Actuarial Report on

British Columbia Municipal Pension Plan

Actuarial Valuation
as at December 31, 2018

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Vancouver, B. C.

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Contents

Actuarial Report Highlights

An actuarial valuation of the Municipal Pension Plan (Plan) was completed as at December 31, 2018. Its purpose was to determine the financial (or actuarial) position of the Plan as at December 31, 2018, to report on the adequacy of the Basic member and employer contribution rates and establish the level of sustainable indexing.

Key Results

Basic Account ($m)	2015	2018
Rate Stabilisation Account (RSA)	1,927	2,485
Assets net of RSA	48,441	58,526
Liabilities	48,441	55,660
Surplus (including amortization requirements)	**0**[1]	**2,866**
Less value of existing amortization requirements	2,648	2,203
Surplus (excluding amortization requirements)	**n/a**	**663**

Basic Contribution Rates	2018
Average Current contribution rates[2]	18.46%
Average Required Rates	
Entry-age normal cost rates[2]	16.03%
Total required *PBSA* amortization	0.00%
Additional Group 5 amortization (to 2024)[3]	0.23%[4]
***PBSA* minimum rate – Average**[1]	16.04%
JTA Required Rate[2]	**18.46%**

Although a funding surplus has arisen at this valuation, it is not large enough to complete the transition provisions of the Joint Trust Agreements. The required Basic contribution rate is therefore equal to the current rate of 18.46% (integrated) of salaries. This exceeds the PBSA minimum required contribution rate.

The Sustainable Indexing Valuation shows that, taking the required Basic account contributions into account, indexing of 2.15% per year is sustainable in the long term (up from 2.1%).

[1] The 2015 report showed a $2,224 m surplus on the entry age basis, after taking into account the present value of then currently existing amortization requirements of $2,945 m. In line with the JTA requirements, $1,927 m was transferred to an RSA and $297 m was required to be retained to maintain the then current contribution rate. These adjustments reduced the surplus to zero.

[2] Less 3% of salary up to the YMPE.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years.

[4] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll, hence the PBSA minimum rate of 16.04% = 16.03%+0.01%.

Scope of the Valuation

Two primary valuations were carried out:

- **A Funding Valuation** – to determine the financial position of the Basic Account as at December 31, 2018 and to report on the adequacy of the member and employer contribution rates.
- **A Sustainable Indexing Valuation** – to determine the rate of indexing that can be sustained in the long term, based on the financial position of the Basic Account and the Inflation Adjustment Account ("IAA"), and the overall level of contributions to the plan.

These valuations ignore the limits imposed by the *Income Tax Act* ("*ITA*") on benefits provided from registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance.

We have also performed supplementary valuations as follows:

- For basic and indexed benefits, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

Key Changes Included in the Valuation

- **Basic Account and Inflation Adjustment Account Contributions:** Effective January 1, 2019, Basic Account contributions were reduced by 1.06% of salary and there was a corresponding increase to contributions to the Inflation Adjustment Account contributions of 1.06% of salary. The decrease and the increase were share equally by the active members and employers.
- **Employer Contribution Rate Simplification:** Effective January 1, 2019, the three year phase in removal of gender- and age-based employer contribution rates to the Basic Account was completed, which implemented the same employer contribution rates for Groups 1 and 4, and eliminated doubling for all groups. Group 4 was also merged into Group 1.

In addition, there were a number of housekeeping amendments. There were no benefit changes that had a material financial impact on the Plan.

Actuarial Methods and Assumptions

The actuarial liabilities include the value of benefits accrued by members as at December 31, 2018 as well as future benefits expected to be earned by existing members. Asset values are based on smoothed market values (limited to ±8% of market value for the Funding Valuation, ±5% of market value for the Sustainable Indexing Valuation), plus projected future contributions based on entry-age normal contribution rates and, where relevant, the existing amortization rates.

The contribution rates are tested on the entry-age funding method. Under this method, a long-term, entry-age rate, which would fully fund benefits for future new entrants to the Plan, is calculated. The surplus (unfunded liability) is then amortized according to the requirements of the Board's Funding Policy. This method is designed to maintain costs at a level percentage of salaries over an extended period. The resulting basic contribution rate is then tested against the going-concern requirements of the BC Pension Benefits Standards Act ("*PBSA")* as required by the Joint Trust Agreement ("JTA").

Key Long term Assumptions

Assumptions were set taking into account the funding policy of the Board. The Funding Valuation focuses on setting an appropriate level of contributions to ensure the security of benefits; accordingly, the economic assumptions require margins for adverse deviations. The Sustainable Indexing Valuation focuses on setting a level of indexing, given the contributions committed to the plan, which is equitable across generations. As a result this valuation has been carried out using best estimate assumptions for future investment returns and price inflation. The key long-term assumptions, which are unchanged from the previous valuation, are as follows:

	Funding Valuation	Sustainable Indexing Valuation
Annual Investment Return	6.25%	6.50%
Annual Salary Increase	3.5% plus seniority	3.25% plus seniority
Annual Indexing	0% for basic costs 2.75% for indexed costs	2.50% for fully indexed costs Sustainable level of indexing calculated as valuation output

Main Reasons for Changes in Funding Valuation Actuarial Position

The Basic account shows a gain of $2.866 million since 2015. The main reasons for this improvement are:

- Smoothed investment returns higher than assumed; and
- Actual salary increases lower than previously assumed;

Partially offset by

- Excess investment returns transferred from the Basic account to the IAA.

Basic Contribution Rate Requirements

Although a surplus has arisen at this valuation, it is not large enough to complete the transition provisions of the JTA. The required contribution rate is therefore equal to the current rate of 18.46% (integrated) of salaries.

- **Compliance**
  - This contribution rate complies with the going-concern requirements of the provincial pension standards legislation (i.e. the PBSA).
  - The Income Tax Act requires that individual member contributions not exceed the lesser of 9% of salaries or $1,000 plus 70% of the pension credit, though this condition may be waived by the Minister of Finance provided members do not contribute more than half the cost of benefits. Following this valuation, a waiver will be required for all groups.

- **Rebalancing Contribution Rates**

  The required contribution rates for the employers are "out of balance" in the sense that Group 1 is paying more than their theoretically correct share of the total costs, while Group 2 and 5 is paying less. The Board may wish to rebalance the employer rates by group so that each group is paying their theoretical requirement. To rebalance the rates, the Group 1 employer rate should decrease by 0.02%, while employer rates for Group 2 and 5 should increase by 0.15% and 0.36% respectively.

Sustainable Indexing Valuation

The Sustainable Indexing Valuation shows that, taking the required Basic account contributions into account, indexing of 2.15% per year is sustainable in the long term. This is a small increase from the sustainable indexing level of 2.10% established at the 2015 valuation.

The main reasons for the improvement in the sustainable indexing level are similar to the improvement in the basic account funding position, which are discussed in Section IV of this report.

Supplementary Results

The supplementary fully indexed valuation results are:

Basic and Indexed Benefits, Without *ITA* Maximum: ($m)	2015	2018
Assets net of RSA, and including the value of required amortization at the relevant valuation date	58,785	69,866
Liabilities	64,639	74,732
Surplus (Unfunded Liability)	**(5,854)**[1]	**(4,866)**

When the *ITA* maximums are recognized, the surplus (unfunded liability) figures change modestly, to:

Benefits Limited to *ITA* Maximums ($m's)	2015	2018
Basic benefits only, including the value of required amortization at the relevant valuation date	226[2]	958
Basic and indexed benefits, including the value of required amortization at the relevant valuation date	(5,554)[1]	(4,482)

[1] Including $2,652,035,000 amortization requirement established at the 2015 valuation.
[2] Including $2,648,878,000 amortization requirement established at the 2015 valuation.

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I. Scope of the Valuation

In accordance with Article 10 of the Joint Trust Agreement (the "JTA") and on the instructions of the Municipal Pension Board of Trustees (the “Board of Trustees”), we have completed an actuarial valuation of the Basic Account and the Inflation Adjustment Account of the Municipal Pension Plan (the "Plan") as at December 31, 2018 and are pleased to submit this report thereon. The primary purpose of this valuation is to determine the financial position of the Basic Account as at December 31, 2018, to report on the adequacy of the member and employer contribution rates and to establish the level of sustainable indexing.

Two main valuations were carried out:

- **A Funding Valuation –** this primary valuation is to determine the financial position of the Basic Account as at December 31, 2018 and to report on the adequacy of the member and employer Basic contribution rates. The Funding Valuation focuses only on the Basic Account and does not examine the Inflation Adjustment Account ("IAA") and its ability to meet future indexing requirements. Furthermore, it ignores the limits on benefits imposed by the *Income Tax Act* ("*ITA*") on registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance; and
- **A Sustainable Indexing Valuation** – to determine the rate of indexing that can be sustained in the long term, based on the financial position of the Basic Account and the Inflation Adjustment Account, and the overall level of contributions to the plan.

In addition to the above, we have performed supplementary valuations as follows:

- For basic and indexed benefits, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

The intended users of this report are The Board of Trustees, the Financial Institutions Commission of British Columbia ("FICOM") and Canada Revenue Agency (“CRA”). This report is not intended or necessarily suitable for other purposes than those listed above.

II. Changes in Plan

The last valuation of the Plan, prepared as at December 31, 2015 and included in our report dated September 22, 2016, determined the actuarial position of the Plan as amended to December 31, 2015. Since then, a number of changes have been made to the Plan. The major changes affecting its financing include:

- **Basic Account and Inflation Adjustment Account Contributions:** Effective January 1, 2019, Basic Account contributions were reduced by 1.06% of salary and there was a corresponding increase to contributions to the Inflation Adjustment Account contributions of 1.06% of salary. The decrease and the increase were share equally by the active members and employers.
- **Employer Contribution Rate Simplification:** Effective January 1, 2019, the three year phase in removal of gender- and age-based employer contribution rates to the Basic Account was completed, which implemented the same employer contribution rates for Groups 1 and 4, and eliminated doubling for all groups. Group 4 was also merged into Group 1.

There were no benefit changes that had a material financial impact on the Plan.

The changes, and the main provisions of the Plan, are described in Appendix A. As there are no longer any Group 3 active members, we have removed any reference to Group 3 contribution rates and active member benefit provisions from Appendix A.

III. Actuarial Methods and Assumptions

1. Financing Method and Adequacy of Contribution Rates

(a) Funding Criteria

In any pension system, the rates of member and employer contribution should be such that:

- The present value of all future contributions at those rates
- **equals** the present value of all future benefits
- **minus** the funds on hand.

There are numerous financing methods that will satisfy this equation. At one end is the pay-as-you-go or current disbursement method; under this method, contributions are limited to those necessary to finance current benefit disbursements, so that no assets are accumulated. At the other end is the achievement of full funding within a reasonable period; this results in the accumulation of substantial assets.

The general criteria we use in establishing the appropriate level of contributions to the Municipal Pension Plan include:

(i) **Benefit security –** the probability of fulfilling the current benefit promises provided in the Plan depends on a mixture of political, economic and financial factors; but, whatever the probability, it is clear that benefit security is enhanced with a larger accumulation of assets.

(ii) **Stability of contributions –** the financing system should result in contribution rates that are relatively stable over an extended period of time.

(iii) **Allocation of costs –** as far as is practicable, pension costs should be allocated to the generation that incurs them; there is no assurance that future generations will assume the burdens transferred to them by prior generations.

The Board has adopted a formal funding policy (most recently revised on March 28, 2019) in which it established that its overall goal for basic benefits is the long term sustainability of the fund. The funding policy further identifies benefit security as the primary objective and stability of contributions as an important secondary objective. We have taken this into account in carrying out this valuation.

(b) Indexing Treatment

The current financing provisions are described in Appendix A. Member and employer contributions are at rates set out in the Plan rules. A larger part of these contributions is allocated to the Basic Account, and a smaller portion to the IAA. The future indexing of pensions is based on funds available in the IAA, which derives its funds primarily from these allocated contributions, from excess investment earnings on pensioner liabilities in the Basic Account, and from investment earnings within the IAA itself.

In a sense, the IAA operates akin to a defined contribution or money purchase liability in that the value of indexing benefits is limited to the assets in the IAA. Future cost-of-living adjustments are not guaranteed, but are granted at the discretion of the Board, subject to the availability of funds in the IAA. Where there are sufficient monies in the IAA, full CPI indexing is provided; alternatively, if the monies in the IAA cannot support full CPI indexing, then the amount of indexing is limited to the monies available. In either case, the mechanics are such that the capitalized value of the indexing granted is transferred from the IAA to Basic Account each time indexing is granted. Thus, the system will limit indexing, if necessary, so that the granting of any increases for indexing should not create (or increase) a Basic Account unfunded liability, or reduce a Basic Account actuarial surplus. Accordingly, we did not consider any future indexing in determining the financial status of the Basic Account.

However, we also show supplementary results on the assumption that the assets of, and future contributions to, the Basic Account and the IAA are combined, with benefits to be fully indexed and funded in advance, as for basic benefits.

(c) Retirement Annuity Account

In considering the fund assets for valuation purposes, we excluded the Retirement Annuity Account. This account holds member voluntary contributions as well as other balances in respect of special agreements with various employers that are accumulated on a money-purchase basis and may be converted at a member's retirement into additional amounts of pension. We excluded these assets from our valuation together with corresponding actuarial liabilities, on the assumption that any pension purchases for retiring employees from time to time will have a neutral effect on the Basic Account.

(d) Basic Account Valuation - Current Financing

We determined the financial status of the Plan for the Basic Account only (i.e. ignoring the indexing granted after December 31, 2018). The methods used are described in Appendix B.

(e) Funding Requirements

The approach taken in this valuation (set out in the following sections) has taken into account the requirements of the Board's funding policy, as well as the requirements of the Joint Trust Agreement.

(f) Normal Cost and Amortization of Surplus or Unfunded Liability

An entry-age funding approach is used. As a first step, contributions are calculated as the level, long term percentage rate required to finance the benefits of new entrants to the Plan over their working lifetimes, so that their projected benefits are fully secured by equivalent assets by the time they retire (the "normal cost rate" or the "entry-age rate"). Thus, to the extent actuarial assumptions are realized, the addition of new entrants to the Plan should not generate either unfunded liabilities or surpluses.

Next, the funded position of the plan at the valuation date is considered. The liability takes into account benefits earned to the valuation date as well as benefits expected to be earned for future service by existing members. Asset values are taken at smoothed market values for existing assets, plus projected future contributions in respect of the existing members at the entry-age normal rates, plus the value of any amortization amounts established at previous valuations. The resulting net financial position may be either an actuarial surplus or an unfunded actuarial liability.

This surplus, or unfunded liability, is amortized over a specified period as outlined in the funding policy, e.g. 25 or 15 years. Minimum contributions, expressed as a percentage of salaries, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

(g) PBSA Requirements

The *PBSA* imposes certain minimum funding requirements on pension plans registered in British Columbia. These include the determination of a plan's financial position on a solvency basis as well as the more usual going-concern basis, the amortization of unfunded actuarial liabilities over a maximum of 15 years from when they are established (with a one year time lag for jointly sponsored plans for any amortization requirements established on or after September 30, 2015, which is the date the new *PBSA* came into effect), and special rules regarding the treatment of surplus. While the Municipal Pension Plan is one of a number of British Columbia public sector plans that are exempt from these provisions, the current joint trusteeship arrangement requires that the Plan's financing comply with the *PBSA* requirements for a going-concern valuation. This report therefore complies with the going concern funding requirements of the *PBSA*.

(h) Test Contribution Adequacy

Under the *PBSA* going concern requirements, the employers and the members must contribute the full normal actuarial cost (e.g. the "entry-age rate" described in (f) above). In addition, unfunded liabilities must be amortized over not more than 15 years from when they are established, with a one year time lag for any amortization requirements established on or after September 30, 2015).

Surpluses may be applied to reduce the contribution requirements from the previously set level. The rate may only be reduced below the normal actuarial cost after a surplus margin of 5% of the net liabilities has been set aside, with the remaining surplus to be amortized over not less than 5 years. The Board sets out its policy with regard to amortization of surplus in its funding policy.

Section 11.5(b) of the JTA requires the Board to use a 25 year period for the amortization of a surplus when considering its application towards benefit improvements without the prior approval of the Plan's partners, in order to provide a measure of contribution rate stability. Appendix B of the JTA also specifies a 25 year surplus amortization period when implementing the contribution and benefit changes contemplated during the transitional period.

The plan is still within the JTA transitional period. The JTA transition requirements set out the parameters for dealing with gains and losses and associated contribution requirements as follows:

- Calculate the "normal cost rate" (i.e. the "entry-age rate").
- Calculate the surplus (or unfunded liability) using this rate, after taking into account the value of additional contributions required to amortize unfunded liabilities identified at previous valuations.
- If there is an unfunded liability, amortize the balance over 15 years, commencing one year from the current valuation date. If there has been a gain since the last valuation, i.e. the currently scheduled amortization rates applied for the balance of the previously established amortization periods are more than sufficient to amortize the previously identified unfunded liabilities; apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. This results in a reduction in the required amortization rates, with the revised rates in effect for the previously established periods.
- If, after removing all previously established amortization amounts there is a surplus, amortize it over a 25 year period, after first allowing for the cost of the transitional period benefit improvements. If the resulting amortization requirements allow the employer and member contribution rates to be rebalanced, then the benefits will be improved and contribution rates rebalanced.
- The foregoing rates are, of course, subject to being compatible with the *PBSA* going concern minimum funding requirements.
- The JTA rules require any contribution rate increases to be shared equally by the Plan members and the employers. The JTA transitional arrangements require that contribution rate decreases be applied so as to equalize member and employer contribution rates at the member rates in effect prior to the 2003 valuation (the employers will continue to pay the excess costs for Groups 2 and 5 members). Simultaneously, benefits must be improved in specified ways (see Appendix A). The transitional period is over once these conditions are met and there is sufficient surplus to allow the transfer of $500 million to the IAA and to set up a $500 million rate stabilization reserve in the Basic Account. The intent is that once transition requirements are met, future costs will be shared equally between members and employers. Thus, we express the future cost requirements as a combined member-plus-employer amount.
- The JTA rules were amended effective October 10, 2014 to provide that certain actions would be taken as a result of the December 31, 2015 valuation results, which are summarized as follows:
    - Effective January 1, 2019, the Basic Account contributions were reduced by 1.06% of salary and the Inflation Adjustment Account contributions were increased by 1.06% of salary. The decrease in the Basic Account contribution rate and the increase in the Inflation Adjustment Account contribution rate were shared equally by the active members and the employers.
    - A contribution rate stabilization account (RSA) of $1.9 billion was established effective December 31, 2015 within the Basic Account. Smoothed investment returns are applied each

year to the RSA, but the total RSA is limited to $2.5 billion. The RSA is excluded from the Basic Account assets when calculating the Basic Account funded position, but may be drawn down to the extent required to avoid increases in the required Basic Account contribution rates. For valuations after 2015, no surplus arising from actuarial gains may be transferred to the RSA unless expressly directed by the Plan Partners.

(i) Elimination of "Doubling" Feature

Prior to January 1, 2017, the employer contribution rates varied by gender (for Groups 1 and 4), and by age, with higher rates paid for members over age 50 (for Groups 1 and 4) or 45 (Groups 2 and 5) via a “doubling” formula.

Commencing January 1, 2017, these differences were phased out over a three year period. As of January 1, 2019 they are fully removed, and employer contribution rates no longer vary by age and/or gender for members within a Group.

2. Sustainable Indexing Valuation

The Sustainable Indexing Valuation is carried out to establish the maximum level of indexing that can be provided over the period until the next valuation in a manner that allows indexing to be sustained in the long term and is fair from the perspective of intergenerational equity.

As for the Funding Valuation, we have used an entry age approach. We start by calculating the long term contribution rate that is required to fund the benefits (including indexing at the target rate) over the life time of a typical new entrant, assuming the Plan has neither a surplus nor an unfunded liability.

Next, we need to calculate how this long term contribution rate should be adjusted to reflect the funded position of the Plan. The assets, consisting of the current funds plus the value of future contributions at this entry age rate less the value of any amounts in an RSA set up to provide for rate stabilization, are compared to the liabilities (including the provision for indexing at the target rate). Subtracting the liabilities from the assets gives rise to a surplus or unfunded liability. We amortize this surplus or unfunded liability (in certain cases, adjusted as described below) over an infinite period to obtain the level long-term contribution that is required to support indexing at the target level.

For the target level of indexing to be sustainable, this long term contribution requirement must not exceed the long term contributions that are committed to be paid into the plan, while from an intergenerational equity perspective, we require the long term commitment and long term requirement to be equal.

The calculation of the long term contribution commitment can be complicated when the members and employers are paying amortization amounts into the plan for a temporary period. We therefore defined the long term contribution commitment as the normal cost of the current Basic benefits, plus the fixed IAA contributions. Effectively, these are the amounts that the members and employers can expect to pay in the absence of any unfunded liabilities or surplus.

Any Funding Valuation amortization requirements are excluded from the long term contribution commitment, as these amounts are only payable for a limited period of time. Instead, the effect of these amortization amounts, if any, is allowed for by including their present value as an adjustment to the unfunded liability; the unfunded liability calculated in the Sustainable Indexing Valuation is thus reduced by the present value of any Funding Valuation required amortization amounts.

3. Actuarial Assumptions

The rates of investment return, salary increase, indexing, mortality, withdrawal, disability and retirement experienced by members of the fund were examined for the three year period ending on the valuation date, together with corresponding experience for earlier periods and with other assumptions affecting the valuation results. We discussed the implications of the assumptions, and changes to them, with the Board.

The assumptions and the approach to setting them are described in Appendix B. In summary, the Funding Valuation, used to set the Basic contribution rate, requires margins for adverse deviations, while it is appropriate to use best estimate assumptions when carrying out the Sustainable Indexing Valuation. As a result, certain key assumptions differ between the two valuations and two sets of assumptions are required. For ease of reference we refer to these as the Funding Valuation assumptions and the Sustainable Indexing Valuation assumptions.

Following discussions with the Board, we made adjustments to some of the demographic and other assumptions. The assumptions are discussed in detail in Appendix B; the key economic assumptions are summarized below (these assumptions are unchanged from the previous valuation).

	Funding Valuation	Sustainable Indexing Valuation
Annual Investment Return	6.25%	6.50%
Annual Salary Increase	3.50% plus seniority	3.25% plus seniority
Annual Indexing	0% for basic costs 2.75% for indexed costs	2.50% for fully indexed costs Sustainable level of indexing calculated as valuation output

Emerging experience differing from the assumptions will result in gains or losses which will be revealed in future valuations.

4. Membership Data

Data as of December 31, 2018 were prepared by the Pension Corporation. The data are described in detail in Appendix B and numerically summarized in Appendices C, D and E.

5. Benefits Excluded

In previous valuations, we had allowed for the Medical Services Plan (MSP) premium assistance carved out on a pay-as-you-go basis from employer contributions to the Basic Account (and paid through the Supplemental Benefits Account) by treating these as an on-going addition to the administration expenses. Following confirmation that the BC government will eliminate MSP premiums effective January 1, 2020, we removed any allowance for them in the administration expenses.

With respect to the indexed valuation results, we have reduced the employer contributions to the IAA to 0.73% (for Groups 1 and 2) and 1.15% (for Group 5) of salaries on the assumption that 0.8% of salaries, the maximum set by the Board, will be allocated to post-retirement group benefits. We have not otherwise considered the liabilities and the financing of these benefits.

IV. Results of Funding Valuation

1. Basic Account – Actuarial Position

Schedule 1 shows a statement of the actuarial position of the Plan as at December 31, 2018. This statement ignores liabilities for future indexing granted after the valuation, and assumes that member and employer contribution rates for basic pensions will be made at the entry-age normal cost rate i.e. 16.03% of salary (integrated), plus the previously established amortization amounts totaling 3.00% (and an additional 0.23% for Group 5 only) of salary currently scheduled to expire in 2024 and 2027.

Schedule 1 – Statement of Actuarial Position as at December 31, 2018

Basic Account - Non-Indexed Benefits – Entry-age Normal Cost

	($000's)	
Assets	**2015**	**2018**
Market Value of Basic Fund including RSA	37,313,995	44,075,868
Asset Smoothing Adjustment	(2,985,120)	(511,170)
Smoothed Value of Basic Fund including RSA	**34,328,875**	**43,564,698**
RSA	(1,927,301)	(2,484,540)
Smoothed Value of Fund net of RSA	**32,401,574**	**41,080,158**
Actuarial present values of:		
▪ Future contributions at entry-age rates	13,390,928	15,242,844
▪ Present value of existing amortization		
• 0.01% to 2018 (from 2003 valuation – amended in 2015)	2,827	-
• 1.75% to 2024 (from 2009 valuation)	1,374,448	1,080,530
• 1.25% to 2027 (from 2012 valuation)	1,260,777	1,114,490
• Group 5 additional amortization – 0.23% to 2024	10,375	8,140
Total Assets	**48,440,929**	**58,526,162**
Liabilities		
Actuarial present values for:		
▪ Pensions being paid	14,809,764	18,122,238
▪ Inactive members		
Deferred vested members	768,591	933,759
LTD members	1,211,691	1,381,289
Other inactive members	325,967	392,436
▪ Active members	30,529,411	34,319,209
▪ Future expenses	795,505	510,787
Total Liabilities	**48,440,929**	**55,659,718**
Surplus (Unfunded Actuarial Liability)	**0**[1]	**2,866,444**
Funded Ratio: Total Assets ÷ Total Liabilities	**100.0%**[2]	**105.1%**
Surplus (Unfunded Actuarial Liability) excluding amortization	**(2,648,427)**	**663,284**
***PBSA* Accessible Going Concern Excess**	**0**	**0**

[1] The 2015 report showed a $2,224,074 thousand surplus, on the entry age basis, after taking into account the present value of then currently existing amortization requirements of $2,945,200 thousand. In line with the JTA requirements, $1,927,301 thousand of the surplus was transferred to the RSA and $296,773 thousand was required to maintain the then current contribution rate. These adjustments reduced the surplus to zero.

[2] Prior to the RSA transfer and the use part of the surplus to maintain the then current contribution rate, the 2015 funded ratio was 104.6%.

2. Change in Actuarial Position

The statement of actuarial position included in Schedule 1 indicates that a surplus of $2,866 million has emerged since December 31, 2015. The $2,866 million surplus is the net result of a number of items, the most significant being higher than assumed investment returns and lower than assumed salary increases, partially offset by the excess investment return transfers from the Basic Account to the IAA.

Schedule 2 – Change in Actuarial Position

		Approximate effect on surplus ($ millions)
1.	**Surplus as at December 31, 2015**	**0**
2.	Actual income from investments higher than 6.25% assumed rate (on smoothed values)	2,781
3.	Actual contributions higher than previously assumed[1]	46
4.	Actual salary increases to December 31, 2018 lower than previously assumed	836
5.	Changes in valuation demographic assumptions	201
6.	Excess investment return transfers to the IAA, plus interest	(1,363)
7.	Impact of the PBSA required one year delay in contribution rate changes	212
8.	Other factors (a net gain) including changes in plan membership and other differences between actuarial assumptions and actual experience during the intervaluation period	153
9.	**Surplus (Unfunded Liability) at December 31, 2018**	**2,866**

The $201 million gain due to changes in demographic assumptions (item (5)) is the net result of the following (the assumption changes are described in Appendix B).

Change in Actuarial Position Arising from Change in Actuarial Assumptions

Assumption changes	Approximate effect ($ millions)
▪ Mortality	99
▪ Disability incidence rates	(1)
▪ Withdrawal rates	3
▪ Retirement rates	59
▪ Expense allowance	41
Total gain due to assumption changes	**201**

[1] The total payroll is slightly higher than expected due to the increase in active members, which results in the present value of remaining amortization payments being slightly higher than expected.

3. Adequacy of Contribution Rates

As discussed previously in Section III, the required contribution rate consists of the normal cost plus an adjustment to amortize any surplus or unfunded liability. These components of the required contributions are discussed in more detail below.

(a) Normal Cost Rate

The average current service contribution, including contributions by the members, required to finance the basic pensions of new entrants (i.e. the normal actuarial cost) has decreased from 16.55% of salaries as at December 31, 2015 to 16.03% of salaries as at December 31, 2018. The 0.52% decrease in the average normal cost rate is developed in Appendix F and is the net result of a number of items, the most significant being:

- the change in the expense assumption, mainly due to the elimination of MSP premiums (cost decrease of 0.38%);
- the change in the new entrant profile (net decrease of 0.06%);
- the change in the mortality assumption (net decrease of 0.03%); and
- the change in the retirement assumption (net decrease of 0.04%).

(b) PBSA Minimum Rate

The valuation shows a surplus of $2,866,444,000 when including the present value of the existing amortization requirements established at previous valuations of $2,203,160,000. As there is a surplus of $663,284,000 excluding the existing amortization requirements, the PBSA allows these amortization requirements to be eliminated entirely. The minimum PBSA required contribution rate is then equal to the normal cost less the 5-year amortization of any surplus in excess of 5% of the net liabilities, which are defined by the PBSA as the liabilities less the present value of future entry age normal contributions. Five percent of the net liabilities is $2,050,844,000, which exceeds the 2018 surplus of $663,284,000. Thus, there is no Accessible Going Conern Excess and no surplus may be amortized under the PBSA requirements to reduce the contribution rate below the entry-age normal cost. The PBSA minimum required contribution rate is therefore 16.04%, equal to the entry-age normal cost of 16.03% of salaries plus the value of the Group 5 additional amortization, which equates to 0.01% for the plan as a whole, and the valuation would show a surplus of $663,284,000 as of December 31, 2018 if the amortization requirements were eliminated.

The current contribution rates, the contribution rates for current service (on an entry-age basis, i.e. the normal actuarial cost) and the amortization requirements are summarized in Schedule 3.

Schedule 3 – Current and Required Basic Contribution Rates

		Based on without tax limit valuation results as at December 31					
		2015 (%)			2018 (%)		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total[3]**	**Member**	**Employer**	**Total**
1	Group 1	9.00	10.17	19.17	8.47	9.63	18.10
2	Group 2	9.00	13.96	22.96	8.47	12.72	21.19
3	Group 5	10.52	15.36	25.88	9.99	14.26	24.25
4	**Average**	**9.08**	**10.49**	**19.57**	**8.56**	**9.90**	**18.46**
	Entry-age normal cost rates[1]						
5	Group 1			16.16			15.66
6	Group 2			19.48			18.92
7	Group 5			22.55			21.96
8	**Entry-age normal cost - Average**			**16.55**			**16.03**
	Amortization of unfunded actuarial liability (surplus)						
	PBSA amortization						
9	• to 2018			0.01			-
10	• to 2024			1.75			-
11	• to 2027			1.25			-
12	**Total *PBSA* amortization (=9+10+11)**			**3.01**			**-**
13	Additional Group 5 amortization (to 2024)[4]			0.23			0.23
	***PBSA* minimum rate basis[1, 4]**						
14	Group 1 (= 5+12)			19.17			15.66
15	Group 2 (= 6+12)			22.49			18.92
16	Group 5 (= 7+12+13)			25.79			22.19
17	***PBSA* minimum rate - Average[5]**			**19.57**			**16.04**
18	**Required Contribution Rate Increase – Average**			**0.00**			**0.00**

Although a surplus has arisen at this valuation, it is not large enough to get through transition as per the JTA, so the required contribution rates must remain at the current rates. The average rate has reduced from the 2015 valuation rate of 18.51% of salaries (after allowance for the January 1, 2019 JTA requirement to reduce

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates for 2015 are shown on an equivalent "non-doubling" basis, based on 2015 payrolls. In addition, 2015 Group 1 rates are the combined Group 1 and 4 rates.

[3] Effective January 1, 2019, as per the JTA, these current rates were reduced by 1.06% of salaries, split equally member and employer, for a resulting average, before consideration of updated payroll, of 18.51%.

[4] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years.

[5] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll (at both 2015 and 2018), hence the PBSA minimum rate for 2015 of 19.57% = 16.55%+3.01%+0.01% and for 2018 of 16.04% = 16.03%+0.01%.

the Basic contribution rates by 1.06% with a corresponding increase of 1.06% to the IAA contribution rates) to 18.46% of salaries due to changes in the relative size of the payrolls of the Groups between the valuations.

4. Revised Contribution Rates

As discussed above, no change to the overall basic contribution rate is required by the PBSA or permitted by the JTA. The IAA contribution rates are not revised as a result of the valuation and therefore may continue unchanged at their current, January 1, 2019, level.

The following table summarizes the current contribution rates.

Schedule 4 – Current and Required Total Contribution Rates

	Current and Required (%)		
	Basic[1]	**IAA**	**Total[1]**
Members			
Groups 1, 2	8.47	1.53	10.00
Group 5	9.99	1.95	11.94
Employers	**Basic[1]**	**IAA**	**Total[1]**
Group 1	9.63	0.73	10.36
Group 2	12.72	0.73	13.45
Group 5	14.26	1.15	15.41

Contribution Rate Imbalance

Schedule 4 confirms that, in line with the JTA and the PBSA, no adjustments are needed or permitted to current rates. It is, however, necessary to consider whether each Group is paying their correct share of the overall required rate. To the extent that they are not, an imbalance arises, which in terms of the funding policy, the Board may chose to eliminate by adjusting the rates for each group, while leaving the average rate unchanged.

Although no changes are required to the Plan's average rate, the table below shows that the change in the theoretically required contribution rate for each individual group, calculated as the sum of the change in the group's entry age normal cost and the addition per Group above the normal cost to match the current average contribution rate as a result of the JTA requirement to keep the average rate unchanged. The net result (the theoretical group rate change less the average rate change) is the required rebalancing adjustment, or the amount that the employer rates for each group should be adjusted so that the group is

[1] Integrated.

paying the correct share of the overall cost. The detail of the calculation is shown below. These rates are "integrated", i.e. each of the member and employer share is reduced by 1.5% of salary up to the YMPE.

Imbalance in Employer Contribution Rates

	Group 1 %	Group 2 %	Group 5 %	Groups 1 / 2 / 5 Average %
1. Theoretical rate = normal cost plus additional to result in current average JTA rate (plus 0.23% amortization for Group 5)	18.08%	21.34%	24.61%	18.46%
2. Current basic contribution rates	18.10%	21.19%	24.25%	18.46%
3. Net employer imbalance by group = (2) - (1)	0.02%	(0.15%)	(0.36%)	0.00%

The above table indicates that the employer rates for all Groups are "out of balance" in the sense that, while the average contribution rate is unchanged, the theoretical cost for Group 1 has decreased, while the theoretical costs for Group 2 and 5 have increased. Therefore, if the current employer rates are not adjusted, Group 1 will be paying more than their theoretically correct share of the total costs, while Group 2 and 5 will be paying less.

The Board may wish to rebalance the employer rates by group so that each group is paying their theoretical requirement. To rebalance the rates, the Group 1 employer rate should decrease by 0.02%, while employer rates for Group 2 and 5 should increase by 0.15% and 0.36% respectively. A similar rebalancing exercise was carried out following the 2015 valuation. The rates were last rebalanced following the 2012 valuation.

Income Tax Act Requirements

Under the *ITA*, there is a requirement that individual member contributions may not exceed the lesser of:

(a) 9% of salary, or

(b) $1,000 plus 70% of the member's pension credit

although these conditions may be waived by the Minister of Finance provided that the contributions are "determined in a manner acceptable to the Minister and it is reasonable to expect that, on a long-term basis, the aggregate of the regular current service contributions made under the provision by all members will not exceed ½ of the amount that is required to fund the aggregate benefits in respect of which those contributions are made".

For Groups 1 and 2, the required member contribution rate of 10.00% of salary (integrated) exceeds the 9% limit for members earning more than $86,100 in 2019, so it will be necessary to apply to the Minister for an exemption. The required employer integrated contributions of 10.36% for Group 1 and 13.45% for Group 2 (including net IAA contributions of 0.73%) exceed the member contributions of 10.00%. As IAA contribution rates are fixed and per the requirements of the JTA any future employer Basic contribution rates will never be less than the member rates, the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met.

The member contributions for Group 5 exceed 9% of salary for all members (11.94% of salary integrated) and thus a waiver is required for these contributions. The corresponding Group 5 employer integrated contribution rate of 15.41% is higher than the current member rate, and, per the Joint Trust Agreement, the employer contributions to Group 5 can never be less than the member contributions. It is therefore reasonable to conclude that the requirement that the member contributions will not exceed half the amount required to fund the aggregate benefits is met.

Similar exemptions were required, and obtained, following the 2015 valuation.

5. Transitional Adjustments and Other Plan Changes

Since the valuation surplus is not large enough to get through the transition, the Board may not consider any of the contribution or benefit changes contemplated during the transitional funding period under the JTA.

6. Accrued Benefits – Funded Ratio

Another index of funding that some readers of the report may want to examine is the funded ratio. The funded ratio is calculated by dividing the Basic Account assets by the total liability for benefits accrued in respect of service to the valuation date. The asset/liability comparison is analogous to that in Schedule 1, except that contributions and benefits in respect of future service for existing members are excluded from the comparison. The results are shown below.

Schedule 5 – Accrued Benefits – Funded Ratio at December 31, 2018

Basic Account – Non-Indexed Benefits

	($000's)	
	2015	**2018**
Fund (Basic Account): smoothed value of assets	**34,328,875**	**43,564,698**
Accrued Liabilities		
- for pensions being paid	14,809,764	18,122,238
- for inactive members	2,306,249	2,707,484
- for active members	16,178,415	17,812,205
Total Accrued Liabilities	**33,294,428**	**38,641,927**
Surplus (Unfunded Liability): for accrued service only	**1,034,447**	**4,922,771**
Funded Ratio: Fund ÷ Total accrued liabilities	**103.1%**	**112.7%**
Assets in RSA	(1,927,301)	(2,484,540)
Adjusted Surplus (Unfunded Liability) net of RSA	(892,854)	2,438,231

The above schedule indicates that the funded ratio for accrued benefits has increased from about 103.1% to 112.7%, prior to the transfer to the RSA. This is largely for reasons similar to the items in the analysis in Schedule 2, excluding those items related to future contribution rates.

7. Sensitivity Analysis

Sensitivity Analysis under Standards of Practice

The Canadian Institute of Actuaries Practice-Specific Standards for Pension Plans require disclosure of the effect of using a discount rate (investment return) 1.0% lower than that used for the valuation on:

(a) The actuarial present value, at the calculation date, of projected benefits allocated to periods up to the calculation date, and

(b) The service cost or the rule for calculating the service cost between the calculation date and the next calculation date.

The table below shows the impact on the accrued liability as required by (a) and the entry-age normal cost as required by (b) as at December 31, 2018 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

Sensitivity – Impact of 1% drop in discount rate on Accrued Benefits and Normal Cost

Impact on liabilities of 1% drop in discount rates	Going Concern 6.25% ($,000's)	Going Concern 5.25% ($,000's)	Increase ($,000's)
Active members	17,812,205	21,153,566	3,341,361
Disabled members	1,381,289	1,615,300	234,011
Terminated members	1,326,195	1,539,514	213,319
Pensioners and beneficiaries	18,122,238	19,735,038	1,612,800
Total increase in liabilities			**5,401,491**

Impact on normal cost rate of 1% drop in discount rates	Going Concern 6.25%	Going Concern 5.25%	Increase
Entry age normal cost	16.03%	19.54%	3.51%

Sensitivity Analysis for Plan Funding

Given that the plan is funded on the entry-age basis, we have also considered the impact of a one percentage point drop in the investment return assumption on the Basic Account non-indexed benefits consistent with Schedule 1. These figures are summarized in the table below:

Sensitivity – Impact of 1% Drop in Discount Rate on Plan Funding

	($000's)		
	6.25%	5.25%	Increase
Smoothed Value of Fund net of RSA	41,080,158	41,080,158	0
Actuarial present values of:			
▪ Future contributions at entry-age rates	15,242,844	20,068,376	4,825,532
▪ Present value of existing amortization	2,203,160	2,280,659	77,499
Total Assets net of RSA	**58,526,162**	**63,429,193**	**4,903,031**
Total Liabilities	**55,659,718**	**66,171,299**	**10,511,581**
Surplus/(Unfunded liability) on entry-age basis	2,866,444	(2,742,106)	(5,608,550)
Entry Age Normal Cost – average	16.03%	19.54%	3.51%
PBSA Amortization	-	4.89%	4.89%
Additional amortization for Group 5	0.23%[1]	0.23%[1]	-
***PBSA* Minimum rate – Schedule 3 – average**	**16.04%**	**24.44%**	**8.40%**

[1] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.

8. Supplementary Valuations

Results analogous to those in Schedules 1, 3 and 5 are shown in Appendix G, on the following bases:

- For basic and indexed benefits combined, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits;
- For basic only, and basic plus indexed benefits, including only benefits accrued to the valuation date, and;
- Limiting benefits to those permitted under the Income Tax Act; this is done both for:
  - basic benefits only; and for
  - basic plus indexed benefits.

The adjustments to the assumptions are discussed in Appendix B. In the indexing calculations, we reduced the employer contributions to the IAA by 0.8% on the assumption that 0.8% of salaries would be allocated to the post-retirement group benefits.

The key results are summarized below:

Schedule 6 – Basic and Indexed Benefits (without tax limits)

Funded position	Basic Only ($000's)	Basic + Indexed ($000's)
Smoothed Value of Fund net of RSA	41,080,158	49,281,016
Actuarial present values of:		
▪ Future contributions at entry-age rates	15,242,844	20,573,997
▪ Present value of existing amortization requirements	2,203,160	2,205,991
(i) 1.75% to 2024	1,080,530	1,080,530
(ii) 1.25% to 2027	1,114,490	1,114,490
(iii) 0.23% (Basic Only)/0.31% (Basic + Indexed) to 2024 for Group 5 only	8,140	10,971
Total Assets net of RSA	**58,526,162**	**72,061,004**
Total Liabilities	**55,659,718**	**74,732,297**
Surplus (Unfunded Liability) including existing amortization	**2,866,444**	**(2,671,293)**
Surplus (Unfunded Liability), excluding existing amortization except 0.31% for G5 (Basic + Indexed), to be amortized over 15 years	**663,284**	**(4,866,313)**
Contribution Rates (Integrated)	**%**	**%**
Member – current	8.56	10.11
Employer – current	9.90	10.66
Total – current, average	**18.46**	**20.77**
Entry-age normal cost – average	16.03	21.16
Amortization for all members[1]	0	3.53
Additional amortization for Group 5 members	0.23[2]	0.31[3]
Total – entry-age basis – average	**16.04**	**24.71**

If assets and liabilities are restricted to accrued service only, i.e. analogous to Schedule 5 earlier, the 2018 surplus (unfunded liability) figures change as follows:

[1] Basic amortization is as required by the *PBSA*; Basic + Indexed amortization is over 15 years.
[2] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.
[3] The Group 5 amortization of 0.31% of Group 5 payroll is 0.02% of the Plan's total payroll.

Schedule 7 – Indexed Accrued Benefits (without tax limits) – Funded Ratio at December 31, 2018

	($000's)	
	Basic Only	**Basic + Indexed**
Assets	43,564,698	51,765,556
Liabilities	38,641,927	51,779,596
Surplus (Unfunded Liability)	**4,922,771**	**(14,040)**
Funded Ratio	112.7%	99.97%
Assets in RSA	(2,484,540)	(2,484,540)
Adjusted Surplus (Unfunded Liability) net of RSA	2,438,231	(2,498,580)

Pensions Limited to *ITA* Maximums

When the income tax limits on pensions are recognized, the above 2018 unfunded liabilities change marginally.

Schedule 8 – Pensions Limited to ITA Maximums – Basic Only – Net of RSA

Basic Only	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	**$000's**	**$000's**
Entry Age Basis (including scheduled amortization)	2,866,444	3,161,702
Entry Age Basis (excluding scheduled amortization)	663,284	958,188
Accrued Service Only (no scheduled amortization)	2,438,231	2,717,238
Contribution Rate	**%**	**%**
Entry-age normal cost	16.03	15.96
PSBA Amortization	0.00	0.00
Additional amortization for Group 5 members	0.23[1]	0.24[2]
Total	**16.04**	**15.97**

[1] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.

[2] The Group 5 amortization of 0.24% of Group 5 payroll is 0.01% of the Plan's total payroll.

Schedule 9 – Pensions Limited to ITA Maximums – Indexed Benefits – net of RSA

Basic and Indexed	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	**($000's)**	**($000's)**
Entry Age Basis (including scheduled amortization)	(2,671,293)	(2,287,159)
Entry Age Basis (excluding scheduled amortization)	(4,866,313)	(4,482,179)
Accrued Service Only (no scheduled amortization)	(2,498,580)	(2,123,721)
Contribution Rate	**%**	**%**
Entry Age Normal Cost	21.16	21.06
15 year Amortization	3.53	3.25
Additional amortization for Group 5 members	0.31[1]	0.31[1]
Total	**24.71**	**24.33**

9. Test Maximum Surplus and Contributions for Tax Purposes

Section 147.2(2) of the *Income Tax Act* limits employer contributions that may be made to a plan if there is a surplus that exceeds 25% of the actuarial liability - the plan becomes revocable if contributions are made when such surplus exists.

Subsection (c) of Section 147.2(2) of the *Income Tax Act* also provides that the benefits taken into account for the purposes of a contribution recommendation "may include anticipated cost-of-living and similar adjustments where the terms of a pension plan do not require that those adjustments be made but it is reasonable to expect that they will be made".

Indexing at full CPI has been provided from January 1, 1982 to January 1, 2018 under the present Plan terms, and for many years before that under earlier Plan provisions. As discussed earlier, indexing is currently financed on a mixture of a pay-as-you-go basis (from a matching 1.53% for Groups 1 and 2 and 1.95% for Group 5 member/employer contribution for active members, less employer contributions allocated to post-retirement group benefits), an excess investment return basis (investment return in excess of the valuation assumption is transferred each year from Basic to IAA in respect of pensioner liabilities), and a "terminally-funded" basis (each year the full capitalized cost of any indexing granted is transferred from IAA to Basic). Furthermore, the Board intends to provide future indexing at full CPI if it possible. Thus, it is appropriate for purposes of testing the *ITA* 147.2(2) limits to recognize, in advance, the future indexing of pensions for the present Plan membership. On this basis, the valuation results on the fully indexed basis, recognizing the income tax limits on benefits, apply.

For the purpose of this test, the total assets should include the $2,484,540,000 in the RSA.

[1] The Group 5 amortization of 0.31% of Group 5 payroll is 0.02% of the Plan's total payroll.

Schedule 10 – Pensions Limited to ITA Maximums – Maximum Surplus and Contributions Test

Basic and Indexed	**With Tax Limit**
Surplus (Unfunded Liability)	**($000's)**
Entry Age Basis, excluding scheduled amortization, net of RSA	(4,482,179)
Amount in RSA	2,484,540
Resulting unfunded liability for ITA test	(1,997,638)
Contribution Rate	**%**
Fully Indexed Entry Age Normal Cost	21.06
15 year Amortization	1.45
Additional amortization for Group 5 members	0.31[1]
Total	**22.53**

Thus a contribution rate of 22.53%[1] would be acceptable for *ITA* purposes, and in fact the unfunded liability could be amortized even faster, resulting in an even higher acceptable rate.

It is therefore clear that the current (and required) contribution rate of 20.77% is lower than the maximum rate that is acceptable under the *ITA* and therefore, contributions may continue at their current levels.

We have commented previously (under section 4) on the 9% limit that applies to individual member contributions.

[1] Entry Age Normal Cost of 21.06% plus 0.02% representing the 0.31% additional amortization for Group 5 members only, as shown in Schedule 9, plus 1.45% 15-year amortization of $1,997,638,000 unfunded liability.

V. Sustainable Indexing Valuation

The Sustainable Indexing Valuation establishes the level of indexing that can be sustained in the long term taking into account the assets of the plan and the long term funding commitment to the Plan. The valuation basis is different from the Funding Valuation basis as discussed in Section III and Appendix B.

1. Long Term Funding Commitment and Amortization Requirements

Based on the results discussed in Section IV, the contribution requirements of the plan can be summarised as:

Long Term Funding Commitment	2018
Normal (entry-age) actuarial cost	16.03%
IAA contributions – current average	2.31%
Long term funding commitment – excluding current amortization schedule	**18.34%**

2. Results

We have calculated that the 2018 sustainable indexing level to be 2.15% per year. This result is an increase from the equivalently calculated 2015 sustainable indexing level of 2.10%.

Allowing for indexing of 2.15% per year, and using the sustainable indexing assumptions discussed earlier, we obtain the following balance sheet and contribution requirements:

	2018 ($000's)
Sustainable Indexing Target	**2.15%**
Assets	
Market Value of Fund net of RSA	49,888,412
Asset Smoothing Adjustment	(607,396)
Smoothed Value of Fund for Sustainable Indexing	**49,281,016**
Actuarial present values of contributions at Entry Age Normal Cost[1]	16,943,119
Present value of 0.23% to 2024 for group 5 only	8,028
Total Assets	**66,232,163**
Total Liabilities	**65,910,080**
Surplus (Unfunded Actuarial Liability)	**322,083**
Contribution Requirements	
Entry Age Normal Cost – based on sustainable indexing target	18.37%
Amortization of (surplus) / unfunded liability over infinite period	(0.09%)
Required contribution	**18.28%**
Long term contribution commitment	**18.34%**

The above results show that, at an indexing rate of 2.15% per year, the required contribution rate is 18.28% of pay, which is marginally less than the long term contribution commitment of 18.34%[2]. It is thus reasonable to conclude that indexing of 2.15% per year can be sustained in the long term. We recommend that the maximum indexing amount referred to in Section 73 of the plan rules be set at not more than 2.15% per year. This is an increase from the level of 2.10% per year based on the 2015 valuation.

The main reasons for the improvement in the sustainable indexing level are similar to the improvement in the basic account funding position, which are discussed in the analysis in Schedule 2.

The sustainable level of indexing will be re-evaluated at the next valuation and is likely to differ from the current level as a result of ongoing experience gains or losses and any changes to the valuation assumptions at that time.

[1] This allows for indexing at 2.15% and reflects a 6.5% discount rate.

[2] Increasing the sustainable indexing limit to 2.20% would result in a required contribution in excess of the long term contribution commitment, i.e. indexing at 2.20%, the next higher limit after 2.15% in terms of the funding policy, is not sustainable and 2.15% is the highest indexing that can be sustained.

V. Subsequent Events

To the best of our knowledge, there are no material subsequent events that would affect the results and recommendations of this valuation. Any investment experience occurring between the valuation date and the report date, which differs from the assumption made, is not reported on in this valuation report and will be reported on in future valuations.

VI. Actuarial Opinion

In our opinion,

(a) the membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation,

(b) the assumptions are appropriate for the purposes of the valuation, and

(c) the methods employed in the valuation are appropriate for the purposes of the valuation.

This report has been prepared and our opinions given in accordance with accepted actuarial practice in Canada. Pursuant to the JTA and regulatory requirements, the next valuation should be completed no later than as of December 31, 2021.

VII. Acknowledgement

We gratefully acknowledge the generous assistance of the staff of the Pension Corporation in the preparation of the data and other items required for this report.

Respectfully submitted,

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September 12, 2019

[1] Canadian Institute of Actuaries is the Primary Regulator.

Appendix A: Summary of Plan and Amendments as at December 31, 2018

Changes to the Plan

The previous valuation was based on the provisions of the Plan as at December 31, 2015. Since then, the plan has been amended a number of times. The main changes are summarized below.

- **PBSA Terminology and Housekeeping Amendments:** Effective November 14, 2018, the plan rules were updated to ensure the term "pension" and benefit" are used in alignment with the *Pension Benefits Standards Act*, and to update locked-in retirement savings vehicles terminology to "locked-in retirement account" and "life income fund" as needed.
- **New *Employment Standards Act* leave types (ESA):** Effective May 17, 2018, addition of the two new ESA leave types – for the disappearance of child and the death of child.
- **Basic Account and Inflation Adjustment Account Contributions:** Effective January 1, 2019, basic account contributions were reduced by 1.06 per cent of salary and inflation adjustment account contributions were increased by 1.06 per cent of salary. The decrease and the increase were share equally by the active members and the employer. A contribution rate stabilization account was also established within the basic account following the actuarial valuation performed as at December 31, 2015, in an amount up to but not exceeding $2.5 billion.
- **Employer Contribution Rate Simplification:** Effective January 1, 2019, completion of three year phase in removal of gender- and age-based employer contribution—respectively, implementation of the same rates for Groups 1 and 4, and elimination of doubling. Group 4 was also merged into Group 1.

In addition, as there are no longer any active members in Group 3, reference to Group 3 contributions rates and active benefit provisions have been removed from this summary of plan provisions.

The Plan

The main provisions of the plan are summarized below and are provided as at December 31, 2018, except as otherwise noted. The section references are to the plan rules, except otherwise noted. The valuation is based on these provisions.

Employer and Employee Eligibility

The plan applies to employers described under section 2: a municipality, a body designated under the *College and Institute Act*, teaching universities as designated under the *University Act,* and any other body designated as an employer on terms and conditions of eligibility specified by the Municipal Pension Board of Trustees (board) or former board. The board retains the authority to set additional terms and conditions limiting or expanding the employee enrolment requirements applying to the individual employer. In general, plan employers include municipalities, regional districts, health services organizations, school districts and regional colleges.

Participation is compulsory for all regular, full-time employees and for other employees who have been working in a continuous full-time capacity with the same employer for 12 months. Enrolment is optional for less than full-time employees who have completed at least 2 years of continuous employment and have earned at least 35 per cent of the Year's Maximum Pensionable Earnings (YMPE) under the Canada Pension Plan in each of two consecutive calendar years. Employees can be enrolled earlier than the plan requires if the employer passes a resolution or if the terms of a collective bargaining agreement provide for it. Where an active member transfers from the service of one employer to another employer, with a break in service of less than one month, contributions must continue without interruption. [Section 3]

Effective January 1, 2019, employees are classified as follows:

(a) Group 1, other than a police officer or firefighter, includes those employees who participated in Group 4 prior to January 1, 2019, whose normal retirement age is 65;

(b) Group 2 if a police officer or firefighter, whose normal retirement age is 60; or

(c) Group 5 if a police officer or firefighter, who has a higher benefit accrual rate and whose normal retirement age is 60. [Section 96(1)]

Member Contributions

Section 5 defines the following contributions (effective January 1, 2019), which are deducted from a member's salary during a calendar year.

For members in Groups 1 and 2:

(a) 6.97 per cent of the member's salary that does not exceed the YMPE (paid into the basic account);

(b) 8.47 per cent of the member's salary in excess of the YMPE (paid into the basic account); and

(c) 1.53 per cent of the member's salary (paid into the IAA).

For members in Group 5:

(a) 8.49 per cent of the member's salary that does not exceed the YMPE (paid into the basic account);

(b) 9.99 per cent of the member's salary in excess of the YMPE (paid into the basic account); and

(c) 1.95 per cent of the member's salary (paid into the IAA).

Member contributions cease after 35 years of pensionable service have been accrued, with the exception of contributions made under certain special agreements entered into under Part 15.

Employer Contributions

Section 6 defines the following contributions (effective January 1, 2019), which are paid by the employer during a calendar year:

(a) for Group 1 members, 8.13 per cent of the cumulative salary that does not exceed the YMPE, and 9.63 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(b) for Group 2 members, 11.22 per cent of the cumulative salary that does not exceed the YMPE, and 12.72 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(c) for Group 5 members, 12.76 per cent of the cumulative salary that does not exceed the YMPE, and 14.26 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(d) 1.53 per cent of the member's salary (paid into the IAA) for Group 1 and 2 members; and

(e) 1.95 per cent of the member's salary (paid into the IAA) for Group 5 members.

Employer contributions to the IAA are reduced by amounts allocated to post-retirement group benefits. [Section 75]

Employer contributions cease in respect of a member's salary after the member has accrued 35 years of pensionable service, with the exception of contributions made under certain special agreements entered into under Part 15.

Termination Benefits

Under sections 42(1)(b) and 45, a terminating member is entitled to a deferred retirement benefit equal to the full normal pension accrued to the date of termination. The date the benefit is payable depends on the service accruals to termination – see below "Eligibility Conditions for Retirement Benefit" section.

Sections 42(1)(c) and 46 provide for the payment of a lump sum commuted value in lieu of the deferred retirement benefit, if the member is below age 55 (50), subject to the commuted value being payable on a locked-in basis.

Under certain limited conditions (small retirement benefit, non-resident status) the *PBSA* permits the election of a lump-sum pay-out, regardless of age, and on a non-locked-in basis.

Section 100 provides that the deferred retirement benefit of a terminating member is based on the highest average salary at termination, increased to retirement or to December 31, 1980 if earlier, in accordance with changes in the pension index. Subsequent to 1980, the highest average salary is increased to retirement by the percentage increase granted to retirement benefits for the period between the month of termination and the month the retirement benefit becomes effective.

Section 75(3)(h) provides that the cost of the indexing described above is funded from the IAA.

Retirement Benefits: Eligibility Conditions for Retirement Benefit

There are different retirement ages for the different member Groups in the plan. The normal retirement age is 65 for members in Group 1, and 60 for members in Groups 2 and 5. In the following summary of the various eligibility conditions and plan provisions, the age and/or service conditions are first shown for Group 1; the age and/or service conditions for Groups 2 and 5, if different, are shown in parentheses following the Group 1 conditions.

Section 50 provides that an active member who terminates employment on or after September 30, 2015, is on application, entitled to receive an unreduced retirement benefit calculated in accordance with section 54 if the member has reached:

(a) age 55 (50) and the sum of the member's age plus years of contributory service is 90 (80) or more; or

(b) age 60 (55) with at least 2 years of contributory service; or

(c) age 65 (60).

Section 51(a) provides for a reduced retirement benefit calculated under section 55(1) if the terminating member has attained age 55 (50) and completed at least 2 years of contributory service.

Section 51(b) provides for a reduced retirement benefit calculated under section 55(2) if the terminating member has attained age 55 (50) but has not completed 2 years of contributory service.

Section 13 provides that, under certain conditions, the contributory service requirements mentioned above can include service during certain periods of child rearing (5 year maximum).

Calculation of Unreduced Retirement Benefit

Section 54 provides that the unreduced retirement benefit payable to a member terminating employment on or after April 1, 2000 in the form of a single life annuity without a guarantee period is calculated as the sum of the following:

(a) 2 per cent of the member's highest average salary multiplied by the number of years of pensionable service accrued before January 1, 1966,

(b) 1.3 per cent of the lesser of

  (i) the member's highest average salary, and

  (ii) 1/12 of the YMPE for the calendar year immediately before the effective date of the retirement benefit

  multiplied by the number of years of pensionable service accrued on and after January 1, 1966 not exceeding 35 years, and

(c) 2 per cent of the excess of the member's highest average salary over the amount determined under paragraph (b) (ii), multiplied by the number of years of pensionable service accrued on and after January 1, 1966 not exceeding 35 years.

For the purposes of the above calculation, in respect to any period of pensionable service for which contributions have been made at the rate applicable for Group 5, the percentages referenced in paragraphs (b) and (c) above are 1.63 per cent and 2.33 per cent respectively.

If the member has, before April 1, 2002, purchased pensionable service for service before the date on which the plan first applied to the member's employer, and has not accrued 35 years of pensionable service after the date that the plan first applied to the employer, the percentages used in the formula referenced in paragraphs (a) and (b) above for that purchased service are 1.75 per cent and 1.05 per cent respectively.

In addition, the member is entitled to a monthly bridge benefit payable until the earlier of the death of the member and the member reaching age 65 that is:

(a) 0.7 per cent of the lesser of

(i) the member's highest average salary, and

(ii) 1/12 of the YMPE for the calendar year immediately before the effective date of the retirement benefit

multiplied by

(b) the number of years of pensionable service on and after January 1, 1966 not exceeding 35 years.

Highest average salary means one-twelfth of the average annual salary earned by a member during the 60 months of pensionable service (not necessarily consecutive) in which the salaries were highest (or, if the member has accrued less than 60 months of pensionable service, the total number of months of pensionable service).

A member who has made voluntary additional contributions in the past (these are no longer accepted) will be granted an increase to their pension or a refund, including interest at fund interest rates on those contributions. Members who have contributed under a pre-2007 special agreement will be granted a retirement annuity or a lump-sum payment of the member's account balance. Members who have contributed under a post-2006 special agreement will be granted a lump-sum payment of the member's account balance.

Calculation of Reduced Retirement Benefit

Where a reduced retirement benefit is payable under section 51 to members aged between 55 (50) and 60 (55) who have 2 or more years of contributory service, section 55 provides that the retirement benefit , described above, is reduced by a percentage equal to 3 per cent for each year by which the member's age is less than the earlier of age 60 (55) or the age at which the member's age plus years of contributory service total 90 (80) (subsection 55(1)), prorated for fractions of a year.

Where a reduced retirement benefit is payable under section 51 to members aged 60 (55) or over who do not have 2 years of contributory service, section 55 provides that the retirement benefit , described above, is reduced by a percentage equal to 3 per cent for each year by which the member's age is less than 65 (60) years of age (subsection 55(2)), prorated for fractions of a year.

If employment terminates under age 50 (45), or between 50 (45) and 55 (50) with less than 10 years of contributory service, the 3 per cent (per year) early retirement reduction factor referred to above is increased to 5 per cent (per year) (subsection 55(3)).

Alternative Types of Pensions

Section 56 provides that a pension may be granted on the single life option with no guarantee period (normal form), single life option with a guarantee period (5, 10 or 15 years), joint life and last survivor option, temporary life annuity option, or a combination of these options upon approval of the plan administrative agent. The amount of any pension granted on a form other than the normal form is calculated on an actuarially equivalent basis.

Where a member has a spouse at retirement, the member is required, as a minimum, to elect that 60 per cent of the member's pension be paid on the joint life and last survivor option, unless the spouse waives this requirement in writing or there is a written agreement or court order filed with the plan administrative agent. This option provides for a reduced amount payable to the member, continuing to the spouse on death of the member at 60 per cent of the initial reduced amount. A spouse is as defined in section 96.

Disability Benefits

Section 60 provides that a member is entitled, upon application, to a disability benefit if the member, before reaching age 60 (55), is totally and permanently disabled, has completed 2 years of contributory service, is not eligible for a monthly income benefit from a group disability plan, has not accepted a lump sum payment in lieu of a continued monthly income benefit under a group disability plan, and has terminated employment.

An eligible member is entitled to receive a disability benefit calculated as the sum of the years of pensionable service accrued by the member to the date of termination of employment, and 50 per cent of the pension the member would have accrued between the pension effective date and age 60 (55) based on their current salary with service, pro-rated for members who work less than full-time, with both portions not reduced for immediate (i.e. early) retirement. Part 6 outlines the provisions related to disability benefits.

Sections 12(6) and 99(2) provide that if a member is receiving a benefit from an approved group disability plan, the member and employer do not make contributions and the member is not entitled to a benefit under the plan, but the period for which the member receives such group disability income benefit is considered pensionable service, with the final retirement benefit based on the highest average salary at disablement increased to retirement in accordance with changes in the consumer price index. An active member receiving benefits from a group disability plan continues to accrue deemed service under a group disability plan where an employer withdraws from the plan or the group disability plan loses approved status.

Pre-retirement Death Benefits

The pre-retirement death benefits for active and inactive plan members are covered in Part 7 as follows:

(a) If there is no surviving spouse or a valid spousal waiver has been filed, the benefit payable to the beneficiary is an amount equal to the greater of a refund of member's contributions with interests at the refund interest rates and the full commuted value of the regular pension earned to the date of death. If a spousal waiver has been filed, the surviving spouse cannot be designated as beneficiary.

(b) If the member has not attained age 55 (50) at the date of death, and there is a surviving spouse and a valid spousal waiver has not been filed, the spouse may elect to receive as a benefit either of the following:

   (i) the greater of a refund of member's contributions with interests at the refund interest rates and the full commuted value of the regular pension earned to the date of death; or

   (ii) an immediate pension that is actuarially equivalent to the full commuted value of the regular pension earned to the date of death and payable as if the member had chosen the joint life and last survivor option.

(c) If the member has attained age 55 (50) on the date of death, and there is a surviving spouse and a valid spousal waiver has not been filed, then the benefit is an immediate pension to the spouse as though the member had terminated employment at the date of death and had chosen the joint life and last survivor option.

If a member terminated employment under the previous vesting and locking-in rules, left contributions on deposit and dies before taking a benefit from the plan, the contributory service requirement in place at the time of termination (i.e. 10 years, 5 years or 2 years) is used to determine benefit eligibility.

Cost of Living Benefits (Indexing)

Section 73 sets out how cost of living benefits are to be administered. It provides for increases to retired members on January 1 of each year, with the benefits funded from the IAA. The portion of the indexable benefit eligible for adjustment is the total amount of the indexable benefit, including any previous cost of living benefit, less any portion of the pension that is a result of voluntary contributions (which are no longer permitted). The maximum increase is equal to the percentage increase in the Consumer Price Index (CPI) over the 12 months ending on September 30 of the previous year.

Indexing is not guaranteed. Once granted, an indexing adjustment becomes part of the indexable benefit. The board annually considers all relevant factors to determine if indexing will be granted. Future indexing adjustments are granted at the discretion of the board.

Section 73 sets out additional requirements with regards to the cost of living benefit, including:

(a) the same uniform percentage increase will be granted in respect of all indexable benefits eligible for adjustment;

(b) the increase is prorated if the indexable benefit has not been in payment for at least 12 months;

(c) the total capitalized value of all cost of living benefits granted on January 1 must not exceed the amount in the IAA on the preceding September 30; and

(d) the capitalized value of all cost of living benefits granted annually is transferred from the IAA to the basic account.

The Pension Fund

Section 75 provides that the Pension Fund is divided into the following four accounts:

(a) the **Basic Account**, consisting of all the assets in the fund other than assets in the IAA, the supplemental benefits account (SBA) and the retirement annuity account (RAA);

(b) the **Inflation Adjustment Account**, consisting of:

 (i) the 1.53 per cent contribution by each of the members under section 5(1)(a)(iii) and the 1.95 per cent contributions by each of the members under section 5(1)b(iii) (rates effective January 1, 2019);

 (ii) the matching employer contributions under section 6(1)(c) and (d) less amounts allocated for the payment of post-retirement group benefit entitlements;

(iii) the net investment income earned on the IAA;

(iv) the income, as determined by the plan administrative agent, that is earned on fund assets held in the basic account in respect of indexable benefits being paid and that is in excess of the investment return anticipated in the most recent actuarial valuation; and

(v) amounts transferred to the account from the RAA under section 75(5)

less:

(vi) amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under section 73 and 88;

(vii) refunds to plan members in respect of the 1.53 per cent contribution made to this account under section 5(1)(a)(iii) and the 1.95 per cent contribution made to this account under section 5(1)(b)(iii) (rates effective January 1, 2019), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account;

(viii) amounts determined by the plan administrative agent in respect of the portions of commuted value payments or other transfers out of the plan that are attributable to cost of living adjustments;

(ix) amounts transferred to the Basic Account that are equal to the capitalized value of increases in a member's retirement benefit resulting from increases in highest average salaries under section 100; and

(x) amounts transferred to the SBA, if any, to cover inflation protection on benefits in excess of those registrable under the *Income Tax Act* (*ITA*);

(Article 10.3 of the Joint Trust Agreement also permits the board, subject to the transitional funding arrangements, to transfer portions of any actuarial surplus in the Basic Account to the IAA.)

(c) the **Supplemental Benefits Account**, consisting of assets required for the administration and payment of benefits that are non-registrable under the *ITA,* including post- retirement group benefits; and

(d) the **Retirement Annuity Account**, consisting of voluntary contributions made under the previous statutes, contributions made under special agreements, and investment earnings thereon, less amounts transferred to the basic account and the IAA for the retirement annuity portion of the benefits paid.

***ITA* Limits**

The *ITA* imposes certain limits on the contributions that may be made to, and the benefits that may be paid from, a registered pension plan. However, in total, the contribution requirements from, and the benefit promises to, plan members have not been altered under the plan. To this end, the SBA covers the financing and payment of benefits in excess of those registrable under the *ITA*.

The excess benefits are paid on a current cash basis, by allocating from the regular employer contributions, the amounts necessary to maintain the SBA at a zero balance. Effectively, from a plan member's perspective, it is expected that these procedures will be invisible – the total contribution and benefit obligations remain unchanged. We have ignored the implications of all such internal restructuring in completing the primary, basic account valuation. In the plan summary herein, and elsewhere in this valuation report, our references to contributions/benefits to/from the basic/IAA are inclusive of the allocations to/from the SBA; in general, the allocations to/from the SBA have not been referenced.

We have also completed supplementary valuations recognizing the income tax limits on pensions. We understand that these limits are applied only in respect of service after 1991. The maximum annual pension permitted at December 31, 2018 (before application of any early retirement reductions, where applicable) is the lesser of:

(a) $2,944.44 multiplied by the years of service; and

(b) 2 per cent multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

The plan also imposes a 35 year cap on accruals at the above maximum rate. The 2019 maximum limit is $3.025.56 which is increased annually by the increase in the average industrial wage.

Refund Interest Rates

In accordance with section 96, for periods on and after January 1, 1993, and before January 1, 2004, interest credits are based on the average yields of 5 year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series B14045. For periods on or after January 1, 2004, interest credits are based on the average yields of 5 year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V122515.

Special Agreements

Under Part 15, a special agreement is an agreement entered into by the board with an employer which provides for employer and member contributions in excess of those required under sections 5 and 6 for the purpose of increasing the benefits of the members employed by the employer. Under the *ITA* the terms of each special agreement constitute a money purchase provision. [Sections 107 and 108]

Member and employer contributions are made at the rates set in each special agreement, subject to the maximum amounts allowable under the *ITA*. The contributions are paid into the RAA and credited to the member's account for whom they are made. The member's account holds the accumulated value of the special agreement contributions made for the member, together with interest at the fund interest rates. Employer contributions immediately vest in the member for whom they are made. A special agreement may require that member and employer contributions continue to be paid after the member has accrued 35 years of pensionable service. Contributions to a special agreement must stop when he or she becomes a member in group 5. [Sections 109 and 110]

Under section 112, a terminating member who elects to receive a commuted value as a termination benefit must be paid a lump sum payment of the member's account balance. If the member does not elect to receive a commuted value as a termination benefit, the member's account remains within the RAA until the member becomes entitled to a retirement benefit.

Section 113 provides that if a member elects to receive a retirement benefit, the member is entitled to:

(a) a lump sum payment of the member's account balance under a pre-2007 special agreement, or

(b) a monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement commencing at the same time and payable under the same option and conditions as the retirement benefit granted under part 5, and

(c) a lump sum payment of the member’s account balance under a post-2006 special agreement.

If a member qualifies for a disability benefit, section 114 provides that the member is entitled to:

(a) a lump sum payment of the member's account balance under a pre-2007 special agreement, or

(b) a monthly retirement annuity commencing at age 60 (55) converted from the member's account balance under a pre-2007 special agreement and payable under the same option and conditions as the disability benefit granted under Part 6, and

(c) a lump sum payment of the member's account balance under a post-2006 special agreement.

If the member elects to receive a monthly retirement annuity but dies before reaching age 60 (55) the member's beneficiary is entitled to a lump sum payment of the member's account balance under a pre-2007 special agreement. If the disability benefit continues to the member's spouse, the spouse may choose either the lump sum payment or an immediate monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement.

Under section 115, if a member dies before taking a benefit from the plan, the member's beneficiary is entitled to a lump sum payment of the member's account balance. If there is a surviving spouse and he or she elects to receive a pension under Part 7, the spouse may choose either the lump sum payment or an immediate monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement or a lump sum payment of the member's account balance under a post-2006 special agreement. If a refund is payable, the payment may be transferred to an RRSP as permitted by the *ITA*.

Section 117 provides that if an inactive member elects to transfer the member's contributory and pensionable service to another pension plan under a transfer agreement entered into by the board, the member must be paid a lump sum payment of the member's account balance.

A monthly retirement annuity paid under this Part is paid from the basic account as a benefit with a capitalized value equal to the member's account balance at the end of the month preceding the commencement of the annuity. When a monthly retirement annuity commences payment under this Part, the member's account balance is transferred from the RAA to the basic account and the IAA and the member's account ceases to exist.

Other Items

1. Article 3.2 of the Joint Trust Agreement provides that all expenses incurred in the administration of the plan are to be paid from the fund.
2. A maximum of 5 years taken to raise a child may be recognized in establishing eligibility for a pension provided the member has a record of pensionable service immediately before and after the child-rearing period(s). [Section 13]
3. Section 57 enables an employer to request the plan administrative agent to adopt a Special Retirement Incentive Plan (SRIP), whereby the age and service conditions, or the early retirement percentage reductions, or both, may be adjusted. The SRIP must stipulate the eligible members, the period it will remain open, the conditions applicable to the incentives, the additional costs to the employer, the timing of these payments to fund the SRIP and restrictions under the *ITA*.
4. Effective April 1, 2010, reciprocal transfers between the College, Municipal, Public Service and Teachers' Pension plans are made exclusively under the National Public Service Pension Transfer Agreement (NTA). This replaced the Public Sector Transfer Agreement. Under the NTA, transfers under the agreement take into account the benefits under the transferring plans and pro-rate service if the importing plan's reserve requirements are higher than those available from the exporting plan. Members may pay for any shortfall, subject to Canada Revenue Agency approval, within certain deadlines. Members can choose to leave their entitlements with their respective plans and apply for the appropriate benefits available from each plan at termination and/or retirement.

Funding and Transitional Rules[1]

These are covered in Article 10 and Appendix B of the Joint Trust Agreement.

Plan funding must comply with the *PBSA* requirements for a going-concern valuation. Further, if an actuarial valuation indicates a requirement to increase contribution rates to the basic account, the increase must be shared equally by members and employers.

The use of emerging surpluses is also limited during a transition period to achieve the following objectives, in the following order:

(a) First, eliminate any unfunded liabilities that existed at a prior valuation;

(b) Next, simultaneously

  (i) rebalance member and employer contribution rates to the basic account, such that

    (A) the current doubling feature is removed,

    (B) the employer rates for Groups 1 and 4 members are set equal to the 5.0/6.5 per cent rate for members, and

    (C) the employer rates for Groups 2 and 3 members are also set equal to the foregoing 5.0/6.5 per cent rate plus the differential in the normal cost rates for Groups 2 and 3 vs. that for Groups 1 and 4, as indicated by the actuarial valuation from time to time;

  and

  (ii)

    (A) improve the normal form of pension from a single life without guarantee to a single life with a ten-year guarantee, and

    (B) change the benefit formula from 1.3/2.0 per cent to 1.35/2.0 per cent,

  for those who are active members at the date (and active members that join after the date) the improvements are implemented.

  The surplus needed for this must be sufficient to stabilize the revised contribution rates on an open group basis, for a 25 year period.

[1] References to Group 3 and 4 have been retained in this summary, to be consistent with the wording in the JTA. As noted in the first page of this Appendix A, effective January 1, 2019, Groups 1 and 4 were merged into Group 1, and references to Group 3 have been removed as there are no longer any Group 3 active members.

(c) After (a) and (b) are achieved, 50 per cent of any additional or emerging surpluses will be allocated to a contribution rate stabilization reserve and the other 50 per cent transferred to the IAA, until an aggregate total of one billion dollars has been so allocated.

The transitional arrangements do not address Group 5.

The transitional period ends when the foregoing objectives have been achieved.

Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below, along with those used at the previous valuation:

	Funding Valuation	Sustainable Indexing Valuation
Investment Return	6.25% p.a. (same as previous valuation)	6.5% p.a. (same as previous valuation)
General Salary Increases	3.5% p.a. (same as previous valuation)	3.25% p.a. (same as previous valuation)
Seniority Salary Increases	Annual percentages varying by age and sex	Same
CPI Increases	2.75% p.a. (same as previous valuation)	2.5% p.a. (same as previous valuation)
Pension Indexing	▪ Future indexing of pensions and deferred pensions ignored, as will be covered by Inflation Adjustment Account ▪ Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.75% p. a. (same as previous valuation) ▪ Indexing to date is capitalized and forms part of pension liability	▪ Future indexing of pensions and deferred pensions at "Sustainable Indexing Rate" – This rate is calculated and is the primary output of this valuation ▪ Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.5% p.a. (same as previous valuation) ▪ Indexing to date is capitalized and forms part of pension liability
Asset Values	▪ Assets carried at smoothed market values ▪ Smoothed value restricted to a range of 92% to 108% of Market Value	▪ Assets carried at smoothed market values ▪ Smoothed value restricted to a range of 95% to 105% of Market Value
Costing Method	▪ Contributions are based on an entry-age funding approach	▪ Required contributions are based on an entry-age funding approach ▪ Contributions are set equal to the funding valuation basic normal cost plus IAA contributions.

More detail with respect to the above, detail with respect to other assumptions, and comparisons with assumptions and approaches in the previous valuation follow.

1. Actuarial Methods

The plan has been valued on a going-concern basis, which assumes that the plan will continue to operate indefinitely. The basis is used to estimate the funded position of the Plan, and to estimate the contributions required to be made to the Plan's fund.

The methodology used to calculate the valuation liabilities shown in the statement of actuarial position was as follows:

- The liability for current pensioners and active members was calculated by projecting the benefit payments to be made to those persons and to their eligible spouses using the actuarial assumptions described below and then discounting these projected payments to the valuation date at the investment return assumption.
- The liability for members currently receiving benefits from a long-term disability plan was calculated partly as if they would continue to earn service credits and ultimately receive a pension from the Plan, and partly as if they would again become contributing members of the Plan.
- The liability for the inactive group (including those entitled to deferred vested pensions) was calculated on the assumption that a proportion (based on present working status, contribution balance, length of credited service and date of last contribution) would again become contributing members of the Plan, and a further proportion (based on similar, but different, criteria) would collect deferred vested pensions.
- The liability for the remaining inactive members was calculated as twice their accumulated refund values.

In order to test the adequacy of the current contribution rates, we calculated the required member/employer contribution rate for current service in accordance with the entry-age actuarial cost method, based on the data for those members who joined the plan in the last three years prior to the valuation date and the actuarial assumptions described below. This method produces the level rate of the member/employer contributions sufficient to provide the benefits for the average future new entrants to the plan. The cost so determined is also referred to as the normal actuarial cost and is calculated on an aggregate basis for all entrants as a level percentage of salaries.

Groups 2 and 5 do not have enough new entrants in each group to base the normal cost on; we have therefore used the combined Group 2 and Group 5 new entrant profile in calculating the Group 2 and Group 5 normal cost.

The valuation assets consist of:

(i) The Basic Account;

(ii) The present value of future member and employer contributions at the entry-age normal cost rates, for the closed active group, for the basic non-indexed benefits; and

(iii) The present value of any existing amortization requirements established at previous valuations.

The funded position, including the present value of any previously established unfunded liability amortization requirements, is then considered. If the assets exceed the liabilities, then the difference between them gives rise to an actuarial surplus. If the liabilities exceed the assets, then there is an unfunded liability. Adjustments to the normal cost, sufficient to amortize the surplus or unfunded liability were then determined, as a percentage of salaries, as follows:

1) If the result is an unfunded liability amortize it over the 15 year period commencing January 1, 2020[1] (allowing for the one-year time lag required by the PBSA); and

2) If the result is a surplus (the result of a gain since the last valuation), apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. If, after removing all previously established amortization amounts there is still a surplus, amortize the remaining surplus over 25 years.

In calculating the required contribution rate for Group 5 when it was established, allowance needed to be made for the fact that initially members transferred from Group 2 and therefore entered the group at an age that was older than the assumed entry age. As a result, the value of the future contributions was less than the value of the future benefits to be earned and there was be an initial unfunded liability. This unfunded liability was taken into account in the 2009 valuation when calculating the Group 5 contribution rate and was amortized over 15 years from December 31, 2009 at a rate of 0.23% of Group 5 payroll. We assumed that the extra 0.23% amortization amount would continue at each subsequent valuation until it expires in 2024.The extra Group 5 amortization amount is now payable for 6 years.

The required contributions are the sum of the normal actuarial cost and the amount required to amortize the unfunded actuarial liability/surplus.

[1] We use an unadjusted 15 year rolling amortization period for the supplementary indexed valuation.

The contribution rates have to comply with the going concern funding requirements of the PBSA. This means that if there is an unfunded liability, it must be amortized over 15 years from one year after the date it is established as described above. If there is a surplus, the contribution rate may not be less than the normal cost, reduced by the rate that amortizes the surplus in excess of 5% of net liabilities over not less than 5 years.

The actuarial procedures applied in this valuation are substantially the same as those in the previous valuation.

2. Treatment of Member and Pensioner Data

Data as of December 31, 2018 were prepared by the Pension Corporation for 195,921 active members, 100,956 pensioners, 8,669 members receiving benefits from a long-term disability plan, 28,831 terminated members eligible for a vested pension, 14,298 other inactive members (including 3 on leave of absence) plus a further 265 non-retired individuals with very limited data, 40,547 active member terminations and 6,326 pensioner terminations during the period January 1, 2016 to December 31, 2018. The Pension Corporation advised us that the data supplied are generally proper, complete and in accordance with specifications, unless otherwise noted.

Where possible, we compared totals with corresponding details in the Plan's audited Annual Reports. We also subjected the data to a number of tests of reasonableness and consistency, including the following:

- A member's (and partner's, as applicable) age is within a reasonable range;
- A member's gender or date of birth did not change;
- A member joined the plan or commenced pension at a reasonable age;
- Accrued service increased by a reasonable amount (e.g. no more than 36 months since the last valuation and no more than 12 months in the valuation year);
- The salary level and the salary increase from the previous valuation was within a reasonable range;
- Pensions in pay increased by a reasonable amount (e.g. in line with the indexation since the last valuation); and
- We examined the additions to and deletions from each of the data files (i.e., the files for active employees, pensioners and terminated members) since the previous valuation to determine whether all Plan members were accounted for in this valuation, to check for duplicate records and to confirm pension amounts.

There were a number of discrepancies recorded during our examination of the data and we sought clarification of these from the Pension Corporation. Where necessary, we modified the data, our assumptions, or both, to compensate for these discrepancies.

Active Members

The active member data includes a number of individuals who work less than full time. For the purposes of calculating liabilities and normal actuarial costs, we treated all members as if they were full-time employees after the valuation date; however, in calculating the amortization costs as a percentage of total future salaries, we reduced the total salary base by 10% to reflect the part-time employment (the same adjustment was applied at the previous valuation).

The active member data included 7,979 persons who had no salary or service reported for 2018, or with a last-contribution-date prior to December 2018. We excluded them from the active member base, but have included them with the inactive group. For 3,333 of them (those with at least 3 years of service, contributions after 2016 and basic employee contributions with interest balances of at least $1,500), we held a liability calculated as if they were would be reactivated on January 1, 2019 (we set their salaries equal to the average salaries for active members in the same age-group category). For the remaining 4,646 persons (i.e. those not eligible to be reactivated), we held a liability equal to twice their basic employee contributions with interest balance. We excluded a further 7 active members from the valuation because of missing, invalid or inconsistent detail. Liabilities of twice their basic employee contributions with interest balance were held for these members. A similar approach was used in the previous valuation.

Salary details were inappropriate (missing, very low, or very high) for a further 415 active members. We assumed that these 415 members had the same average earnings as for other actives in the same age-group category.

In previous valuations, Group 3 active members (all female, and a count of 2 as of the 2015 valuation) were reported with Group 2 females. There are no longer any active Group 3 members as of this valuation, so references to Group 3 have been removed.

Members on Long-Term Disability

The liability for 8,378 of the members on long-term disability was calculated in two steps. We first calculated a liability as if these individuals would ultimately collect deferred vested pensions starting at age 62 for Group 1 and age 57 for Group 2 and 5 (both assumptions unchanged from 2015) with deferred pensions on the basis of service projected to retirement date (maximum 35 years) and the actual salaries indexed to the valuation date (where the actual salary detail shown for those members was inappropriate, we used the average salaries for active members in the same age-group category). We also calculated a liability as if these members would again become contributing members of the plan. In order to allow for the possibility of recoveries from disability we set the liability equal to 80% of the former figure plus 20% of the latter figure. This approach is unchanged from the previous valuation. We excluded 291 long-term disability members from the valuation because of missing, invalid or inconsistent detail. Liabilities of twice their basic employee contributions with interest balance were held for these members.

Terminated Members

We divided the 28,831 terminated members entitled to a vested pension into two classes:

(i) Those with missing, invalid or inconsistent detail, and

(ii) All other inactive members.

The liability for the 997 members in the first group was held as twice their basic employee contributions with interest balance. For the second group, we calculated liabilities on the assumption that 100% of these members would receive vested pensions. A similar approach was used in the previous valuation.

Inactive Members

We divided the 14,298 other inactive members into three classes:

(i) Those with missing, invalid or inconsistent detail, or whose basic employee contributions with interest balances were less than $1,500, or who had less than 3 complete years of service, or who did not contribute in 2017 or 2018, or who were known to have taken a refund after the valuation date;

(ii) Those whose basic employee contributions with interest balances were at least $1,500, and who are on leave of absence or who have returned to work after the valuation date; and

(iii) All other inactive members.

We calculated liabilities on the assumption that the first group would take immediate refunds and we held a liability equal to twice their basic employee contributions with interest balances, and that the 6 members in the second and third groups would be reactivated on January 1, 2019, with assumed average salaries equal to the average salaries for active members in the same age-group category. A similar approach was used in the previous valuation.

With respect to the 265 remaining non-retired members with limited data, we held a liability equal to twice their basic employee contributions with interest balance.

Of the total pensioner data, there were 177 members excluded from the valuation because they died prior to the valuation date with no outstanding guaranteed pensions due or they were in receipt of a remaining guarantee only which rounded to zero months remaining, and hence their liability is zero.

The data from the Pension Corporation and our treatment of this data is summarised below. Further details on the active member data, the new entrant groups on which our entry-age costs are based, the inactive member data and the pensioner data are summarized in Appendices C, D and E.

		Valuation Treatment						
	Pension Corp. Data	Pensioners with zero liability	Pensioners	Active Members	LTD	Vested	Re-activated	Refund 2 x CWI[1]
Pensioners	100,956	177	100,779					
Active Members	195,921			187,935			3,333	4,653
Long Term Disability (LTD)	8,669				8,378			291
Terminated Vested	28,831					27,834		997
Inactive members	14,298						6	14,292
Limited data	265							265
Total membership	**348,940**	**177**	**100,779**	**187,935**	**8,378**	**27,834**	**3,339**	**20,498**

3. Actuarial Assumptions

Investment Return and General Salary Increase Rates

Our actuarial valuation method involves projecting future benefit disbursements and contribution and investment income. In such projections, the most significant assumptions are those that are made for the future rates of return to be earned by the fund and future general salary increases (which are across-the-board increases applying to employees regardless of service, rank or position).

(a) Funding Valuation – excess interest threshold

The Funding Valuation investment return assumption is also significant for another reason. Since 1980, the provisions of the plan relating to the indexing of pensions provide that the income to be credited to the Inflation Adjustment Account in respect of pensions being paid is determined by reference to the amount in excess of the investment return anticipated in the most recent actuarial valuation. A decrease in the investment return assumption, and hence in the excess return threshold, would have at least two effects:

(i) It would increase the amount of excess investment return allocated to the IAA, and hence increase the potential for future indexing; and

(ii) It would increase the costs of the basic non-indexed plan, provided benefit levels are not changed.

An increase in the investment return assumption would have the opposite effects. In this context, the excess investment return threshold takes on benefit design connotations as well, and thus consistency in the assumptions, from one valuation to the next, takes on added significance.

[1] CWI = contributions with interest.

The previous valuation used a long-term investment return assumption of 6.25% per annum. As noted earlier, this also becomes the threshold rate used to determine excess investment return transfers to the IAA during the post-retirement period; effectively, this is the same as saying that the Basic Account will earn no more than 6.25% per annum during the post-retirement period.

(b) Actual returns and asset mix

We have calculated market value returns on the total fund (i.e. Basic plus IAA), including non-invested assets (i.e. receivables, net of payables), net of investment-related expenses, and assuming that all cash flows occur at mid year, as 5.9% for 2016, 11.0% for 2017 and 2.1% for 2018. At December 31, 2018, approximately 59% of the total portfolio was invested in equities (including private placements), a further 17% in real estate, and the balance of 24% in fixed income (including mortgages).

(c) Expected returns

After examining the net average investment return earned by the fund's investments, the yield on investments made in recent years, the likely future trend of investment returns in general, the investment practices, and the provisions of this Plan - e.g. the allocation of excess investment income to the Inflation Adjustment Account - we have concluded that a reasonable best estimate of the long term investment return on the plan's assets is 6.50% (no change from the previous valuation). We also concluded that a reasonable best estimate of the real return on the assets, i.e., the investment return in excess of inflation, is 4% (no change from the previous valuation).

In setting the Funding Valuation assumptions, it is necessary to reduce these expected returns by a margin, so that the resulting liabilities have a suitable provision for adverse deviations. Following discussions with the Board regarding the appropriate adjustments to the best estimate assumptions and taking into account the requirements of the Board's funding policy, for the purposes of this valuation we kept our long-term investment return assumption of 6.25% per annum. We also continued with our previous valuation assumption for the real return of 3.5%. In other words, there is a margin of 0.25% on the investment return assumption, and a margin of 0.5% on the real return assumption (no change in the margins compared to our previous valuation).

The following table shows the development of the investment return assumption:

	Discount rate
Weighted average return	6.35%
Diversification and rebalancing effect	0.30%
Passive investment management fees	(0.18%)
Active investment management fees	(0.14%)
Total investment management expenses	(0.32%)
Value added from active management	0.14%
Rounding	0.03%
Estimated net investment return before margin	**6.50%**
Margin for adverse deviation	(0.25%)
Discount return assumption (rounded to nearest 0.25%)	**6.25%**

To determine the going concern discount rate, our model determined expected long term capital market returns, standard deviations and correlations for each major asset class by using historic returns, current yields and forecasts. We then stochastically generated projected asset class returns for 5,000 paths over 30 years to create expected returns for each major asset class and applied these to the Plan's target asset mix.

For the purposes of establishing the discount rate used in this report, we have assumed that there will be no added-value returns from employing an active management strategy in excess of the associated additional investment management fees. The total investment expense allowance of 0.32% and the allowance for passive investment management fees of 0.18% were derived from estimates provided by BCI. The allowance for additional fees for active management (and our allowance for the value added from active management) is calculated as the difference between these two figures.

As the sustainable indexing target is not guaranteed, and the primary objective of the sustainable indexing approach is to improve intergenerational equity, it is not appropriate to include margins in the sustainable indexing basis. The Sustainable Indexing Valuation therefore assumed a nominal investment return of 6.50% and real investment return of 4.0%.

(d) Real return and salary relationships – derive salary assumption

The 6.25% investment return assumption used in the 2015 valuation was viewed as consisting of a real return component of about 3.50% per annum plus a long-term underlying inflation assumption of about 2.75% per annum. This can also be viewed as a best estimate of future inflation of 2.50% (derived from the best estimate nominal return assumption of 6.50% less the best estimate real return assumption of 4%), plus a margin for adverse deviations of 0.25%.

The general salary increase assumption used in the 2015 valuation was 3.50% per annum. This was viewed as consisting of the underlying inflation assumption of 2.75% per annum, plus a real salary increase component of 0.75% per annum. For this valuation, we continued with the real salary increase assumption of 0.75% and the general salary increase assumption of 3.50%. The real salary increase assumption of 0.75% consists of a best estimate of real salary increases of 0.50%, plus a margin for adverse deviations of 0.25%.

For the Sustainable Indexing Valuation, the general salary increase assumption is 3.25% per annum. This is made up of the best estimate inflation assumption of 2.5% plus real salary increase of 0.75%.

These assumptions are unchanged from the previous valuation. The impact of these assumptions on the valuation result is discussed further below.

(e) Impact of investment return and salary assumptions on valuation

During the **post-retirement period**, the excess investment return threshold is critical as this is the discount rate for the Basic Account post-retirement liabilities. It also sets the excess investment return threshold which puts a ceiling on the amounts the Basic Account can effectively earn on the portion of the assets that support post-retirement liabilities. For example, if the threshold is 6.25%, then, provided the long-term returns exceed 6.25% on average, all of the excess will be transferred to the IAA, i.e. the Basic Account will only retain 6.25% on these assets.

During the **pre-retirement period**, it is the relationship, i.e. the net difference, between the investment return and general salary increase assumptions that is the key, rather than their absolute levels - projected benefits increase each year by the salary assumption and are then discounted by the investment assumption, i.e. the net result is that the liabilities are effectively being discounted by the net difference between the two assumptions. For example, the long-term assumptions we have used in this valuation (i.e. 6.25% investment return, 3.50% salary, 2.75% underlying inflation) would produce results similar to those using assumptions of 6.50% investment return and 3.75% salary, with 3.00% underlying inflation; or 6.0% investment return and 3.25% salary, with 2.5% underlying inflation, etc. Thus, the underlying inflation assumption is not material to the result.

(f) Summary of interrelationships

The annual investment return and general salary increase assumptions, and their underlying economic interrelationships, are summarized below. These assumptions are unchanged from the previous valuation.

	Funding Valuation	Sustainable Indexing Valuation
	2015 and 2018	2015 and 2018
1. Investment return = excess investment return threshold	6.25%	6.50%
2. Real return rate	3.50%	4.00%
3. Implied underlying inflation = 1 - 2	2.75%	2.50%
4. Real salary increase	0.75%	0.75%
5. General salary increase = 3 + 4	3.50%	3.25%

(g) Salaries

The 2018 valuation data indicates that average annual earnings increased by about 5.0% from mid-2015 to mid-2018 (i.e. about 1.6% per annum), as compared with an expected increase of about 10.9% (i.e. about 3.50% per annum) on the basis of the assumptions used in the 2015 valuation.

The input data salaries provided to us for this valuation were the actual earnings during 2018. We took them without further adjustment as being equal to the salary rates on the valuation date (this may slightly understate the actual salary rates at the valuation date). Thereafter, the assumed rates of salary increase are applied continuously during each future year.

(h) YMPE increase

We also assumed that the YMPE under the Canada Pension Plan would increase at the general salary increase rate (3.50% per year for the Funding Valuation, 3.25% per year for the Sustainable Indexing Valuation) from its 2019 level of $57,400. In the previous valuation we assumed that the YMPE would increase at the same rate of 3.50% per year for the Funding Valuation and 3.25% per year for the Sustainable Indexing Valuation from its 2016 level of $54,900.

Pension Indexing

(a) Basic Funding Valuation

Indexing adjustments on and after January 1, 1982 are on an annual basis and are limited to those amounts that can be appropriately financed by the balances available in the Inflation Adjustment Account. Thus we do not need to allow for future indexing in our calculations as the costs of this indexing are currently fixed at 1.53% of salaries (1.95% for group 5) to be paid by each of the members and the employers, effective January 1, 2019, less amounts paid for post-retirement group benefits for pensioners. With respect to indexing adjustments granted through December 31, 2018, the present values have been included in the actuarial liabilities for pensions in the course of payment and thus form part of the determination of the recommended contribution.

As in the previous valuation, we ignored the future pre-retirement escalation that applies to vested pensions, since the cost of this "indexing" is also charged to the Inflation Adjustment Account.

With regard to the vested pensions of members who have terminated employment, the amounts of deferred pensions quoted to us include indexing during the deferred period to date. We understand that such transfers to the Basic Account from the Inflation Adjustment Account do not occur until retirement (theoretically, such transfers should be made on an annual basis as the indexing occurs, so as to reduce the inter-generational transfer of the costs of such indexing). We have therefore adjusted the deferred pension amounts to remove this indexing, so that the Basic Account Liability is aligned with the allocation of assets between the Basic and IAA accounts. We made the same adjustment in the previous valuation.

The indexing of salaries before retirement in the case of members on long-term disability is, on the other hand, a charge to the Basic Account rather than to the Inflation Adjustment Account. Accordingly, in valuing the deferred pensions for those currently on long-term disability, we have made an allowance for this by applying an escalation assumption (at the full underlying inflation assumption) of 2.75% per annum during the deferral period to retirement.

(b) Sustainable Indexing Valuation

All current and future pensions are assumed to increase at the sustainable indexing level.

For those on long term disability, we allow for escalation in the deferral period at a rate of 2.5% per annum, which equals the best estimate assumption for inflation. In other words, for the sustainable indexing valuation, the escalation assumption does not include the 0.25% margin taken into account in the funding valuation.

Asset Values

The fund's annual reports record assets on a market value basis. We relied on these annual reports for the asset values used for the years ending December 31, 2016 to December 31, 2018.

Following the December 31, 2015 valuation, in line with the JTA, a Rate Stabilization Account (RSA) was established in the amount of $1.927 bn. Interest is applied to the RSA based on the smoothed one year fund return. The JTA is capped at a maximum of $2.5 bn. The RSA is excluded from the Funding and Sustainable Indexing valuations. It can be drawn down as needed to stabilize the contribution rate.

As in the previous valuations, we applied a five year smoothing technique to these assets. We believe a smoothing approach is appropriate as it cushions the actuarial valuation results against the dramatic swings in market value which can occur.

To obtain the unconstrained smoothed value, we first determine the actual return on the basis of market values during the year (taking into account the timing of non-investment related cashflows i.e. the net contributions minus benefits and non-investment expenses). We then determine an assumed return for the year at a rate equal to the assumed underlying real return rate plus the year-over-year change in the consumer price index. The difference between the two returns is then spread over a five year period, recognizing one-fifth of it in each of the current and four succeeding years. This approach effectively spreads the difference between (a) the total investment return (including both realized and unrealized capital changes) and (b) a hypothetical return based on a long-term real return rate, over a five year period.

(a) Funding Valuation Assets

The smoothed value is then restricted to a range of 92% to 108% of market value, if necessary (the same range was applied in the previous valuation). This means that in periods of significant market decline (growth) the smoothed value does not become too large (low) relative to the market value - effectively the constraint accelerates recognition of very poor (strong) market returns and allows the contribution rate to more appropriately reflect the actual returns earned by the plan. This lower constraint of 92% applied as at December 31, 2015.

The application of this approach to the total fund yields the following results:

Total Fund Smoothing

	2016	2017	2018
1. Dec-over-Dec increase in CPI	1.5%	1.9%	2.0%
2. Base return = (1) + 3.5%	5.0%	5.4%	5.5%
Year-end asset values – $000's			
3. Market value	46,361,498	51,548,502	52,784,249
4. Smoothed value	43,631,150	48,191,814	52,172,083
5. Ratio of (4) ÷ (3)	0.941	0.935	0.988
Annual returns			
6. Market value	5.9%	11.0%	2.1%
7. Smoothed value	8.3%	10.3%	7.9%

Using the relationship between the market and adjusted values shown in line 5 above, and applying this relationship to the Basic Account and Inflation Adjustment Account balances we get:

Year end asset values – $000's

Basic Account including RSA	2016	2017	2018
8. Market value	39,336,667	43,144,870	44,075,868
9. Smoothed value	37,020,029	40,335,402	43,564,698
10. Ratio of (9) ÷ (8)	0.941	0.935	0.988
Retirement Annuity Account			
11. Market value	422,952	413,921	411,297
12. Smoothed value	398,044	386,968	406,527
13. Ratio of (12) ÷ (11)	0.941	0.935	0.988
Inflation Adjustment Account			
14. Market value	6,601,879	7,989,711	8,297,084
15. Smoothed value	6,213,077	7,469,444	8,200,858
16. Ratio of (15) ÷ (14)	0.941	0.935	0.988
RSA			
17. Market Value and Smoothed Value	2,086,957	2,301,734	2,484,540
Basic Account excluding RSA			
18. Market value	37,249,710	40,843,136	41,591,328
19. Smoothed value	34,933,072	38,033,668	41,080,158

b) Sustainable Indexing Valuation Assets

As mentioned previously, a primary reason for using a sustainable indexing approach is to improve intergenerational equity. Intergenerational equity would be best served by using best estimate assumptions (as we are doing) and not smoothing the assets. However, an important secondary objective is to attempt to stabilise the indexing target over time. This secondary objective is aided by smoothing the assets. In discussion with the Board, it was concluded that using a best estimate basis together with a low smoothing limit would provide a suitable balance between these two objectives. Accordingly, in our assessment we have used the five year smoothed value of assets, restricted to a range of 95% to 105% of the market value of assets. This lower constraint applied as at December 31, 2015 where the smoothed assets for the sustainable indexing purposes were capped at 95% of market value.

Mortality

A key demographic assumption is the longevity of the plan members. For this valuation, Club Vita Canada's 2017 VitaCurves were used, with generational projection using the CPM-B improvement scale. VitaCurves are baseline mortality rates that vary by member based on their individual longevity characteristics and have been developed using a generalized linear modelling framework. The 2017 VitaCurves have been calibrated based on Club Vita Canada's longevity dataset for the years 2013 to 2015 and thus an appropriate base year is 2014. Improvements in baseline mortality from 2014 to the calendar year of determination are projected based on each member's year of birth.

Club Vita Canada's longevity dataset is composed of a subset of registered pension plans across Canada, and includes plans covering a range of industries in both the private and public sector. Club Vita Canada's 2017 VitaCurves have been developed based on longevity experience consisting of 1.65 million exposure years and 44 thousand deaths over 2013 to 2015, and vary by the following longevity factors:

- Gender;
- Pensioner type – pensioner or surviving spouse;
- Disability status at retirement for pensioners – disabled or non-disabled pensioner;
- Postal code-based lifestyle/longevity group – five groups for each of males and females;
- Affluence as measured by pension amount or earnings – there are three pension bands for males and females, while there are four earnings bands for males and three for females; and
- Occupation type – currently or formerly employed in a blue or white collar occupation.

Given that the availability of longevity factors varies by plan, and also by members within a plan, the 2017 VitaCurves are calibrated based on different combinations of the factors outlined above, resulting in just over 300 baseline mortality tables. The best VitaCurve is assigned to each individual member based on the longevity factors available for that member.

An aggregate ill health VitaCurve is assigned for all current active disabled members, for pensioners who retired on account of disability, and after incidence of disability for those assumed to become disabled in the future.

For deferred vested pensions, mortality was ignored during the deferral period before retirement. The same assumption was used in the previous valuation.

In the previous valuation, the incidence of mortality both prior to (with the exception of deferred vested members, as noted above) and after retirement (other than employees retired on account of disability) was assumed to be in accordance with 105% for males of the rates in the 2014 Public Sector Mortality Table (CPM2014Publ), and 90% for females below age 80 and 100% for females age 80 and over of the rates of CPM2014Publ, all projected using CPM Improvement Scale B (CPM-B). For Employees retired on account of disability we used 75% for males and 70% for females of the mortality rates (applicable in 2012) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011.

The change in mortality rates was made to better reflect the member specific mortality expected for Plan members.

Withdrawal

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period January 1, 2016 to December 31, 2018 and compared this with the experience observed and the rates used for previous valuations. The observed rates for Group 1 females in the second and third years of service were slightly lower than those assumed in the previous valuation, while the observed rates for Group 1 males after 3 years of service were slightly higher than assumed in the previous valuation. As a result, we have made modest changes to the withdrawal rates used for the previous valuation, by adopting the following multiples of those rates.

Multiples applied to 2015 Rates

	In the first 3 years of service			After 3 years of service
	1st year	2nd year	3rd year	
Group 1 males	100%	100%	100%	105%
Group 1 females	100%	95%	95%	100%
Group 2 & 5	100%	100%	100%	100%

Sample withdrawal rates are shown in the following tables.

A. Withdrawal Rates Applicable in the First 3 Years of Service (including terminations from disability)

Age at entry	2015 valuation			2018 valuation		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year
Group 1 Males						
20	.155	.143	.119	.155	.143	.119
30	.103	.106	.090	.103	.106	.090
40	.074	.069	.056	.074	.069	.056
50	.067	.056	.041	.067	.056	.041
Group 1 Females						
20	.122	.128	.114	.122	.122	.108
30	.103	.112	.082	.103	.106	.078
40	.059	.057	.050	.059	.054	.048
50	.059	.057	.039	.059	.054	.037
Group 2 & 5						
20	.026	.022	.019	.026	.022	.019
30	.019	.014	.011	.019	.014	.011
40	.009	.007	.006	.009	.007	.006

B. Withdrawal Rates Applicable After 3 Years of Service

Attained age	2015 valuation			2018 valuation		
	Group 1 Males	Group 1 Females	Group 2 & 5	Group 1 Males	Group 1 Females	Group 2 & 5
23	.086	.115	.014	.090	.115	.014
33	.049	.049	.008	.051	.049	.008
43	.026	.029	.005	.027	.029	.005
53	.016	.018	-	.017	.018	-

The withdrawal rates we have used do not extend past 10 years below the normal retirement age for each group.

Disability

The Plan provides for either the payment of a disability pension from the Plan or, for members receiving long-term disability benefits, the continued accrual of pension benefits. We examined the combined experience of members going on disability pensions and on long-term disability and made slight adjustments to the rates from those used in the previous valuation, resulting in a marginal decrease for Group 1 females. Since most members receive continuing disability service credits rather than an immediate pension, we have continued to value the disability cost for active members as a deferred pension (indexed before retirement) with continued accrual of service, rather than as an immediate pension. Based on an examination of those now retired who had, prior to retirement, been in receipt of disability service credits, we assumed that the deferred pensions would commence at age 62 for Group 1 and at age 57 for Groups 2 and 5 (or immediately, for those older than these ages). The same age 62 and 57 assumptions were made in the 2015 valuation.

Sample disability rates are shown in the following table. No direct allowance is made for the possibility of an individual recovering from disability prior to retirement.

Age	2015 valuation			2018 valuation		
	Group 1 Males	Group 1 Females	Group 2 & 5	Group 1 Males	Group 1 Females	Group 2 & 5
25	.0003	.0001	.0001	.0003	.0001	.0001
35	.0003	.0013	.0001	.0003	.0012	.0001
45	.0021	.0041	.0009	.0021	.0040	.0009
55	.0069	.0112	.0029	.0069	.0109	.0029

The rates used for this valuation are 180% for Group 1 males, 185% for Group 1 females and 75% for Groups 2 and 5 of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011. The 2015 valuation used the same assumptions, with the exception of Group 1 females where 190% of the relevant rates was assumed.

Retirement

We examined the 2016-2018 retirement experience of members retiring from active service and compared this with the experience observed in our previous analyses of the retirement rates and with the rates used in the previous valuation. In general, the actual experience is reasonably consistent with the assumption used in the previous valuation; in most cases, actual experience was slightly lower. We gave partial recognition to the observed experience by adopting modest reductions to some of the rates previously used for retirement.

The rates used in this and the previous valuation, are as follows, with the changes shown in bold:

Normal Retirement Age = 65

Age	Service	2015 valuation		2018 valuation	
		Group 1 Males	Group 1 Females	Group 1 Males	Group 1 Females
For unreduced retirement pensions					
55-59	rule-of-90	.53	.48	.53	.48
60	10	.40	.43	**.35**	**.41**
61	10	.20	.22	.20	.22
62	10	.20	.23	.20	.23
63	10	.20	.22	.20	.22
64	10	.23	.24	.23	**.22**
65	0	1.00	1.00	1.00	1.00
For reduced early retirement					
55-59	at least 10 years, but age plus service add to less than 80	.04	.07	**.03**	**.06**
55-59	age plus service add to at least 80	.09	.11	.09	**.10**

Normal Retirement Age = 60

Age	Service	2015 valuation	2018 valuation
		Group 2 and 5	Group 2 and 5
For unreduced retirement pensions			
50-54	rule-of-80	.20	**.24**
55	10	.24	.24
56	10	.23	.23
57	10	.30	**.28**
58	10	.33	**.31**
59	10	.55	.55
60	0	1.00	1.00
For reduced early retirement			
50-54	at least 10 years, but age plus service add to less than 75	.05	**.04**
50-54	age plus service add to at least 75	.07	**.06**

Although pensions are available with less than 10 years of service, we have continued to apply the retirement rates before age 65 (60) only to those with 10 or more years of service, on the assumption that those with fewer than 10 years would not retire until the normal retirement age.

As for the previous valuation, we assumed that all deferred vested members at the valuation date will retire at age 60 for Group 1 (55 for Group 2 and 5), or immediately if older than 60, and that members terminating service in future will subsequently retire at age 55 for Group 1 (50 for Group 2 and 5).

Seniority Salary Scales

Seniority salary increases are in addition to the general salary increases and are intended to reflect increasing seniority, recognition of merit and promotion. We examined the seniority salary scales based both on the earnings history of the active members during the 3 year period ended December 31, 2018 and on the graduated average salaries of the active members as of December 31, 2018, and compared these with the experience observed and rates used in the previous valuation. Based on these investigations we decided to continue with the previous salary scales.

The annual seniority increases are assumed to reduce with age. Sample seniority increase assumptions at key ages are shown below. The assumptions represent the assumed seniority increase in the next year.

Age	2015 and 2018 valuations			
	Group 1 Males	Group 1 Females	Group 2 & 5 Males	Group 2 & 5 Females
25	.019	.022	.026	.034
35	.014	.011	.011	.008
45	.005	.007	.009	.002
55	.002	.003	.008	.001
60	.000	.001	.000	.000
65	.000	.000	n/a	n/a

Proportion of Eligible Terminating Members Electing a Vested Pension

Following the introduction of the new PBSA effective September 30, 2015 which requires that a vested pension is payable for all service, we have valued all terminations as vested pensions. This is unchanged from the previous valuation.

Proportion of Members Married at Death

We assumed that the surviving spouses of all vested members who die after their earliest retirement age would opt to take the commuted value of the pension earned to the date of death. As the benefit is the same regardless of marital status, the proportions of members assumed to be married at death are irrelevant for this valuation. The same assumption was made in the previous valuation.

Growth of Active Municipal Population

We assumed in all the actuarial projections that there would be no future growth or decline in the Municipal population. The same assumption was made in the previous valuation.

Expenses

In previous valuations, the administration expenses comprised of the sum of the administrative expenses paid out of the Municipal fund (which was an allowance of 0.43% of salaries as of the 2015 valuation), plus an allowance for Medical Services Plan (MSP) premium assistance for pensioners which was carved out of the incoming employer Basic Account contributions, and was paid through the Supplemental Benefits Account (which was an allowance of 0.41% of salaries as of the 2015 valuation). The total, rounded, allowance in the 2015 valuation was 0.85% of salaries.

Following confirmation that the BC government will eliminate MSP premiums effective January 1, 2020, we removed any allowance for them in the administration expenses. The actual administration expenses (not including the MSP allowance) was 0.45%, 0.41% and 0.45% of salaries for 2016, 2017 and 2018 respectively. Projected administration expenses provided by the Pension Corporation for the next three years anticipate that administration expenses will increase to approximately 0.47% of salaries for the next three years. Accordingly, we have reduced the total expense provision included as part of the normal actuarial costs in the determination of the required contribution rates under the entry-age funding method from 0.85% of salary used in the previous valuation to 0.47% of salary, a reduction of 0.38% of salaries. This total reduction is comprised of a reduction in the allowance of 0.41% of salaries due to the elimination of the MSP premiums, and a small increase in the allowance for future administrative expenses of 0.03% of salaries. We also included a provision for the present value of expenses in the statement of actuarial position. The same approach was used in the previous valuation.

As before, the investment management fees are excluded from our analysis above and from the expense provision we have made as they are reflected in the long term investment return assumption.

Refunds

As with the previous valuation, we have continued to value all active terminations as vested pensions, and so the interest assumed to be earned in the future on member contributions continues to be irrelevant for this valuation.

Recognition of Child-Rearing Periods for Pension Eligibility

We continued to assume that this would only affect female members, and that, on average, it would increase the member's contributory service (which is used for determining pension eligibility) by 2 years; there would, of course, be no increase to the member's pensionable service (which is used for determining pension amounts). The impact of this would be to reduce the eligibility requirement for unreduced pensions between ages 55 and 59, from a rule-of-90 to a rule-of-88 (Group 1 females; for Groups 2 and 5 females, at ages 50 to 54, to a rule-of-78), and we assumed that there would be no impact on the eligibility assumptions made for other benefits. The same assumption was made in the previous valuation.

Plan Termination

The Standards of Practice issued by the Canadian Institute of Actuaries generally require that a valuation report include a hypothetical wind-up valuation which reports on the funded status of a pension plan if it were to be wound up on the calculation date. However, this is not required if the plan does not define the benefits payable upon wind-up.

Schedule A of the Public Sector Pension Plans Act, which sets out the governing framework under joint trusteeship does not address wind-up, and neither do the plan rules, therefore the benefits on wind-up are not defined. Accordingly, as with previous valuations, we make no comment on the financial position of the plan if were to be wound up.

Funding Valuation: Fully Indexed Valuations – Assumption Changes

We made the following changes to the assumptions when doing the fully indexed valuations:

- We combined the assets in the Basic and Inflation Adjustment Accounts, using a smoothed asset value of $49,281,016,000, net of the assets in the RSA;
- We applied an indexing assumption equal to the full assumed underlying inflation rate, i.e. 2.75% per annum. This indexing rate was applied both to pensions after retirement and during the pre-retirement period in the case of deferred vested pensions and disability salary accruals. We loaded the pensions in pay by 2.1% to cover the actual January 1, 2019 indexing increase. The indexing is applied annually, in arrears; and

- We combined the contribution rates to Basic and IAA, i.e. we assumed a total member contribution rates of 8.47% + 1.53% = 10% for Groups 1/2 and 9.99% + 1.95% = 11.94% for Group 5, integrated with the CPP (i.e. reduced by 1.5% of salaries below the YMPE). The employer contributions of 1.53% for Group 1/2 and 1.95% for Group 5 to the IAA were reduced by 0.8% to account for the carve-out of the non-pension (EHB and Dental) benefits. The 0.8% carve-out was based on the Board's funding policy that no more than 0.8% of the employers' IAA contributions (excluding the extra 0.42% contribution for Group 5) would be available to pay for post-retirement group benefits. A similar approach was used in the previous valuation.

Funding Valuation: *ITA* Maximum Pension Rule – Assumption Changes

As noted earlier, we have not applied the *ITA* maximum pension rules when doing the primary Basic and Basic-plus-Indexed valuations. We have applied them, as described below, when doing the supplementary valuations with pensions limited to the *ITA* maximums.

The maximum annual pension currently permitted (in 2019) under the income tax rules is the lesser of:

(i) $3,025.56 multiplied by the years of service; and

(ii) 2% multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

While the Plan applies the *ITA* limits only in respect of service after 1991, we have, for ease of calculation, assumed that this limit applies on all service; this assumption does not affect the future normal costs, but the accrued liabilities will be slightly understated. The Plan also imposes a 35 year cap on accruals at the above maximum rate, which we have applied.

For an individual in this Plan to be currently affected by the $3,025.56 maximum the final average salary must be very high and while current salaries are not such as to cause many problems, the salaries projected in the future through application of the assumed salary increase rates outlined above are such that some individuals would be limited. However, under the income tax rules, the flat $3,025.56 limit is automatically indexed each year after 2019 in accordance with increases in the average wage. Accordingly, we have applied a 3.5% per annum increase to the $3,025.56 limit after 2019. (At the previous valuation the corresponding dollar limit was $2,890 in 2016, and after 2016 was assumed to increase by the average wage increase of 3.5%.)

As with the previous valuation, in the tax-limited results, we valued the deferred vested pensions not yet in pay, in full, as provided to us, i.e. we were unable to carve out any "excess" portions. Supplemental pensions in pay were carved out.

Appendix C: Active Member Data as at December 31, 2018

Age group[1]	Active members December 31, 2018[2]			New entrants Jan 1, 2016 to Dec 31, 2018 and still active	
	Number	Average annual earnings[3] $	Average service (years)	Number	Average annual earnings[3] $
Group 1 (males - normal retirement age = 65)					
18-19	10	48,475	0.2	77	51,702
20-24	647	53,417	0.9	896	56,072
25-29	2,955	58,769	1.9	1,667	60,797
30-34	4,845	65,341	3.6	1,482	65,969
35-39	5,570	69,312	5.5	1,165	66,459
40-44	5,921	71,747	7.3	905	68,631
45-49	6,463	72,179	9.6	724	69,467
50-54	6,844	71,468	12.6	567	66,562
55-59	7,256	70,442	14.8	377	66,343
60 & over	5,977	68,386	14.8	180	68,534
Total	**46,488**	**69,086**	**9.5**	**8,040**	**64,460**
Group 1 (females - normal retirement age = 65)					
18-19	14	47,284	0.2	200	46,435
20-24	1,967	51,468	0.8	3,285	55,895
25-29	10,817	59,052	1.9	4,621	58,078
30-34	15,709	64,290	3.6	3,114	59,782
35-39	16,701	66,233	5.1	2,590	58,723
40-44	16,758	65,278	6.5	2,100	56,633
45-49	18,389	64,083	8.3	1,705	57,122
50-54	19,282	62,682	10.8	1,194	56,323
55-59	19,722	61,681	12.8	692	54,547
60 & over	14,953	60,021	13.3	232	56,343
Total	**134,312**	**62,926**	**8.1**	**19,733**	**57,463**
Total Group 1	**180,800**	**64,510**	**8.4**	**27,773**	**59,489**

[1] Age nearest birthday at December 31, 2018 for actives and at entry for new entrants.

[2] In total, 7 actives excluded because of invalid data; 7,979 actives included with inactive data.

[3] Actual earnings in 2018 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

Age group[1]	Number	Active members December 31, 2018[2] Average annual earnings[3] $	Average service (years) with 2% benefit rate	Average service (years) with 2.33% benefit rate
Group 5 (males – normal retirement age = 60)				
20-24	35	69,699	0.1	1.1
25-29	377	79,834	0.3	2.3
30-34	824	90,762	1.3	4.2
35-39	1,000	97,646	3.5	5.4
40-44	1,000	104,206	6.9	6.2
45-49	1,216	112,261	11.0	6.2
50-54	935	119,778	15.3	6.3
55 & over	498	124,490	18.3	6.1
Total males	**5,885**	**105,297**	**8.2**	**5.5**
Group 5 (females – normal retirement age = 60)				
20-24	11	61,011	0.2	0.8
25-29	107	79,385	0.4	2.4
30-34	141	89,641	1.1	4.2
35-39	139	96,688	3.5	5.4
40-44	162	102,992	5.9	6.2
45-49	169	108,221	10.3	6.5
50-54	135	114,061	12.9	6.9
55 & over	45	115,350	14.9	6.4
Total females	**909**	**99,898**	**6.4**	**5.4**
Total Group 5	**6,794**	**104,575**	**8.0**	**5.5**

[1] Age nearest birthday at December 31, 2018 for actives and at entry for new entrants.

[2] In total, 7 actives excluded because of invalid data; 7,979 actives included with inactive data.

[3] Actual earnings in 2018 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

Age group[1]	Active members December 31, 2018[2]			New entrants Jan 1, 2016 to Dec 31, 2018 and still active Groups 2 and 5 combined	
	Number	Average annual earnings[3] $	Average service (years)	Number	Average annual earnings[3] $
Group 2 (males – normal retirement age = 60)					
20-24	3	56,733	1.1	108	72,545
25-29	17	54,537	1.2	259	75,045
30-34	34	76,509	4.0	191	77,628
35-39	47	83,756	7.2	68	77,948
40-44	48	93,007	10.7	17	87,622
45-49	71	99,891	14.2	20	104,272
50-54	53	104,653	15.6	12[4]	97,525
55 & over	47	97,787	16.9	-	-
Total males	**320**	**91,670**	**11.4**	**675**	**77,251**
Group 2 (females – normal retirement age = 60)					
20-24	5[5]	61,180	3.0	35	66,837
25-29	-	-	-	46	76,728
30-34	-	-	-	23	75,224
35-39	5[6]	60,309	0.6	15	78,011
40-44	-	-	-	6	87,480
45-49	4	88,422	17.5	-	-
50-54	4	66,471	15.1	-	-
55 & over	3	79,300	12.7	5[7]	71,327
Total females	**21**	**69,758**	**8.9**	**130**	**74,235**
Total Group 2	**341**	**90,320**	**11.2**	**805**	**76,764**
Total – All groups	**187,935**	**66,005**	**8.6**	**28,578**	**59,975**

Average age of the 187,935 actives is 45.6.

[1] Age nearest birthday at December 31, 2018 for actives and at entry for new entrants.

[2] In total, 7 actives excluded because of invalid data; 7,979 actives included with inactive data.

[3] Actual earnings in 2018 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

[4] 2 Males age 55 & over are included in this group due to privacy.

[5] 3 Females age 30-34 are included in this group due to privacy.

[6] 2 Females age 40-44 are included in this group due to privacy.

[7] 4 Females age 45-49 are included in this group due to privacy.

A comparison of the December 31, 2018 active membership with the December 31, 2015 active membership is as follows:

	Group 1 Males	Group 1 Females	Group 2	Group 5
At December 31, 2018				
- Number	46,488	134,312	341	6,794
- Proportion of total	24.7%	71.5%	0.2%	3.6%
- Average age (at 12.31)	46.4	45.4	44.5	42.4
- Average service	9.5	8.1	11.2	13.5
- Average salary	$69,086	$62,926	$90,320	$104,575
At December 31, 2015				
- Number	42,815	123,713	539	6,358
- Proportion of total	24.7%	71.3%	0.3%	3.7%
- Average age (at 12.31)	47.0	46.0	44.3	42.2
- Average service	9.9	8.2	12.4	13.4
- Average salary	$66,441	$59,900	$87,701	$98,702
Change 2015 to 2018				
- Number	+8.6 %	+ 8.6%	-36.7%	+6.9%
- Proportion of total	No change	+0.2%	-0.1%	-0.1%
- Average age	- 0.6 years	- 0.6 years	+ 0.2 years	+ 0.2 years
- Average service	- 0.4 years	- 0.1 years	- 1.2 years	+ 0.1 years
- Average salary	+ 4.0 %	+ 5.1 %	+ 3.0 %	+ 6.0 %

The above comparison indicates an increase in the covered membership during the three year inter-valuation period of 8.4% in total. The proportion of females increased slightly. The average ages have increased for Groups 2 and 5 and decreased for Group 1. As expected, the shift in membership from Group 2 to Group 5 continued.

A comparison of the new entrant subset used at December 31, 2018 with that used at December 31, 2015 in determining the entry-age normal costs, is as follows:

	Group 1 Males	Group 1 Females	Groups 2/5
At December 31, 2018			
- Number	8,040	19,733	805
- Proportion of total	28.1%	69.1%	2.8%
- Average age at entry	36.6	34.9	30.3
- Average salary	64,460	57,463	76,764
At December 31, 2015			
- Number	5,984	14,804	597
- Proportion of total	28.0%	69.2%	2.8%
- Average age at entry	37.5	35.1	30.4
- Average salary	$62,032	$54,957	$71,116
Change 2015 to 2018			
- Number	+34.4%	+33.3%	+34.8%
- Proportion of total	+0.1%	-0.1%	No change
- Average age	-0.9 years	-0.2 years	-0.1 years
- Average salary	+3.9%	+4.6%	+7.9%

There is a significant increase in the number of new entrants in the 2018 subset compared to the 2015 for all groups. For all Groups, the average salary has increased, and the average age of new entrants has decreased.

Appendix D: Inactive Member Data as at December 31, 2018

1. Inactive Members Assumed Reactivated on Valuation Date

Age group[1]	Group 1 (males)			Group 1 (females)		
	Number	Average annual earnings[2]	Average service (years)	Number	Average annual earnings[2]	Average service (years)
29 and below	25	59,271	3.2	120	59,725	3.2
30-34	56	66,031	4.9	526	64,574	4.5
35-39	88	69,389	5.7	580	66,221	5.9
40-44	88	71,671	7.5	375	65,416	7.0
45-49	68	72,131	8.2	318	64,081	8.0
50-54	82	71,475	10.1	325	62,687	9.5
55-59	79	70,621	12.5	294	61,678	9.9
60 & over	78	68,239	13.2	219	59,888	9.9
Total	**564**	**69,611**	**8.7**	**2,757**	**63,864**	**7.1**

Group[1]	Number	Average annual earnings[2]	Average service (years) with all benefit rate	Average service (years) with 2.33% benefit rate
Group 2 / 5 males	9	110,093	15.0	5.0
Group 5 females	9	100,480	11.7	5.7

	Number	Average Age	Average annual earnings[2]	Average service (years)
Total – All Groups	**3,339**	**44.0**	**65,058**	**7.4**

[1] Age nearest birthday at December 31, 2018.

[2] Assumed same earnings as for active members in same age-group category.

2. Members on Long-Term Disability with Projected Deferred Pensions

Age group[1]	Males		Females	
	Number	Average annual deferred pensions[2]	Number	Average annual deferred pensions[2]
29 & below	6	27,322	40	25,104
30-34	26	25,673	198	28,048
35-39	52	28,135	291	28,093
40-44	86	24,952	495	23,466
45-49	134	25,431	787	20,656
50-54	231	23,251	1,171	19,056
55-59	383	18,610	1,830	17,118
60 & over	457	16,218	2,191	14,372
Total	**1,375**	**20,188**	**7,003**	**18,240**

	Number	Average age	Average annual deferred pensions[2]
Total males & females	**8,378**	**54.1**	**18,560**

	Number	Average age	Average pensionable service	Average salary	Expected average remaining Service life
Active and LTD Combined	**196,313**	**45.9**	**8.9**	**65,677**	**10.1**

[1] Age nearest birthday at December 31, 2018.

[2] Basic lifetime portions assumed payable from age 62; males include 30 Group 2/5 members and females include 13 Group 2/5 members with pensions assumed to commence from age 57; additional temporary pensions are payable to age 65.

3. Other Inactive Members Entitled to Vested Pensions and Not Assumed Reactivated

Age group[1]	Males			Females		
	Average annual vested pensions			Average annual vested pensions		
	Number	Initial[2]	Offset at age 65	Number	Initial[2]	Offset at age 65
25-29	462	1,329	441	1,298	1,170	386
30-34	741	2,860	897	2,009	2,465	786
35-39	926	4,514	1,291	2,498	3,645	1,099
40-44	997	5,453	1,494	2,663	4,603	1,335
45-49	1,301	7,157	1,886	3,107	5,573	1,598
50-54	1,442	9,452	2,392	3,312	7,089	1,989
55-59	1,203	8,730	2,267	2,819	6,720	1,904
60 & over	912	7,147	1,880	2,144	5,741	1,672
Total	**7,984**	**6,552**	**1,741**	**19,850**	**5,032**	**1,455**

	Number	Average age	Average annual vested pension - initial	Average annual vested pension - Offset at age 65
Total males & females	**27,834**	**46.6**	**5,468**	**1,537**

4. Remaining Inactive Members

	Number	Average age	Member contributions with interest
Valued at 2 x contribution with interest	20,498[3]	50.5	$92,143,076

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[1] Age nearest birthday at December 31, 2018.

[2] These pensions are assumed to commence at the first age at which the member is entitled to an unreduced pension, assuming no earlier than age 60(55) i.e. at various ages between 60(55) and 65(60).

[3] Includes 7 active, 291 disabled and 997 vested members with invalid data.

Appendix E: Pensioner Data at December 31, 2018

1. Former Contributors

Age group[1]	Number of pensioners[2]	Annual Pensions ($000's)[3]				
		Single life	Joint life & survivor	Joint life & survivor with guarantee	Single life with guarantee	Temporary life
Male pensioners						
Less than 50	4	12	45			
50-54	99	-	1,603	1,979	1,155	1,113
55-59	1,806	935	25,018	13,761	12,238	19,076
60-64	5,263	7,785	62,966	31,180	32,781	55,958
65-69	7,001	20,965	83,395	25,585	30,279	6,447
70-74	5,947	31,468	75,384	10,034	15,325	3
75-79	3,479	26,202	45,114	876	2,894	1
80-84	2,149	20,835	21,023	20	83	-
85-89	1,275	13,850	8,191	-	-	-
90-94	568	7,026	2,745	-	-	-
95 & over	139	2,413	487			
Total	**27,730**	**131,491**	**325,971**	**83,435**	**94,755**	**82,598**
Female pensioners						
Less than 50	19	52	59	-	92	1
50-54	89	116	251	146	993	264
55-59	3,579	1,531	13,346	9,763	20,806	23,582
60-64	12,136	16,584	47,407	31,493	77,162	90,574
65-69	18,027	59,636	64,217	28,700	95,568	11,903
70-74	14,781	91,079	44,908	7,635	43,795	1
75-79	8,706	73,963	22,233	509	8,144	-
80-84	4,694	43,774	6,686	16	219	-
85-89	2,476	21,900	1,402	-	-	-
90-94	1,024	8,519	365	-	-	-
95 & over	281	3,050	21			
Total	**65,812**	**320,204**	**200,895**	**78,262**	**246,779**	**126,325**
Grand Total	**93,542**	**451,695**	**526,866**	**161,697**	**341,534**	**208,923**

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	**1,587**	**5,057**	**2,100**	**1,687**	**-**

Average age of the 93,542 pensioners is 70.3.

[1] Age nearest birthday at December 31, 2018.

[2] These numbers include only those who were formerly contributors to the plan as well as pre-retirement limited members (i.e. divorced spouses with a pension interest). For the latter group, under the Family Relations Act, any temporary bridge benefit which is payable ceases at the date the original member reaches age 65 and, as a result, it is possible to have a bridge pension payable past the recipient reaching age 65.

[3] Including supplements to January 1, 2018.

2. Beneficiaries

Age group[1]	Number of beneficiaries[2]	Annual Pensions ($000's)[3]	
		Single life	Single life with guarantee
Male beneficiaries			
Less than 50	32	155	8
50-54	39	308	29
55-59	92	752	24
60-64	175	1,601	163
65-69	289	2,868	244
70-74	386	3,691	326
75-79	390	3,892	181
80-84	299	2,475	19
85-89	182	1,434	-
90-94	95	735	-
95 & over	19	122	-
Total	**1,998**	**18,033**	**994**
Female beneficiaries			
Less than 50	45	418	24
50-54	73	875	83
55-59	177	2,524	372
60-64	347	5,722	321
65-69	488	8,480	283
70-74	712	11,749	192
75-79	709	11,155	88
80-84	784	11,264	29
85-89	824	11,744	-
90-94	548	7,840	-
95 & over	201	3,127	-
Total	**4,908**	**74,898**	**1,392**
Remaining guarantees	**331**	**-**	**4,605**
Grand Total	**7,237**	**92,931**	**6,991**

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	**348**	**13**

Average age of the 6,906 beneficiaries is 76.7.

[1] Age nearest birthday at December 31, 2018.

[2] These numbers include spouses (or estates) currently receiving benefits where the former contributor is deceased.

[3] Including supplements to January 1, 2018.

Appendix F: Development of Required Contribution Rates

All of the cost figures shown herein are integrated and on a level, i.e. "non-doubling" basis and are combined member/employer rates.

Normal ("entry-age") actuarial cost portion	2015 (%)	2018 (%)
- Group 1	16.16	15.66
- Group 2	19.48	18.92
- Group 5	22.55	21.96
- Average	**16.55**	**16.03**

The change in the normal actuarial cost from 2015 to 2018 can be traced as follows:

	Group 1 %	Group 2 %	Group 5 %	Groups 1 / 2 / 5 average %
Normal cost at 2015 valuation	**16.16**	**19.48**	**22.55**	**16.55**
Data changes	(0.05)	0.05	0.06	(0.06)
Assumption changes:				
▪ Disability incident rates	0.00	0.00	0.00	0.00
▪ Withdrawal rates	(0.01)	0.00	0.00	(0.01)
▪ Retirement rates	(0.04)	0.02	0.03	(0.04)
▪ Mortality assumptions	(0.02)[1]	(0.25)	(0.30)	(0.03)
▪ Administration expenses	(0.38)	(0.38)	(0.38)	(0.38)
Total change	**(0.50)**	**(0.56)**	**(0.59)**	**(0.52)**
Normal cost at 2018 valuation	**15.66**	**18.92**	**21.96**	**16.03**

[1] Group 1 males decreased by 0.20% and Group 1 females increased by 0.07%.

Calculation of Required Contribution Rate

	2015	2018
1. Normal (entry-age) actuarial cost - average	16.55%	16.03%
2. Surplus (Unfunded actuarial liability) net of RSA	(2,648,427)	663,284
3. Present value of existing amortization requirements ($000's)		
(i) 1.06% to 2018	299,600	-
(ii) 1.75% to 2024	1,374,448	1,080,530
(iii) 1.25% to 2027	1,260,777	1,114,490
(iv) 0.23% to 2024 for Group 5 only	10,375	8,140
4. Sum of 2. and 3.	296,773	2,866,444
5. Reduction to existing amortization (if 6. is greater than zero)	1.05%	3.00%
6. Total *PBSA* amortization requirement		
(i) to 2018	0.01	0.00
(ii) to 2024	1.75	0.00
(iii) to 2027	1.25	0.00
Total *PBSA* amortization	**3.01**	**0.00**
Additional Group 5 amortization to 2024	0.23[1]	0.23[1]
7. Total *PBSA* minimum required contribution rate - average	**19.57**	**16.04**
8. Average current contribution rate	**19.57**	**18.46**
9. Required increase in contribution rate	**0.00**	**0.00**

The percentages are applied to members' total earnings and are integrated (i.e. reduced by 1.5% on members' salary up to the YMPE for each of the members and the employers, for a 3.0% total reduction).

[1] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll, hence the 2015 PBSA minimum rate of 19.57% = 16.55%+3.01%+0.01%, and 2018 PBSA minimum rate of 16.04% = 16.03%+0.01%

Appendix G: Comparative Results

Comparative Results on Fully Indexed Basis, and with Income Tax Limits

The results herein are analogous to those contained in Schedules 1, 3 and 5 in the body of the report. For ease of comparison, we have repeated the 2018 Basic Account results; selected 2015 comparisons are also shown. The results are included for:

- Basic (i.e. non-indexed) benefits only, without tax limits;
- Basic plus Indexed, without tax limits;
- Basic only, with tax limits; and
- Basic plus Indexed, with tax limits.

Schedule G1 – Statement of Actuarial Position as at December 31, 2018 – Present Plan – ($000's)

	Without Tax Limits		With Tax Limits	
	Basic Only	**Basic + Indexed**	**Basic Only**	**Basic + Indexed**
Assets				
Market value of Fund net of RSA	41,591,328	49,888,412	41,591,328	49,888,412
Asset smoothing adjustment	(511,170)	(607,396)	(511,170)	(607,396)
Smoothed Value of Fund net of RSA	**41,080,158**	**49,281,016**	**41,080,158**	**49,281,016**
Actuarial present values of:				
future contributions at entry-age rates	15,242,844	20,573,997	15,168,506	20,460,171
present value of existing amortization				
(i) 1.75% to 2024	1,080,530	1,080,530	1,080,530	1,080,530
(ii) 1.25% to 2027	1,114,490	1,114,490	1,114,490	1,114,490
(iii) Group 5 only to 2024[1]	8,140	10,971	8,494	10,971
Total Assets	**58,526,162**	**72,061,004**	**58,452,178**	**71,947,178**
Liabilities				
Actuarial present values for:				
▪ pensions being paid	18,122,238	23,699,531	17,991,780	23,525,257
▪ inactive members	2,707,484	3,988,621	2,706,787	3,987,682
▪ active members	34,319,209	46,533,358	34,081,122	46,210,611
▪ future expenses	510,787	510,787	510,787	510,787
Total Liabilities	**55,659,718**	**74,732,297**	**55,290,476**	**74,234,337**
Surplus (Unfunded Actuarial Liability)	**2,866,444**	**(2,671,293)**	**3,161,702**	**(2,287,159)**
Present value of existing amortization (items (i) and (ii) for Basic + Indexed)	(2,203,160)	2,195,020	(2,203,514)	2,195,020
Surplus (Unfunded Liability) excluding existing amortization except 0.31% for G5 (Basic + Indexed), to be amortized over 15 years	**663,284**	**(4,866,313)**	**958,188**	**(4,482,179)**
Selected 2015 Comparisons				
Total Assets including amortization after RSA transfer	48,440,929	58,784,586	48,379,997	58,701,592
Total Liabilities	48,440,929	64,638,649	48,153,763	64,255,348
Surplus (Unfunded Actuarial Liability)	0[2]	(5,854,063)[3]	226,234[4]	(5,553,756)[5]

[1] 0.23% for Basic without tax limit, 0.24% for Basic with tax limit and 0.31% for Basic + Indexed with and without tax limit.

[2] Prior to the 2015 amortization reduction of 1.05% of salary, the surplus was $296,773 thousand.

[3] Prior to the 2015 amortization reduction of 1.05% of salary, the unfunded liability was $5,557,290 thousand.

[4] Prior to the 2015 amortization reduction of 1.05% of salary, the surplus was $523,007 thousand.

[5] Prior to the 2015 amortization reduction of 1.05% of salary, the unfunded liability was $5,256,983 thousand.

Schedule G3 (1) – Current and Required Contributions Rates – December 31, 2018 – Basic Only

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	8.47	9.63	18.10	8.47	9.63	18.10
2	Group 2	8.47	12.72	21.19	8.47	12.72	21.19
3	Group 5	9.99	14.26	24.25	9.99	14.26	24.25
4	**Average**	**8.56**	**9.90**	**18.46**	**8.56**	**9.90**	**18.46**
	Entry-age normal cost rates[1]						
5	Group 1			15.66			15.58
6	Group 2			18.92			18.90
7	Group 5			21.96			21.92
8	**Entry-age normal cost - Average**			**16.03**			**15.96**
	Amortization of unfunded actuarial liability (surplus)						
	PBSA amortization						
9	• to 2024			0.00			0.00
10	• to 2027			0.00			0.00
11	**Total *PBSA* amortization** (=9+10)			**0.00**			**0.00**
12	Additional Group 5 amortization (to 2024)[2]			0.23			0.24
	***PBSA* minimum rate basis[3]**						
13	Group 1 (= 5+11)			15.66			15.58
14	Group 2 (= 6+11)			18.92			18.90
15	Group 5 (= 7+11+12)			22.19			22.16
16	***PBSA* minimum rate – Average**			**16.04**			**15.97**
17	**Required Contribution Rate Increase – Average**			**0.00**			**n/a**

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

[3] The total contribution rate to the plan needs to comply with the *PBSA* requirements. The *PBSA* does not apply at the group level.

Schedule G3 (2) – Selected 2015 Comparisons – December 31, 2015 – Basic Only

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1,2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	9.00	10.17	19.17	9.00	10.17	19.17
2	Group 2	9.00	13.96	22.96	9.00	13.96	22.96
3	Group 5	10.52	15.36	25.88	10.52	15.36	25.88
4	**Average**	**9.08**	**10.49**	**19.57**	**9.08**	**10.49**	**19.57**
	Entry-age normal cost rates[1]						
5	Group 1			16.16			16.10
6	Group 2			19.48			19.46
7	Group 5			22.55			22.51
8	**Entry-age normal cost – Average**			**16.55**			**16.48**
	Amortization of unfunded actuarial liability (surplus)						
	PBSA amortization						
9	• to 2018			0.01			0.00
10	• to 2024			1.75			1.47
11	• to 2027			1.25			1.25
12	**Total *PBSA* amortization** (=9+10+11)			**3.01**			**2.72**
13	Additional Group 5 amortization (to 2024)[3]			0.23			0.24
	***PBSA* minimum rate basis[4]**						
14	Group 1 (= 5+12)			19.17			18.82
15	Group 2 (= 6+12)			22.49			22.18
16	Group 5 (= 7+12+13)			25.79			25.47
17	***PBSA* minimum rate – Average**			**19.57**			**19.21**
18	**Required Contribution Rate Increase – Average**			**0.00**			**n/a**

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] These 2015 current rates are shown on an equivalent "non-doubling" basis, based on 2015 payrolls. Groups 1 and 4 have been combined.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

[4] The total contribution rate to the plan needs to comply with the *PBSA* requirements. The *PBSA* does not apply at the group level.

Schedule G3 (3) – Current and Required Contributions Rates – December 31, 2018 – Basic + Indexed

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	10.00	10.36	20.36	10.00	10.36	20.36
2	Group 2	10.00	13.45	23.45	10.00	13.45	23.45
3	Group 5	11.94	15.41	27.35	11.94	15.41	27.35
4	**Average**	**10.11**	**10.66**	**20.77**	**10.11**	**10.66**	**20.77**
	Entry-age normal cost rates[1]						
5	Group 1			20.67			20.56
6	Group 2			24.81			24.78
7	Group 5			29.03			28.99
8	**Entry-age normal cost - Average**			**21.16**			**21.06**
	Amortization of unfunded actuarial liability (surplus)						
9	15 year amortization			3.53			3.25
10	PBSA amortization			n/a			n/a
11	Additional Group 5 amortization (to 2024)[2]			0.31			0.31
	Total contribution rate[1]						
12	15 year amortization – Average			24.71			24.33

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

Schedule G3 (4) – Selected 2015 Comparisons – December 31, 2015 – Basic + Indexed

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	10.00	10.37	20.37	10.00	10.37	20.37
2	Group 2	10.00	14.16	24.16	10.00	14.16	24.16
3	Group 5	11.94	15.98	27.92	11.94	15.98	27.92
4	**Average**	**10.11**	**10.71**	**20.82**	**10.11**	**10.71**	**20.82**
	Entry-age normal cost rates[1]						
5	Group 1			21.16			21.07
6	Group 2			25.51			25.49
7	Group 5			29.82			29.76
8	**Entry-age normal cost - Average**			**21.67**			**21.58**
	Amortization of unfunded actuarial liability (surplus)						
9	15 year amortization			6.99			6.74
10	PBSA amortization			n/a			n/a
11	Additional Group 5 amortization (to 2024)[3]			0.31			0.31
	Total contribution rate[1]						
12	15 year amortization – Average			28.68			28.34

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] These 2015 current rates are shown on an equivalent "non-doubling" basis, based on 2015 payrolls. Groups 1 and 4 have been combined.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

Schedule G5 – Accrued Liabilities and Funded Ratio – December 31, 2018

Present Plan – ($000's)

($000's)	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets – smoothed value	**43,564,698**	**51,765,556**	**43,564,698**	**51,765,556**
▪ pensions being paid	18,122,238	23,699,531	17,991,780	23,525,257
▪ inactive members	2,707,484	3,988,621	2,706,787	3,987,682
▪ active members	17,812,205	24,091,444	17,664,353	23,891,798
Total Accrued Liabilities	**38,641,927**	**51,779,596**	**38,362,920**	**51,404,737**
Surplus (Unfunded Actuarial Liability)	**4,922,771**	**(14,040)**	**5,201,778**	**360,819**
Funded Ratio – Fund ÷ Total Accrued Liabilities	**112.7%**	**100.0%**	**113.6%**	**100.7%**
Assets in RSA	(2,484,540)	(2,484,540)	(2,484,540)	(2,484,540)
Adjusted surplus (unfunded liability) net of RSA	**2,438,231**	**(2,498,580)**	**2,717,238**	**(2,123,721)**
Selected 2015 Comparisons				
Assets including RSA	34,328,875	39,846,324	34,328,875	39,846,324
Total Liabilities	33,294,428	44,406,926	33,073,983	44,115,942
Surplus (Unfunded Actuarial Liability)	1,034,447	(4,560,602)	1,254,892	(4,269,618)
Funded Ratio	103.1%	89.7%	103.8%	90.3%