	6,626	7,116	7,861	6,656	703
31-Aug-2023	4,999	5,190	5,471	6,244	6,788	7,414	8,293	6,837	866
31-Aug-2024	4,979	5,172	5,469	6,334	6,995	7,638	8,737	7,025	993
31-Aug-2025	4,905	5,110	5,426	6,415	7,185	7,970	9,176	7,225	1,135
31-Aug-2026	4,894	5,123	5,483	6,539	7,374	8,230	9,634	7,439	1,274
31-Aug-2027	4,851	5,109	5,520	6,619	7,567	8,552	10,176	7,663	1,413
31-Aug-2028	4,806	5,087	5,486	6,776	7,815	8,838	10,715	7,899	1,570
31-Aug-2029	4,781	5,098	5,565	6,900	8,025	9,213	11,220	8,141	1,716
31-Aug-2030	4,768	5,110	5,621	7,039	8,252	9,558	11,821	8,403	1,890
31-Aug-2031	4,765	5,138	5,665	7,228	8,443	9,903	12,363	8,667	2,043
31-Aug-2032	4,709	5,123	5,719	7,399	8,653	10,269	12,985	8,941	2,227
31-Aug-2033	4,742	5,133	5,752	7,535	8,947	10,598	13,594	9,214	2,381
31-Aug-2034	4,699	5,108	5,821	7,724	9,190	11,031	14,231	9,509	2,591
31-Aug-2035	4,678	5,130	5,855	7,860	9,419	11,469	15,091	9,811	2,798
31-Aug-2036	4,674	5,152	5,898	7,983	9,666	11,874	15,577	10,126	3,009
31-Aug-2037	4,776	5,244	5,987	8,197	9,958	12,217	16,692	10,457	3,245
31-Aug-2038	4,803	5,309	6,095	8,363	10,258	12,642	17,397	10,810	3,511
31-Aug-2039	4,743	5,307	6,191	8,498	10,544	13,172	18,451	11,188	3,807

The stochastic model produces a distribution of the closed group funded ratio over the projection period. The following table shows a summary of the projected distribution for each year, before any corrective action required under the Funding Policy.

Table C.12 – Distribution of Projected Closed Group Funded Ratio

Date	2.5% CTE	5% CTE	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Mean	Standard Deviation
31-Aug-2019	108.8%	108.8%	108.8%	108.8%	108.8%	108.8%	108.8%	108.8%	0.0%
31-Aug-2020	95.1%	96.7%	99.4%	105.2%	109.4%	113.8%	119.8%	109.6%	6.3%
31-Aug-2021	89.5%	92.0%	95.6%	104.0%	110.1%	116.5%	125.8%	110.3%	9.2%
31-Aug-2022	85.0%	87.9%	92.6%	102.7%	110.5%	118.7%	131.1%	111.0%	11.7%
31-Aug-2023	81.8%	84.9%	89.5%	102.2%	111.1%	121.3%	135.7%	111.9%	14.2%
31-Aug-2024	79.9%	83.0%	87.7%	101.6%	112.2%	122.5%	140.2%	112.7%	15.9%
31-Aug-2025	77.1%	80.3%	85.2%	100.8%	112.9%	125.2%	144.2%	113.5%	17.8%
31-Aug-2026	75.2%	78.7%	84.3%	100.5%	113.3%	126.5%	148.0%	114.3%	19.6%
31-Aug-2027	72.9%	76.8%	83.0%	99.5%	113.7%	128.5%	152.9%	115.2%	21.2%
31-Aug-2028	70.7%	74.8%	80.7%	99.6%	114.9%	129.9%	157.5%	116.1%	23.1%
31-Aug-2029	68.8%	73.3%	80.1%	99.3%	115.4%	132.5%	161.4%	117.1%	24.7%
31-Aug-2030	67.2%	72.0%	79.2%	99.2%	116.2%	134.6%	166.5%	118.4%	26.6%
31-Aug-2031	65.8%	70.9%	78.2%	99.8%	116.5%	136.7%	170.6%	119.6%	28.2%
31-Aug-2032	63.7%	69.3%	77.4%	100.2%	117.1%	139.0%	175.8%	121.1%	30.2%
31-Aug-2033	63.0%	68.2%	76.4%	100.1%	118.9%	140.8%	180.6%	122.4%	31.6%
31-Aug-2034	61.3%	66.6%	75.9%	100.8%	119.9%	143.9%	185.7%	124.1%	33.8%
31-Aug-2035	59.9%	65.7%	75.0%	100.7%	120.7%	147.0%	193.4%	125.7%	35.9%
31-Aug-2036	58.8%	64.8%	74.2%	100.5%	121.7%	149.5%	196.1%	127.5%	37.9%
31-Aug-2037	59.0%	64.8%	74.0%	101.3%	123.1%	151.0%	206.3%	129.3%	40.1%
31-Aug-2038	58.3%	64.4%	74.0%	101.5%	124.5%	153.4%	211.2%	131.2%	42.6%
31-Aug-2039	56.5%	63.2%	73.7%	101.3%	125.7%	157.0%	219.9%	133.3%	45.4%

The following table is the average correlation matrix for the asset classes outlined in Table C.4. The matrix represents the correlations between asset classes produced by the stochastic simulation.

Table C.13 – Average Correlation Among Asset Classes

Asset Classes	Inflation	Short Term Assets	Real Return Bonds	Government Bonds	Corporate Bonds	Canadian Equities	Canadian Low Vol	Canadian small cap	US Equities	EAFE Equities	Real Estate	Infrastructure	Private Equity	Absolute Return	US Low Vol	EAFE Low Vol	Emerging Market Low Vol
Inflation	1.00	0.01	0.26	0.08	0.04	0.11	0.07	0.01	-0.18	-0.14	0.09	0.23	-0.03	0.17	-0.13	-0.10	0.04
Short Term Assets		1.00	-0.24	-0.12	-0.21	-0.02	-0.02	-0.10	-0.07	-0.05	0.31	0.01	-0.04	0.12	-0.05	-0.04	-0.16
Real Return Bonds			1.00	0.49	0.51	0.20	0.14	0.12	-0.15	-0.20	0.02	0.41	0.02	0.14	-0.11	-0.14	0.07
Government Bonds				1.00	0.87	-0.14	-0.10	-0.30	0.00	-0.22	0.00	0.17	-0.03	-0.08	0.00	-0.15	-0.19
Corporate Bonds					1.00	0.16	0.11	0.08	0.12	-0.04	-0.17	0.15	0.16	0.16	0.09	-0.03	0.01
Canadian Equities						1.00	0.70	0.75	0.40	0.53	0.12	0.13	0.54	0.74	0.29	0.37	0.50
Canadian Low Vol							1.00	0.53	0.29	0.37	0.08	0.09	0.38	0.52	0.20	0.26	0.35
Canadian small cap								1.00	0.22	0.36	-0.13	0.08	0.43	0.59	0.16	0.25	0.43
US Equities									1.00	0.73	0.05	-0.08	0.62	0.43	0.70	0.51	0.08
EAFE Equities										1.00	0.20	-0.12	0.56	0.39	0.51	0.70	0.35
Real Estate											1.00	0.03	0.06	0.21	0.03	0.14	0.05
Infrastructure												1.00	0.04	0.13	-0.06	-0.08	0.02
Private Equity													1.00	0.55	0.44	0.39	0.23
Absolute Return														1.00	0.30	0.28	0.38
US Low Vol															1.00	0.35	0.05
EAFE Low Vol																1.00	0.25
Emerging Market Low Vol																	1.00

The disclosures in this report have been prepared in compliance with the Canadian Institute of Actuaries Standard of Practice, subsection 3270 - Disclosure for Stochastic Models Used to Comply with Specific Regulatory Pension Plan Funding Requirements.

Limitations of Analysis for Risk Management Tests

This report contains analysis and results that rely on assumptions about future events. While we believe that the model inputs and assumptions are reasonable at the time this report has been prepared, other reasonable model inputs and assumptions could be used, resulting in potentially very different distributions of forecasted outcomes.

Future events and actual experience will vary from the simulated outcomes produced with this analysis. As these differences arise, contribution levels and benefits payable under the Plan will be adjusted in accordance with the priorities set out under the Funding Policy.

It is not possible or practical to reflect every variable in a model that is based in the real world. Therefore, we use summary information, estimates, and simplifications to facilitate the modeling of future events. We also exclude factors or data that we consider immaterial.

The results presented in this report are not intended nor should they be interpreted to represent a guarantee or warranty with respect to the future financial condition of the Plan. Furthermore, any determination of probabilities based on the model represent simulated outcomes and should not be interpreted as being actual probabilities.

Appendix D – Summary of Plan Provisions

The following is a brief summary of the main provisions of the New Brunswick Teachers' Pension Plan ("NBTPP") as at August 31, 2019. For an authoritative statement of the provisions of the NBTPP, reference must be made to the official NBTPP documents.

Introduction

The New Brunswick Teachers' Federation/Fédération des enseignants du Nouveau-Brunswick, the Province of New Brunswick and the Minister of Finance, in his capacity as governor and administrator of the Former TPA entered into a Memorandum of Understanding pursuant to which they agreed to convert the Former TPA to the NBTPP effective July 1, 2014. As of that date, the *Teachers' Pension Act* ("Former TPA") was repealed by *An Act Respecting Pensions Under the Teachers' Pension Plan Act* (New Brunswick) which provided that the Former TPA be converted to a plan allowed under the TPPA.

Effective July 1, 2014, the NBTPP was created and is administered by an independent Board of Trustees.

Eligibility and Participation

Each Member of the Former TPA joins the NBTPP on July 1, 2014. Each Teacher is required to join the Plan upon employment.

Effective September 1, 2016, Supply Teachers as defined in the *Collective Agreement between Board of Management and the New Brunswick Teachers' Federation/la Fédération des enseignants du Nouveau-Brunswick, March 1, 2012 to February 29, 2016* are required to participate in the NBTPP with an "opt-out" option if they meet the following eligibility requirements:

- earn a minimum of 35% of the Year's Maximum Pensionable Earnings (the "YMPE") for each of the prior two consecutive calendar years; and
- have a minimum of 24 months of continuous employment from their most recent hire date.

Required Contributions

From January 1, 2014 to June 30, 2014, each member is required to contribute 7.3% of earnings up to the YMPE, plus 9.0% of earnings in excess of the YMPE.

From July 1, 2014 to June 30, 2015, each member is required to contribute 8.5% of earnings up to the YMPE, plus 10.2% of earnings in excess of the YMPE.

From July 1, 2015 to June 30, 2016, each member is required to contribute 9.0% of earnings up to the YMPE, plus 10.7% of earnings in excess of the YMPE.

From July 1, 2016 to June 30, 2017, each member is required to contribute 9.5% of earnings up to the YMPE, plus 11.2% of earnings in excess of the YMPE.

From July 1, 2017 to June 30, 2029, each member is required to contribute 10.0% of earnings up to the YMPE, plus 11.7% of earnings in excess of the YMPE.

As of July 1, 2029, each member is required to contribute consistent with a contribution formula of 9.25% of earnings up to the YMPE, plus 10.95% of earnings in excess of the YMPE, as defined in the Funding Policy.

From July 1, 2014 to June 30, 2019, the employer is required to contribute 11.5% of earnings up to the YMPE, plus 13.2% of earnings in excess of the YMPE.

From July 1, 2019 to June 30, 2024, the employer is required to contribute 10.75% of earnings up to the YMPE, plus 12.45% of earnings in excess of the YMPE.

From July 1, 2024 to June 30, 2029, the employer is required to contribute 10.0% of earnings up to the YMPE, plus 11.70% of earnings in excess of the YMPE.

From July 1, 2029, the employer is required to match the teachers' contributions.

Contribution rates are subject to change in accordance with triggers found under the Funding Policy for the NBTPP.

Normal Retirement

The normal retirement date is the first day of the month following the member's sixty-fifth birthday.

A member's annual normal retirement pension is equal to the sum of:

A. In respect of service before July 1, 2014, the product of:

- i. the number of years of the member's pensionable service before July 1, 2014, and
- ii. 1.3% of the annual average of the best five (5) consecutive years of earnings at July 1, 2014, up to the annual average YMPE for 2014, 2013 and 2012, plus 2.0% of the excess of the annual average of the best five (5) consecutive years of earnings at July 1, 2014 over the annual average YMPE for 2014, 2013 and 2012;

and

B. In respect of service from July 1, 2014, the sum of (i) and (ii) for each calendar year (or pro-rated for a portion thereof):

- iii. 1.3% of the Member's annualized earnings for the calendar year, up to the YMPE for the calendar year; and
- iv. 2.0% of the portion of the Member's annualized earnings for the calendar year that are in excess of the YMPE for the calendar year.

Pensions accrued above are subject to regular indexing every January 1st following July 1, 2014, equal to 100% of the increase in the Consumer Price Index (CPI) (subject to a maximum of 4.75%) while the Teacher is active, and equal to 75% of CPI (subject to a maximum of 4.75%) after the Teacher's termination of employment, and contingent on the NBTPP's financial condition as outlined in the Funding Policy.

Normal and Optional Forms of Pension

The normal form of pension is a pension payable in equal monthly instalments commencing on the member's pension commencement date and continuing thereafter during the lifetime of the member. For a member with a spouse or common-law partner at the time of the member's death, 50% of the member's pension (before

application of reductions for early retirement) continues to such spouse or common-law partner in equal monthly instalments for the life of the spouse or common-law partner. Should the member have dependent children at the time of his/her death, such dependent children may be entitled to a pension if there is no spouse or common-law partner or after the death of such spouse or common-law partner. A minimum amount of pension equal to the member's own contribution with interest to retirement will be payable in total.

Optional forms of pension are also available on an actuarially equivalent basis.

Early Retirement and Bridge Benefit

Early retirement is permitted as of the earliest of age 55, or 35 years of pensionable service or the age at which the member reaches 80 points (or 84 points if the member became a teacher after July 1, 2014).

On early retirement, an annual bridge benefit is payable in addition to the lifetime pension found under "Normal Retirement". The annual bridge benefit is payable to age 65 or to the death of the member, if earlier, and is equal to the sum of:

A. In respect of service before July 1, 2014, the product of:

- i. the number of years of the member's pensionable service before July 1, 2014, and
- ii. 0.7% of the annual average of the best five (5) consecutive years of earnings at July 1, 2014 up to the annual average YMPE for 2014, 2013 and 2012;

and

B. In respect of service from July 1, 2014, for each calendar year (or pro-rated for a portion thereof), 0.7% of the Member's annualized earnings for the calendar year up to the YMPE for the calendar year.

The portions of the lifetime pension and bridge benefit accrued for service before July 1, 2014 are unreduced if the pension and bridge commence to be paid upon or after fulfilment of one of the following criteria:

- Achievement of the 87 points rule (age + years of pensionable service)
- Age 60 and 20 years of pensionable service
- 35 years of pensionable service
- Age 65 and 5 years of continuous service or 2 years of pensionable service or Plan membership

If payment commences before any of these criteria are met, the lifetime pension and bridge benefit shall each be reduced by 5/12% per month (5% per year) that the pension and bridge commencement date precedes the first day of the month in which the criterion is met.

The portions of the lifetime pension and bridge benefit accrued for service on and after July 1, 2014 are reduced by 5/12% per month (5% per year) that the pension and bridge commencement date precedes the first day of the month following the first of the following events:

- Achievement of the 91 points rule (age+ years of pensionable service)
- Age 62 and 20 years of pensionable service
- 35 years of pensionable service

- Age 65 and 5 years of continuous service or 2 years of pensionable service or Plan membership.

Benefits on Termination of Employment

If a member terminates employment prior to completing 5 years of continuous service and prior to completing 2 years of pensionable service or Plan membership, the member is entitled to a refund of the total amount of his/her contributions to the NBTPP and Former TPA, if any, with interest.

If a member terminates employment before age 55 but after completing at least 5 years of continuous service or 2 years of pensionable service or Plan membership, the member may elect to receive:

- a deferred lifetime pension payable from the normal retirement date equal to the accrued pension to which the member is entitled as at his/her date of termination in accordance with the formula specified above for the normal retirement pension; or
- to transfer the termination value calculated in accordance with the TPPA, to a registered retirement savings arrangement as allowed under the PBA.

Members electing a deferred lifetime pension will also be entitled to retire early in accordance with the “Early Retirement” section, and will also be eligible for a bridge benefit.

Death Benefits

If a member dies prior to completing 5 years of continuous service and prior to completing 2 years of pensionable service or Plan membership, the benefit payable is a refund of the member’s own contributions to the NBTPP and Former TPA, if any, with interest.

If the member dies after completing at least 5 years of continuous service or 2 years of pensionable service or Plan membership, but before pension commencement, the death benefit is as follows:

- a pension of 50% of the accrued lifetime pension payable to the surviving spouse or surviving common-law partner; or to dependent children if there is no surviving spouse or following the death of the surviving spouse an amount equal to the spouse’s pension (split equally among dependent children). Any amount by which the Termination Value exceeds the aggregate of all pension payments made above, shall be paid to the designated beneficiary(ies) or estate.
- If no pension is payable to the surviving spouse or the surviving common-law partner, and if there is no dependent child or dependent at the time of death, the benefit payable is a refund of the member’s own contributions to the NBTPP and Former TPA, if any, with interest, to the estate.

In the event of death after pension commencement, the benefit payable is determined in accordance with the form of pension selected by the member at retirement.

Primary Goal, Benefit Security and Cost-of-Living Adjustments

The primary goal of the NBTPP is to provide pensions to eligible teachers after retirement and until death in respect of their service as teachers. A further purpose of this NBTPP is to provide secure pension benefits to members without an absolute guarantee but with a risk-focused management approach delivering a high degree of certainty that full base benefits will be payable in the vast majority of potential future economic scenarios. As a plan allowed under the TPPA, all future cost-of-living adjustments and other ancillary benefits under the

NBTPP shall be provided only to the extent that funds are available for such benefits, as determined by the Board of Trustees in accordance with applicable laws and the Funding Policy.

Appendix E – Plan Administrator Confirmation Certificate

With respect to the Actuarial Valuation Report of the New Brunswick Teachers' Pension Plan as at August 31, 2019, I hereby confirm that to the best of my knowledge:

- the data regarding Plan members and beneficiaries provided to Morneau Shepell as at August 31, 2019 constitutes a complete and accurate description of the information contained in our files;
- copies of the official Plan text, Funding Policy and Statement of Investment Policies of the NBTPP and all amendments to date were provided to Morneau Shepell; and
- there are no subsequent events or any extraordinary changes to the Plan membership from August 31, 2019 which would materially affect the results, other than those noted in this report.

The NBTPP Board of Trustees



Signature

Name: Larry Jamieson

Title: Chair

Date: June 19, 2020

Morneau Shepell is the only human resources consulting and technology company that takes an integrated approach to employee well-being to meet health, benefits and retirement needs. The Company is the largest administrator of retirement and benefits plans and the largest provider of integrated absence management solutions in Canada. LifeWorks by Morneau Shepell is the leading total well-being solution that combines employee assistance, wellness, recognition and incentive programs. As a leader in strategic HR consulting and innovative pension design, the Company also helps clients solve complex workforce problems and provides integrated productivity, health and retirement solutions.

Established in 1966, Morneau Shepell serves approximately 24,000 clients, ranging from small businesses to some of the largest corporations and associations. With more than 4,500 employees in offices across North America, the United Kingdom and Australia, Morneau Shepell provides services to organizations around the globe. Morneau Shepell is a publicly-traded company on the Toronto Stock Exchange (TSX:MSI). For more information, visit morneaushepell.com.

