

Nova Scotia Public Service
Superannuation Plan
**Report on the Actuarial
Valuation for Funding
Purposes as at
December 31, 2020**

June 2021

Canada Revenue Agency Registration Number: 0284521

Note to reader regarding actuarial valuations:

This valuation report may not be relied upon for any purpose other than those explicitly noted in the Introduction, nor may it be relied upon by any party other than the parties noted in the Introduction. Mercer is not responsible for the consequences of any other use. A valuation report is a snapshot of a plan's estimated financial condition at a particular point in time; it does not predict a pension plan's future financial condition or its ability to pay benefits in the future. If maintained indefinitely, a plan's total cost will depend on a number of factors, including the amount of benefits the plan pays, the number of people paid benefits, the amount of plan expenses, and the amount earned on any assets invested to pay the benefits. These amounts and other variables are uncertain and unknowable at the valuation date. The content of the report may not be modified, incorporated into or used in other material, sold or otherwise provided, in whole or in part, to any other person or entity, without Mercer's permission. All parts of this report, including any documents incorporated by reference, are integral to understanding and explaining its contents; no part may be taken out of context, used, or relied upon without reference to the report as a whole.

To prepare the results in this report, actuarial assumptions are used to model a single scenario from a range of possibilities for each valuation basis. The results based on that single scenario are included in this report. However, the future is uncertain and the plan's actual experience will differ from those assumptions; these differences may be significant or material. Different assumptions or scenarios within the range of possibilities may also be reasonable, and results based on those assumptions would be different. Furthermore, actuarial assumptions may be changed from one valuation to the next because of changes in regulatory and professional requirements, developments in case law, plan experience, changes in expectations about the future, and other factors.

The valuation results shown in this report also illustrate the sensitivity to three key actuarial assumptions, including the discount rate. We note that the results presented herein rely on many assumptions, all of which are subject to uncertainty, with a broad range of possible outcomes, and the results are sensitive to all the assumptions used in the valuation.

Decisions about benefit changes, granting new benefits, investment policy, funding policy, benefit security, and/or benefit-related issues should not be made solely on the basis of this valuation, but only after careful consideration of alternative economic, financial, demographic, and societal factors, including financial scenarios that assume future sustained investment losses.

Funding calculations reflect our understanding of the requirements of the Income Tax Act, and related regulations that are effective as of the valuation date. Mercer is not a law firm, and the analysis presented in this report is not intended to be a legal opinion. You should consider securing the advice of legal counsel with respect to any legal matters related to this report.

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1 Summary of Results

	31.12.2020	31.12.2019
Going Concern Financial Status		
Actuarial value of assets	\$7,207,072,000	\$6,813,354,000
Going concern actuarial liability	\$7,363,569,000	\$6,918,434,000
Funding excess (shortfall)	(\$156,497,000)	(\$105,080,000)
Funded ratio	97.9%	98.5%
Funding Requirements in the Year Following the Valuation ¹		
Total current service cost	\$194,526,000	\$177,454,000
Estimated members' required contributions	\$118,175,000	\$112,456,000
Estimated employers' required contributions	\$117,755,000	\$111,972,000
Current service cost excess (deficit)	\$41,404,000	\$46,974,000
Current service cost excess (deficit) as a percentage of payroll	3.0%	3.7%
Payroll	\$1,362,589,000	\$1,270,548,000

¹ Provided for reference purposes only. Contributions must be remitted to the Plan in accordance with the Minimum Funding Requirements and Maximum Eligible Contributions sections of this report.

For information purposes, we also include the hypothetical financial position and current service cost as if the Plan was 100% fully indexed post-retirement:

Hypothetical Position if Fully Indexed	31.12.2020	31.12.2019
Going Concern Financial Status		
Actuarial value of assets	\$7,207,072,000	\$6,813,354,000
Going concern actuarial liability	\$8,950,826,000	\$8,387,425,000
Funding excess (shortfall)	(\$1,743,754,000)	(\$1,574,071,000)
Funded ratio	80.5%	81.2%
Funding Requirements in the Year Following the Valuation		
Total current service cost	\$239,912,000	\$217,961,000
Estimated members' required contributions	\$118,175,000	\$112,456,000
Estimated employers' required contributions	\$117,755,000	\$111,972,000
Current service cost excess (deficit)	(\$3,982,000)	\$6,467,000
Current service cost excess (deficit) as a percentage of payroll	(0.3%)	0.5%
Payroll	\$1,362,589,000	\$1,270,548,000

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Introduction

To the Public Service Superannuation Plan Trustee Inc. (the “Trustee”)

At your request, we have conducted an actuarial valuation of the Nova Scotia Public Service Superannuation Plan (the “Plan”), as at the valuation date, December 31, 2020. We are pleased to present the results of the valuation.

Purpose

The purpose of this valuation is to determine:

- The funded status of the Plan as at December 31, 2020 on a going concern basis, and
- The current service cost and contributions to the Plan for 2021.

The information contained in this report was prepared for the internal use of the Nova Scotia Pension Services Corporation (the “Corporation”) and the Trustee and for filing with the Canada Revenue Agency, in connection with our actuarial valuation of the Plan. This report is not intended or suitable for any other purpose.

The next actuarial valuation of the Plan will be required for purposes of the *Income Tax Act* (the “ITA”) as at a date not later than December 31, 2023. Under the *Public Service Superannuation Act* (the “Act”), the next actuarial valuation will be required as at December 31, 2021.

Terms of Engagement

In accordance with our terms of engagement with the Corporation on behalf of the Trustee, our actuarial valuation of the Plan is based on the following material terms:

- It has been prepared in accordance with applicable pension legislation and actuarial standards of practice in Canada.
- As instructed by the Trustee, the going concern discount rate does not include a margin for adverse deviations.

- No wind-up valuation has been performed. The terms and conditions of a wind-up and the benefits that would be payable are not outlined in the governing legislation and thus are unknown.

Events since the Last Valuation at December 31, 2019

Pension Plan

There have been no special events since the last valuation date.

Effective January 1, 2020, the Town of Truro (“Truro”) commenced participation in the PSSP for future service. The liability related to the Truro pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer adjustment has been determined and there is a credit available to be applied evenly to future employee and employer contribution requirements. At the valuation date, we have not reflected any assets payable in this regard.

Effective February 1, 2020, the DirectionS Council for Vocational Services Society Pension Plan (“DirectionS”) commenced participation in the PSSP for future service. The liability related to the DirectionS pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined but for valuation purposes, we have not included any assets receivable in this regard.

Effective March 1, 2020, the Municipality of the District of Lunenburg (“Lunenburg”) commenced participation in the PSSP for future service. The liability related to the Lunenburg pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined but for valuation purposes, we have not included any assets receivable in this regard.

Effective October 1, 2020, the Region of Queens Municipality (“Queens”) commenced participation in the PSSP for future service. The liability related to the Queens pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined but for valuation purposes, we are not holding any assets receivable in this regard. As the membership data had not been provided to the PSSP in final form in sufficient time to be included in the valuation calculations, we have estimated the value of the liability transfer as at December 31, 2020 for valuation purposes corresponding to the assets transferred.

The valuation results as at December 31, 2020 take into account the impact of these groups transferring to the PSSP.

This valuation reflects the provisions of the Plan as at December 31, 2020. The Plan has not been amended in any material way since the date of the previous valuation, and we are not aware of any pending definitive or virtually definitive amendments coming into effect during the period covered by this report. The Plan provisions are summarized in Appendix D.

Assumptions

We have used the same going concern valuation assumptions and methods as were used for the previous valuation, except for the following:

	Current valuation	Previous valuation
Discount rate:	5.25%	5.50%

A summary of the going concern methods and assumptions is provided in Appendix B.

Funding Policy

The Act contains a detailed funding policy based on a 5-year review cycle. The first such review was conducted in conjunction with the December 31, 2014 actuarial valuation. The objective of the 5-year review process as at December 31, 2014 was to establish contributions for the period commencing January 1, 2016 and ending December 31, 2020, as well as the annual indexing on each January 1 from 2016 through 2020. The next such 5-year review process was conducted in conjunction with the December 31, 2019 actuarial valuation.

The following summarizes the funding policy (reference should be made to the Act for complete details):

- Based on the funded ratio of the Plan in the 5-year actuarial valuation report, the Trustee may (and in some cases, must) take certain actions.
- Generally, when the Plan is less than fully funded (funded ratio below 100%), no indexing is permitted, employee and employer contributions may be increased and, in extreme cases, benefits may be reduced.
- When the Plan's funded ratio is above 100%, indexing is permitted (and in some instances, required), certain portions of the funding excess are used to establish a funding reserve (referred to as the strategic reserve under the Act), employee and employer contributions may be adjusted and any previously reduced benefits may be restored.

- Within the 5-year valuation cycle, the funding policy also permits (and in some instances, requires) certain Trustee actions in the event of a sharp decline in the Plan's funded ratio.

For the 5-year review as at December 31, 2019, as the Plan had a funding deficit, no indexing was permitted for the period 2021-2025 under the funding policy. Further, current member and employer contribution rates were determined to be sufficient to cover current service cost as well as returning the Plan to 100% funded on a projected basis within 10 years as required by the funding policy. Consequently, the Trustee decided not to increase contribution rates as permitted by the funding policy.

The next such 5-year review process will be conducted in conjunction with the December 31, 2024 actuarial valuation.

Regulatory Environment and Actuarial Standards

There have been no changes to the Act or the ITA regulations which impact the funding of the Plan.

Subsequent Events

Effective February 1, 2021, the Town of Yarmouth (Yarmouth") commenced participation in the PSSP for future service. The liability related to the Yarmouth pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined.

Effective April 1, 2021, the Municipality of the County of Colchester ("Colchester") commenced participation in the PSSP for future service. The liability related to the Colchester pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined.

The valuation results as at December 31, 2020 do not take into account the impact of these groups transferring to the PSSP. The impact will be reflected in the next actuarial valuation of the PSSP effective December 31, 2021.

After checking with representatives of the Corporation, to the best of our knowledge there have been no other events subsequent to the valuation date which, in our opinion, would have a material impact on the results of the valuation. Our valuation reflects the financial position of the Plan as of the valuation date and does not take into account any experience after the valuation date.

We have assumed that all the Plan's assets are available to cover the Plan's liabilities presented in this report.

3 Valuation Results – Going Concern

Financial Status

A going concern valuation compares the relationship between the value of Plan assets and the present value of expected future benefit cash flows in respect of accrued service, assuming the Plan will be maintained indefinitely. The results of the current valuation, compared with those from the previous valuation, are summarized as follows:

	31.12.2020	31.12.2019
Assets		
Market value of assets	\$7,207,072,000	\$6,813,354,000
Actuarial value of assets	\$7,207,072,000	\$6,813,354,000
Going concern actuarial liability		
• Active and LTD members	\$2,986,709,000	\$2,752,396,000
• Pensioners and survivors	\$4,244,524,000	\$4,037,161,000
• Deferred pensioners	\$27,118,000	\$23,189,000
• Pending terminations	91,501,000	\$97,861,000
• Riverview	\$0*	\$7,827,000
• Queens	\$13,717,000	\$0
Total	\$7,363,569,000	\$6,918,434,000
Funding excess (shortfall)	(\$156,497,000)	(\$105,080,000)
Funding ratio	97.9%	98.5%

*Riverview liabilities as of December 31, 2020 are not identified separately but are included with other PSSP liability groups.

Individual data for Queens was not held by the PSSP at the time the valuation calculations were being carried out. Therefore, the Queens liability has been set equal to the assets transferred to the PSSP.

The going concern actuarial liability does not include a margin for adverse deviations.

Reconciliation of Financial Status

Funding excess (shortfall) as at previous valuation		(\$105,080,000)
Interest on funding excess (shortfall) at 5.50% per year		(\$5,779,000)
Contributions in excess of current service cost		\$54,266,000
Expected funding excess (shortfall)		(\$56,593,000)
Net experience gains (losses)		
• Net investment return	\$135,447,000	
• Increase in pensionable earnings, ITA Max and YMPE	(\$10,438,000)	
• Mortality	(\$10,770,000)	
• Retirement	\$19,623,000	
• Termination	(\$13,149,000)	
• Disability	\$2,479,000	
Total experience gains (losses)		\$123,192,000
Impact of changes in assumptions		(\$213,024,000)
Net impact of other elements of gains and losses		(\$10,072,000)
Funding excess (shortfall) as at current valuation		(\$156,497,000)

Current Service Cost

The current service cost is an estimate of the present value of the additional expected future benefit cash flows in respect of pensionable service that will accrue after the valuation date, assuming the Plan will be maintained indefinitely.

The current service cost during the year following the valuation date, compared with the corresponding value determined in the previous valuation, is as follows:

	2021		2020	
	\$	% of payroll	\$	% of payroll
Total current service cost	\$194,526,000	14.3%	\$177,454,000	14.0%
Estimated members' required contributions	\$118,175,000	8.7%	\$112,456,000	8.9%
Estimated employer's required contributions	\$117,755,000	8.6%	\$111,972,000	8.8%
Estimated total required contributions	\$235,930,000	17.3%	\$224,428,000	17.7%
Current service cost excess (deficit)	\$41,404,000	3.0%	\$46,974,000	3.7%
Payroll	\$1,362,589,000		\$1,270,548,000	

The terms of the Plan specify that the employers will match the required contributions made by the members up to the earnings which result in the maximum pension accrual under the *Income Tax Act*.

Discount Rate Sensitivity

The following table summarizes the effect on the going concern actuarial liability and current service cost shown in this report of using a discount rate which is 1% lower than that used in the valuation. For the purposes of the illustration, we have reduced the interest rate used to determine commuted values upon termination of employment by 1%.

Scenario	Valuation Basis	Reduce Discount Rate by 1%
Going concern actuarial liability	\$7,363,569,000	\$8,341,766,000
Current service cost		
• Total current service cost	\$194,526,000	\$238,816,000
• Estimated members' required contributions	\$118,175,000	\$118,175,000
• Estimated employers' required contributions	\$117,755,000	\$117,755,000
• Current service cost excess (deficit)	\$41,404,000	(\$2,886,000)
• Current service cost excess (deficit) as a percentage of payroll	3.0%	(0.2%)

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Valuation Results – Hypothetical Wind-up

Financial Position

When conducting a hypothetical wind-up valuation, we determine the relationship between the respective values of the Plan's assets and its liabilities assuming the Plan is wound up and settled on the valuation date, assuming benefits are settled in accordance with the Act and under circumstances producing the maximum wind-up liabilities on the valuation date.

The Act requires that:

- where the pension fund is terminated and wound up, the assets must be used to meet the accrued benefit entitlements of members, former members and any other persons entitled to a benefit under the Plan before any other distribution may be made;
- if the assets are insufficient to secure the benefit entitlements, the assets must be allocated to members, former members and any other persons entitled to a benefit under the Plan on a pro-rated basis, based on the actuarial present value of the accrued benefits of such persons as of the date of the wind-up, and distributed in the manner prescribed by the plan regulations (though no regulations are prescribed); and
- no employee or employer is required to pay any additional amount in respect of a shortfall upon the wind-up of the Plan.

Beyond the above, the terms and conditions of a wind-up and the benefits that would be payable are not outlined in the governing legislation and thus are unknown. In addition, the Plan is not expected to be wound up in the foreseeable future. Under the terms of engagement, no hypothetical wind-up valuation has been performed.

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Minimum Funding Requirements

The Act prescribes the minimum contributions that the employees and employer must make to the Plan, as described in Appendix D.

The estimated minimum annual contributions in respect of the Plan are as follows:

	\$	% of payroll
Estimated members' required contributions	\$ 118,175,000	8.7%
Estimated employers' required contributions	\$117,755,000	8.6%
Estimated total required contributions	\$235,930,000	17.3%

The estimated contribution amounts above are based on projected members' pensionable earnings. Therefore, the actual employee and employer contributions and current service cost may be different from the foregoing estimates and, as such, the contribution requirements should be monitored closely to ensure contributions are made in accordance with the Act.

Other Considerations

Differences between Valuation Bases

There is no provision in the Act to fund the difference between the required contributions and funding or hypothetical wind-up and solvency shortfalls, if any. As the Nova Scotia *Pension Benefits Act* is not applicable to this Plan and the Plan does not have a requirement to amortize deficits, no special payments are required.

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Maximum Eligible Contributions

The *Income Tax Act* (the “ITA”) limits the amount of employer contributions that can be remitted to the defined benefit component of a registered pension plan. However, notwithstanding the limit imposed by the ITA, for plans which are not ‘Designated’ as defined in the ITA, in general, the minimum required contributions under the Act can be remitted.

In accordance with Section 147.2 of the ITA and *Income Tax Regulation* 8516, for a plan which is underfunded on either a going concern or on a hypothetical wind-up basis, the maximum permitted contributions are equal to the employer’s current service cost, including the explicit expense allowance if applicable, plus the greater of the going concern funding shortfall and hypothetical wind-up shortfall.

For a plan which is fully funded on both going concern and hypothetical wind-up bases, the employer can remit a contribution equal to the employer’s current service cost, including the explicit expense allowance if applicable, as long as the surplus in the plan does not exceed a prescribed threshold. Specifically, in accordance with Section 147.2 of the ITA, for a plan which is fully funded on both going concern and hypothetical wind-up bases, the plan may not retain its registered status if the employer makes a contribution while the going concern funding excess exceeds 25% of the going concern actuarial liability.

The employee and employer contributions are fixed under the Act. If the total required contributions exceed the total current service cost, as is true in this valuation, the excess over the current service cost would reduce any funding shortfall in the Plan. The total estimated annual contributions, attributable between current service and in excess thereof, are as follows:

Year	Contribution as a % of Payroll ²			Estimated total contributions		
	Total	Current Service	Excess Over Current Service	Total	Current Service	Excess Over Current Service
2021	17.3%	14.3%	3.0%	\$235,930,000	\$194,526,000	\$41,404,000
2022	17.3%	14.3%	3.0%	\$241,828,000	\$199,389,000	\$42,439,000
2023	17.3%	14.3%	3.0%	\$247,874,000	\$204,374,000	\$43,500,000

² Expressed as a percentage of members’ pensionable earnings

The funding shortfall at the valuation date is \$156,497,000. Subsection 147.2(2)(c) of the *Income Tax Act* and the CIA Pension Standards allow the benefits taken into account for the purposes of a funding recommendation to include anticipated cost of living and similar adjustments where the terms of the plan do not require that these adjustments be made, but it is reasonable to assume they will be made. As the funding policy permits indexing in the future (and in some instances, mandates it), it is reasonable to expect that some indexing will occur in the future. Given the funding shortfall at December 31, 2020 and the potential increase in liabilities if indexing were expected to occur in the future, the contributions in excess of the current service cost are eligible contributions.

In certain circumstances, member contributions may be in excess of the limits prescribed by the *Income Tax Act*. A waiver under *Income Tax Act* Regulation 8501(6.1) to allow the increased member contributions has been received.

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Actuarial Opinion

In my opinion, for the purposes of the valuations,

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

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



Douglas M. Brake
Fellow, Society of Actuaries
Fellow, Canadian Institute of Actuaries

June 28, 2021

Date

Appendix A

Plan Assets

The pension fund is held in trust by the Trustee. In preparing this report, we have relied upon asset information provided by the Corporation for the period from January 1, 2020 to December 31, 2020. Customarily, this information would not be verified by a plan's actuary. We have reviewed the information for internal consistency and we have no reason to doubt its substantial accuracy.

Reconciliation of Market Value of Plan Assets

The pension fund transactions since the last valuation are summarized in the following table:

	2020
January 1, 2020	\$6,843,469,000
PLUS	
Members' contributions*	\$118,139,000
Employer's contributions	\$113,686,000
Transfer to Plan	\$41,034,000
Net investment Income	\$507,919,000
	<u>\$780,778,000</u>
LESS	
Pensions paid	\$390,625,000
Lump-sums paid	\$26,643,000
	<u>\$417,268,000</u>
December 31, 2020	\$7,206,979,000
Rate of return net of expenses	7.50%

* Includes \$3,962,000 in unmatched past service contributions

The market value of assets in the pension fund (adjusted for payables and receivables) is further adjusted to reflect the present value of the remaining payments with respect to the past service buy-backs. The adjusted market value of assets is, therefore, equal to:

Adjusted Market Value of Assets	
Market value of Plan assets at December 31, 2020	\$7,206,979,000
Present value of contributions receivable past service buy-back	\$93,000
Adjusted market value of Plan assets at December 31, 2020	\$7,207,072,000

Investment Policy

The Trustee has adopted a statement of investment policy and procedures. This policy is intended to provide guidelines for the manager(s) as to the level of risk that is consistent with the Plan's investment objectives. A significant component of this investment policy is the asset mix.

The Trustee is solely responsible for selecting the plan's investment policies, asset allocations, and individual investments.

The constraints on the asset mix and the actual asset mix at the valuation date are provided for information purposes:

	Investment Policy Target	Actual Asset Mix as at 31.12.2020
Equities	23%	26%
Fixed Income	32%	32%
Absolute Return Strategies	10%	10%
Private Equity	5%	3%
Real Assets	25%	22%
Commodities	3%	3%
Cash and Cash Equivalents	2%	4%
	100%	100%

Appendix B

Methods and Assumptions – Going Concern

Valuation of Assets

For this valuation, we have used the market value of assets adjusted for in-transit amounts.

Going Concern Actuarial liability

Over time, the real cost of a pension plan is the excess of benefits and expenses over investment earnings, such cost being generally shared equally between employers and employees in this plan. The actuarial cost method allocates this cost to annual time periods.

For purposes of the going concern valuation, we have continued to use the projected unit credit actuarial cost method. Under this method, we determine the present value of benefit cash flows expected to be paid in respect of service accrued prior to the valuation date, including ancillary benefits, based on projected final average earnings. This is referred to as the actuarial liability. For each individual plan member, accumulated contributions with interest are established as a minimum actuarial liability.

The funding excess or funding shortfall, as the case may be, is the difference between the market or actuarial value of assets and the actuarial liability. A funding excess on a market value basis indicates that the current market value of assets and expected investment earnings are expected to be sufficient to meet the cash flows in respect of benefits accrued to the valuation date as well as expected expenses – assuming the plan is maintained indefinitely. A funding shortfall on a market value basis indicates the opposite – that the current market value of the assets is not expected to be sufficient to meet the plan's cash flow requirements in respect of accrued benefits, absent additional contributions.

Under the Act, there is no requirement for the Province to make up a funding shortfall through additional contributions. In the event of a funding shortfall, contributions and/or benefits would be revisited and any adjustments made in accordance with the Funding Policy.

The actuarial cost method used for the purposes of this valuation produces a reasonable matching of contributions with accruing benefits. Because benefits are recognized as they accrue, the actuarial cost method provides an effective actuarial liability for a plan that is maintained indefinitely.

Current Service Cost

The current service cost is the present value of projected benefits to be paid under the plan with respect to service expected to accrue during the period until the next valuation.

The current service cost has been expressed as a percentage of the members' pensionable earnings to provide an automatic adjustment in the event of fluctuations in membership and/or pensionable earnings.

Under the projected unit credit actuarial cost method, the current service cost for an individual member will increase each year as the member approaches retirement. However, the current service cost of the entire group, expressed as a percentage of the members' pensionable earnings, can be expected to remain stable as long as the average age distribution of the group remains constant.

If the total required contributions exceed the total current service cost, as is true in this valuation, the current service cost excess would reduce any funding shortfall in the Plan, or otherwise be used in accordance with the requirements of the Act and the *Income Tax Act*.

Actuarial Assumptions – Going Concern Basis

The present value of future benefit payment cash flows is based on economic and demographic assumptions. At each valuation we determine whether, in our opinion, the actuarial assumptions are still appropriate for the purposes of the valuation, and we revise them, if necessary. Emerging experience will result in gains or losses that will be revealed and considered in future actuarial valuations.

The table below shows the various assumptions used in the current valuation in comparison with those used in the previous valuation.

Assumption	Current valuation	Previous valuation
Discount rate:	5.25%	5.50%
Inflation:	2.00%	2.00%
ITA limit / YMPE increases:	2.50%	2.50%
Pensionable earnings increases:	2.50% per year plus promotional scale	2.50% per year plus promotional scale
Post retirement pension increases:	None	0.85% per year up to 2020, none thereafter
Interest on employee contributions:	3.00%	3.00%

Assumption	Current valuation	Previous valuation
Retirement rates:	<ul style="list-style-type: none"> • 10% at age 59 • 20% at age 60 • 10% at each age 61-64 • 50% at each age 65-69 • 100% at age 70 <p>However, 20% each year on or after EURD (based on points), if it is greater.</p> <p>40% at 35 years of service (before age 65)</p>	<ul style="list-style-type: none"> • 10% at age 59 • 20% at age 60 • 10% at each age 61-64 • 50% at each age 65-69 • 100% at age 70 <p>However, 20% each year on or after EURD (based on points), if it is greater.</p> <p>40% at 35 years of service (before age 65)</p>
Mortality rates:	120% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)	120% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)
Mortality improvements:	Fully generational using CPM Improvement Scale B (CPM-B)	Fully generational using CPM Improvement Scale B (CPM-B)
Disability rates:	None	None
Termination rates:	Service-related table	Service-related table
Form of benefit elected:	<p>Retirement: 100% of eligible members receive a pension from the plan</p> <p>Termination: 50% of eligible members receive a pension from the plan and 50% elect a lump sum transfer</p>	<p>Retirement: 100% of eligible members receive a pension from the plan</p> <p>Termination: 50% of eligible members receive a pension from the plan and 50% elect a lump sum transfer</p>
Actuarial basis for benefits assumed to be settled through a lump sum:	Discount rate: 3.50% Mortality rates: CPM2014 with fully generational improvements using CPM-B	Discount rate: 3.50% Mortality rates: CPM2014 with fully generational improvements using CPM-B
Eligible spouse at retirement:	85% of males / 75% of females	85% of males / 75% of females

Assumption	Current valuation	Previous valuation
Eligible spouse post-retirement:	90% of male members and 80% of female members who had a spouse at retirement will have a surviving spouse at the valuation date	90% of male members and 80% of female members who had a spouse at retirement will have a surviving spouse at the valuation date
Spousal age difference:	Male 3 years older	Male 3 years older

The assumptions are best-estimate.

Promotional Scale (Age-Related Table)

Sample rates from the age-related promotional scale table are summarized in the following table:

Age	Promotional Scale
Under 30	2.0%
30 - 34	1.5%
35 - 39	1.0%
40 - 45	0.5%
45 - 49	0.0%
50 +	0.0%

Termination Rates (Service-Related Table)

Sample rates from the service-related termination table are summarized in the following table:

Years of service	Termination	Years of service	Termination
0	12.00%	8	2.00%
1	10.00%	9	1.50%
2	7.00%	10-15	1.25%
3	5.00%	16	1.00%
4	4.00%	17	0.75%
5	3.50%	18	0.50%
6	3.00%	19	0.25%
7	2.50%	20	0.00%

Pensionable Earnings

The benefits ultimately paid will depend on each member's final average earnings. To calculate the pension benefits payable upon retirement, death, or termination of employment, we have taken each member's rate of pay on December 31, 2020 and assumed that such pensionable earnings will increase at the assumed rate which is 2.50% per year, plus promotional scale.

Rationale for Assumptions

A rationale for each of the assumptions used in the current valuation is provided below.

Discount Rate

We have discounted the expected benefit payment cash flows using the expected investment return on the actuarial value of the fund net of fees and less a margin for adverse deviations. Other bases for discounting the expected benefit payment cash flows may be appropriate, particularly for purposes other than those specifically identified in this valuation report.

The discount rate is comprised of the following:

- Estimated returns for each major asset class consistent with market conditions on the valuation date, the expected time horizon over which benefits are expected to be paid, and the target asset mix specified in the Plan's investment policy.
- Additional returns assumed to be achievable due to active equity management equal to the fees related to active equity management. Such fees were determined by the difference between the provision for total investment expenses and the hypothetical fees that would be incurred for passive management of all assets.
- Implicit provision for investment and non-investment expenses.
- No margin for adverse deviations.

The discount rate was developed as follows:

Assumed investment return	5.33%
Additional returns for active management	0.30%
Expense provision	(0.40%)
Margin for adverse deviation	(0.00%)
Rounding	0.02%
Net discount rate	<u>5.25%</u>

Inflation

The assumption is based on our best estimate of future inflation considering the Bank of Canada's inflation target and market expectations of long-term inflation implied by the yields on nominal and real return bonds.

Income Tax Act Pension Limit and Year's Maximum Pensionable Earnings

The assumption is based on historical real economic growth and the underlying inflation assumption.

Pensionable Earnings

The assumption is based on general wage growth assumptions increased by our best estimate of future merit and promotional increases over general wage growth considering current economic and financial market conditions.

Post-Retirement Pension Increases

The assumption is based on the scheduled increases as at the valuation date reflecting the decision of the Trustee not to grant post-retirement indexing for the 5-year cycle starting in 2021 (January 1, 2021 through January 1, 2025).

Retirement Rates

The assumption is based on a study of experience over the years 2009 to 2013.

Termination Rates

The assumption is based on a study of experience from 2009 to 2013.

Mortality Rates

The mortality rates selected reflect a study of plan-specific experience over the years 2009 to 2013. The assumption for the mortality rates is based on the Canadian Pensioners' Mortality (CPM) study published by the Canadian Institute of Actuaries in February 2014, for the public sector adjusted by a factor of 120%.

There is broad consensus among actuaries and other longevity experts that mortality improvement will continue in the future, but the degree of future mortality improvement is uncertain. Two mortality improvement scales were recently published by the Canadian Institute of Actuaries (CIA) and may apply to Canadian pension valuations:

- The Canadian Pensioners Mortality (CPM) study published in February 2014 included CPM Improvement Scale B (CPM-B) which is also used for commuted value calculations.
- A report released by the Task Force on Mortality Improvement on September 20, 2017 includes an analysis of the rate of mortality improvement for the Canadian population and provides for mortality improvement scale MI-2017 to be considered for the purpose of reflecting future mortality improvement in Canadian actuarial work, while acknowledging that it might be appropriate to use alternative mortality improvement assumptions to reflect the nature of the work.

The CIA Committee on Pension Plan Financial Reporting published a revised version of the Educational Note on the Selection of Mortality Assumptions for Pension Plan Valuations on December 21, 2017. The Educational Note indicates that given the recent publication of the CPM-B and MI-2017 improvement scales and the similar data sets used in their development, it may be appropriate to use either scale in the absence of credible information to the contrary, such as the publication of a successor scale by the CIA.

For the present valuation, we have continued to use the CPM-B scale, which is a reasonable outlook for future mortality improvement.

Based on the assumption used, the life expectancy of a member age 65 at the valuation date is 21.7 years for males and 23.5 years for females.

Interest on Employee Contributions

The assumption is based on Plan terms and long-term expectation in respect of applicable interest rate levels.

Disability Rates

We have assumed that those currently disabled would remain disabled until retirement and would continue to accrue benefits until retirement in accordance with the Plan terms. Members on disability are assumed to retire when their accrual ceases.

Form of benefit elected and cost of future lump sums

The assumption for the percentage of eligible plan participants that will elect to receive their benefit as a lump sum transfer from the plan is based partially on experience from 2009 to 2013.

The cost of future lump sums will depend on the level of market interest rates at the time the lump sum is paid and any changes in the applicable actuarial standards for the determination of pension plan commuted values. The assumed cost of future lump sums is based on the average expected level of market interest rates over the period during which lump sums are expected to be paid, taking into account market conditions on the valuation date. We have also assumed that future lump sums elected by eligible plan participants will be calculated using the mortality basis applicable under the actuarial standards since October 2015.

Eligible Spouse

The assumption is based on an industry standard for non-retired members. Reported marital status is used for retirees but adjusted downward to reflect observed plan experience of marital status on pensioner death.

Spousal Age Difference

The assumption is based on an industry standard showing males are typically 3 years older than their spouse.

Appendix C

Membership Data

Analysis of Membership Data

The actuarial valuation is based on membership data as at December 31, 2020, provided by the Corporation.

We have applied tests for internal consistency, as well as for consistency with the data used for the previous valuation. These tests were applied to membership reconciliation, basic information (date of birth, date of hire, gender, etc.). On an aggregate basis we have applied tests to pensionable earnings, credited service, contributions accumulated with interest, and pensions to retirees and other members entitled to a deferred pension. Contributions and pensions to retirees were compared with corresponding amounts reported in financial statements. The results of these tests were satisfactory. There was insufficient information available to compare lump sum payments with the financial statements. However, the data was consistent with the previous year.

If the data supplied are not sufficient and reliable for its intended purpose, the results of our calculation may differ significantly from the results that would be obtained with such data. Although Mercer has reviewed the suitability of the data for its intended use in accordance with accepted actuarial practice in Canada, Mercer has not verified or audited any of the data or information provided.

The Corporation provided separate amounts for lifetime and temporary pensions for certain retirees in the retiree data file – this split between lifetime and temporary pensions was used. Where a split was not provided and only one amount combining both lifetime pensions and temporary pensions payable until age 65 was received, it was assumed that 29% of the total pension for participants under age 65 was in respect of temporary pensions.

Plan membership data are summarized below. For comparison, we have also summarized corresponding data from the previous valuation.

	31.12.2020	31.12.2019
Active and LTD Members		
Number	19,100	18,484
Average pensionable earnings	\$69,541	\$68,136
Average years of pensionable service	11.4	11.5
Average age	47.5	47.6
Deferred Pensioners		
Number	396	360
Average annual total pension	\$7,872	\$7,716
Average age	52.7	52.4
Pensioners		
Number	14,883	14,356
Average annual lifetime pension	\$21,482	\$21,382
Average annual temporary pension	\$8,695	\$8,741
Average age	70.9	70.5
Spouses and Ex-Spouses		
Number	3,200	3,147
Average annual lifetime pension	\$12,494	\$12,482
Average age	76.9	76.8
Dependants		
Number	70	77
Average annual pension	\$3,360	\$2,843
Average age	18.9	18.6
Pending Terminations		
Number	2,215	2,111
Average annual lifetime pension	\$3,791	\$4,382
Average annual temporary pension	\$1,332	\$1,479
Average age	46.4	46.4

Note: Queens members are excluded from the above statistics.

The membership movement for all categories of membership since the previous actuarial valuation is as follows:

	Active Members	LTD Members	Deferred Pensioners	Pensioners	Spouses & Ex-Spouses	Dependants	Pending Terminations
As of December 31, 2019	17,759	725	360	14,356	3,147	77	2,111
Adjustments	-	-	(5)	38	4	(1)	5
New entrants	1,180	1		4			49
From new employers	465	6	45	145	-	-	28
Transferred to Active	67	(67)					
Transferred to Disabled	(170)	170	-	-	-	-	-
Terminations							
- No decision	(292)	(11)	-	-	-	-	303
- Transfers/Refunds	(165)	(2)	(3)	-	-	-	(135)
- Deferred pensions	(13)	-	24	-	-	-	(11)
Deaths							
- With survivors	(7)	(11)	(1)	(232)	248	6	(3)
- No survivors	-	-	-	(119)	(199)	-	-
Disabled	-	-	-	-	-	-	-
Retirements	(536)	(52)	(21)	693	-	-	(84)
Pension ceased	-	-	-	-	-	(12)	-
Returned to active employment	51	2	(3)	(2)	-	-	(48)
As of December 31, 2020	18,339	761	396	14,883	3,200	70	2,215

Note: Queens members are excluded from the above statistics.

The distribution of the active and LTD members by age and pensionable service as at the valuation date is summarized as follows:

Age	Years of Pensionable Service							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30 +	
Under 20								
20 to 24	257	1						258
	48,351	*						48,349
25 to 29	964	57						1,021
	53,399	61,188						53,834
30 to 34	1,109	490	73					1,672
	59,196	66,829	70,815					61,940
35 to 39	947	719	470	46	1			2,183
	62,479	70,427	75,510	72,684	*			68,117
40 to 44	730	565	766	360	51	1		2,473
	61,709	70,432	77,764	79,015	77,436	*		71,516
45 to 49	723	532	685	537	312	34	2	2,825
	63,251	66,412	74,599	81,286	80,742	74,151	*	72,081
50 to 54	565	467	620	513	518	312	112	3,107
	63,776	66,122	72,296	80,288	83,476	85,603	71,543	74,311
55 to 59	449	402	614	459	446	392	386	3,148
	61,178	62,307	64,546	74,959	78,594	83,826	76,010	71,095
60 to 64	256	262	324	301	237	194	287	1,861
	61,904	61,134	68,508	72,123	79,268	82,170	78,822	71,531
65 to 69	76	80	102	73	59	38	90	518
	64,511	60,626	63,894	74,679	79,704	82,315	92,986	73,206
70 +	3	5	5	8	4	1	8	34
	46,107	58,861	50,052	65,870	68,243	*	91,698	67,918
Total	6,079	3,580	3,659	2,297	1,628	972	885	19,100
	\$59,860	\$66,797	72,355	\$77,806	\$ 80,625	\$83,647	\$78,170	\$69,541

Note: Each cell contains the number of plan members and average pensionable earnings. Average pensionable earnings in cells with less than three members are not shown for confidentiality reasons.

Queens members are excluded from the above statistics.

The distribution of the pensioners and deferred pensioners by age as at the valuation date is summarized as follows:

Age	Deferred Pensioners		Pensioners and Survivors	
	Number	Average Total Pension	Number	Average Total Pension
Under 45	62	6,773	13	6,003
45 – 49	66	6,979	10	12,373
50 – 54	96	10,142	171	29,900
55 – 59	119	8,208	1,192	31,979
60 – 64	41	5,333	3,015	29,194
65 – 69	10	6,447	3,938	20,722
70 – 74	1	*	3,787	19,811
75 – 79	1	*	2,436	17,975
80 – 84			1,641	17,012
85 – 89			1,096	16,738
90 – 94			584	17,221
95 +			200	15,332
Total	396	7,872	18,083	21,637

Note: The average pension in cells with less than three members is not shown for confidentiality reasons.

Queens members are excluded from the above statistics.

Appendix D

Summary of Plan Provisions

Mercer has used and relied on the legislation, regulations and plan documents, including amendments and interpretations of plan provisions, supplied by the Corporation. If any plan provisions supplied are not accurate and complete, the results of any calculation may differ significantly from the results that would be obtained with accurate and complete information. Moreover, plan documents may be susceptible to different interpretations, each of which could be reasonable, and the results of estimates under each of the different interpretations could vary.

This valuation is based on the plan provisions in effect on December 31, 2020. Since the previous valuation, the Plan has not been amended in any material way.

Effective October 1, 2020, the Region of Queens Municipality (“Queens”) commenced participation in the PSSP for future service. The liability related to the Queens pension plan was transferred to the PSSP under the provisions of the *Municipal and Other Authorities Pension Plan Transfer Act (MOAPPTA)*. The liability transfer was accompanied by an initial corresponding asset transfer. The final asset transfer, if any, has yet to be determined but for valuation purposes, we are not holding any assets receivable in this regard. As the membership data had not been provided to the PSSP in final form in sufficient time to be included in the valuation calculations, we have estimated the value of the liability transfer as at December 31, 2020 for valuation purposes corresponding to the assets transferred. The following is a summary of the main provisions of the Plan in effect on December 31, 2020. This summary is not intended as a complete description of the Plan.

<p>Eligibility for membership</p>	<p>All employees of the Province (and of participating employers) must join the Plan on their date of employment. For purposes of the Plan, employee includes:</p> <ul style="list-style-type: none"> • a permanent employee; • a probationary employee; and • any other class of persons or person employed in the public service who is designated by the Governor in Council to be an employee. <p>However, employee does not include:</p> <ul style="list-style-type: none"> • a part-time employee (except as provided by the regulations); • a temporary employee; • a member of a class of persons for whom superannuation is otherwise provided or any person who is excluded by order in council; or • an employee who is less than eighteen years of age.
<p>Employee Contributions</p>	<p>Members contribute 8.4% of earnings up to the Year's Maximum Pensionable Earnings ("YMPE") plus 10.9% of earnings in excess of the YMPE. Contributions cease once a member accrues 35 years of service.</p>
<p>Employer Contributions</p>	<p>The Province and participating employers contribute an amount equal to that of the members. However, contributions by the Province and participating employers are only made on salaries up to the salary level which results in the maximum pension accrual for the year allowed under the Income Tax Act.</p>

Retirement
Dates

Normal Retirement Date

- The normal retirement date is the last day of the month in which the member attains age 65.

Early Retirement Date

- If a member first commenced employment prior to April 6, 2010 and the sum of the member's attained age and years of service is at least 80, the member may retire as early as age 50 without any reduction in the pension payable.
- If a member first commences employment on or after April 6, 2010 and the sum of the member's attained age and years of service is at least 85, the member may retire as early as age 55 without any reduction in the pension payable.
- Members who are at least 55 years of age with at least two years of service but have not satisfied the "Rule of 80" or "Rule of 85", as applicable, may retire subject to a reduction in the pension payable.
- Members with at least two years of service may retire as early as age 60 without reduction.

Postponed Retirement Date

- In the event that a member continues in employment beyond age 65, the member will continue to contribute and to earn pension benefits until the end of the year in which the member reaches age 71.

Normal
Retirement
Pension

Pension Payable Before Age 65:

- 2.0% of the average of the member's best five years' earnings for each year of pensionable service.

Pension Payable After Age 65:

- 1.3% of the average of the member's best five years' earnings up to the average YMPE plus 2.0% of the average of the member's best five years' earnings in excess of the average YMPE for each year of pensionable service on and after January 1, 1966 plus 2.0% of the average of the member's best five years' earnings for each year of pensionable service prior to January 1966.

Notes:

The average YMPE is determined over the same five years of service as the member's best five years of earnings.

Pensionable service is limited to a maximum of 35 years.

<p>Early Retirement Pension</p>	<p>If a member retires early, the member will be entitled to a pension that is calculated the same way as for a normal retirement. The basic pension payable, however, will be reduced by 0.5% for each month by which the member has retired prior to the first date an unreduced pension would be payable.</p>
<p>Maximum Pension</p>	<p>The Income Tax Act limits the lifetime pension payable (the amount of pension payable after age 65) with respect to service accrued after December 31, 1991. In 2021, the maximum lifetime pension payable under the Income Tax Act is \$3,245.56 per year of service.</p> <p>The General Revenue Fund or the member's employer (if the employer has elected to participate in the supplementary plan) is responsible for paying a supplementary amount equal to the difference between the lifetime amount calculated in accordance with the Plan and the maximum lifetime pension amount payable under the Income Tax Act. These supplementary amounts are not reflected in this valuation.</p>
<p>Disability Benefits</p>	<p>A member receiving benefits from an employer-sponsored LTD program will continue to accrue pensionable service while in receipt of LTD benefits provided the member continues to contribute to the Plan. For disabilities starting prior to May 1, 2002, LTD benefits under the Province's LTD Program are payable to age 65. For disabilities starting between May 1, 2002 and December 31, 2008, LTD benefits are payable to the earlier of age 60 and 35 years of service. For disabilities starting on and after January 1, 2009, LTD benefits are payable to the earlier of age 65 and 35 years of service.</p> <p>The member's contribution is based on the salary the member would have received if the member remained active in the same position as the member held at the time of disability.</p>

Death Benefits (Pre-retirement)	<p>If a vested member dies and is survived by a spouse, the spouse will receive an immediate pension, payable for 60 months, equal to 100% of the pension the member would have received calculated as if the member was eligible to retire with an unreduced pension on the date of death, less any benefits paid to eligible children. At the end of the 60 month period, the amount payable to the spouse is reduced to $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the lifetime pension accrued to the member. This lifetime pension is calculated at the "before age 65" rate (2%) for service before January 1, 1992 and the "after age 65" rate ($1.3\% / 2\%$) for service after December 31, 1991. If a vested member dies after age 65, this lifetime pension is calculated at the "after age 65" rate for all service.</p> <p>An additional pension equal to 10% of the pension accrued by the member, as calculated above, is payable to each surviving child under age 18 (subject to a maximum total of $33\frac{1}{3}\%$ (40% if the member's employment first commences on or after April 6, 2010) divided equally amongst the children). This pension is payable until age 18, or until age 25 if the child is a student.</p> <p>If there is no surviving spouse, but there are children under the age of 18 or age 25 if still in school, $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the pension accrued to the member, as indicated above, will be payable equally divided amongst the children. This benefit replaces the children's benefit of the 10% each above.</p> <p>If there is no surviving spouse or eligible children, but there is a mentally or physically infirm dependant, the dependant will receive the spouse's pension for life, or until the disability ceases.</p> <p>If there is no surviving spouse, children or eligible dependant, the estate or designated beneficiary will receive a lump sum payment equal to the member's contributions with interest.</p>
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Death Benefits (Post- retirement)	<p>If a member with a spouse dies during the 60 months following retirement, the spouse will continue to receive 100% of the pension accrued to the member for the remainder of the 60 month period less any amount payable to eligible children. At the end of the 60 month period and in the case where a member with a spouse dies after the end of the 60 month period following retirement, survivor benefits are payable depending on the age of the pensioner at the date of death.</p> <p>If the pensioner dies prior to age 65, the spousal pension paid prior to when the member would have turned 65 is $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the pension payable to the member. Once the member would have turned 65, the spousal pension paid is $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the pension payable at the time of death with respect to the service prior to January 1, 1992 plus $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the pension that would be payable to the member after age 65 with respect to service after December 31, 1991.</p> <p>If the pensioner dies after reaching age 65 the spousal pension paid is $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the pension payable to the member.</p> <p>A pension of 10% of the pension payable to the member (as described above) is payable to each child (to a maximum of $33\frac{1}{3}\%$ (40% if the member's employment first commences on or after April 6, 2010) divided equally amongst the children). If there is no spouse, each eligible child will receive an equal portion of the spouse's pension totaling $66\frac{2}{3}\%$ (60% if the member's employment first commences on or after April 6, 2010) of the member's accrued pension. This pension is payable to each child until the age of 18 or age 25 if the child is a student and replaces the children's benefit described above.</p>
Termination Benefits	<p>If a member's employment terminates for reasons other than death, disability, or retirement, the benefits payable from the Plan will depend on the member's service. If the member has less than two years of service, the Plan will refund the member's contributions with interest.</p> <p>If the member has at least two years of service, the Plan will provide a deferred pension payable from normal or early retirement.</p> <p>If a member is entitled to a deferred pension, the member may transfer the commuted value of that pension to a locked-in retirement account or to another pension plan (provided that plan agrees to the transfer). A member may also elect a refund of contributions with respect to pre-1988 service.</p> <p>Effective January 1, 2011, deferred pensions are no longer indexed prior to pension commencement, regardless of when such pension accrued.</p>

Indexing Pensions in payment will not be indexed for the 5 year cycle starting in 2021 (January 1, 2021 to January 1, 2025).
Indexing for the 5-year cycle starting January 1, 2026 to January 1, 2030 is subject to the review of Trustee in 2025 considering among other things, the funding policy and the funded ratio of the Plan as of December 31, 2024.
This process will be replicated on a 5-year basis.

Appendix E

Plausible Adverse Scenarios

In this Appendix, the financial impact on the Plan's going concern results (i.e., going concern financial position at the valuation date and current service cost from the valuation date to the next valuation date) of plausible adverse scenarios that would pose threats to the Plan's future financial condition is illustrated for the following risks:

- Interest rate risk, the potential that interest rates will be lower than expected;
- Deterioration of asset values; and
- Longevity risk, the potential that pension plan members will live longer than expected.

The following table summarizes the going concern results, where we assumed for:

- Interest rate risk, an immediate parallel decrease in market interest rates of 75 basis points
- Deterioration of asset values, an immediate decrease of 6% in the market value of non-fixed income assets; and
- Longevity risk, that life expectancy from the valuation date at age 65 for a male would increase by 0.9 year and a female would increase by 1.7 years.

Scenario	Going Concern Valuation Results as at December 31, 2020	Plausible Adverse Scenario Results as at December 31, 2020		
		Interest Rate Risk	Deterioration of Asset Values	Longevity Risk
Going Concern Financial Status				
Market value of assets	\$7,207,072,000	\$7,314,106,000	\$6,839,516,000	\$7,207,072,000
Going concern funding target	\$7,363,569,000	\$7,452,224,000	\$7,363,569,000	\$7,566,197,000
Funding excess (shortfall)	(\$156,497,000)	(\$138,118,000)	(\$524,053,000)	(\$359,125,000)
Funded Ratio	97.9%	98.1%	92.9%	95.3%

Scenario	Going Concern Valuation Results as at December 31, 2020	Plausible Adverse Scenario Results as at December 31, 2020		
		Interest Rate Risk	Deterioration of Asset Values	Longevity Risk
Estimated Employer's Current Service Cost				
December 31, 2020	\$194,526,000	\$198,405,000	\$194,526,000	\$201,165,000
Current Service Cost Excess (Deficit)	\$41,404,000	\$37,525,000	\$41,404,000	\$34,765,000

The balance of this Appendix provides details of the plausible adverse scenarios selected and the determination of the impact on the going concern results.

Interest Rate Risk

The purpose of this scenario is to illustrate the sensitivity of the Plan's going concern results to the potential that interest rates will be lower than expected. For this purpose, we have assumed an immediate parallel decrease in market interest rates underlying fixed income investments, where fixed income investments include "Fixed Income" as shown in the investment policy summarized in Appendix A.

Using a methodology consistent with the one used to determine the going concern discount rate, we have determined that a parallel decrease in market interest rates of 75 basis points would have a non-trivial probability (between 1 in 10 and 1 in 20) of occurring within the year following the valuation date. For purpose of this scenario, we have assumed that such a decrease in market interest rates would occur immediately on the valuation date and would have the following impact on the value of assets and going concern assumptions:

Defined Term	Description
Market value of assets	The decrease in market interest rates has been assumed to affect only the market value of the fixed income investments. The decrease is assumed to have occurred immediately on the valuation date.
Discount rate assumption	It was assumed that the decrease in market interest rates affects only the expected return on assets for the fixed income portion of assets. The discount rate assumption was therefore decreased from 5.25% to 5.15%.
Other assumptions	Except as mentioned above, all assumptions used were the same as those used for this valuation.

Deterioration of Asset Values

The purpose of this scenario is to illustrate the sensitivity of the Plan's going concern results to a deterioration of asset values. For this purpose, we assumed an immediate reduction in the market value of the Plan's non-fixed income assets, where non-fixed income investments includes everything except "Fixed Income" and "Cash and cash equivalents" categories as shown in the investment policy summarized in Appendix A.

Using a methodology consistent with the one used to determine the going concern discount rate, we have determined that a decrease of 6% in the market value of value of non-fixed income assets would have a non-trivial probability (between 1 in 10 and 1 in 20) of occurring within the year following the valuation date. For the purpose of this scenario, we have assumed that such a decrease would occur immediately on the valuation date and would have the following impact on the value of assets and going concern assumptions:

Market value of assets	The decrease in the market value of the non-fixed income portion of assets is assumed to have occurred immediately on the valuation date.
Going concern assumptions	This scenario is assumed to have no impact on the assumptions used for this valuation.

Longevity Risk

The purpose of this scenario is to illustrate the sensitivity of the Plan's going concern results to the potential that pension plan members will live longer than expected. For this purpose, we have determined that a plausible adverse scenario would be to assume that future mortality improvements³ will be in line with the average improvements experienced by the Canadian population over the most recent 15-year period available, with uniform improvement rates for all future years but varying by age⁴ and gender.

The table below summarizes the improvement rates under the plausible adverse scenario compared to those currently assumed under the CPM-B scale and is based on Canadian population experience from the Human Mortality Database (HMD) from 2002 to 2016.

³ i.e. starting one year after the valuation in this context

⁴ improvement rates below age 45 are set to those at age 45

Age	males				females			
	CPM-B			Adverse Scenario	CPM-B			Adverse Scenario
	2020	2025	2030+		2020	2025	2030+	
20	1.59%	1.20%	0.80%	1.68%	0.98%	0.89%	0.80%	1.47%
30	1.88%	1.34%	0.80%	1.68%	0.98%	0.89%	0.80%	1.47%
40	1.80%	1.30%	0.80%	1.68%	1.17%	0.98%	0.80%	1.47%
50	1.17%	0.98%	0.80%	1.76%	0.98%	0.89%	0.80%	1.34%
55	1.47%	1.13%	0.80%	1.67%	1.11%	0.96%	0.80%	1.14%
60	1.77%	1.28%	0.80%	1.75%	1.24%	1.02%	0.80%	1.34%
65	2.06%	1.43%	0.80%	2.11%	1.36%	1.08%	0.80%	1.65%
70	2.06%	1.43%	0.80%	2.48%	1.36%	1.08%	0.80%	1.77%
75	2.01%	1.41%	0.80%	2.66%	1.36%	1.08%	0.80%	1.93%
80	1.96%	1.38%	0.80%	2.63%	1.36%	1.08%	0.80%	2.03%
85	1.38%	1.03%	0.68%	2.32%	1.31%	0.99%	0.68%	1.98%
90	0.75%	0.62%	0.48%	1.68%	0.75%	0.62%	0.48%	1.60%
95	0.16%	0.25%	0.34%	1.04%	0.16%	0.25%	0.34%	1.12%
100	0.14%	0.22%	0.30%	0.64%	0.14%	0.22%	0.30%	0.80%
105	0.14%	0.22%	0.30%	0.38%	0.14%	0.22%	0.30%	0.55%

Appendix F

Administrator Certification

With respect to the Report on the Actuarial Valuation for Funding Purposes as at December 31, 2020 of the Nova Scotia Public Service Superannuation Plan, I hereby certify that, to the best of my knowledge and belief:

- The valuation reflects the terms of the Corporation's engagement with the actuary described in Section 2 of this report, particularly the requirement not to include a margin in the discount rate used to perform the going concern valuation.
- A copy of the official plan documents and of all amendments made up to December 31, 2020 was provided to the actuary and is reflected appropriately in the summary of plan provisions contained herein.
- The asset information summarized in Appendix A is reflective of the Plan's assets.
- The membership data provided to the actuary included a complete and accurate description of every person who is entitled to benefits under the terms of the Plan for service up to December 31, 2020.
- All events subsequent to December 31, 2020 that may have an impact on the Plan have been communicated to the actuary.

June 23, 2021
Date

Kim Blinn
Signed

Kim Blinn
Name

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