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Actuarial Report on the

British Columbia Public Service Pension Plan

as at March 31, 2023

Vancouver, British Columbia

December 20, 2023

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Contents

Actuarial Report Highlights

We have completed an actuarial valuation of the Public Service Pension Plan as at March 31, 2023. Its purpose was to determine the financial position of the Plan as at March 31, 2023 and to report on the adequacy of the member and employer contribution rates.

Key Results

Basic Account ($m)	2020	2023
Asset smoothing cushion	505	123
Rate Stabilization Account (RSA)	1,252	1,672
Assets (smoothed) net of RSA	23,634	30,836
Actuarial present values of future contributions at entry-age rates	5,950	7,158
Liabilities	28,116	33,503
Surplus	**1,468**	**4,491**
5% of net liabilities	1,108	1,317
Accessible Going Concern Excess	**360**	**3,174**

Basic Contribution Rates	2023
Current contribution rate	14.20%
Minimum Permissible contribution rate	
Entry-age normal cost rate	16.06%
25 year amortization of surplus	(5.06%)
Minimum Permissible contribution rate	**11.00%**

The above contribution rate is the theoretical minimum permissible rate prior to considering other potential uses of surplus.

Key Changes Since the Previous Valuation

As set out in our report dated December 11, 2020, the previous funding valuation as at March 31, 2020 revealed a Basic account surplus of $2,667 million. On June 1, 2021, the Board passed motions to amend the Plan to:

- Increase the flat accrual rate from 1.85% to 1.95% for service after April 1, 2022;
- Keep the contribution rate to the Basic account at 14.20% of salary; and
- Transfer the remaining surplus of $1,135 million not needed to maintain the 14.20% Basic contribution rate to the RSA.

The impact of these changes on the valuation results was set out in our letter dated August 20, 2021. In this report, where we show comparative figures at the previous valuation, these figures incorporate the Plan amendments described above unless noted otherwise.

Different provisions apply to judges, Members of the Legislative Assembly (MLAs), correctional employees and ambulance paramedics.

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

Key Actuarial Methods and Long Term Assumptions

The actuarial liabilities include the value of benefits accrued by members as at March 31, 2023 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), plus projected future contributions based on entry-age normal contribution rates and, where relevant, the existing amortization rates.

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 key long-term assumptions are unchanged from the previous valuation and summarized as follows:

	Funding Valuation 2020 and 2023
Annual Investment Return	6.00%
Annual Salary Increase	3.25% plus seniority
Annual Indexing	0% for basic costs
	2.5% for indexed costs

We updated the demographic assumptions used for the valuation as follows:

- We made minor updates to the assumed rates of retirement, withdrawal and disability to reflect the Plan's recent experience;
- The assumed base rates of mortality were updated to use the latest available member-specific rates provided by Club Vita Canada, adjusted as follows:
    - A reserve of 2% of liabilities was included in the Funding Valuation (3% on an indexed basis) as a margin for uncertainty in the mortality assumption. In our view, there is increased uncertainty in the pattern of future mortality rates as the long-term impact of the COVID-19 pandemic remains unclear. This margin is broadly equivalent to that which was included in the mortality assumptions used for the valuation of the Plan as at December 31, 2017, immediately prior to adopting the Club Vita mortality curves. The Entry Age Normal Cost for the Funding Valuation was increased by 0.05% of salaries as a provision for the uncertainty.

See Appendix B for details of the assumptions used in this valuation and the rationale employed in setting these assumptions. See Section 4.2 for the impact of the changes in assumptions on the valuation results.

Main Reasons for Change in Actuarial Position

The funding valuation shows an improvement in the actuarial position for the Basic Account on the entry-age funding basis. The surplus has increased from $1,468 million at March 31, 2020 (after the Plan amendments) to $4,491 million at March 31, 2023.

The main reason for the improvement in the actuarial position was investment returns being greater than assumed. There was also a small net gain from membership experience differing from the assumptions (for example, retirements, withdrawals and deaths). These positive factors were partially offset by a loss from contributions being lower than the normal actuarial cost (i.e. surplus being used to pay below the normal cost) and by the addition of the reserve for mortality uncertainty. See Section 4.2 for more detail of the actuarial gains and losses since the previous valuation.

Funding Policy and JTA Implications

Members currently contribute 7.10%[1] of salaries for basic non-indexed benefits; employers contribute a matching amount for a total contribution rate of 14.20%. The long-term cost rate for future service (i.e. the entry-age, normal actuarial cost) is unchanged at 16.06% of salaries, or 1.86% of salaries higher than the current combined member and employer contributions.

Based on the Plan's current funding position, the Board's funding policy sets out the following priority order for the allocation of excess surplus:

- Firstly, transfer excess surplus to the IAA to improve the level of sustainable indexing, with the aim of providing 100% of CPI on the sustainable indexing basis. No such transfer is required to support sustainable indexing at 100% of CPI.
- Secondly, stabilize the contribution rate by adjusting, or establishing, a rate stabilization reserve. No transfer from the RSA to the Basic account is required to maintain the current contribution rate.
- Given the surplus, and that the current contribution rate is below the entry-age normal cost, the funding policy requires that the contribution rate is calculated with a 15-year and a 25-year amortization period (both commencing one year after the valuation date). As the current contribution rate of 14.20% is greater than the 25-year contribution rate of 11.00%, there is "excess surplus" and the Board may decide how to apply this excess surplus.

[1] All contribution rates are quoted as level rates i.e. the same rate is applied to all salary, and there is no difference on earnings above and below the YMPE.

The Joint Trust Agreement (JTA) lists the following options for uses of the remaining excess surplus. The Board may consider one or more of these.

- Transfer Basic account assets to the RSA to deal with future market losses in the light of the relatively low number of actives per retiree;
- Reduce the contribution rate;
- Increase benefits;
- Make a further transfer to the IAA to increase the target level of indexing or strengthen the likelihood of maintaining the target level;
- Leave in the Basic Account.

While the Plan is exempt from the funding requirements of the BC Pension Benefits Standards Act (*PBSA)*, the JTA requires that the Plan complies with the going-concern requirements of the *PBSA*, as those requirements existed prior to December 31, 2019, referenced as the JTA-B requirements. If there is a surplus, then a cushion of 5% of the net liabilities must be retained, and the remaining balance may be amortized over not less than 5 years. In this case, 5% of the net liabilities is $1,317 million, and the remaining $3,174 million of the going concern surplus may be used in part or full to reduce contributions. The minimum JTA-B required contribution rate is then equal to the entry-age normal cost of 16.06% of salaries less the amortization of $3,174 million over a minimum of 5 years, commencing one year after the valuation date (13.98%), resulting in a required contribution of 2.08% under the JTA-B requirements.

Given that the 25-year amortization contribution rate is greater than the minimum permissible JTA-B contribution rate, the funding policy determines that the minimum permissible contribution rate is the 25-year amortization contribution rate of 11.00%.

Compliance with the Income Tax Act

The fully indexed valuation, recognizing the Income Tax Act (ITA) limits, shows a surplus of $8,393 million including the assets in the RSA. This surplus is less than 25% of the corresponding net liability (indexed liability less the present value of the indexed entry age normal cost), so the Plan does not have an excess ITA surplus. Given that there is a surplus, but not an excess surplus, the maximum contributions to the plan may not exceed the fully indexed, ITA limited, entry-age normal cost rate of 21.40%. The current total average contribution rate of 17.20% is less than the ITA limit and therefore is acceptable under the ITA.

The *ITA* also 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 provided members do not contribute more than half the cost of benefits. The current member contributions of 8.35% of salaries are below the 9% limit and the $1,000 plus 70% of the pension credit rule which may affect high paid members is applied by the Pension Corporation (with excess contributions going through the Supplemental Benefits Account). Accordingly, provided the member contribution rate remains below 9%, a waiver is not required.

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Section 1. Scope of the Valuation

In accordance with section 10 of the Joint Trust Agreement ("JTA") and on the instructions of The Public Service Pension Board of Trustees (the "Board of Trustees"), we have completed an actuarial valuation of the Basic Account of the Public Service Pension Plan (the "Plan") as at March 31, 2023 and are pleased to submit this report thereon. The primary purpose of this valuation is to determine the financial or actuarial position of the Basic Account as at March 31, 2023 and to report on the adequacy of the member and employer contribution rates.

The main valuation focuses on the Basic Account and the funding of the Basic, non-indexed benefits. It excludes liabilities for:

- Future indexing funded via fixed contributions to the Inflation Adjustment Account ("IAA"); and
- Post-retirement group benefits provided on a pay-as-you-go basis via employer contributions that would otherwise go to the IAA.

Furthermore, it does not apply the limits imposed by the *Income Tax Act* ("*ITA*") on benefits provided from registered pension plans - these excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance.

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

- For basic and indexed benefits, on the presumption 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 BC Financial Services Authority ("BCFSA") and the Canada Revenue Agency ("CRA"). This report is not intended or necessarily suitable for other purposes than those listed above.

Section 2. Changes in Plan

As set out in our report dated December 11, 2020, the previous funding valuation as at March 31, 2020, revealed a Basic account surplus of $2,667 million. On June 1, 2021, the Board passed motions to amend the Plan to:

- Increase the flat accrual rate from 1.85% to 1.95% for service after April 1, 2022;
- Keep the contribution rate to the Basic account at 14.20% of salary; and
- Transfer the remaining surplus of $1,135 million not needed to maintain the 14.20% Basic contribution rate to the RSA.

The impact of these changes on the valuation results was set out in our letter dated August 20, 2021. In this report, where we show comparative figures at the previous valuation, these figures incorporate the Plan design changes described above unless noted otherwise.

Different provisions apply to judges, MLAs, correctional employees and ambulance paramedics.

There were no other 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.

Section 3. 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 such 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.

The general criteria we use in establishing the appropriate level of contributions to a pension plan include the following:

1. benefit security - the probability of fulfilling the present 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 would be enhanced with a larger accumulation of assets.
2. stability of contributions - the financing system should result in contribution rates that are relatively stable over an extended period of time.
3. allocation of costs - as far as is practicable, pension costs should be allocated to the generation that incurs them.

The Board has adopted a formal funding policy (most recently revised on June 15, 2023) 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 its primary objective and stability of contributions as an important secondary objective for the basic account. 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 account 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 indexing in line with the Canada Consumer Price Index ("CPI") is provided; alternatively, if the monies in the IAA cannot provide full CPI indexing on a long term sustainable basis, 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 each time indexing is granted. Thus, the system will limit indexing, if necessary, so that the granting of any increase 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. Basic Account Valuation - Current Financing

We determined the financial status of the Plan for the Basic Account only (i.e. ignoring any indexing that may be granted after March 31, 2023). The methods used are described in Appendix B.

d. 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.

e. 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 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 (with the first year at the current contribution rate as required by the PBSA), 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, may be amortized over a specified period as outlined in the funding policy, e.g. 25 or 15 years. Adjusted contributions, expressed as a percentage of salaries, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

f. JTA-B Requirements (Pre December 31, 2019 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 a going-concern basis, the amortization of unfunded actuarial liabilities over a specified maximum number of years, and special rules regarding the treatment of surplus. While the Public Service Pension Plan is one of a number of British Columbia public sector plans that are exempt from these provisions, the current JTA requires that the Plan's financing comply with the *PBSA* requirements for a going-concern valuation as those requirements existed prior to December 31, 2019. The relevant provisions are documented in Appendix B of the JTA, and we refer to them as the JTA-B requirements. This report therefore complies with the JTA-B funding provisions.

g. Test Contribution Adequacy

Under the JTA and JTA-B requirements, the employers and the members must contribute the full normal actuarial cost (e.g. the "entry-age rate" described in (e) 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 this purpose, the unfunded liability that needs to be amortized from the valuation date is the unfunded liability described above, reduced by the present value of any previously established amortization amounts.

Surpluses may be applied to reduce the contribution requirements. 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, or “Accessible Actuarial Excess”, to be amortized over not less than 5 years. The funding policy sets the Board’s Basic Excess Asset allocation policy as:

i. Firstly, transfer Basic Excess Assets to the IAA to improve the level of sustainable indexing, with the aim of providing 100% of CPI on the sustainable indexing basis, i.e. having no limit on the level of indexing provided,

ii. Secondly, stabilize the contribution rate by adjusting, or establishing, a rate stabilization reserve,

iii. Thirdly, provide benefit improvements or reduce basic contribution rates.

In order to provide a measure of contribution rate stability, 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.

The Board set out its policy with regard to amortization of surplus in its funding policy. Accordingly, we have calculated theoretical minimum contribution requirements in accordance with the funding policy and JTA as follows:

i. Calculate the "normal cost rate" (i.e., the "entry-age rate") and the resulting excess assets (or unfunded liability) using this rate.

ii. If there is an unfunded liability after allowing for the value of any previously established amortization amounts, amortize it over 15 years, commencing one year after the valuation date.

iii. If there are Basic Excess assets, the first priority will be to transfer Basic Excess Assets to the IAA to improve the level of sustainable indexing.

iv. If there are remaining Basic Excess Assets, and the current contribution rate is above the entry age normal cost and established amortization rates are higher than required i.e. there was an unfunded liability, but actuarial gains since the last valuation means the contribution rate could be reduced:

- If the JTA-B required rate is less than the entry age normal cost, the policy outlined in point v below is followed.
- If the current contribution rate is 1% of pay or less above the entry age normal cost, a rate stabilization buffer will be established such that the required contribution rate is equal to the current contribution rate, i.e. the contribution rate will not reduce.
- If the current contribution rate is more than 1% of pay above the entry age normal cost, the Board will establish a rate stabilization buffer such that the required contribution rate is the higher of the JTA-B minimum rate or the rate that is 1% higher than the entry age normal cost and the contribution rate will be reduced to the required contribution rate, provided that doing so does not cause the sustainable indexing level to fall below 100% of CPI .
- If the smoothed value of assets is greater than the market value of assets, the contribution rate will not be reduced by more than the reduction calculated as per above two bullet points but using the market value of assets rather than the smoothed value of assets.

v. If there are Basic Excess Assets, and the current contribution rate is at or below the entry age normal cost:

- Calculate the contribution rate with a 15-year amortization period, commencing one year after the valuation date, and the contribution with a 25-year amortization period, commencing one year after the valuation date. The contribution rate with a 15-year amortization of surplus will be lower than the rate with a 25-year amortization of surplus.
- If the current contribution is between the 15 and 25-year rates, then the rate should remain unchanged. Effectively, the surplus is applied as a rate stabilization reserve.
- If the current contribution rate is greater than the 25-year contribution rate, then there is “excess surplus” and the Board may decide how to apply this excess surplus. Options, as set out in the funding policy include any one or more of the following:
  - A transfer to the contribution rate stabilization account (RSA)
  - Reducing the contribution rate;

- Improving benefits;
- Making a transfer to the Inflation Adjustment Account;
- Leave in the Basic Account.

- If the current contribution rate is lower than the 15-year contribution rate, then the rate should be increased to be equal to the 15-year contribution rate.
- The resulting contribution rate must also comply with the JTA-B minimum requirement.

The JTA rules require any contribution rate changes, up or down, to be shared equally by the Plan members and the employers (the employers will continue to pay the excess costs for certain smaller groups of members who have more advantageous benefits). Thus, we express the future cost requirements as a combined member-plus-employer amount.

In line with the funding policy, where there is an excess surplus, the contribution adequacy tests above are conducted after consideration is given as to whether a transfer is required to the IAA.

An RSA was established within the Basic Account, effective March 31, 2017. A further $1,135 million was transferred to the RSA effective March 31, 2020. Smoothed investment returns are applied each year to the RSA. 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.

In applying the rate stabilization policy addressed in the funding policy, there is a requirement that consideration be given to the size of the asset smoothing cushion and projections of the expected trend in future contribution rates. In the case where the market value of assets is significantly below the smoothed value of assets it is possible that while the current contribution rate is adequate per the above framework, a significant increase is likely at the next valuation. In this case the Board will consider whether it is preferable to increase the contribution rate immediately to partially offset the increase that has been deferred (in the absence of offsetting future investment gains) to the next valuation as a result of the asset smoothing process.

2. 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 possible changes to them, with the Board.

The assumptions and the approach to setting them are described in Appendix B.

Following discussions with the Board, we kept the economic assumptions unchanged from the previous valuation, and made adjustments to some of the demographic assumptions. We also added a reserve to the liabilities for mortality uncertainty. The assumptions are discussed in detail in Appendix B; the key economic assumptions are summarized below.

	Funding Valuation
Annual Investment Return	6.00%
Annual Salary Increase	3.25% plus seniority
Annual Indexing	0% for basic costs 2.50% for indexed costs

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

3. Membership Data

Data as of March 31, 2023 were prepared by the Pension Corporation. The data are described in detail in Appendix B and numerically summarized in Appendices C, D and E.

4. Benefits Excluded

The treatment of post-retirement group benefits does not affect the Basic Account valuation results. With respect to the indexed valuation results, we have reduced the employer contributions to the IAA by 1% of salaries, being the maximum potential amounts that could be allocated instead to the post-retirement group benefits. We have not otherwise considered the liabilities and the financing for these benefits.

Section 4. Results of Funding Valuation

1. Basic Account - Actuarial Position

Schedule 1 shows a statement of the actuarial position of the Plan as at March 31, 2023. This statement ignores liabilities for indexing of pensions after the valuation date, and assumes that contributions will be made at the basic, non-indexed, entry-age normal cost rate of 16.06% of future payroll. As noted earlier, the comparative results shown as at March 31, 2020 are after the Plan amendments effective April 1, 2022.

Schedule 1 - Statement of Actuarial Position as at March 31, 2023

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

	($m's)	
Assets	**2020**	**2023**
Market Value of Basic Account including RSA	25,391	32,631
Asset Smoothing Adjustment	(505)	(123)
Smoothed Value of Basic Account including RSA	**24,886**	**32,508**
RSA	(1,252)	(1,672)
Smoothed Value of Basic Account net of RSA	**23,634**	**30,836**
Actuarial present values of future contributions at entry-age rates	5,950	7,158
Total Assets	**29,584**	**37,994**
Liabilities[1]		
Actuarial present values for		
• pensions being paid	11,886	14,069
• inactive members		
○ deferred vested members	549	640
○ LTD members	649	759
○ other inactive members	152	168
• active members	14,699	16,993
• future expenses	181	217
Reserve for mortality uncertainty	n/a	657
Total Liabilities	**28,116**	**33,503**
Surplus (Unfunded Liability)	**1,468**	**4,491**
Funded Ratio: Total Assets ÷ Total Liabilities	**1.05**	**1.13**
5% of net liabilities[2]	1,108	1,317
***JTA-B* Accessible going concern excess**	**360**	**3,174**

[1] The fund continues to hold a Voluntary Contribution Balance, but it rounds down to zero when shown in millions, and hence has been excluded from this and other balance sheets shown in the report.

[2] Net liabilities equals total liabilities minus the value of future entry age contributions

2. Change in Actuarial Position

The statement of actuarial position included in Schedule 1 indicates that the surplus has increased from $1,468 million at March 31, 2020 to $4,491 million at March 31, 2023. The $3,023 million increase in the surplus is the net result of a number of items, by far the most significant being higher than assumed investment returns.

Schedule 2 - Change in Actuarial Position

	Approximate effect on surplus ($m's)
1. Surplus (Unfunded Liability) at March 31, 2020	**1,468**
2. Interest on Surplus	280
3. Change in new entrant profile	6
4. Amortization of surplus	(205)
5. Experience gains / (losses)	
a. Smoothed investment return greater than assumed	3,365
b. Expenses less than assumed	6
c. Salary increases higher than assumed	(58)
d. YMPE increases higher than assumed	12
e. Retirements later than assumed	171
f. More terminations than assumed (net of rehires)	2
g. Mortality experience lighter than assumed in aggregate[1]	(38)
h. Inflation higher than assumed for LTD deferred period	(18)
i. Disability rates different than assumed	(3)
6. Gains / (losses) due to changes in valuation assumptions	
a. Disability incidence rate increased	1
b. Withdrawal rates increased	10
c. Retirement rates reduced	31
d. Mortality rates increased	139
e. Addition of mortality reserve	(637)
7. Miscellaneous	(41)
8. Surplus (Unfunded liability) at March 31, 2023	**4,491**

[1] There were more deaths than assumed among older pensioners, resulting in a gain, but fewer than assumed among younger pensioners (who tend to have higher liabilities), resulting in a loss. The net effect was a loss of $38 million.

3. Adequacy of Contribution Rates

As discussed in Section 3, the required contribution rate consists of the normal cost plus an adjustment to amortize any surplus or unfunded liability. When there is a surplus, the calculations are done to show the minimum possible rate if the surplus was only used to reduce the contribution rate. There is no need to reduce the contribution rate to these minimum permissible levels without first considering other uses for the surplus and they are therefore only of relevance to confirm that the current contribution rate is adequate.

All contribution rates are quoted as level rates i.e. the same rate is applied to all salary, and there is no difference on earnings above and below the YMPE.

a) Normal Cost Rate

The total current service contribution required to finance the basic pensions of new entrants (i.e. the normal cost) is unchanged at 16.06% of salaries. The impact of membership changes and of each assumption change are very small.

Schedule 3 - Change in entry-age normal cost

	Combined %
Entry-age normal cost at 2020 valuation	**16.06**
Change in demographic profile of new entrants	0.01
Assumption changes:	
• disability incidence rates increased	0.03
• withdrawal rates increased	(0.01)
• retirement rates reduced	(0.02)
• mortality rates reduced	(0.06)
• provision for mortality uncertainty	0.05
Total change	**0.00**
Entry-age normal cost at 2023 valuation	**16.06**

b) JTA-B Minimum Permissible Rate

The minimum JTA-B required contribution rate is then equal to the normal cost of 16.06% less the 5 year amortization of the accessible going concern excess (surplus in excess of 5% of the net liabilities). Five percent of the net liabilities is $1,317[1] million, leaving an accessible going concern excess of $3,174 million. Amortizing this over five years, commencing one year after the valuation date, results in a maximum permissible reduction of 13.98%. The JTA-B minimum required contribution rate is therefore 2.08% of salaries.

[1] Any surplus less than this can be considered to be a compulsory rate stabilization reserve.

c) JTA and Funding Policy Requirements

Since there is a Basic account surplus, and the current contribution rate of 14.20% is less than the entry-age normal cost of 16.06%, the funding policy requires that the contribution rate is calculated with both a 15-year and a 25-year amortization period (both commencing one year after the valuation date).

These contribution rates are as follows:

- 8.58% with a 15-year amortization of surplus;
- 11.00% with a 25-year amortization of surplus.

The current contribution rate of 14.20% of salaries is greater than the 25-year contribution rate and hence, under the funding policy, there is an "excess surplus", and the Board may decide how to apply this excess surplus.

The current contribution rates, the contribution rates for current service (on an entry-age basis, i.e. the normal actuarial cost) and the minimum permissible contribution rates are summarized in Schedule 4. It is not necessary for the current contribution to be reduced to the minimum permissible contribution rate, but any decrease in contribution rates must be shared equally between members and employers.

Schedule 4 - Current and Minimum Permissible Basic Account Contribution Rates

	Based on valuation results as at March 31	
Current Basic Account contribution rates	**2020 (%)**	**2023 (%)**
Member	7.10	7.10
Employer	7.10	7.10
Combined member/employer	**14.20**	**14.20**
Minimum Basic Account contribution rates[1]		
Entry age normal cost rate	**16.06**	**16.06**
Amortization of unfunded liability (surplus)		
• 25-year amortization	(1.94)	(5.06)
• 15-year amortization	(2.87)	(7.48)
• *JTA-B* amortization	(1.86)	(13.98)
Basic Account contribution rate		
• 25-year amortization	14.12	11.00
• 15-year amortization	13.19	8.58
• *JTA-B* minimum rate	14.20	2.08
Minimum Permissible Basic Account contribution rate	**14.20**	**11.00**

[1] Total member plus employer, to be shared equally.

The above results indicate that the current contribution rate of 14.20% of salaries exceeds both the minimum permissible *JTA-B* contribution rate of 2.08% of salaries and the funding policy 25-year amortization rate of 11.00% of salaries.

The Board can decide how to use the excess surplus that has arisen, but the funding policy indicates that the contribution rate should not be reduced below the 25-year amortization rate of 11.00% of salaries.

4. Revised Contribution Rates

Section 10.3 of the JTA requires that the Plan's financing comply with the JTA-B funding requirements (the *PBSA* requirements for a going-concern valuation as those requirements existed prior to December 31, 2019). It also indicates that any changes in the Basic Account contribution rate must be shared equally between members and employers.

As noted above, the 25-year amortization contribution rate under the funding policy exceeds the minimum permissible JTA-B contribution rate. As a result, the current rates may be decreased to the funding policy 25-year amortization rate. This represents a decrease of 3.20% of salaries. Sharing this equally would result in a decrease of 1.60% of salaries each for the members and the employers.

When this is combined with the current IAA contribution rates, the revised minimum permissible rates become:

Schedule 5 - Current and Minimum Permissible Total Contribution Rates

	Member	Employer	Total
Current Basic Account	7.10%	7.10%	14.20%
Minus maximum permissible additional Basic Account reduction	(1.60%)	(1.60%)	(3.20%)
Minimum Permissible Basic Rate	**5.50%**	**5.50%**	**11.00%**
Current IAA	1.25%	1.75%[1]	3.00%
Total Minimum Permissible Contribution Rate	**6.75%**	**7.25%**	**14.00%**

As noted earlier when there is a surplus, the calculations are done to show the minimum possible rate if the surplus was only used to reduce the contribution rate. There is no need to reduce the contribution rate to these minimum permissible levels without first considering other uses for the surplus and they are therefore only of relevance to confirm that the current contribution rates are adequate.

[1] Net of 1% assumed to first be allocated to post-retirement group benefits.

Income Tax Act Individual Member 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 1/2 of the amount that is required to fund the aggregate benefits in respect of which those contributions are made."

The current member contribution rate is 8.35% of salaries, which is below 9% of salaries. The Pension Corporation applies the $1,000 plus 70% of the PA limit, by allocating any contributions in excess of this to the Supplemental Benefits Account. Accordingly, provided the member contribution rate remains below 9%, a waiver is not required.

5. Other Plan Changes

The Board's funding policy sets out the following priority order for allocation of excess surplus:

- Firstly, transfer excess surplus to the IAA to improve the level of sustainable indexing, with the aim of providing 100% of CPI on the sustainable indexing basis. No such transfer is required to support sustainable indexing at 100% of CPI.
- Secondly, stabilize the contribution rate by adjusting, or establishing, a rate stabilization reserve.
- Thirdly, consider one or more of the following other uses of excess surplus:
    - Transfer Basic account assets to the RSA to deal with future market losses in the light of the relatively low number of actives per retiree;
    - Reduce the contribution rate;
    - Increase benefits;
    - Make a further transfer to the IAA to increase the target level of indexing or strengthen the likelihood of maintaining the target level.
    - Leave in the Basic Account

If the contribution rate is reduced, the JTA requires that the decrease be shared equally between the members and the employers. Accordingly, the current member and employer contribution rates may reduce by 1.60% of salaries each, for a total reduction of 3.20% of salaries, or the Basic benefits may be increased such that the required contribution rate becomes equal to the current contribution of 14.20%, or

the contribution rate can remain at 14.20% of pay and the surplus can be retained in the Basic Account as a rate stabilization reserve, transferred to the RSA or transferred to the IAA. Variations that combine some, or all, of the alternatives are allowed by the JTA and the Board's funding policy. We would be happy to discuss alternatives with the Board.

6. Accrued Benefits - Funded Ratio

The accrued benefits 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 to be worked by existing members are excluded from the comparison. The results are shown below.

Schedule 6 - Accrued Benefits: Funded Ratio at March 31, 2023

Basic Account - Non-Indexed Benefits

	($m's)	
	2020	**2023**
Fund (Basic Account):		
• **Smoothed Value of Fund**	**24,886**	**32,508**
Accrued Liabilities:		
• for pensions being paid	11,887	14,069
• for inactive members	1,342	1,567
• for active members	8,400	9,366
• for voluntary contributions	-	-
• mortality reserve	n/a	500
Total Accrued Liabilities	**21,629**	**25,502**
Surplus (Unfunded Actuarial Liability):		
• for accrued service only	3,257	7,006
Funded Ratio:		
Fund ÷ Total accrued liabilities	115%	127%
Assets in RSA	(1,252)	(1,672)
Adjusted Surplus (Unfunded Liability) net of RSA	2,005	5,334

The above schedule indicates that the funded ratio for accrued benefits has improved from 115% to 127%. This is largely for reasons similar to the items in the analysis in Schedule 2.

7. Sensitivity Analysis

Sensitivity Analysis under Standards of Practice

The Canadian Institute of Actuaries Practice-Specific Standards for Pension Plans require reporting 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 tables below show the impact on the accrued liability as required by (a) and the entry age normal cost as required by (b) as at March 31, 2023 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

Schedule 7 - Sensitivity - Impact of 1% drop in investment return on Accrued Benefits and Normal Cost

Impact on liabilities of 1% drop in discount rates	6.00% Discount Rate	5.00% Discount Rate	Increase
	($m's)	($m's)	($m's)
Active members	9,366	11,160	1,794
Disabled members	759	898	139
Terminated members	808	950	142
Pensioners and beneficiaries	14,069	15,289	1,220
Mortality reserve	500	566	66
Totals	**25,502**	**28,863**	**3,361**

Impact on normal cost rate of 1% drop in discount rates	6.00% Discount Rate	5.00% Discount Rate	Increase
Current service cost rate	16.06%	20.19%	4.13%

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:

Schedule 8 - Sensitivity - Impact of 1% drop in investment return on Plan Funding

	($m's)		
	6.00% Discount Rate	**5.00% Discount Rate**	**Increase**
Smoothed Value of Fund net of RSA	30,836	30,836	-
Actuarial present value of future contributions at entry-age rates	7,158	9,484	2,326
Total Assets net of RSA	37,994	40,320	2,326
Total Liabilities	33,503	39,334	5,831
Surplus/(Unfunded liability)	4,491	986	(3,505)
Entry-age Normal Cost	16.06%	20.19%	4.13%
25 year Amortization	(5.06%)	(0.99%)	5.06%[1]
JTA-B Amortization	(13.98%)	(0.00%)	
Minimum permissible rate	**11.00%**	**20.19%**	**9.19%**

8. Supplementary Valuations

Expanded results are shown in Appendix F, 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 from 2.75% to 1.75% on the assumption that 1% will be allocated to the post-retirement group benefits (the maximum permitted).

[1] Represents the difference between the highest amortization i.e. the difference between the 25 year amortization at 6.00% investment return and the *JTA-B* amortization at the 5.00% investment return.

The key results are summarized below:

Schedule 9 - Indexed Benefits (without tax limits)

	Basic Only	Basic + Indexed
	($m's)	($m's)
Smoothed Value of Fund net of RSA	30,836	40,515
Actuarial present value of future contributions at entry-age rates	7,158	9,787
Total Assets net of RSA	37,994	50,302
Total Liabilities	33,503	43,932
Surplus (Unfunded Liability)	**4,491**	**6,370**
Contribution Rates		
Current Member	7.10%	8.35%
Current Employer	7.10%	8.85%
Current Total	**14.20%**	**17.20%**
Entry-age Normal Cost	16.06%	21.68%
25 year Amortization	(5.06%)	(6.99%)
Total entry-age with amortization	**11.00%**	**14.69%**

If assets and liabilities are restricted to accrued service only, i.e., analogous to Schedule 6 earlier, the 2023 surplus (unfunded liability) figures change as follows:

Schedule 10 - Indexed Accrued Benefits (without tax limits): Funded Ratio at March 31, 2023

	Basic Only	Basic + Indexed
	($m's)	($m's)
Smoothed Value of Fund	32,508	42,187
Total Accrued Liabilities	25,502	33,213
Surplus (Unfunded Liability)	7,006	8,974
Funded Ratio	127%	127%
Assets in RSA	(1,672)	(1,672)
Adjusted Surplus (Unfunded Liability) net of RSA	5,334	7,302

Benefits Limited to ITA Maximums

When the income tax limits on benefits are recognized, the above 2023 surpluses (unfunded liabilities) and normal cost rates change marginally. The key results are summarized below:

Schedule 11 - Benefits Limited to ITA Maximums: Basic Account Only: net of RSA

Basic Account Only	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	**($m's)**	**($m's)**
Entry Age Basis	4,491	4,780
Accrued Service Only	5,334	5,682
Contribution Rate	**%**	**%**
Entry-age normal cost	16.06	15.84
25 year Amortization	(5.06)	(5.38)
Total	**11.00**	**10.46**

Schedule 12 - Benefits Limited to ITA Maximums: Indexed Benefits: net of RSA

Basic and Indexed Benefits	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	**($m's)**	**($m's)**
Entry Age Basis	6,370	6,721
Accrued Service Only	7,302	7,742
Contribution Rate	**%**	**%**
Entry Age Normal Cost	21.68	21.40
25 year Amortization	(6.99)	(7.37)
Total	**14.69**	**14.03**

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 since January 1, 1982 under the current Plan terms, and for many years before that under earlier Plan provisions. Further, there is a fund set aside to fund future indexing and contributions are made to this fund on an ongoing basis. Thus, it is appropriate for purposes of testing the *ITA* 147.2(2) limits to recognize the future indexing of pensions for the current Plan membership.

Accordingly, the valuation results on the fully indexed basis, recognizing the income tax limits on benefits, should be considered.

For the purpose of this test, the total assets should include the $1,672 million in the RSA.

Schedule 13 - Pensions Limited to ITA Maximums: Maximum Surplus and Contributions Test

Basic and Indexed	**With Tax Limit**
Surplus (Unfunded Liability)	**($m's)**
Entry Age Basis net of RSA	6,721
Amount in RSA	1,672
Resulting Surplus for ITA test	8,393
Net liability	33,794
25% of Net liability	8,448
Contribution Rate	%
Fully Indexed Entry Age Normal Cost	21.40

The fully indexed valuation, recognising the income tax limits, shows a surplus of $8,393 million. The corresponding net liability is $33,794 million, so the 25% limit is $8,448 million. Thus the Plan does not have an excess *ITA* surplus. Given that there is a surplus, but not an excess surplus, the maximum contributions to the plan may not exceed those calculated at the fully indexed, income tax limited, entry-age normal cost rate of 21.40%. Should contributions exceed this amount, the excess above 21.40% will need to be directed to the Supplemental Benefits Account which is used to finance benefits in excess of the *Income Tax Act* limits.

Section 5. Subsequent Events

To the best of our knowledge there have been no events subsequent to the valuation date, other than disclosed above, that would have an impact on the results of this valuation, or alter our opinion.

Section 6. 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 March 31, 2026.

Section 7. 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,

Catherine Robertson

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

Appendix A: Summary of Plan and Amendments as at March 31, 2023

Changes to the Plan

The previous valuation was based on the provisions of the Plan as at March 31, 2020. Since then, the Plan has been amended several times. The main changes to March 31, 2023 are summarized below.

- Retroactively effective April 1, 2018, the plan rules were amended to update the early reduction rate for general members with less than 2 years of contributory service on or after April 1, 2018. The reduction rate was retroactively updated from 6.2% per year to 5% per year. The reduction rate applies from age 55 to 65.
- Retroactively effective May 30, 2019, the plan rules were amended as follows:
    - to clarify that a member can choose a full or half temporary annuity pension option based on the maximum Old Age Security benefit.
    - Section 16 was repealed and replaced to reflect all new *Employment Standards Act* (ESA) leave types for which the employer is required to pay the employer portion if the employee chooses to pay the employee portion.
- Effective April 1, 2020, the following plan design changes were implemented for benefits earned on pensionable service accrued on or after April 1, 2020, for ambulance paramedics:
    - a flat accrual rate of 1.85 per cent
    - removal of the bridge benefit
    - elimination of the rules of 80 and 85
    - an earliest retirement age of 50, regardless of service
    - an unreduced pension at 35 years of contributory service
    - a single early retirement reduction of 6.2 per cent per year:
        - for members with fewer than 10 years of contributory service: reduced for each year member is under age 60;
        - for members with 10 or more years of contributory service: reduced for each year member is under age 55
    - change in the additional employer contribution rate to 2.28 per cent
    - updated reduction rates from members between age 50-55 who previously did not qualify to retire before age 55

- Effective March 23, 2020, the plan rules were amended to reflect two new ESA leave types for which the employer is required to pay the employer portion if the employee chooses to pay the employee portion. The two new leaves are illness or injury leave and COVID-19-related leave.
- Effective May 1, 2020, the plan rules were amended to allow plan members to continue to contribute to the plan while on an ESA leave. Implementing this additional purchase option ensures the plan rules are compliant with the ESA and provides more flexibility for members.
- Effective June 4, 2020, the plan rules were amended to provide criteria for what constitutes a "good and sufficient reason" for pension backdating to clarify the plan rules on what situations the corporation considers when reviewing a pension backdating request.
- Effective December 11, 2020, the plan rules were amended to replace gendered terms with gender-neutral language.
- Effective December 10, 2021, the plan rules were amended to accommodate the participation of federally-regulated employers in the plan.
- Effective April 1, 2022, the plan rules were amended further as follows:
    - General members and ambulance paramedics: benefit accrual rate increase from 1.85% to 1.95%
    - Ambulance paramedics: additional employer contribution rate decrease from 2.28% to 2.18%
    - Correctional members:
        - member and employer contribution rates revert to integrated structure: Basic account contributions: 7.0% up to year's maximum pensionable earnings (YMPE), 7.70% over YMPE;
        - refunds provided for overcontributions made from August 1, 2018, to March 31, 2022
        - below YMPE accrual rate increase from 1.35% to 1.60%
        - additional employer contribution rate decrease from 2.57% to 2.56%
    - Updated early retirement reduction rate for general members with public safety service, from 5%/year to 3%/year from age 50-55
    - Minor updates to Judge and MLA contribution rates

Employer and Employee Eligibility

The Plan applies to public sector employers, including the government and other employers where application of the Plan is authorized by another enactment, and to any other body designated as an employer, on terms and conditions of eligibility specified by the Board. [Section 2]

Participation is compulsory for all "regular employees" (continuous full-time and continuous part-time) of government or other Plan employers, or employees who earn at least 50% of the Year's Maximum Pensionable Earnings (YMPE) in one calendar year. Enrolment is optional for regular employees appointed by the Lieutenant Governor in Council, deputy ministers, assistant deputy ministers, associate deputy ministers and eligible part-time staff who earn less than 50% of the YMPE in a calendar year and have been employed continuously for two years where there has not been a temporary absence of more than 52 weeks. [Section 3]

Member Contributions

Section 5 defines the following contributions, which are deducted from a regular member's salary during a calendar year:

a) 7.10% of the member's entire salary (paid into the Basic Account);

b) 1.25% of the member's entire salary (paid into the Inflation Adjustment Account).

Member contributions cease after 35 years of pensionable service have been accrued.

Employer Contributions

Section 6 requires every employer to contribute the following amounts for regular members during a calendar year:

a) 7.10% of the member's salary (paid into the Basic Account);

b) 2.75% of the member's salary (paid into the Inflation Adjustment Account net of amounts first allocated to non-pension benefits).

Employer contributions cease in respect of a member's salary after the member has accrued 35 years of pensionable service.

Retirement Benefits: Eligibility Conditions for Pension

The normal retirement age is 65 for all members except for correctional employees, who have a normal retirement age of 60. In the following summary of the various eligibility conditions and plan provisions, the age and/or service conditions are first shown for the groups with normal retirement age of 65; the age and/or service conditions, if different for those with normal retirement age of 60, are shown in parentheses, following the normal age 65 conditions. In addition, certain ambulance paramedics have different provisions which are not included below, as the impact on the Plan is not material.

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

a) for service accrued before April 1, 2018, calculated under section 54, if the member has reached

   (i) age 55 (50) and the sum of the member's age plus years of contributory service is 85 or more, or

(ii) age 60 (55) with 2 or more years of contributory service, or

(iii) age 65 (60).

b) for service accrued after March 31, 2018, calculated under section 54, if the member has reached

(i) age 55 (50) with 35 years of contributory service, or

(ii) age 60 (55) with 2 or more years of contributory service, or

(iii) age 65 (60).

Despite any other provision of this Plan, correctional employees shall receive benefits in respect of all their service, including service accrued after March 31, 2018, in accordance with paragraph (a) above.

Calculation of unreduced retirement benefits

Members are eligible for an unreduced pension at age 60 with two years of contributory service, and at age 65 with any amount of service. Members who are 55 years of age with 35 years of contributory service are eligible for an unreduced pension for service accrued on or after April 1, 2018.

The rule of 85 is removed effective April 1, 2018; however, the rule of 85 will still apply to service accrued before April 1, 2018, and service accrued after March 31, 2018, will be used to calculate eligibility for the rule of 85 for pre-April 1, 2018, service.

Section 54 provides that a regular member is entitled to receive an unreduced lifetime monthly retirement benefit in the form of a single life annuity guaranteed for 10 years that is the sum of:

a) for service accrued before April 1, 2006, the sum of

(i) 2% of the member's highest average salary multiplied by the number of years of pensionable service accrued before 1966,

(ii) 1.35% of the lesser of

- member's highest average salary, and
- 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 after 1965 and before April 1, 2006, not exceeding 35 years,

(iii) 0.65% of the lesser of

- member's highest average salary, and
- 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 after 1965 and before April 1, 2006, not exceeding 35 years,

b) for service accrued after March 31, 2006, and before April 1, 2018, the sum of

(i) 2% of the excess of the member's highest average salary over the 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 after 1965 and before April 1, 2018,

(ii) 1.65% of the lesser of

- member's highest average salary, and
- 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 after March 31, 2006, and before April 1, 2018,

(iii) 0.35% of the lesser of

- member's highest average salary, and
- 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 after March 31, 2006, and before April 1, 2018,

c) for service accrued on or after April 1, 2018, and before April 1, 2022

(i) 1.85% of the member's highest average salary multiplied by the number of years of pensionable service on or after April 1, 2018,

d) for service accrued on or after April 1, 2022

(i) 1.95% of the member's highest average salary multiplied by the number of years of pensionable service on or after April 1, 2022.

Highest average salary means one-twelfth of the average annual salary earned by a member during the 5 years of pensionable service (not necessarily consecutive) in which the salaries were highest (or, if the member has accrued less than 5 years of pensionable service, the total number of years and partial years of pensionable service).

The calculation of the pension payable to a deferred member who terminated employment prior to March 1, 2002 and who is entitled to an unreduced pension is the same as for a member terminating employment on or after March 1, 2002 except that the pension is payable in the form of a single life annuity (no guarantee), the 1.35% referred to in the calculation of the lifetime pension is 1.3%, and the 0.65% referred to in the calculation of the monthly benefit payable until the earlier of age 65 or the death of the member is 0.7%.

A member who has made voluntary additional contributions in the past - these are no longer accepted - will be granted an additional pension or may take a refund at any time prior to termination or retirement, including interest at fund interest rates on those contributions.

Calculation of Reduced Pension

Section 55 outlines the calculation of reduced retirement benefits payable to regular members in accordance with section 50, as follows:

a) for service accrued before April 1, 2018,

   (i) for members aged between 55 (50) and 60 (55) with 10 or more years of contributory service, there is a reduction factor of 3% for each year under the earlier of age 60 (55) or the age at which the member's age plus years of contributory service total 85, whichever is less (subsection 55(3)(a)),

   (ii) if the member terminates employment under age 50 (45), or with less than 10 years of contributory service, the reduction factor referred to above is 5% per year (subsection 55(4)),

   (iii) members aged 55 (50) or over who do not have 2 years of contributory service, the reduction factor is 5% for each year under age 65 (60) (subsection 55(2)(a)),

b) for service accrued on or after April 1, 2018,

   (i) for members aged 55 or more, but less than 60, with two or more years of contributory service (but less than 35) there is a reduction factor of 6.2% for each year under age 60 (subsection 55(3)(b)),

   (ii) for members under age 65 with less than two years of contributory service there is a reduction factor of 5% for each year from age 55-65 (subsection 55(2)(a)),

Note, the reduction applied is prorated for fractions of a year.

Alternative Types of Pensions

Section 56 provides that a pension calculated in accordance with sections 54 and 55 may be granted on the single life plan with a guaranteed period of 10 years (normal form), single life plan with a guaranteed period (5 or 15 years), joint life and last survivor plan, temporary annuity plan equal to 50% or 100% of the maximum pension payable under the *Old Age Security Act* (Canada), in connection with one of the above, or a combination of these plans with the 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 to elect a 60% joint life and last survivor option, unless the spouse waives this requirement in writing or there is a written agreement or court order made under Part 5 or 6 of the *Family Law Act* that is 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% of the initial reduced amount. The provision in section 56(5) is worded slightly differently, though we understand it is

implemented as described above, as is required under the *PBSA*. A spouse is as defined in the PBSA and includes a common-law or same-sex spouse.

Long-Term Disability

Sections 12(5) and 99(2) provide that if a member is receiving a monthly income benefit from an approved group disability plan, the member and employer do not make contributions and the member is not entitled to a pension under the Plan, but the period for which the member receives such group disability income benefit is considered pensionable service, with the final pension based on the highest average salary at disablement increased to retirement in accordance with changes in the consumer price index.

Disability Pensions

Section 60 provides that a member is entitled upon application to a disability benefit if the member, before reaching age 60 (55), has terminated employment, is totally and permanently disabled, has completed 2 years of contributory service and is not eligible for a monthly income benefit from a group disability plan. A member who has received a lump sum payment instead of a monthly income benefit under a group disability plan is not eligible to receive a disability benefit. Section 63 provides that where a disability benefit is payable, the benefit earned to date is increased as permitted under the *Income Tax Act*. Subject to certain limits, this permits the immediate recognition of projected future service in the calculation of the benefit.

Pre-retirement Death Benefits

The pre-retirement death benefits for active and inactive plan members are covered in section 69, and are 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 the member's contributions with interest at the refund interest rates, and the commuted value of the retirement benefit 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 interest at the refund interest rates, and the commuted value of the retirement benefit earned to the date of death, or

   (ii) an immediate pension that is actuarially equivalent to the commuted value of the retirement benefit earned to the date of death.

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 payable to the spouse is an immediate pension that is actuarially equivalent to the commuted value of the retirement benefit earned to the date of death.

Vesting and Portability

A terminating member is entitled to either of the following:

a) under sections 42(1)(b) and 45, a deferred retirement benefit equal to the normal form pension accrued to the date of termination; this may be paid on a reduced basis at an early retirement date depending on the service to termination (see above "Eligibility Conditions for Pension" section),

b) under sections 42(1)(c) and 46, 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, or

c) under section 42(1)(d) and 46, the payment of a lump sum commuted value, in lieu of the deferred retirement benefit, if the member reached age 55 (50) after March 31, 2018, and before October 1, 2019 and elects a commuted value under section 46 on or before October 31, 2019, subject to the commuted value being payable on a locked-in basis.

Under certain limited conditions (small pensions, or small commuted values) the PBSA permits the election of a lump-sum payout, regardless of age, and on a non-locked-in basis.

Section 100 provides that the deferred vested 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, based on the percentage increase granted to indexable benefits each January 1 under section 73. After 1980, the highest average salary is increased to retirement by the percentage increase granted to indexable benefits for the period between the month of termination and the month the retirement benefit becomes effective.

Section 75(3)(i) provides that the cost of the deferred indexing described above is funded from the Inflation Adjustment Account.

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 indexable benefits funded from the Inflation Adjustment Account. The increase is based on the total amount of indexable benefit being received, including previous cost of living increases, less any portion of the pension that is a result of voluntary contributions (which are no longer permitted). The monthly benefit to age 65, payable as part of the retirement benefits formula, and a temporary life annuity arising as a result of converting some or all of the lifetime pension to one of the optional forms are subject to indexing increases. The maximum increase is equal to the percentage increase in the annual change in the 12-month average Consumer Price Index (CPI) for the period November to October.

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 Inflation Adjustment Account on the preceding September 30,

d) the capitalized value of all cost of living benefits granted annually is transferred from the Inflation Adjustment Account to the Basic Account, and

e) if in calculating the cost of living there is a decrease in the CPI (deflation), indexable benefits will not be reduced and the reduction in the cost of living will be carried forward into subsequent years until it has been recovered.

The Fund

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

a) the Basic Account, consisting of all the assets in the fund other than assets in the Inflation Adjustment Account and the Supplemental Benefits Account,

b) the Inflation Adjustment Account, consisting of:

1) the 1.25% contribution by each of the members under section 5(1)(c),

2) the 2.75% employer contributions under section 6(1)(c) net of amounts first allocated for the payment of premiums for prescribed non-pension (i.e., group) benefit entitlements,

3) the net investment income earned on the Inflation Adjustment Account, and

4) subject to the prior approval of the board, all or such lesser part as the board designates of the income, as specified by the plan administrative agent, that is earned on other fund assets held in the Basic Account in respect of indexable benefits being paid, and is in excess of the investment rate of return assumed in the most recent actuarial valuation

less

5) amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under sections 73 and 88,

6) refunds to plan members in respect of contributions made to this account under sections 5(1)(c), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account,

7) 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,

8) amounts transferred to the Basic Account that are equal to the capitalized value of increases in deferred retirement benefits resulting from increases in highest average salaries under section 100, and

9) amounts transferred to the Supplemental Benefits Account, if any, to cover inflation protection on benefits in excess of those registrable under the *Income Tax Act*; and

Section 10.3 of the Joint Trust Agreement also permits the Board to transfer portions of any actuarial surplus in the Basic Account to the Inflation Adjustment Account)

c) the Supplemental Benefits Account, consisting of assets required for the administration and payment of benefits that are non-registrable under the *Income Tax Act*.

Income Tax Act Limits

The *Income Tax Act* 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 Public Service Pension Plan. To this end, a Supplemental Benefits Account has been created to cover the financing and payment of benefits in excess of those registrable under the *Income Tax Act*. The excess benefits are paid on a current cash basis, by allocating from the regular employer contributions, the amounts necessary to maintain the Supplemental Benefits Account 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/Inflation Adjustment Accounts are inclusive of the allocations to/from the Supplemental Benefits Account; in general, the allocations to/from the Supplemental Benefits Account 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 currently permitted (before application of any early retirement reductions, where applicable) is the lesser of:

a) $3,506.67 in 2023 multiplied by the years of service; and

b) 2% 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.

Other Items

1. The Post Retirement Group Benefit Rules set out the non-retirement (i.e., group) benefits that are provided to retired members. These include the partial subsidy of premiums for extended-health and group-life benefits. The subsidized costs are allocated entirely from employer contributions that would otherwise go to the Inflation Adjustment Account. Dental benefits, which were previously subsidized, are now offered through a voluntary member-funded dental plan.

2. Section 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.

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. Where the plan administrative agent agrees, the plan administrative agent must also determine the members eligible for the SRIP, the period it remains open, the conditions applicable to the incentives, the additional costs to the employer, and the timing of these payments to fund the SRIP.

4. The benefit provisions are different in a number of respects for certain groups of participants, e.g. judges, MLAs, deputy ministers, certain ambulance paramedics, etc. These groups are relatively small and should not have a material effect on the results of our valuation and hence we have ignored these differences in our calculations. We have also ignored the normal-retirement-age-60 classification and have treated all active members as if they are subject to normal retirement age 65.

5. The plan has in place transfer agreements with other public sector pension plans in Canada, including the three other main BC public sector pension plans. Under these agreements members may elect to transfer their service from one plan to another. Transfers under the agreement consider 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.

Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below.

Investment Return	6.00% per annum (same for the previous valuation)
General Salary Increases	3.25% per annum (same for the previous valuation)
Seniority Salary Increases	Annual percentages varying by age and sex
CPI Increases	2.50% (same for the 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 2.50% per annum (same for the previous valuation) • Indexing to date is capitalized and forms part of pension liability
Asset Values	• Assets at smoothed market values • Smoothed value restricted to a range of 92% to 108% of the market value
Costing Method	Contributions are based on an entry-age funding approach

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

Actuarial Methods

The plan has been valued on a going concern basis, which assumes that the plan will continue to operate indefinitely. The going concern 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 those 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 current 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 generally set equal to twice of 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.

The valuation assets consist of:

1. The Basic Account; and
2. 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
3. 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 in accordance with the Joint Trust Agreement and the Board's funding policy. The required contributions are the sum of the normal actuarial cost and the amount required to amortize the unfunded actuarial liability/surplus.

The contribution rates have to comply with the JTA-B funding requirements (the going concern funding requirements of the PBSA, as those requirements existed prior to December 31, 2019). 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.

Treatment of Member and Pensioner Data

Data as of March 31, 2023 were prepared by the Pension Corporation and the membership counts received are as follows:

	Pension Corp. Data
Pensioners	55,090
Active Members	68,080
Long Term Disability	2,686
Terminated Vested	18,248
Inactive	5,915
Leave of absence	14
Limited Data	170
Total Membership	**150,203**

The data also included 18,230 active member terminations and 4,579 pensioner terminations during the period April 1, 2020 to March 31, 2023. 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 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 payrolls, we reduced the total payroll base by 4% to reflect the part-time employment (the same adjustment was applied at the previous valuation).

There were also 2,003 active members coded as having maximum-retirement-age equal to age 60. We ignored this classification and treated all active members as having maximum-retirement-age equal to 65. In addition, certain members, e.g. judges and MLAs, have enhanced benefits. We ignore these enhanced benefits in this valuation. The additional contributions required for members with enhanced benefits will be reported on separately to the Board of Trustees.

The active member data included 2,250 persons who had no salary or service reported for the year ending March 31, 2023, or with a last-contribution-date prior to March 2023. We excluded them from the active member base, and have included them with the inactive data as follows:

- We treated the 955 of them who had at least 3 years of service, contributions after March 31, 2021 and basic employee contributions with interest balances of at least $1,500, as if they would be reactivated on April 1, 2023 (we set their salaries equal to the average salaries for active members in the same age-group category);
- We held a liability equal to twice the basic employee contributions with interest balance for the remaining 1,295 members.

A similar approach was used in the previous valuation. Salary details were inappropriate (missing, very low, or very high) for a further 20 active members. We assumed that these members had the same average earnings as for other actives in the same age-sex category.

We calculated the liability for 14 members on a leave of absence on the assumption that these members would be reactivated on April 1, 2023 (with assumed average salary equal to the average salary for active members in the same age sex category).

Members on Long-Term Disability

The liability for 2,652 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 63 where their deferred pensions were calculated 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-sex 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 (unchanged from the previous valuation). We excluded 34 members on long-term disability from the

regular valuation process 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.

Terminated Members

In respect of the 18,248 terminated members entitled to a vested pension, we excluded 1,031 members from the regular valuation process because of missing, invalid or inconsistent detail, or whose accrued pension equalled zero. Liabilities of twice their basic employee contributions with interest balance were held for these members. For the remaining 17,217 terminated members, we calculated their 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 5,915 inactive members into three classes:

I. 5,913 who were 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 2021/22 or 2022/23, or who were known to have taken a refund after the valuation date;

II. Members 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 (2 members at this valuation); and;

III. all other inactive members (no members in this class at this valuation).

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 members in the second and third groups would be reactivated on April 1, 2023, 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 170 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 124 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	Pensioners with zero liability	Actives	LTD	Vested	Re-activate	Refund 2 x CWI
Pensioners	55,090	54,966	124					
Active Members	68,080			65,830			955	1,295
Long Term Disability	2,686				2,652			34
Terminated Vested	18,248					17,217		1,031
Inactive members	5,915						2	5,913
Leave of absence	14						14	
Limited data	170							170
Total membership	**150,203**	**54,966**	**124**	**65,830**	**2,652**	**17,217**	**971**	**8,443**

Actuarial Assumptions

Investment return and general salary increase rates

Our actuarial costing 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) <u>Relationship to excess investment return threshold</u>

The investment return assumption can also be significant for another reason. The plan rules permit the Board, at its discretion, to transfer to the IAA excess investment returns over the valuation investment return assumption on pensioner liabilities in the Basic account, i.e. on that part of the Basic account that covers pensions in payment. Between 1980 and 2017, such transfers of excess investment returns to the IAA were automatic. Since 2017, transfers have been at the discretion of the Board, and the Board has elected not to transfer excess investment returns in the Basic Account to the IAA.

A decrease in the investment return assumption, and hence in the excess return threshold, would have at least two effects, if the Board used their discretion to affect the excess transfer to the IAA:

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

2) 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, has added significance.

Where the Board uses their discretion to make excess transfers to the IAA, the Basic Account earns no more than the investment return assumption during the post-retirement period.

b) Actual and long-term asset mix

The actual asset allocations for the Basic Account and IAA at March 31, 2023 are as follows:

Asset Class	Asset Mix at March 31, 2023
Short Term	1.9%
Fixed Income	23.8%
Mortgages	4.0%
Canadian Equities	3.4%
Global Equities	15.0%
Emerging markets equities	6.8%
Real Estate	18.1%
Private Equity	16.3%
Infrastructure and Renewable Resources	10.7%
Total Portfolio	**100.0%**

The long-term asset mix is set out in the Plan's Statement of Investment Policies and Procedures and summarized in the table below.

Asset Class	Long-term Asset Mix
Short Term	2.0%
Government Bonds	22.0%
Corporate Bonds	8.0%
Private Debt	8.0%
Mortgages	4.8%
Total Fixed Income	**44.8%**
Canadian Equities	3.4%
Global Equities	13.6%
Emerging Markets	3.0%
Private Equity	16.0%
Total Equity	**36.0%**
Real Estate	19.2%
Infrastructure and Renewable Resources	15.0%
Total Real Assets	**34.2%**
Total Portfolio	**115%**

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, we have concluded that a reasonable best estimate of the long term investment return on the plan's assets is 6.25% (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 4.00% (no change from the previous valuation).

In setting the 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 continue with our long-term investment return assumption of 6.00% per annum and the real return assumption of 3.5% from the previous valuation. In other words, there is a margin of 0.25% on the investment return assumption, and a margin of 0.50% 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	6.27%
Diversification and rebalancing effect	0.25%
Passive investment management fees	(0.24%)
Active investment management fees	(0.69%)
Value-added from active management	0.69%
Rounding	(0.03%)
Estimated net investment return before margin	**6.25%**
Margin for adverse deviation	(0.25%)
Discount return assumption (rounded to nearest 0.25%)	**6.00%**

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 0.93% and the allowance for passive investment management fees of 0.24% 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. The long-term asset mix adds to 115% due to the 15%

leverage target. BCI were limited to a 10% leverage target until very recently. It is expected that increases above 10% will be implemented over time. As a reflection of this implementation, and because it is unlikely in our view that all future market conditions will make it attractive to apply the full 15% when it can be applied, we have continued to reflect 10% leverage, and have adjusted the asset mix accordingly in determining the discount rate.

d) Real return and salary relationships - derive salary assumption

The 6% investment return assumption used at the last valuation was viewed as consisting of a real return component of about 3.5% per annum plus a long-term underlying inflation assumption of about 2.5% per annum. Continuing with the same real return component of 3.50%, we get a same long-term underlying inflation assumption of 2.50% per annum (i.e. 6.00% - 3.50%). This can also be viewed as a best estimate of future inflation of 2.25% (derived from the best estimate nominal return assumption of 6.25% less the best estimate real return assumption of 4.00%), plus a margin for adverse deviations of 0.25%.

The general salary increase assumption used in the last valuation was 3.25% per annum. This was viewed as consisting of the underlying inflation assumption of 2.5% per annum, plus a real salary increase component of 0.75% per annum. For this valuation, as the underlying inflation assumption of 2.5% is unchanged, we keep the same general salary increase assumption of 3.25%. 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%.

The impact of these assumptions on the valuation result is discussed further below.

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

During the **post-retirement period**, the investment return assumption is critical as this is the discount rate for the Basic Account post-retirement liabilities. It also sets the excess investment return threshold at which the Board may consider transferring assets from the Basic account to the IAA.

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., 6.00% investment return, 3.25% salary, 2.50% underlying inflation) would produce results similar to those using assumptions of 6.25% investment return and 3.50% salary, with 2.75% underlying inflation; or 5.75% investment return and 3.00% salary, with 2.25% underlying inflation, etc. Thus, the underlying inflation assumption in itself is not material to the results.

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.

Assumptions (%)		2023			2020
		Best Est.	Margin	Valn.	Valn.
1	Nominal Investment Return	6.25	(0.25)	6.00	6.00
2	Real Investment Return	4.00	(0.50)	3.50	3.50
3	**Implied Inflation (1) – (2)**	**2.25**	**0.25**	**2.50**	**2.50**
4	Real Salary Growth	0.50	0.25	0.75	0.75
5	**Nominal Salary Growth (3) + (4)**	**2.75**	**0.50**	**3.25**	**3.25**
	Resulting Net Rates				
6	Pre-retirement			2.75	2.75
7	Post-retirement			6.00	6.00

g) Salaries

The 2023 valuation data indicates that average annual earnings increased by about 9.9% from mid-fiscal-2020 to mid-fiscal-2023 (i.e., about 3.2% per annum), as compared with an expected increase of about 10.1% (i.e., 3.25% per annum) on the basis of the assumptions used in the 2020 valuation.

The input data salaries provided to us for this valuation were the actual earnings during fiscal 2023. 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 of 3.25% per year from its 2023 level of $66,600. In the previous valuation we assumed that the YMPE would increase at a rate of 3.25% per year for the Funding Valuation from its 2020 level of $58,700.

Pension Indexing - Basic Valuation

Indexing adjustments on and after January 1, 1982 are provided 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 1.25% of salaries to be paid by the members, plus 2.75% paid by the employers, net of amounts first paid for group benefits for pensioners (currently capped at 1% of pay). With respect to indexed adjustments granted through January 1, 2023, 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 transfers to the Basic Account from the Inflation Adjustment Account to finance this indexing 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). The amounts of deferred pensions without the indexing were also provided from the 2020 valuation, we have therefore used this deferred pension amounts without indexing so that the Basic Account liability is aligned with the allocation of assets between the Basic and IAA accounts.

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 2.5% per annum during the deferral period to retirement.

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 March 31, 2021 to March 31, 2023.

Following the March 31, 2020 valuation, $1,135 million of 2020 valuation surplus was transferred to the Rate Stabilization Account (RSA). Interest is applied annually to the RSA based on the smoothed one year fund return. The RSA is excluded from the valuation. It can be drawn down as needed to stabilize the contribution rate.

As in the previous valuation, 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 nominal investment return assumption. This is a change in methodology from the previous valuation, where the assumed return was based on the assumed underlying real interest rate plus the year over year change in the consumer price index (CPI). The method has been changed to reduce the potential volatility in the smoothing that can arise as CPI fluctuates. The prior method has been retained in the smoothing adjustments determined prior to April 1, 2022. 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.

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. The lower constraint of 92% applied as of March 31, 2021.

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

Adjustments to Total Fund

Target return	2020	2021	2022	2023
1. March-over-March increase in CPI	0.9%	2.2%	6.7%	4.3%
2. Base return[1]	4.4%	5.7%	10.2%	6.0%
Year-end asset values - $m				
3. At market value	33,623	38,924	41,381	42,347
4. At smoothed value	32,954	35,810	39,914	42,187
5. Ratio of (4) ÷ (3)	0.980	0.920	0.965	0.996
Annual returns				
6. At market value	3.1%	17.4%	7.8%	3.7%
7. At smoothed value	5.7%	10.2%	13.1%	7.2%

The annualized market value rate of return since last valuation is 9.5%.

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 - $m's

Basic Account including RSA	2020	2021	2022	2023
8. Market value	25,392	29,319	31,299	32,631
9. Smoothed value	24,886	26,973	30,190	32,508
10. Ratio of (9) ÷ (8)	0.980	0.920	0.965	0.996
Inflation Adjustment Account				
11. Market value	8,231	9,605	10,082	9,715
12. Smoothed value	8,068	8,837	9,724	9,679
13. Ratio of (12) ÷ (11)	0.980	0.920	0.965	0.996
RSA				
14. Market Value and Smoothed Value	1,252	1,380	1,561	1,672
Basic Account excluding RSA				
15. Market value	24,140	27,939	29,738	30,959
16. Smoothed value	23,634	25,593	28,629	30,836

The Basic Account market value includes contributions receivable of $28 million.

[1] 6.0% for 2023; March-over-March increase in CPI plus 3.5% for years prior to 2023.

Mortality

The assumed incidence of mortality both before and after retirement was based on Club Vita Canada's CV22 VitaCurves (with adjustments noted below), 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. (More details on the methodology can be found in the Canadian Institute of Actuaries member's paper: *Key Factors for Explaining Differences in Canadian Pensioner Baseline Mortality*.) The CV22 VitaCurves have been calibrated based on Club Vita Canada's longevity dataset for the years 2018 to 2020 and thus an appropriate base year in 2019. Improvements in baseline mortality from 2019 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 Canadian registered pension plans across Canada, and includes plans covering a range of industries in both the private and public sector. Club Vita Canada's CV22 VitaCurves have been developed based on longevity experience consisting of 2.5 million exposure years and 65 thousand deaths over 2018-2020, 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 four pension bands for males and three pension bands for females, and four earnings bands for males and females;
- Occupation type - currently or formerly employed in a blue or white collar occupation; and
- Pension form at retirement for pensioners - single life or joint life.

Given that the availability of longevity factors varies by plan, and also by members within a plan, the CV22 VitaCurves are calibrated based on different combinations of the factors outlined above, resulting in over 1000 baseline mortality tables. The best VitaCurve is assigned to each individual member based on the longevity factors available for that member.

For pensioners who retired on account of disability, for members currently on long-term disability and for those assumed to become disabled in future, the assumed rates of mortality were based on an aggregate VitaCurve for disabled pensioners, with generational projection using the CPM-B improvement scale.

In the previous valuation, the assumed rates of mortality were based on Club Vita Canada's CV19 VitaCurves, also projected using CPM-B improvement scale.

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

The use of the Club Vita mortality curves is a best estimate assumption. Prior to the adoption of Club Vita, we believed our mortality assumption included a margin, but we had no means to quantify the margin until we adopted the Club Vita assumptions. Given the considerable uncertainty in the future trajectory of mortality rates following the COVID-19 pandemic, we have added a reserve to the liabilities of 2% of liabilities on the non-indexed basis and 3% on the indexed basis. This is broadly equivalent to the margin that existed in the assumptions used prior to adopting the Club Vita mortality curves (2014 Public Sector Mortality Table, multiplied by 95% for females and unadjusted for males).

For the same reason of mortality uncertainty, we have added a provision of 0.05% of salaries to the Basic entry-age normal cost. The adoption of the Club Vita Canada's CV22 VitaCurves reduced the Basic entry-age normal cost by 0.06% of payroll, so the net effect is a reduction of 0.01%. A similar provision of 0.10% of salaries was included on the indexed entry-age normal costs.

Withdrawal

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period April 1, 2020 to March 31, 2023 and compared this with the experience observed and the rates used for previous valuations. The observed withdrawal rates in the first year of service for both male and females, and observed withdrawal rates in the second year and after 3 years for males were higher than assumed. Accordingly, we have made relatively minor changes to the withdrawal rates used for the previous valuation, by adopting the following multiples of those rates.

Multiples applied to 2020 rates

	In the first 3 years of service			After 3 years of service
	1st year	2nd year	3rd year	
Males	110%	105%	100%	105%
Females	110%	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	2020 valuation			2023 valuation		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year
Males						
20	.177	.141	.136	.195	.148	.136
30	.091	.086	.089	.100	.090	.089
40	.084	.075	.062	.092	.079	.062
50	.067	.051	.055	.074	.054	.055
Females						
20	.112	.122	.147	.123	.122	.147
30	.106	.122	.127	.116	.122	.127
40	.074	.074	.053	.081	.074	.053
50	.059	.060	.049	.065	.060	.049

B. Withdrawal Rates Applicable After 3 Years of Service

Attained age	2020 valuation		2023 valuation	
	Males	Females	Males	Females
23	.147	.130	.155	.130
33	.052	.076	.055	.076
43	.025	.032	.027	.032
53	.015	.015	.016	.015

The withdrawal rates we have used do not extend past age 54.

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 concluded that the experience in the inter-valuation period merited a change in the assumed rates. The rates used for this valuation are 215% for males and 180% for females of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2020. The lower rates used at the 2020 valuation were based on 230% for males and 190% for females of the respective rates used for the 2011 valuation of the Pension Plan for the Public Service of Canada.

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 63 (or, immediately, for those older than age 63). The same commencement age was assumed in the 2020 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.

Disability Rates

Age	2020 Valuation		2023 Valuation	
	Males	Females	Males	Females
25	.0003	.0001	.0002	.0001
35	.0004	.0013	.0008	.0016
45	.0027	.0041	.0031	.0050
55	.0089	.0112	.0087	.0127

Retirement

We examined the 2020-2023 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 shows fewer retirements than were indicated on the basis of the rates used in the previous valuation, indicating that members are generally retiring later than assumed. We gave partial recognition to the observed experience by making modest adjustments to the rates previously used for some of the unreduced retirement ages.

The rates used in this and the previous valuation, are as follows:

Retirement Rates

		2020 valuation		2023 valuation	
Age	Service	Males	Females	Males	Females
For unreduced retirement pensions					
55-59	rule-of-85	.35	.40	.30	.36
60	10	.25	.35	.23	.32
61	10	.18	.20	.16	.20
62	10	.20	.20	.17	.20
63	10	.18	.20	.18	.19
64	10	.20	.20	.20	.19
65	0	1.00	1.00	1.00	1.00
For reduced early retirement					
55-59	at least 10 years, but not rule-of-80	.03	.05	.03	.05
55-59	rule-of-80	.10	.12	.10	.12

Even though pensions (unreduced and reduced) are available with less than 10 years of service, we have continued to apply the retirement rates before age 65 only to those with 10 or more years of service, on the presumption that those with fewer than 10 years would not retire until age 65. Adding an assumption allowing for retirement with less than 10 years based on observed experience would not have a material impact on the results.

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

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 on the earnings history of the active members during the 3 year period ended March 31, 2023 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.

Sample Seniority Salary Rate Increases

Age	2020 and 2023 valuation	
	Males	Females
25	.037	.029
35	.016	.015
45	.007	.009
55	.003	.004
65	.000	.000

Proportions of members married at death

Given the pre-retirement death benefit, we value a commuted value on pre-retirement death for all members. As the benefit is the same regardless of marital status, the proportions of members assumed to be married at death are irrelevant for the valuation. The same assumption was made in the previous valuation.

Growth of active Public Service population

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

Payroll for Amortization

The data provided the annualized salary at the valuation year. We examined the experience of members working part time and assumed that the total payroll is 96% of annualized salary from the valuation data. The same assumption was assumed in the previous valuation. The total payroll, capped with 35 years of service, for amortization purpose was assumed to be $4,975 million.

Expenses

Administration expenses premiums are paid out of the Public Service Pension Plan fund. These amounts totalled 0.45%, 0.46% and 0.42% of salaries for the 2021, 2022 and 2023 fiscal years respectively. The projected expenses provided by the Pension Corporation for the next few years anticipate that administration expenses will be slightly higher. Therefore, we kept the expense provision unchanged from 0.48% of payroll used in the previous valuation, as part of the normal actuarial costs in the determination of the required contribution rates under the entry-age funding method. 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. Based on the projected payroll of $4,975 million, the estimated expenses for the 2024 fiscal year are $24 million.

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.

Plan Termination

The Standards of Practice issued by the Canadian Institute of Actuaries require that a valuation report "disclose the financial position of the plan if it were to be wound up on the calculation date, unless the plan does not define the benefits payable upon wind-up, in which case the actuary should include a statement to that effect".

While the Joint Trust Agreement deals with plan termination in sections 13.4 and 13.5, it is our, and the Board's, opinion that the benefits on wind-up are not defined. Accordingly, we no longer comment on the financial position of the plan if it were to be wound up.

Fully Indexed Valuation - 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 $40,515 million, net of the assets in the RSA;
- We applied an indexing assumption equal to the full assumed underlying inflation rate, i.e., 2.5% per annum. This indexing rate was applied to pensions after retirement and, in the case of deferred vested pensions and disability salary accruals, during the pre-retirement period. Indexing is applied annually, in arrears;
- We have added a reserve to the liabilities of 3% of liabilities and a provision to the normal cost of 0.10% of payroll; .and

- We combined the contribution rates to Basic and IAA, i.e., we assumed a total member contribution rate of 7.10% + 1.25% = 8.35%. The employer contributions to the IAA were reduced by 1% to account for the non-pension (EHB and Dental) benefits. The 1% was based on the Board's funding policy that no more than 1% of the employers' IAA contributions would first be made available to pay for post-retirement group benefits, prior to being paid to the IAA. The total employer rate is assumed to be 7.10% + 1.75% = 8.85%. A similar approach was used in the previous valuation.

ITA Maximum Pension Rule - Assumption Changes

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

The maximum annual pension currently permitted under the income tax rules is the lesser of:

a) $3,506.67 in 2023 multiplied by the years of service; and

b) 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 $3,506.67 maximum, the final average salary must be very high; 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 $3,506.67 limit is automatically indexed each year after 2023 in accordance with increases in the average wage. Accordingly, we have applied a 3.25% per annum increase to the $3,506.67 limit after 2023 (at the previous valuation the corresponding dollar limit was $3,092.22, and was scheduled to be automatically indexed each year after 2020 in accordance with increases in the average wage; same 3.25% increase rate was applied after 2020 to the $3,092.22 limit at the previous valuation).

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.

When testing the ITA maximum surplus requirements, the funds in the RSA are included.

Appendix C: Active Member Data

Active members March 31, 2023								New entrants April 1, 2020 to March 31, 2023 and still active March 31, 2023	
Age group[1]	Number	Average annual earnings[2] $	Average 1.35%/0.65%	Average 1.65%/0.35%	Average 1.85%	Average 1.95%	Total Average service (years)	Number	Average annual earnings $
Males									
Less than 25	505	57,624	0.0	0.0	0.4	0.6	1.0	768	59,281
25-29	2,373	64,211	0.0	0.1	1.2	0.8	2.2	1472	64,027
30-34	3,961	72,237	0.1	0.7	2.1	0.9	3.7	1374	70,238
35-39	4,345	79,840	0.1	2.0	2.5	0.9	5.5	1119	75,467
40-44	4,234	85,115	0.2	3.7	2.9	0.9	7.7	703	75,016
45-49	3,981	86,253	0.7	5.2	3.1	1.0	9.9	577	74,365
50-54	4,394	87,854	2.3	6.7	3.3	1.0	13.3	413	81,129
55-59	3,962	90,456	4.0	7.6	3.4	1.0	16.0	278	77,889
60-64	2,819	88,133	4.5	7.9	3.4	0.9	16.8	108	76,437
65 & over	1,171	91,010	5.3	8.1	3.3	0.9	17.5	28	86,686
Total	**31,745**	**82,460**	**1.5**	**4.4**	**2.8**	**0.9**	**9.6**	**6,840**	**70,499**
Females									
Less than 25	487	54,511	0.0	0.0	0.3	0.6	0.9	914	56,555
25-29	2743	61,869	0.0	0.1	1.2	0.8	2.1	1,764	61,741
30-34	4592	69,191	0.0	0.7	2.0	0.8	3.6	1,585	65,480
35-39	5054	74,684	0.0	2.1	2.5	0.9	5.4	1,089	68,316
40-44	4790	78,970	0.1	3.6	2.8	0.9	7.4	870	69,761
45-49	4296	81,224	0.9	5.0	3.0	0.9	9.8	644	69,595
50-54	4779	82,305	2.9	6.5	3.2	1.0	13.5	470	70,012
55-59	4082	80,863	4.6	7.5	3.4	1.0	16.4	268	67,963
60-64	2383	78,558	4.7	7.5	3.3	0.9	16.4	107	65,411
65 & over	879	77,419	4.9	7.9	3.3	0.9	17.0	11	59,502
Total	**34,085**	**76,201**	**1.5**	**4.1**	**2.7**	**0.9**	**9.2**	**7,722**	**65,147**
Total males and females	**65,830**	**79,219**	**1.5**	**4.2**	**2.7**	**0.9**	**9.4**	**14,562**	**67,661**

Average age of the 65,830 actives is 44.8.

[1] Age nearest birthday at March 31, 2023 for actives and at entry for new entrants.

[2] Based on actual earnings in 2022/23 for those employed all year and annualized for others. Very low and very high earnings figures were replaced by the average earnings in the same age-sex group.

A comparison of the March 31, 2023 active membership with the March 31, 2020 membership is as follows:

	March 31, 2020	March 31, 2023	Change 2020 to 2023
Males			
Number	29,927	31,745	+ 6.1%
Proportion of total	48.5%	48.2%	- 0.3%
Average age (at 3.31)	45.6	45.2	- 0.4 years
Average service	10.0	9.6	- 0.4 years
Average salary	$75,624	$82,460	+ 9.0%
Females			
Number	31,771	34,085	+ 7.3%
Proportion of total	51.5%	51.8%	+ 0.3%
Average age (at 3.31)	44.6	44.3	- 0.3 years
Average service	9.6	9.2	- 0.4 years
Average salary	$68,859	$76,201	+ 10.7%

The above comparison indicates an increase in the covered membership during the 3 year inter-valuation period. The proportion of males to females has decreased slightly. The average ages and average service have decreased for males and females. The increase in average salary is higher for females than for males.

A comparison of the new entrant subset used at March 31, 2023 with that used at March 31, 2020 in determining the entry-age normal costs is as follows:

	March 31, 2020	March 31, 2023	Change 2020 to 2023
Males			
Number	7,213	6,840	- 5.2%
Proportion of total	46.6%	47.0%	+ 0.4%
Average age at entry	36.2	36.2	No change
Average salary	$65,522	$70,499	+ 7.6%
Females			
Number	8,258	7,722	- 6.5%
Proportion of total	53.4%	53.0%	- 0.4%
Average age at entry	35.5	35.8	+ 0.3 years
Average salary	$59,346	$65,147	+ 9.8%

The average number of new entrants has decreased, and the portion of males to females has increased slightly. The average age of new entrants has no change for males and increased for females. The increase in average salary for all new entrants is lower than the increase in average salary for the actives as a whole.

Appendix D: Inactive Member Data

1. Inactive Members Assumed Reactivated on Valuation Date

Age group[1]	Males			Females		
	Number	Average annual earnings[2]	Average service (years)	Number	Average annual earnings[2]	Average service (years)
Under 30	30	64,594	3.5	23	62,935	3.4
30-34	65	72,746	4.9	102	69,265	4.7
35-39	62	79,374	5.3	121	74,543	6.1
40-44	69	85,240	8.3	81	78,865	7.2
45-49	48	86,160	8.9	49	80,978	8.7
50-54	60	87,904	11.4	63	82,334	12.0
55-59	49	90,552	12.0	53	80,735	12.7
60 & over	45	89,303	13.8	51	78,088	12.7
Total	**428**	**82,558**	**8.5**	**543**	**76,127**	**8.1**

	Number	Average age	Average annual earnings[2]	Average service
Total males & females	**971**	**44.0**	**$78,961**	**8.3 years**

[1] Age nearest birthday at March 31, 2023.

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

2. *Members on Long-Term Disability*

Age group[1]	Males		Females	
	Number	Average annual deferred pension[2]	Number	Average annual deferred pensions[2]
Under 30	9	$40,305	10	$37,115
30-34	28	46,001	47	41,861
35-39	54	44,383	82	41,629
40-44	77	42,245	140	42,233
45-49	107	37,519	173	37,455
50-54	201	38,079	330	34,940
55-59	221	33,600	399	32,461
60 & over	277	27,947	497	27,467
Total	**974**	**35,047**	**1,678**	**33,539**

	Number	Average age	Average annual deferred pensions[2]
Total males and females	**2,652**	**53.4**	**$34,093**

	Number	Average age	Average Pensionable Service	Average salary	Expected Average Remaining Service life
Active and LTD Combined	**68,482**	**45.1**	**9.7**	**$78,942**	**10.2**

[1] Age nearest birthday at March 31, 2023.

[2] Basic lifetime portions payable from age 63; additional temporary amounts are payable from age 63 to 65.

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

	Males			Females		
	Average annual vested pensions			Average annual vested pensions		
Age group[1]	Number	Initial[2] $	Offset at age 65 $	Number	Initial[2] $	Offset at age 65 $
Under 30	795	1,213	66	784	1,137	28
30-34	1,042	2,168	142	1,201	2,095	112
35-39	1,021	3,497	303	1,219	3,597	333
40-44	959	5,220	534	1,221	5,003	565
45-49	898	6,436	782	1,227	6,642	894
50-54	1,125	8,608	1,323	1,593	7,977	1,366
55-59	1,003	8,018	1,327	1,240	7,385	1,430
60 & over	875	6,641	906	1,014	5,862	928
Total	**7,718**	**5,327**	**691**	**9,499**	**5,249**	**762**

	Number	Average age	Average annual vested pension - initial	Average annual vested pension - Offset at age 65
Total males and females	**17,217**	**45.2**	**$5,284**	**$730**

4. Remaining Inactive Members

	Number	Average age	Member contributions with interest
Valued at 2 x contribution with interest	**8,443**[3]	**52.8**	**$31,102,984**

[1] Age nearest birthday at March 31, 2023.

[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, i.e., at various ages between 60 and 65.

[3] Includes 34 disabled and 1,031 vested members, with invalid data.

Appendix E: Pensioner Data

1. Former Contributors

		Annual Pensions ($000's)				
Age group[1]	**Number of pensioners[2]**	**Single life**	**Joint life & survivor**	**Joint life & survivor with guarantee**	**Single life with guarantee**	**Temporary life**
Male pensioners						
< 55	36	-	253	61	215	290
55-59	933	69	11,895	3,401	6,862	8,795
60-64	3,187	4,083	47,637	13,201	22,469	33,149
65-69	5,406	19,760	87,372	17,245	27,387	4,336
70-74	5,865	39,869	98,173	10,525	17,805	-
75-79	4,488	43,617	78,871	1,996	5,854	-
80-84	2,443	29,224	35,186	109	486	-
85-89	1,259	17,004	13,339	-	-	-
90-94	646	8,407	4,665	-	-	-
95 & over	181	3,040	926	-	-	-
Total	**24,444**	**165,073**	**378,317**	**46,538**	**81,078**	**46,570**
Female pensioners						
< 55	33	10	58	23	249	138
55-59	1,252	101	8,613	3,915	13,199	10,483
60-64	3,963	7,517	27,603	15,224	40,468	35,287
65-69	6,117	32,672	39,834	14,052	48,558	4,747
70-74	5,576	58,602	32,870	5,156	25,467	-
75-79	3,764	52,085	16,848	421	4,774	-
80-84	2,071	28,616	5,610	-	490	-
85-89	1,050	13,041	1,087	-	-	-
90-94	544	5,733	223	-	-	-
95 & over	212	2,111	26	-	-	-
Total	**24,582**	**200,488**	**132,772**	**38,791**	**133,205**	**50,655**
Grand Total	**49,026**	**365,561**	**511,089**	**85,329**	**214,283**	**97,225**
Supplemental Pensions (included above)		**4,015**	**16,833**	**921**	**3,126**	

Average age of the 49,026 pensioners is 71.8.

[1] Age nearest birthday at March 31, 2023.

[2] These numbers include only those who were formerly contributors to the Plan.

2. Beneficiaries

		Annual Pensions ($000's)	
Age group[1]	**Number of beneficiaries**[2]	**Single life**	**Single Life with Guarantee**
Male beneficiaries			
Less than 50	11	140	-
50-54	9	89	8
55-59	44	629	10
60-64	64	1,023	89
65-69	110	2,002	108
70-74	165	2,866	270
75-79	160	2,368	81
80-84	135	1,650	14
85-89	88	1,100	-
90-94	45	381	-
95 & over	15	125	-
Total	**846**	**12,373**	**580**
Female beneficiaries			
Less than 50	20	210	19
50-54	40	545	6
55-59	104	1,940	109
60-64	241	4,247	200
65-69	442	10,035	626
70-74	671	14,154	248
75-79	815	15,727	31
80-84	851	14,825	-
85-89	801	12,830	-
90-94	607	9,060	-
95 & over	305	5,329	-
Total	**4,897**	**88,902**	**1,239**
Remaining guarantees	**197**	**0**	**3,534**
Grand Total	**5,940**	**101,275**	**5,353**
Supplemental Pensions (included above)		**2,221**	

[1] Age nearest birthday at March 31, 2023.

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

Average age of the 5,743 beneficiaries in receipt of a lifetime pensions is 78.9.

	Number	Average age	Average annual pension ($)
Total Pensioners & Beneficiaries	**54,966**	**72.5**	**23,340**

Appendix F: Additional Results Detail

Additional Funding Valuation Results Detail on Fully Indexed Basis, and with Income Tax Limits

The results in this Appendix expand on some of details included in the body of the report. The results are included for:

- Basic (i.e., non-indexed) benefits only, no tax limits;
- Basic plus Indexed, no tax limits;
- Basic only, with tax limits; and
- Basic plus Indexed, with tax limits

Schedule F1: Statement of Actuarial Position as at March 31, 2023

Present Plan ($m's)

	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets				
Market value of Fund net of RSA	30,959	40,674	30,959	40,674
Asset smoothing adjustment	(123)	(159)	(123)	(159)
Smoothed value of Fund net of RSA	**30,836**	**40,515**	**30,836**	**40,515**
Actuarial present values of future contributions at entry-age rates	7,158	9,787	7,070	9,660
Total Assets	**37,994**	**50,302**	**37,906**	**50,175**
Actuarial present values for:				
• pensions being paid	14,069	17,471	13,765	17,091
• inactive members	1,567	2,379	1,567	2,379
• active members	16,993	22,585	16,928	22,502
• future expenses	217	217	217	217
Mortality reserve	657	1,280	649	1,265
Total Liabilities	**33,503**	**43,932**	**33,126**	**43,454**
Surplus (Unfunded Liability)	**4,491**	**6,370**	**4,780**	**6,721**
JTA-B Accessible Going Concern Excess	**3,174**	**n/a**	**3,477**	**n/a**

Schedule F2: Current and Minimum Permissible Contribution Rates - March 31, 2023

	Without Tax Limits		With Tax Limits	
	Basic only %	Basic + Indexed %	Basic only %	Basic + Indexed %
Current contribution rates				
Member	7.10	8.35	7.10	8.35
Employer [1]	7.10	8.85	7.10	8.85
Combined member/employer[1, 2]	**14.20**	**17.20**	**14.20**	**17.20**
Required contribution rates[2]				
Entry age normal cost rate[1]	16.06	21.68	15.84	21.40
• 25 year amortization	(5.06)	(6.99)	(5.38)	(7.37)
• 15 year amortization	(7.48)	(10.33)	(7.96)	(10.90)
• *JTA-B* amortization	(13.98)	n/a	(15.32)	n/a
Total contribution rate				
• 25-year amortization	11.00	14.69	10.46	14.03
• 15-year amortization	8.58	11.35	7.88	10.50
• *JTA-B* rate	2.08	n/a	0.52	n/a
Total minimum permissible rate	**11.00**	**n/a**	**10.46**	**n/a**

[1] Non-indexed costs ignore IAA contributions; indexed costs include IAA contributions, at 1.25% for members and 1.75% (which is net of the maximum of 1% first used to fund post-retirement group benefits) for employers.

[2] Total member plus employer, to be shared equally.

Schedule F3: Accrued Liabilities and Funded Ratio

Present Plan - March 31, 2023 ($m's)

	Without Tax Limits		With Tax Limits	
	Basic only	Basic + Indexed	Basic only	Basic + Indexed
Funds				
• **Smoothed Value of Fund**	**32,508**	**42,187**	**32,508**	**42,187**
Accrued Liabilities				
• for pensions being paid	14,069	17,471	13,765	17,091
• for inactive members	1,567	2,379	1,567	2,379
• for active members	9,366	12,396	9,329	12,348
• for voluntary contributions	-	-	-	-
• Mortality reserve	500	967	493	955
Total Accrued Liabilities	**25,502**	**33,213**	**25,154**	**32,773**
Surplus (Unfunded Actuarial Liability)				
• for accrued service only	7,006	8,974	7,354	9,414
Funded Ratio				
Fund ÷ Total accrued liabilities	127%	127%	129%	129%
Assets in RSA	(1,672)	(1,672)	(1,672)	(1,672)
Adjusted surplus (unfunded liability) net of RSA	**5,334**	**7,302**	**5,682**	**7,742**

Appendix G: Plausible Adverse Scenarios

The following analysis does not impact the funding requirements of the Plan and is for information purposes only.

A plausible adverse scenario is considered to be one that will occur in the short term (immediately to one year) with a likelihood of occurring between 1 in 10 and 1 in 20 based on the opinion of the actuary. The purpose of the following scenarios is to illustrate the impact on the Plan's financial position of the following adverse but plausible assumptions relative to the best estimate assumptions selected for the Plan's going concern valuation. The purpose of disclosing these results is to demonstrate the sensitivity of the key valuation results to certain key risk factors affecting the Plan. The results of the scenarios selected are shown in the table below, with a description of each scenario following. Some figures may appear not to add correctly, due to rounding to the nearest $1 million.

	Basic Account Results at March 31, 2023	Plausible Adverse Scenario Results at March 31, 2023		
		Interest Rate Risk	Deterioration of Asset Values	Longevity Risk
Basic Account ($m)				
Smoothed Value of Fund	32,508	32,634	31,735	32,508
Less RSA	(1,672)	(1,679)	(1,633)	(1,672)
Actuarial present values of future contributions at entry-age rates	7,158	7,612	7,158	7,225
Total Assets	37,994	38,567	37,260	38,061
Total Liabilities	33,503	34,674	33,503	33,503
Surplus / (Unfunded Liability)	**4,491**	**3,893**	**3,757**	**4,558**
Funded Ratio: Total Assets ÷ Total Liabilities	113%	111%	111%	114%
Entry-age normal cost rates	**16.06%**	**16.89%**	**16.06%**	**16.20%**
Discount rate	6.00%	5.78%	6.00%	6.00%
Adjusted market value of assets (including RSA)	32,631	33,259	29,384	32,631

Interest Rate Risk

This scenario illustrates the sensitivity of the key Basic Account valuation results to an immediate change in the market interest rates underlying fixed income investments.

In order to assess the impact of a decrease in interest rates of a magnitude consistent with a 1 in 10 likelihood of occurring, we have used the same stochastic model that is used to determine the going concern discount rate (see Appendix B). The stochastic model is based on 5,000 simulations of projected financial variables, including long term yields on fixed income investments and asset class returns. Our long-term best estimates for these variables, and the going concern discount rate are based on the median values over these 5,000 simulations.

To determine the sensitivity to interest rate risk, and the resulting impact on Plan assets and liabilities, we have:

- considered the hypothetical going concern discount rate over the 500 trials where fixed income yields are lowest at the one-year horizon, and
- determined the decrease in median long-term fixed income yields over the 500 trials where fixed income yields are the lowest at the one-year horizon.

As such, under the interest rate risk scenario, the going concern discount rate is decreased by 0.22% to 5.78% as of March 31, 2023.

With respect to the impact on fixed income assets, the scenario results in a decrease in long term yields on fixed income investments of 0.78%.

Based on the estimated duration of the Plan assets, liabilities and the entry age normal cost rate, we have then determined the estimated change to the Plan's key valuation results under the interest rate risk scenario.

Deterioration of Asset Values

This scenario illustrates the sensitivity of the funded status of the Plan to short-term shock which causes a reduction in the market value of assets, with no change to the liabilities of the Plan. This scenario is assumed not to impact the current expectation of the long-term rate of return, and consequently, the going concern discount rate.

In order to assess the impact of a decrease in asset values of a magnitude consistent with a 1 in 10 likelihood of occurring, we have used the same stochastic model that is used to determine the going concern discount rate (see Appendix B). The stochastic model is based on 5,000 simulations of projected financial variables, including long term yields on fixed income investments and asset class returns.

To determine the sensitivity to a deterioration in asset values, based on the Plan's target asset mix, we have:

- determined the decrease in median investment returns over the 500 trials where investment returns are the lowest at the one-year horizon.

As such, under the deterioration of asset values scenario, the actuarial value of assets (smoothed assets) is decreased by 2.38% as of March 31, 2023. Note that market value of assets is assumed to decrease by 9.95%; the use of smoothed assets decreases the immediate effect of the asset shock.

Longevity Risk

This scenario illustrates the sensitivity of the funded status of the Plan to pension plan members living longer than expected. As we already included a reserve (which equates to approximately a 90% adjustment to the mortality table used) to the liability for the funding valuation as of March 31, 2023, we only show the impact on the normal cost of including a 90% adjustment to the mortality table.