

Actuarial Report on

**British Columbia College  
Pension Plan**

as at August 31, 2021

Vancouver, British Columbia

May 13, 2022

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## Actuarial Report Highlights

An actuarial valuation of the College Pension Plan was completed as at August 31, 2021. Its purpose was to determine the financial position of the Plan as at August 31, 2021, to report on the adequacy of the member and employer Basic contribution rates, establish the level of sustainable indexing, and identify the transfer of any surplus from the Basic Account to the Inflation Adjustment Account (IAA), and/or the Rate Stabilization Account (RSA).

### Key Results

Basic Account (\$ millions)	2018 <sup>1</sup>	2021
Asset smoothing cushion	221.7	427.9
Rate Stabilization Account (RSA)	109.1	145.7
Assets (smoothed) net of RSA	4,939.5	6,425.0
Liabilities	4,939.5	6,223.3
<b>Surplus</b>	<b>0.0</b>	<b>201.7</b>
5% of net liabilities	n/a	(229.8)
<b>Accessible Going Concern Excess</b>	<b>0.0</b>	<b>0.0</b>

Basic Contribution Rates	2020
Current contribution rate	16.88%
Entry-age normal cost (EANC) rate	16.83%
Minimum JTA Appendix B contribution rate (pre-December 31, 2019 PBSA requirements)	16.83%
<b>Required Contribution Rate = Minimum Permissible JTA Contribution Rate</b>	<b>16.83%</b>

The Joint Trust Agreement (JTA) requires the calculation of a “Required Contribution Rate”, being the greater of the Entry Age Normal Cost (16.83%) and the minimum JTA-B rate (also 16.83%, as there is no accessible going concern excess to amortize). Since the Required Contribution Rate of 16.83% is less than the Current Contribution Rate of 16.88%, the JTA requires the Board to reduce Employer and Member contributions equally so that the aggregate contribution rate is equal to the Required Contribution Rate, unless the Board determines that the required reduction is not material.

<sup>1</sup> After transfer of surplus to RSA/IAA – see “Key Plan Changes Since the Previous Valuation” below.

The resulting contributions are summarized in the table below.

	Member	Employer	Total
Current Basic Account contributions	8.39%	8.49%	16.88%
Current IAA	1.85%	1.85%	3.70%
<b>Current total contribution rate</b>	<b>10.24%</b>	<b>10.34%</b>	<b>20.58%</b>
Required Contribution Rate (= EANC, rounded)	8.37%	8.47%	16.84%
Current IAA	1.85%	1.85%	3.70%
<b>Required total contribution rate</b>	<b>10.22%</b>	<b>10.32%</b>	<b>20.54%</b>

SFU members and employer are required to pay 0.64% of salary each to the Basic Account and 0.20% of salary each to the IAA in addition to the above contributions.

In line with the JTA and the funding policy, subject to consultation with the Partners, the surplus assets of \$201.7m must be split 50/50 between the IAA and the RSA, unless either has reached their target, in which case, the balance in excess of the target is diverted to the other account until it too reaches its target.

The Sustainable Indexing Valuation shows that indexing at 100% of CPI remains sustainable in the long term, with a significant margin.

The above complies with the requirements of the JTA, including the pre December 31, 2019 going concern funding provisions of the PBSA (which are now captured in the JTA). Expanded details of this compliance are included in the main body of this report.

### Key Plan Changes Since the Previous Valuation

The last valuation of the Plan was prepared as at August 31, 2018. The Plan's provisions and recent amendments are summarized in Appendix A.

Our report on the 2018 valuation showed a Basic Account surplus of \$303.2 million. Following the valuation the RSA was established in the amount of \$109.1 million, and the remaining surplus of \$194.1 million was transferred to the IAA. The RSA is excluded from the Funding and Sustainable Indexing valuations. It can be drawn down as needed to stabilize the Basic contribution rate.

On July 1, 2021, active members of the Simon Fraser University (SFU) Pension Plan for Members of the Academic Staff joined the College Plan for service from that date. In line with the Pension Plan Entry Agreement between SFU and the Board, additional contributions were required so that the Plan's financial status would not be affected (positively or negatively) by the addition of the SFU members. SFU made a one-off payment of \$5 million to the Plan, and SFU and SFU members are required to pay the following contributions for 20 years from July 1, 2021, on top of the regular contributions required by the Plan:

- 0.64% of salary each to the Basic Account
- 0.20% of salary each to the IAA.

There were no other legislative changes or changes to the Plan that were not reflected in the previous valuation that would materially impact the valuation results.

### **Key Long-term Assumptions**

We also updated the actuarial assumptions. In particular:

- The discount rates used for the Funding valuation and the Sustainable Indexing valuations were both reduced by 0.25%, reflecting a reduction in the expected long-term nominal rate of investment returns.
- The assumed rates of price inflation, salary increases, and annual cost of living increases were also reduced by 0.25%, leaving the assumed long-term real rates of return unchanged.
- The assumed rates of death, withdrawal, disability and retirement were updated to reflect our analysis of Plan experience.

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**

After the transfer of Basic Account surplus to the RSA and IAA, the Basic Account was in balance at August 31, 2018, with no surplus or deficit. The surplus of \$201.7 million at August 31, 2021 has arisen primarily because of smoothed investment returns being higher than assumed over the three years. This was partially offset by the transfer of excess investment returns from the Basic Account to the IAA, and by the changes made to the economic assumptions. See Section 4(2) for more detail of the actuarial gains and losses since the previous valuation.

### **Compliance with the Income Tax Act**

The fully indexed valuation, recognising the income tax limits and including the RSA, shows a surplus of \$317.8 million. 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, income tax limited, entry-age normal cost rate of 22.36%. The current total contributions of 20.58%, and the required total contribution rate of 20.54% are both less than the ITA limit and therefore are 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 these conditions may be waived by the Minister of Finance provided members do not contribute more than half of the cost of benefits. Both the current member contribution rate of 10.24% and the required member contribution rate of 10.22% exceed this limit, so it will be necessary to apply to the Minister for a waiver. A similar exemption was required, and obtained, following the 2018 valuation.

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## Section 1. Scope of the Valuation

In accordance with Section 11 of the current Joint Trust Agreement (the “JTA”) and on the instructions of the College Pension Board of Trustees (the “Board of Trustees”), we completed an actuarial valuation of the Basic Account and the Inflation Adjustment Account of the College Pension Plan (the “Plan”) as at August 31, 2021 and are pleased to submit this report thereon. The primary purpose of this valuation is to determine the financial position of the Basic Account as at August 31, 2021 and to report on the adequacy of the member and employer contribution rates and to confirm the sustainability of indexing.

Two main valuations were carried out:

- **A Funding Valuation** – this primary valuation is to determine the financial position of the Basic Account as at August 31, 2021 and to report on the adequacy of the member and employer Basic contribution rates. The Funding Valuation focuses only on the Basic Account and does not examine the Inflation Adjustment Account (“IAA”) and its ability to meet future indexing requirements. Furthermore, it ignores the limits on benefits imposed by the *Income Tax Act* (“ITA”) on registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance; and
- **A Sustainable Indexing Valuation** – to determine the rate of indexing that can be sustained in the long term, based on the financial position of the Basic Account and the Inflation Adjustment Account, and the overall level of contributions to the plan.

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

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

The intended users of this report are The Board of Trustees, the BC Financial Services Authority (“BCFSA”) and Canada Revenue Agency (“CRA”). This report is not intended or necessarily suitable for other purposes than those listed above.

## Section 2. Changes in the Plan

The last valuation of the Plan was prepared as at August 31, 2018. The Plan's provisions and recent amendments are summarized in Appendix A.

Our report on the 2018 valuation showed a Basic Account surplus of \$303.2 million. Following the valuation the RSA was established in the amount of \$109.1 million, and the remaining surplus of \$194.1 million was transferred to the IAA. The RSA is excluded from the Funding and Sustainable Indexing valuations. It can be drawn down as needed to stabilize the Basic contribution rate.

On July 1, 2021, active members of the Simon Fraser University (SFU) Pension Plan for Members of the Academic Staff joined the College Plan for service from that date, for an addition of 1,184 members still active as of the valuation date. This represents a large increase in the active membership of the plan (almost 10%). In line with the Pension Plan Entry Agreement between SFU and the Board, additional payments were required so that the Plan's financial status would not be affected (positively or negatively) by the addition of the SFU members.

The amount owed is due to the fact that when a group joins the plan with an average age higher than the normal assumed entry age, but only pays the entry age normal rate, an unfunded liability results as the future contributions for this group are insufficient to fund the future benefits to be earned by the group. In the case of SFU, the size of the group joining meant that the unfunded liability created was material to the plan's finances. Further, the plan was in a surplus position following the 2018 valuation and a large group joining would dilute this surplus unless an additional payment was made to compensate for this effect. A total payment of \$44.092 million was required effective July 1, 2021 split \$35,189 million to the Basic Account and \$8.903 million to the IAA. Rather than pay this amount in a lump sum, SFU made a one-off payment of \$5 million to the Plan, with the balance to be paid off by SFU and SFU members over 20 years from July 1, 2021. As a result SFU and SFU members are required to pay, on top of the regular contributions required by the Plan:

- 0.64% of salary each to the Basic Account
- 0.20% of salary each to the IAA.

There were no other legislative changes or changes to the Plan that were not reflected in the previous valuation that would materially impact the valuation results.

## 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 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 the College Pension Plan include the following:

- 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, obviously benefit security is enhanced with a larger accumulation of assets.
- Stability of contributions** – the financing system should result in contribution rates that are relatively stable over an extended period of time.
- Allocation of costs** – as far as is practicable, pension costs should be allocated to the generation that incurs them; there is no assurance that future generations will assume the burdens transferred to them by prior generations.

The Board has adopted a formal funding policy (most recently revised in December 2021) in which it identified benefit security as its primary funding objective and contribution stability as an important secondary objective. We have taken this into account in carrying out this valuation.

#### *b) Indexing Treatment*

The current financing provisions are described in Appendix A. Member and employer contributions are at rates set out in the Plan rules. A larger part of these contributions is allocated to the Basic Account, and a smaller portion to the IAA. The future indexing of pensions is based on funds available in the IAA, which derives its funds primarily from these allocated contributions, from excess investment earnings on pensioner reserves 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 CPI indexing is provided; alternatively, if the monies in the IAA cannot support full CPI indexing, then the amount of indexing is limited to the monies available. In either case, the mechanics are such that the capitalized value of the indexing granted is transferred from the IAA to Basic Account each time indexing is granted. Thus, the system will limit indexing, if necessary, so that the granting of any increases for indexing should not create (or increase) a Basic account unfunded liability, or reduce a Basic account actuarial surplus. Accordingly, we did not consider any future indexing in determining the financial status of the Basic Account.

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

**c) *Basic Account Valuation – Current Financing***

We determined the financial status of the Plan for the Basic Account only (i.e. ignoring any indexing granted after August 31, 2021). The methods used are described in Appendix B.

**d) *Funding Requirements***

The approach taken in this valuation (set out in the following sections) reflects 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 rate of pay 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 generate neither unfunded liabilities nor 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, is amortized over a specified period as outlined in the funding policy. Adjusted contributions, expressed as a percentage of payrolls, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

**f) Pre December 31, 2019 PBSA Requirements - JTA-B**

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 no more than a specified number of year from when they are established, and special rules regarding the treatment of surplus. While the College Pension Plan is one of a number of British Columbia public sector plans that are exempt from these provisions, the 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 JTA-B. This report therefore complies with the JTA-B funding provisions.

**g) Test Contribution Adequacy – JTA provisions**

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 any amortization requirements established on or after September 30, 2015). 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 liability has been set aside, with the remaining surplus to be amortized over not less than 5 years.

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

- Calculate the minimum rate required under the JTA-B provisions (the "JTA-B Contribution Rate"). The requirements of JTA-B are:
  - (i) pay the entry-age normal cost (EANC)
  - (ii) if there is an unfunded liability (UL), it should be amortized over 15 years
  - (iii) if there is a surplus
    - a surplus cushion equal to 5% of the net liability must be retained (the "JTA-B minimum surplus"),
    - the remaining balance can then be amortized over not less than five years.
- If there are surplus assets, the Joint Trust Agreement (JTA) and funding policy require firstly that the JTA-B minimum surplus be maintained as a cushion. Any surplus in excess of this cushion (the "Accessible Going Concern Excess") is then to be used as follows:

- (i) To reduce the contribution rate to the greater of the JTA-B Contribution Rate and the EANC, subject to materiality. If the current contribution rate is less than the EANC, then the Accessible Going Concern Excess is used to support a contribution rate of the greater of the current contribution rate and the EANC minus 1.0%. The Accessible Going Concern Excess must be so applied by amortizing it over a 25-year period from the effective date of the valuation assuming an open group of Plan Members. The resulting contribution rate becomes the Required Rate (As the amortization is over a longer period than the JTA-B amortization, this rate will be higher than the JTA-B Contribution Rate).
  - (ii) If there is remaining surplus, the Board must transfer the surplus to the IAA to support indexing and to the Rate Stabilization Account (RSA) to stabilize the contribution rate, as required.
    - o The target amount of assets in the IAA is the amount required to keep the stochastically modeled probability of an indexing cap being reinstated to less than 25% over a period of 15 years following the valuation.
    - o The target amount of assets in the RSA is the amount required to keep the stochastically modeled probability of the Basic Contribution Rate being equal to the EANC at 80% over a period of 15 years following the valuation in question.
    - o Surpluses transferred to the IAA and RSA are split 50/50 between the two accounts, until either account reaches its target level. Any remaining excess surplus in excess of the target level is directed to the other account, until its target is reached.
  - (iii) Finally, the Board may use any remaining Accessible Going Concern Excess to support benefit improvements or contribution rate reductions (but not lower than 1% below the EANC), or leave surplus in the Basic Account as an additional contribution stabilization reserve.
- The funds in the RSA are 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.

The JTA requires any contribution rate changes, up or down, to be shared equally by the members and the employers. Thus, we express the future cost requirements as a combined member-plus-employer amount.

## 2. Sustainable Indexing Valuation

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

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

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

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

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

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

**3. Actuarial Assumptions**

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

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

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

	<b>Funding Valuation</b>	<b>Sustainable Indexing Valuation</b>
Annual Investment Return	6.00% (6.25%)	6.25% (6.50%)
Annual Salary Increase	3.25% (3.50%) plus seniority	3.00% (3.25%) plus seniority
Annual Indexing	0% for basic costs 2.50% (2.75%) for indexed costs	2.25% (2.50%) for fully indexed costs

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

**4. Membership Data**

Data as of August 31, 2021 were prepared by the Pension Corporation. The data are described in detail in Appendix B and numerically summarized in Appendices C, D and E.

**5. Benefits**

Plan benefits are summarized in Appendix A. Key changes since the last valuation which had an impact on the results are summarized in Section 2. No benefits have been excluded from the valuation.

## Section 4. Results of the Funding Valuation

### 1. Basic Account – Actuarial Position

Schedule 1 shows a statement of the actuarial position of the funding valuation of the Plan as at August 31, 2021. This statement ignores liabilities for future indexing granted after the valuation date, and assumes that contributions will be made at the current rate of 16.88% for one year, then at the basic, non-indexed, entry-age normal cost rate of 16.83%. The comparative results shown as at August 31, 2018 are after the transfer of surplus to the IAA and RSA.

#### **Schedule 1 – Statement of Actuarial Position as at August 31, 2021**

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

(\$ millions)	2018	2021
<b>Assets</b>		
Market Value of Basic Account including RSA	4,319.9	5,340.8
Asset Smoothing Adjustment	(221.7)	(427.9)
<b>Smoothed Value of Basic Account including RSA</b>	<b>4,098.2</b>	<b>4,912.9</b>
RSA	(109.1)	(145.7)
2018 valuation surplus transferred to IAA	(194.1)	n/a
<b>Smoothed Value of Basic Account net of RSA</b>	<b>3,795.0</b>	<b>4,767.2</b>
Actuarial present values of future contributions at entry-age rates (current rate in first year)	1,144.5	1,628.1
PV of required amortization for SFU and SFU members <sup>1</sup>	n/a	29.7
<b>Total Assets</b>	<b>4,939.5</b>	<b>6,425.0</b>
<b>Liabilities</b>		
Actuarial present values for		
• pensions being paid	1,986.6	2,403.0
• inactive members		
deferred vested members	114.6	143.1
LTD members	75.4	89.2
other inactive members	25.7	39.5
• active members	2,695.7	3,495.3
• future expenses	41.5	53.2
<b>Total Liabilities</b>	<b>4,939.5</b>	<b>6,223.3</b>
<b>Surplus (Unfunded Liability)</b>	<b>-</b>	<b>201.7</b>
<b>Funded Ratio: Total Assets ÷ Total Liabilities</b>	<b>100.0%</b>	<b>103.2%</b>
5% of net liabilities <sup>2</sup>	189.8	229.8
<b>JTA-B Accessible Going Concern Excess</b>	<b>0</b>	<b>0</b>

<sup>1</sup> As noted earlier, SFU and SFU members are paying additional contributions of 0.64% of salary each to the Basic account for 20 years from July 1, 2021.

<sup>2</sup> 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 a surplus of \$202 million has emerged since August 31, 2018. This surplus is the net result of a number of items, the most significant items being higher than assumed investment returns, partially offset by the excess investment return transfers from the Basic Account to the IAA and the changes made to the economic assumptions.

### *Schedule 2 – Change in Actuarial Position*

	Approximate effect on surplus
	(\$ millions)
<b>1. Surplus (Unfunded Liability) at August 31, 2018</b>	<b>0</b>
2. Interest on Surplus	0
3. Change in new entrant profile	(13)
4. Excess investment return transfer	(134)
5. Contribution gain from paying higher than normal cost	10
6. Experience gains / (losses)	
a. Smoothed investment return greater than assumed	426
b. Expenses lower than assumed	3
c. Salary increases lower than assumed	11
d. YMPE increases lower than assumed	(2)
e. Retirements later than assumed	14
f. Less terminations than assumed, net of rehires	(8)
g. Mortality heavier than assumed	4
h. Disability lighter than assumed	(3)
7. Gains / (losses) due to changes in valuation assumptions	
a. Economic assumptions changed (discount rate, inflation and general salary increases reduced)	(120)
b. Disability incidence rate increased and disability retirement age increased	0
c. Withdrawal rates increased	2
d. Retirement rates reduced (ie later retirement assumed)	24
e. Improvement scale added to disabled mortality rates	(9)
8. Miscellaneous	(3)
<b>9. Surplus (Unfunded Liability) at August 31, 2021</b>	<b>202</b>

### 3. Adequacy of Contribution Rates

As discussed previously in Section 3, the required contribution rate consists of the normal cost plus an adjustment to amortize any surplus or unfunded liability. These components of the required contributions are discussed in more detail below.

#### a) Normal Cost Rate

The current service contribution required to finance the basic pensions of new entrants (i.e. the normal actuarial cost) has increased from 16.50% of salaries as at August 31, 2018 to 16.83% of salaries as at August 31, 2021. The reasons for this 0.33% increase in normal cost rate are shown below, with the most significant being the changes in economic assumptions.

#### Schedule 3 – Change in entry-age normal cost

	% of salaries
<b>Entry-age normal cost at 2018 valuation</b>	<b>16.50</b>
Changes in demographic profile of new entrants	(0.13)
Assumption changes:	
• economic assumptions	0.52
• expense allowance	(0.05)
• disability incidence rates	0.01
• disability assumed retirement age	0.01
• withdrawal rates	(0.02)
• retirement rates	(0.08)
• improvement scale added to assumed disabled mortality rates	0.07
<b>Total change</b>	<b>0.33</b>
<b>Entry-age normal cost at 2021 valuation</b>	<b>16.83</b>

#### b) JTA-B Contribution Rate

The minimum permissible contribution rate in accordance with the JTA-B requirements is equal to the normal cost of 16.83% 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 \$229.8 million, which is greater than the surplus of \$201.7 million, meaning the accessible going concern excess is zero. The minimum rate permissible under JTA-B (referred to as the “PBSA Contribution Rate” in Section 11.2 of the JTA) is therefore equal to the normal cost of 16.83% of salaries.

#### c) JTA and Funding Policy Requirements

The JTA requires the calculation of a “Required Contribution Rate”, being the greater of the minimum permissible JTA-B rate (16.83%) and the Entry Age Normal Cost (also 16.83%). Since the Required



Contribution Rate of 16.83% is less than the Current Contribution Rate of 16.88%, the JTA requires the Board to reduce Employer and Member contributions equally so that the aggregate contribution rate is equal to the Required Contribution Rate, unless the Board determines that the required reduction is not material.

The resulting contributions are summarized in the table below.

	Member	Employer	Total
Current Basic Account contributions	8.39%	8.49%	16.88%
Current IAA	1.85%	1.85%	3.70%
<b>Current total contribution rate</b>	<b>10.24%</b>	<b>10.34%</b>	<b>20.58%</b>
Required Contribution Rate (= EANC, rounded)	8.37%	8.47%	16.84%
Current IAA	1.85%	1.85%	3.70%
<b>Required total contribution rate</b>	<b>10.22%</b>	<b>10.32%</b>	<b>20.54%</b>

SFU members and employer continue to pay 0.64% of salary each to the Basic Account and 0.20% of salary each to the IAA in addition to the above contributions.

In line with the JTA and the funding policy, subject to consultation with the Partners, the surplus assets of \$201.7m must be split 50/50 between the IAA and the RSA, unless either has reached their target, in which case, the balance in excess of the target is diverted to the other account until it too reaches its target.

**d) Compliance with Income Tax Act (ITA)**

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."

Both the current member contributions and the required member contributions will exceed this limit, so regardless of the decision by the Board with respect to contribution rates, it will be necessary to apply to the Minister for a waiver. The employer contributions currently exceed the member contributions by 0.1% of salaries. As IAA contribution rates are fixed and any future Basic contribution rate changes must be shared equally in terms of the JTA, the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met. A similar exemption was required, and obtained, following the 2018 valuation.

#### 4. 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 4 – Accrued Benefits – Funded Ratio at August 31, 2021**

###### *Basic Account – Non-Indexed Benefits*

	(\$ millions)	
	2018	2021
<b>Fund (Basic Account):</b>		
<b>Smoothed value of assets (including RSA)</b>	<b>3,904.1<sup>1</sup></b>	<b>4,912.9</b>
<b>Accrued Liabilities</b>		
• for pensions being paid	1,986.6	2,403.0
• for inactive members	215.6	271.8
• for active members	1,479.0	1,761.1
<b>Total Accrued Liabilities</b>	<b>3,681.2</b>	<b>4,435.9</b>
<b>Surplus (Unfunded Actuarial Liability):</b>		
<b>For accrued service only</b>	<b>222.9</b>	<b>477.0</b>
<b>Funded Ratio:</b>		
<b>Fund ÷ Total accrued liabilities</b>	<b>106%</b>	<b>111%</b>
Assets in RSA	(109.1)	(145.7)
Adjusted Surplus (Unfunded Liability) net of RSA	113.8	331.3

Schedule 4 indicates that the funded ratio for accrued benefits has improved from about 106% to 111%. This is largely for reasons similar to the items in the analysis in Schedule 2.

#### 5. Sensitivity Analysis

##### **Sensitivity Analysis under Standards of Practice**

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

<sup>1</sup> After transfer of \$194.1m of 2018 valuation surplus to IAA

- a) The actuarial present value, at the calculation date, of projected benefits allocated to periods up to the calculation date, and
- b) The service cost or the rule for calculating the service cost between the calculation date and the next calculation date.

The table below shows the impact on the accrued liability as required by (a) and the entry-age normal cost as required by (b) as at August 31, 2021 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

***Sensitivity – Impact of 1% drop in investment return on Accrued Benefits and Normal Cost***

<b>Impact on liabilities of 1% drop in discount rates (\$ millions)</b>	<b>Going Concern 6.00%</b>	<b>Going Concern 5.00%</b>	<b>Increase</b>
Active members	1,761.1	2,075.5	314.4
Disabled members	89.2	105.4	16.2
Terminated members	182.6	214.1	31.5
Pensioners and beneficiaries	2,403.0	2,618.7	215.7
<b>Total</b>	<b>4,435.9</b>	<b>5,013.7</b>	<b>577.8</b>

<b>Impact on normal cost rate of 1% drop in discount rates</b>	<b>Going Concern 6.00%</b>	<b>Going Concern 5.00%</b>	<b>Increase</b>
Current service cost rate	16.83%	20.79%	3.96%

### Sensitivity Analysis for Plan Funding

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

#### *Sensitivity – Impact of 1% drop in investment return on Plan Funding*

	(\$ millions)		
	6.00 %	5.00%	Increase
Smoothed Value of Fund net of RSA	4,767.2	4,767.2	-
Actuarial present values of:			
Existing amortization for SFU and SFU members	29.7	32.4	2.7
Future contributions at entry-age rates	1,628.1	2,093.4	465.3
<b>Total Assets net of RSA</b>	<b>6,425.0</b>	<b>6,893.0</b>	<b>468.0</b>
<b>Total Liabilities</b>	<b>6,223.3</b>	<b>7,293.4</b>	<b>1,070.1</b>
Surplus/(Unfunded liability) on entry-age basis	201.7	(400.4)	(602.1)
Accessible Going Concern Excess	-	-	
Entry Age Normal Cost	16.83%	20.79%	3.96%
JTA-B Amortization of unfunded liability	n/a	2.63% <sup>1</sup>	2.63%
<b>Required contribution rate net of RSA</b>	<b>16.83%</b>	<b>23.42%</b>	<b>6.59%</b>
Transfer from RSA	-	145.7	145.7
Revised unfunded liability	201.7	(254.7)	(456.4)
JTA-B amortization of revised unfunded liability	n/a	1.67%	1.67%
<b>Required contribution rate after applying RSA</b>	<b>16.83%</b>	<b>22.46%</b>	<b>5.63%</b>

<sup>1</sup> Prior to any transfer from the RSA.

## 8. Supplementary Funding Valuations

Results analogous to those in Schedules 1 and 4 - 8 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. The fully indexed funding valuation result takes into account IAA contributions of 1.85% from each of members and employers. The key results are summarized below:

### Schedule 5 – Indexed Benefits (without tax limits)

	Basic Only	Basic + Indexed
	(\$ millions)	(\$ millions)
Smoothed Value of Fund net of RSA	4,767.2	6,014.4
Actuarial present values of:		
Existing amortization for SFU and SFU members	29.7	39.0
Future contributions at entry-age rates	1,628.1	2,194.3
Total Assets net of RSA	6,425.0	8,247.7
Total Liabilities	6,223.3	8,087.6
<b>Surplus (Unfunded Liability)</b>	<b>201.7</b>	<b>160.1</b>
<b>Accessible Going Concern Excess</b>	<b>0</b>	<b>0</b>
<b>Contribution Rates</b>	<b>%</b>	<b>%</b>
Current Member	8.39	10.24
Current Employer	8.49	10.34
<b>Current Total (excluding additional contributions in respect of SFU)</b>	<b>16.88</b>	<b>20.58</b>
<b>Entry-age normal cost</b>	<b>16.83</b>	<b>22.69</b>

For previous valuations we have also shown contributions rates including the effect of amortizing any surplus or unfunded liability. Since the table above shows no unfunded liability or Accessible Going Concern Excess on either the indexed or non-indexed basis, there are no amortization requirements according to the JTA and the funding policy.

If assets and liabilities are restricted to accrued service only, i.e. analogous to Schedule 4 earlier, the 2021 surplus (unfunded liability) figures change as follows:

**Schedule 6 – Indexed Accrued Benefits (no tax limits) – Funded Ratio at August 31, 2021**

(\$millions)	Basic Only	Basic + Indexed
Smoothed Value of Fund	4,912.9	6,160.1
Total Accrued Liabilities	4,435.9	5,733.0
<b>Surplus (Unfunded Liability)</b>	<b>477.0</b>	<b>427.1</b>
Funded Ratio	111%	107%
Assets in RSA	(145.7)	(145.7)
Adjusted Surplus (Unfunded Liability) net of RSA	331.3	281.4

**Benefits Limited to ITA Maximums**

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

**Schedule 7 – Benefits Limited to ITA Maximums – Basic Only: net of RSA**

Basic Only	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	(\$ millions)	(\$ millions)
Entry Age Basis	201.7	214.4
Accrued Service Only	331.3	348.1
<b>Contribution Rate</b>	<b>%</b>	<b>%</b>
Entry Age Normal Cost	16.83	16.57

**Schedule 8 – Benefits Limited to ITA Maximums – Indexed Benefits: net of RSA**

Basic and Indexed	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	(\$ millions)	(\$ millions)
Entry Age Basis	160.1	172.1
Accrued Service Only	281.4	302.3
<b>Contribution Rate</b>	<b>%</b>	<b>%</b>
Entry Age Normal Cost	22.69	22.36

## 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 was provided from January 1982 to January 2011 under the present Plan terms, and for many years before that under earlier Plan provisions. As discussed earlier, the plan moved to a sustainable indexing basis effective January 2011, whereby indexing is limited based on the financial position of the plan at the most recent valuation. Under this approach, if the contribution levels supported it, full indexing in line with increases in the cost of living would be provided. 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 \$145.7 million in the RSA.

### **Schedule 9 – Pensions Limited to ITA Maximums: Maximum Surplus and Contributions Test**

Basic and Indexed	With Tax Limit
Surplus (Unfunded Liability)	(\$millions)
Entry Age Basis net of RSA	172.1
Amount in RSA	145.7
Resulting Surplus for ITA test	317.8
<b>Net liability</b>	<b>5,881.4</b>
25% of Net liability	1,470.3
<b>Contribution Rate</b>	<b>%</b>
Fully Indexed Entry Age Normal Cost	22.36

The fully indexed valuation, recognising the income tax limits and including the RSA, shows a surplus of \$317.8 million. The corresponding net liability (indexed liability less the present value of the indexed entry age normal cost) is \$5,881.4 million, so the 25% limit is \$1,470.3 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 the fully indexed, income tax limited, entry-age normal cost rate of 22.36%. The current total contributions of 20.58% and the total Required Contribution Rate of 20.54% are both less than the ITA limit and therefore are acceptable under the ITA.

We have commented previously (under section 4(3)(d)) on the 9% limit that applies to individual member contributions.

## Section 5. Sustainable Indexing Valuation

The Sustainable Indexing Valuation establishes the level of indexing that can be sustained in the long term taking into account the assets of the Plan and the long term funding commitment to the Plan. The valuation basis is different from the Funding Valuation basis as discussed in Section 3 and Appendix B.

As noted above, the level of indexing that can be sustained may vary depending on the long term funding commitment to the Plan. For the purposes of this section, we have illustrated the impact on sustainable indexing if contributions to the Basic Account are set at the Basic benefit entry-age normal cost of 16.83% of salaries.

### 1. Long Term Funding Commitment and Amortization Requirements

Based on the results discussed in Section 4, the contribution requirements of the plan can be summarised as:

Long Term Funding Commitment	2021
Basic benefit normal (entry-age) actuarial cost	16.83%
IAA contributions	3.70%
<b>Long term funding commitment</b>	<b>20.53%</b>

### 2. Results

Based on a long term funding commitment as above, we have calculated that indexing at 100% of CPI is fully sustainable based on the 2021 results. In 2018 indexing was also sustainable at 100% of CPI.

Allowing for indexing of 2.25% per year (i.e at 100% of CPI), and using the sustainable indexing assumptions discussed earlier, we obtain the following balance sheet and contribution requirements:



**Schedule 10 – Sustainable Indexing Valuation<sup>1</sup>**

	<b>2021</b>
	<b>(\$ millions)</b>
<b>Sustainable Indexing Target</b>	<b>2.25%</b>
<b>Assets</b>	
Market Value of Fund	6,695.8
Asset Smoothing Adjustment (capped at 5%)	(334.8)
RSA	(145.7)
<b>Smoothed Value of Fund for Sustainable Indexing</b>	<b>6,215.3</b>
Actuarial present values of contributions at Entry Age Normal Cost <sup>2</sup>	1,913.0
Present value of amortization for SFU and SFU members	37.3
<b>Total Assets</b>	<b>8,165.6</b>
<b>Total Liabilities</b>	<b>7,464.4</b>
<b>Surplus (Unfunded Actuarial Liability)</b>	<b>701.2</b>
<b>Contribution Requirements</b>	
Entry Age Normal Cost - based on sustainable indexing target	20.38%
Amortization of (surplus) / unfunded liability over infinite period	(1.87%)
<b>Required contribution</b>	<b>18.51%</b>
<b>Long term contribution commitment</b>	<b>20.53%</b>

The above results show that, at an indexing rate of 2.25% per year, the required contribution rate is 18.51% of pay, which is 2.02% less than the long term contribution commitment of 20.53%.

Although indexing at 100% of CPI was also sustainable at the 2018 valuation, there was no margin in this conclusion. The position has therefore improved, and this is mainly due to the smoothed investment returns over the three year period being higher than assumed.

The sustainable level of indexing will be re-evaluated at the next valuation and may be less than the full indexing as a result of future experience losses and any changes to the valuation assumptions at that time.

<sup>1</sup> These results are presented prior to any transfer of Basic Account surplus to the RSA, however, such a transfer would not change the conclusion that indexing is fully sustainable.

<sup>2</sup> This allows for indexing at 2.25% and reflects a 6.25% discount rate.

## **Section 6. JTA / Funding Policy Requirements**

Since the Required Contribution Rate of 16.83% is less than the Current Contribution Rate of 16.88%, the JTA requires the Board to reduce Employer and Member contributions equally so that the aggregate contribution rate is equal to the Required Contribution Rate, unless the Board determines that the required reduction is not material.

In line with the JTA and the funding policy, subject to consultation with the Partners, the surplus assets of \$201.7m must be split 50/50 between the IAA and the RSA, unless either has reached their target, in which case, the balance in excess of the target is diverted to the other account until it too reaches its target.

## **Section 7. Subsequent Events**

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

## **Section 8. 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 August 31, 2024.

## Section 9. Acknowledgement

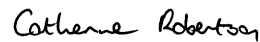
We gratefully acknowledge the generous assistance of the staff of the Pension Corporation in the preparation of the data and other items required for this report.

Respectfully submitted,



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Fellow of the Canadian Institute of Actuaries<sup>1</sup>  
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May 13, 2022

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<sup>1</sup> Canadian Institute of Actuaries is the Primary regulator.

## Appendix A: Summary of Plan and Amendments as at August 31, 2021

### Changes to the Plan

The previous valuation was based on the provisions of the Plan as at August 31, 2018. The main changes made to the Plan provisions up to August 31, 2021, not reported in the previous valuation report (unless otherwise indicated), are summarized below.

- Effective December 11, 2018, a plan rule amendment was made to improve clarity, update terminology and update references to legislation. Section 96 was updated to add definitions for “bridge benefit,” “indexable benefit,” “monthly benefit,” “retirement benefit” and “temporary annuity” to reflect *Pension Benefits Standards Act* terminology.
- Effective April 1, 2019, member and employer contribution rates to the Inflation Adjustment Account were each increased from 1.76 per cent to 1.85 percent of members’ salary.
- Effective May 30, 2019, a plan rule amendment was made to reflect two new 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 of absence include those respecting critical illness or injury leave, and domestic or sexual violence leave.
- Effective June 12, 2020, the plan rules were amended following the Bank of Canada’s discontinuance of the CANSIM Series V122515. This series was used for calculating interest to be credited on member contributions in accordance with the Pension Benefits Standards Regulation. The BC Financial Services Authority subsequently directed that the plan rules be updated to instead reference CANSIM series V80691336, or its future equivalent.
- Effective May 1, 2020, a plan rule amendment was made to allow members a choice to continue contributing to the plan while on an *Employment Standards Act* leave (this is a new option) or to complete a purchase after returning from an *Employment Standards Act* leave (this option was available before).
- Effective March 23, 2020, a plan rule amendment was made to reflect two new 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 of absence include those respecting illness or injury leave, and COVID-19-related leave.
- Effective December 15, 2020, the plan rules were made gender-neutral by removing all gender-specific language.
- Effective June 11, 2021, a plan rule amendment added additional contributions to employer and member contributions when such contributions are identified in terms and conditions specified by the Board when the employer joined the Plan.

- Effective July 1, 2021, active members of the Simon Fraser University (SFU) Pension Plan for Members of the Academic Staff joined the College Plan for service from that date. In line with the June 11, 2021 amendment referenced above, effective July 1, 2021 under sections (d) of both the Member Contributions and Employer Contributions below, SFU members and SFU each pay the following additional amounts:
  - 0.64% of salary each to the Basic Account
  - 0.20% of salary each to the IAA.

In addition, effective October 1, 2021, the College Pension Plan Joint Trust Agreement (“JTA”) was restated. The restated JTA updated its language to be more prescriptive on options regarding allocation of surplus, giving first priority to preventing the contribution rate from increasing from its current level (provided the current rate is not more than 1% lower than the entry age normal cost rate), then strengthening the Inflation Adjustment Account and the Rate Stabilization Account. It has also incorporated the minimum funding rules that the Plan voluntarily complies with into the agreement as these rules are no longer prescribed the same way in the Pension Benefits Standards Regulation from December 31, 2019. Finally, it has clarified the partners' process for nomination of a new trustee to replace an existing one and made other housekeeping changes.

The main provisions of the Plan taken into account in the valuation as at August 31, 2021, are summarized below. Except as otherwise noted, the section references are to the College Pension Plan Rules as at June 11, 2021.

### **Employer and Employee Eligibility**

The Plan applies to a body designated under the *College and Institute Act*, 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 members of the senior administrative staff and staff providing educational services (including librarians) who are full-time or who earn more than 50 per cent of the YMPE under the Canada Pension Plan in any calendar year. Enrolment is optional for eligible staff who are part-time and have not yet earned 50 per cent of the YMPE in a calendar year; enrolment is also optional for educational staff who were hired before September 1, 1999. [Section 3]. Some individual employers have additional criteria applying on top of these general provisions.

### **Member Contributions**

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

- a) 8.39 per cent of the member's salary (paid into the Basic Account) – effective January 1, 2016.
- b) any additional contributions (paid into the Basic Account) identified in the terms and conditions specified by the Board when the member's employer joined the Plan – effective June 11, 2021.
- c) 1.85 per cent of the member's salary (paid into the Inflation Adjustment Account) – effective April 1, 2019.

- d) any additional contributions (paid into the Inflation Adjustment Account) identified in the terms and conditions specified by the Board when the member's employer joined the Plan – effective June 11, 2021.

### **Employer Contributions**

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

- a) 8.49 per cent of the member's salary (paid into the Basic Account) – effective January 1, 2016.
- b) any additional contributions (paid into the Basic Account) identified in the terms and conditions specified by the Board when the employer joined the Plan – effective June 11, 2021.
- c) 1.85 per cent of the member's salary (paid into the Inflation Adjustment Account) – effective April 1, 2019.
- d) any additional contributions (paid into the Inflation Adjustment Account) identified in the terms and conditions specified by the Board when the employer joined the Plan – effective June 11, 2021.

### **Funding**

Effective October 1, 2021, the JTA was restated and article 11 provides that the Plan funding must comply with the Pre-December 31, 2019 PBSA requirements for a going concern valuation, which are included in Appendix B of the JTA. Future contribution rate changes indicated by a valuation must be shared equally between employers and members.

### **Retirement Benefits: Eligibility Conditions for Pension**

Section 50 provides that an active member who, on or after September 30, 2015, terminates employment is, on application, eligible to receive an unreduced retirement benefit calculated in accordance with sections 54 and 55 if the member has:

In respect of service prior to January 1, 2016:

- a) attained age 55 and completed at least 35 years of contributory service;
- b) attained age 60 with at least 2 years of contributory service; or
- c) attained age 65.

In respect of service on or after January 1, 2016:

- a) attained age 55 and completed at least 35 years of contributory service;
- b) attained age 65.

A reduced retirement benefit is otherwise provided where the terminating member had reached age 55.

An active member who terminated employment prior to September 30, 2015, is entitled, upon application, to an unreduced retirement benefit if the member had:

- a) attained age 55 and completed at least 35 years of contributory service;
- b) attained age 60 with at least 2 years of contributory service; or
- c) attained age 65.

A reduced retirement benefit is provided to such a terminating member who had reached age 55 and completed at least 2 years of contributory service, or attained age 60 but had not completed 2 years of contributory service.

Under certain conditions, the contributory service requirements mentioned above can include service during certain periods of child rearing.

Section 78 (4) provides that, before authorizing the payment of an immediate retirement benefit, the plan administrator may require a member and their employer to declare that no pre-arrangement to return to work with the same employer existed at the time of termination of employment.

#### **Calculation of Unreduced Retirement Benefit**

Section 54 provides that the unreduced lifetime monthly retirement benefit payable to a member terminating employment on or after January 1, 2002, in the form of a single life guaranteed option for 10 years (the "normal form"), is calculated as the sum of the following:

- a) 2 per cent of the member's highest average salary multiplied by the number of years of pensionable service accrued before January 1, 1966;
- b) 1.7 per cent of the lesser of
  - (i) the member's highest average salary; and
  - (ii) 1/12 of the YMPE for the calendar year immediately before the effective date of the retirement benefit payable to the member;

multiplied by the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016<sup>1</sup>;

- c) 2 per cent of the excess of the member's highest average salary over the amount determined under paragraph (b) (ii), multiplied by the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016<sup>1</sup>; and

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<sup>1</sup> Prior to September 1, 2009, service was limited to 35 years.

- d) 2 per cent of the member's highest average salary multiplied by the number of years of pensionable service accrued after December 31, 2015.

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

- a) 0.3 per cent of the lesser of
  - (i) the member's highest average salary; and
  - (ii)  $\frac{1}{12}$  of the YMPE for the calendar year immediately before the effective date of the retirement benefit payable to the membermultiplied by
- b) the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016<sup>1</sup>.

(Prior to January 1, 1999, retirement benefits were calculated under a 1.3 per cent/0.7 per cent lifetime/bridge formula for service accrued on or after January 1, 1966. This benefit formula was amended to 1.35 per cent/0.65 per cent for plan members terminating employment between January 1, 1999 to December 31, 2001. The YMPE integrated benefit formula of 1.7 per cent/0.3 per cent applies to plan members who terminated employment on or after January 1, 2002, with respect to pensionable service accrued after December 31, 1965 and before January 1, 2016, whereas the non-YMPE integrated benefit formula of 2 per cent applies with respect to pensionable service accrued by plan members after December 31, 2015.)

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). [Part 13 Division 2]

The calculation of the retirement benefit payable to a deferred member who terminated employment on or after January 1, 2002, and who is entitled to an unreduced retirement benefit is detailed in section 54. The retirement benefit is calculated on the basis of the single life guaranteed option with a term of 10 years using a benefit formula of 1.7 per cent/0.3 per cent for service accrued up to December 31, 2015 and a benefit formula of 2 per cent for service accrued after December 31, 2015. Section 45 stipulates that the retirement benefit payable to a deferred member who terminated prior to January 1, 2002 will be based on the rules in force at the date of termination.

Accordingly, a member who terminated prior to January 1, 2002, but after January 1, 1999, will receive a retirement benefit on the basis of a single life guaranteed option with a term of 10 years, but using a benefit formula of 1.35 per cent/0.65 per cent.



A member who terminated prior to January 1, 1999 will receive a retirement benefit in the form of a single life annuity (no guarantee), using a benefit formula of 1.3 per cent/0.7 per cent.

A member who has made voluntary additional contributions in the past (these are no longer accepted) will be granted an additional retirement benefit or may take a refund, including interest at fund interest rates on those contributions.

### **Calculation of Reduced Retirement Benefit**

Section 55 (1) provides that if a member referred to in section 45 (1) or section 50 terminated employment on or after January 1, 2002 and, on the effective date of the members' retirement benefit, the member has not either attained age 65 or age 55 and completed at least 35 years of contributory service, the lifetime and bridge benefits payable to the member need to be reduced as follows:

- a) for pensionable service accrued prior to January 1, 2016:
  - (i) sections 55 (2) and 55 (5) provide that if the member has not reached age 60 and has completed 2 years of contributory service, the benefits are reduced by a percentage equal to 3 per cent for each year of age by which the member is less than age 60, unless the member while an active member did not reach age 50, did not complete 10 years of contributory service or did not complete at least 8 months of contributory service in the 24 months preceding their termination of employment, in which case a percentage equal to 5 per cent applies;
  - (ii) section 55 (3) provides that if the member has reached age 60 and completed 2 years of contributory service, the benefits are paid without reduction; and
  - (iii) section 55 (4) provides that if the member has reached age 60 and has not completed 2 years of contributory service, the benefits are reduced by a percentage equal to 5 per cent for each year of age by which the member is less than age 65;
- b) for pensionable service accrued after December 31, 2015, section 55 (6) provides the benefits are reduced by a percentage equal to 3 per cent for each year of age by which the member is less than age 65.

Where a retirement benefit is reduced the reduction is prorated for fractions of years.

Section 55 (8) provides that a reduced retirement benefit must have an actuarial present value that is at least equal to the actuarial present value of the retirement benefit payable at normal retirement age.

In the case of members who terminated employment on or after January 1, 2002, and prior to January 1, 2016, lifetime and bridge benefits are reduced as outlined above under point (a).

### **Alternative Types of Pensions**

Section 56 provides that a pension may be granted on the single life plan with a guaranteed period (5, 10 or 15 years) or joint life and last survivor plan with a guaranteed period (5, 10 or 15 years). A temporary annuity until the member reaches age 65 may only be granted in combination with either a single life plan with a guaranteed period of 5 years or a joint life and last survivor plan with a guaranteed period of 5 years. 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 or 100 per cent joint life and last survivor plan, 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 administrator. This option provides for a reduced amount payable to the member, continuing to the spouse on death of the member at 60 or 100 per cent of the initial reduced amount. A spouse is as defined in the PBSA, and includes a common-law or same-sex spouse.

### **Disability Benefits**

Section 60 provides that a member is entitled upon application to disability benefits if the member, before reaching age 65, 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. Despite the above provisions, 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 disability benefits.

Disability benefits are equal to the full unreduced lifetime portion of the retirement benefit (i.e., there is no additional bridge benefit to age 65) earned to the date of disability.

Part 6 outlines the application process for disability benefits.

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 retirement benefit under the Plan, but the period for which the member receives such group disability income benefit is considered pensionable service, with the final retirement benefit based on the highest average salary at disablement increased to retirement in accordance with changes in the consumer price index.

### **Shortened Life Expectancy Benefits**

Part 6.1 establishes a member's entitlement to benefits in the event of shortened life. Under this part, a member entitled to receive a benefit from the Plan and having an illness or disability that is certified by a medical practitioner to be terminal or likely to shorten the member's life considerably may, subject to and in accordance to the Pension Benefits Standards Regulation, elect to convert all or part of their benefit to a series of payments for a fixed term or to receive a lump sum equal to or of a lesser amount to the commuted value of the benefit.

Payments made to the member subsequent to a payment made under this part will be actuarially reduced to reflect that payment.

### **Pre-retirement Death Benefits**

The pre-retirement death benefits for active and inactive plan members who die, on or after September 30, 2015, are covered in section 69 as follows:

- a) if there is no surviving spouse or a valid spousal waiver has been filed, the benefit payable to the beneficiary is a payment of the greater of a refund of member's contributions with interest and the full 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 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 and the full commuted value of the retirement benefit earned to the date of death; and
  - (ii) an immediate pension that is actuarially equivalent to the full commuted value of the retirement benefit earned to the date of death.
- c) if the member has attained age 55 on the date of death, and there is a surviving spouse and a valid spousal waiver has not been filed, then the benefit is an immediate retirement benefit to the spouse that is actuarially equivalent to the full commuted value of the retirement benefit earned to the date of death.

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

For periods on and after October 1, 2019, interest credits for member's contribution are based on the average yields of 5-year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V80691336.

### **Refunds, Vesting and Portability**

Under sections 42 (1) (b) and 45, a terminating member is entitled to a deferred retirement benefit equal to the full normal retirement benefit accrued to the date of termination; this may be paid on a reduced basis at an early retirement age depending on the service to termination - see above "Eligibility conditions for pension" section.

Sections 42 (1) (c) and 46 provide for the payment of a lump-sum commuted value in lieu of the deferred retirement benefit, if the member has not attained age 55, subject to the commuted value being payable on a

locked-in basis. Under certain limited conditions (small retirement benefits, 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 by the percentage increase granted to retirement benefits for the period between the month of termination and the month the retirement benefit becomes effective<sup>1</sup>.

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

A member who terminated employment under age 60 with less than 2 years of contributory service on or after April 1, 2000, and before September 30, 2015, may receive a refund of their contributions plus interest. For periods on and after October 1, 2019, interest credits are based on the average yields of 5-year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V80691336.

### **Cost of Living Benefits (Indexing)**

Section 73 sets out how cost of living benefits are to be administered. It provides for increases to retired members on January 1 of each year, with the benefits funded from the Inflation Adjustment Account. The benefit is based on the total amount of indexable benefit being received, including previous cost of living increases, less any portion of the indexable benefit that is a result of voluntary contributions (which are no longer permitted). (The bridge benefit to age 65, payable as part of the regular retirement benefit formula, and the temporary life annuity are subject to indexing increases.)

Indexing granted on and after January 1, 2011 is calculated as the lesser of:

- a) the percentage change in the average CPI for the 12 months ending October 31 over the highest average CPI for any previous 12 month period ending October 31, and
- b) the sustainable indexing rate, which is to be recommended by the actuary during the triennial valuation and is subject to the approval of the board,

provided there are sufficient funds in the Inflation Adjustment Account ("IAA") to meet the cost of the increase.

Indexable benefits will not be reduced in years of deflation. In years immediately following a period of deflation, indexable benefits will only be increased as described above once there is net positive inflation over the period since the indexable benefits were last increased.

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<sup>1</sup> For increases prior to December 31, 1980, the increase in the highest average salary is in accordance with changes in the pension index.

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

### The Fund

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

- a) the **Basic Account**, consisting of all the assets in the fund other than assets in the Inflation Adjustment Account, the Supplemental Benefits Account and the Retirement Annuity Account;
  - b) the **Inflation Adjustment Account**, consisting of:
    - (i) the contributions by each of the members under section 5 (1) (c) or (d);
    - (ii) the matching employer contributions under section 6 (1) (c) or (d) less amounts allocated for the administration of group benefit entitlements;
    - (iii) the net investment income earned on the Inflation Adjustment Account; and
    - (iv) the income, as determined 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 that is in excess of the investment return anticipated in the most recent actuarial valuation;
- less:
- (v) amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under section 73 and 88;
  - (vi) refunds to plan members in respect of the contributions made to this account under section 5 (1) (c) or (d), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account;
  - (vii) 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;

(viii) 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

(ix) amounts transferred to the Supplemental Benefits Account, if any, as specified by the board;

(Article 12 (3) of the JTA, and article 11.2 of the Restated JTA, also permit the Board to transfer portions of any actuarial surplus in the Basic Account to the IAA.)

- c) the **Supplemental Benefits Account**, consisting of assets required for the administration and payment of benefits that are non-registrable under the *Income Tax Act*; and
- d) the **Retirement Annuity Account**, consisting of voluntary contributions made under the previous statutes, and interest earnings thereon.

### **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 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 funding valuations recognizing the income tax limits on pensions. We understand that these limits are applied only in respect of service after 1991. The maximum annual pension permitted (before application of any early retirement reductions, where applicable) is the lesser of:

- (i) \$3,245.56 (for 2021) multiplied by the years of service; and
- (ii) 2 per cent multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

Under the income tax rules, the flat \$3,245.56 limit will be automatically indexed each year.

## Other Items

1. The College Pension Plan Post Retirement Group Benefit Rules, made under article 13 of the JTA, and article 12 of the restated JTA, set out the non-pension (i.e., group) benefits that are provided for retired members. These post-retirement group benefit rules replaced the College Pension Plan Post Retirement Group Benefit Regulation, B.C. Reg. 490/2003, effective June 22, 2012.

Effective September 1, 2009, the member is responsible for paying 100 per cent of the premium for extended health and dental benefits. Previously, the cost of those benefits was carved out from employer contributions to the IAA. This carve out was limited to a maximum of 1 per cent of pensionable salary (out of the total employer IAA contribution at that time of 1.09 per cent).

Effective April 1, 2004, the member was responsible for paying 100 per cent of the premiums for coverage under the Medical Services Plan ("MSP"). The provincial government eliminated MSP premiums effective January 1, 2020.

2. Article 9 of the JTA, and article 3.2 of the restated JTA, provide that all expenses incurred in the administration of the Plan are to be paid from the fund.
3. A maximum of five years taken to raise a child may be recognized in establishing eligibility for a retirement benefit provided the member has a record of pensionable service immediately before and after the child-rearing period(s). [Section 13]
4. 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 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.
5. In 1999, the definitions of, and references to, approved and reciprocal employers were removed from the Plan by Bill 18 (1997), to comply with *Income Tax Act* requirements. In general, these provisions allowed for portability among various plans (mostly the four public sector plans in B.C.), whereby service and salaries were commonly recognized in all of the plans. The arrangements for the four public sector plans in B.C. were replaced by a transfer of reserve agreement, whereby the plan member could elect to have a reserve transferred and then be covered for full service by the rules of the importing plan. The College Pension Plan withdrew from the Interplan Pension Transfer Agreement effective October 31, 2002, and negotiated three separate "bilateral" agreements with the Municipal, Public Service and Teachers' Pension Plans. On April 1, 2004, these "bilateral" service transfer agreements with the Municipal, Public Service and Teachers' Pension Plans were replaced with the Public Sector Transfer Agreement.

Effective April 1, 2010, reciprocal transfers between the College, Municipal, Public Service and Teachers' Pension Plans are made exclusively under the National Public Service Pension Transfer Agreement (NTA). Under the NTA, as with the Public Sector Transfer Agreement (and the previous bilateral agreements), if the importing plan's benefits are more generous, the transferred service is pro-rated based on each plan's benefits. Members may pay for any shortfall, subject to CRA approval, within deadlines set by the plans. Members can also choose to leave their entitlements with their respective plans and apply for the appropriate benefits available from each plan at termination and/or retirement.



## Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below. The assumptions used at the previous valuation are shown in brackets.

	Funding Valuation	Sustainable Indexing Valuation
<b>Investment Return</b>	6.00% p.a. (6.25%)	6.25% p.a. (6.50%)
<b>General Salary ("across-the-board") Increases</b>	3.25% p.a. (3.50%)	3.00% p.a. (3.25%)
<b>Seniority Salary Increases</b>	Annual percentages varying by age and sex (same)	Annual percentages varying by age and sex (same)
<b>CPI Increases</b>	2.50% p.a. (2.75%)	2.25% p.a. (2.50%)
<b>Pension Indexing</b>	<ul style="list-style-type: none"> <li>• Future indexing of pensions and deferred pensions ignored, as will be covered by Inflation Adjustment Account</li> <li>• Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.50% p. a. (2.75%)</li> <li>• Indexing to date is capitalized and forms part of pension liability</li> </ul>	<ul style="list-style-type: none"> <li>• Future indexing of pensions and deferred pensions at "Sustainable Indexing Rate" – This rate is calculated and is the primary output of this valuation</li> <li>• Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.25% p.a. (2.50%)</li> <li>• Indexing to date is capitalized and forms part of pension liability</li> </ul>
<b>Asset Values</b>	<ul style="list-style-type: none"> <li>• Assets carried at smoothed market values</li> <li>• Smoothed value restricted to a range of 92% to 108% of Market Value (same)</li> </ul>	<ul style="list-style-type: none"> <li>• Assets carried at smoothed market values</li> <li>• Smoothed value restricted to a range of 95% to 105% of Market Value (same)</li> </ul>
<b>Costing Method</b>	<ul style="list-style-type: none"> <li>• Contributions are based on an entry-age funding approach</li> </ul>	<ul style="list-style-type: none"> <li>• Required contributions are based on an entry-age funding approach</li> <li>• Committed contributions are set equal to the funding valuation basic normal cost plus IAA contributions.</li> </ul>

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

## 1. Actuarial Methods

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

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

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

In order to test the adequacy of the current contribution rates, we calculated the required 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 five years prior to the valuation date<sup>1</sup> and the actuarial assumptions described below. This method produces the level rate of the 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:

- (i) The Basic Account; and
- (ii) The present value of future contributions at the entry-age normal cost rates (with the first year's contributions at the current rate), for the closed active group, for the basic non-indexed benefits.

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<sup>1</sup> For this purpose, SFU members are included as new entrants based on their date of hire by SFU, not based on their date of joining the plan of July 1, 2021. This is to ensure that the new entrant profile is representative of what we expect for future new entrants and not distorted by a large group of joining the plan mid-career.

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

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

The contribution rates must comply with 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.

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

## 2. Treatment of Member and Pensioner Data

Data as of August 31, 2021 were prepared by the Pension Corporation and the membership counts received are as follows:

	Pension Corp. Data
Pensioners	9,527
Active Members	16,438
Long Term Disability	281
Terminated Vested	7,054
Leave of absence	3
Limited Data	8
<b>Total Membership</b>	<b>33,311</b>

The data also included 3,864 active member terminations and 472 pensioner terminations during the period September 1, 2018 to August 31, 2021. The Pension Corporation advised us that the data supplied are generally proper, complete and in accordance with specifications, unless otherwise noted.

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

- A member's (and partner's as applicable) age is within a reasonable range;
- A member's gender or date of birth did not change;

- A member joined the plan or commenced pension at a reasonable age;
- Accrued service increased by a reasonable amount (e.g. no more than 36 months since the last valuation and no more than 12 months in the valuation year);
- The salary level and the salary increase from the previous valuation was within a reasonable range;
- Pensions in pay increased by a reasonable amount (e.g. in line with the indexation since the last valuation); and
- We examined the additions to and deletions from each of the data files (i.e., the files for active employees, pensioners and terminated members) since the previous valuation to determine whether all Plan members were accounted for in this valuation, to check for duplicate records and to confirm pension amounts.

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

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 10% to reflect the part-time employment (the same adjustment was applied at the previous valuation).

The active member data included 2,986 members who had no salary or service reported for the year ending August 31, 2021, or with a last-contribution-date prior to August 2021. We excluded them from the active member base, and have included them with the inactive data as follows:

- We treated the 589 of them who had at least 3 years of service and a basic employee contributions with interest balance of at least \$1,500, as if they would be reactivated on August 31, 2021 (we set their salaries equal to the average salaries for active members in the same age-sex category);
- We treated 1,996 of them who had a salary history in the last five years as if they were deferred vested members; and
- We held a liability equal to twice the basic employee contributions with interest balance for the remaining 401 members.

A similar approach was used in the previous valuation. Salary details were inappropriate (missing or very low) for 2 active members. We assumed that these 2 members had the same average earnings as for other actives in the same age-sex category.

We calculated the liability for 3 members on a leave of absence on the assumption that these members would be reactivated on September 1, 2021 (with assumed average salary equal to the average salary for active members in the same age sex category).

The liability for 273 of the members on long-term disability was calculated as if these individuals would ultimately collect deferred vested pensions starting at age 64, with deferred pensions on the basis of service projected to retirement date 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 excluded 8 long-term disability members from the valuation because of missing, invalid or inconsistent detail. Liabilities of twice their basic employee contributions with interest balance were held for these members. A similar approach was used in the previous valuation, except that we assumed the deferred vested pensions would start at age 63.

We divided the 7,054 inactive members into two classes:

- (i) 325 who were those with missing, invalid or inconsistent detail, or whose accrued pension equal to zero, or who were known to have taken a refund after the valuation date, and
- (ii) The remaining 6,729 inactive members.

We calculated liabilities for the second group on the assumption that 100% of this group would receive vested pensions. The liability for the first group was held as twice their basic employee contributions with interest balance. A similar approach was used in the previous valuation. With respect to the 8 remaining non-retired members with limited data, we held a liability equal to twice their basic employee contributions with interest balance.

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.

	Pension Corp. Data	Valuation Treatment						
		Pensioners	Pensioner with zero liability	Active Members	Long Term Disability	Vested	Reactivate	Refund 2 x CWI <sup>1</sup>
Pensioners	9,527	9,512	15					
Active Members	16,438			13,452		1,996	589	401
Long Term Disability	281				273			8
Terminated Vested	7,054					6,729		325
Leave of absence	3						3	
Limited data	8							8
<b>Total membership</b>	<b>33,311</b>	<b>9,512</b>	<b>15</b>	<b>13,452</b>	<b>273</b>	<b>8,725</b>	<b>592</b>	<b>742</b>

### 3. 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) Funding Valuation – Excess Investment Return Threshold**

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

- (i) it would increase the amount of excess investment return allocated to the IAA, and hence increase the potential for future indexing; and
- (ii) it would increase the costs of the basic non-indexed plan, provided benefit levels are not changed.

<sup>1</sup> Contributions with interest.

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

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

**b) Expected Returns**

After examining the net average investment return earned by the fund's investments, the yield on investments made in recent years, the likely future trend of investment returns in general, the investment practices, and the provisions of this Plan - e.g. the allocation of excess investment income to the Inflation Adjustment Account - we have concluded that a reasonable best estimate of the long term investment return on the plan's assets is 6.25% (reduced from 6.50% in the previous valuation). We also concluded that a reasonable best estimate of the real return on the assets, i.e., the investment return in excess of inflation, is 4% (no change from the previous valuation).

In setting the Funding Valuation assumptions, it is necessary to reduce these expected returns by a margin, so that the resulting liabilities have a suitable provision for adverse deviations. Following discussions with the Board regarding the appropriate adjustments to the best estimate assumptions and taking into account the requirements of the Board's funding policy, for the purposes of this valuation we decreased our long-term investment return assumption from 6.25% to 6.00% per annum. We continued with our previous valuation assumption for the real return of 3.50%. 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:

	<b>Discount Rate</b>
Weighted average return	6.22%
Diversification and rebalancing effect	0.25%
Passive investment management fees	(0.19%)
Active investment management fees	(0.65%)
Value added from active management	0.65%
Effect of transition from current strategy over 3 years	(0.03%)
<b>Estimated net investment return before margin</b>	<b>6.25%</b>
Margin for adverse deviation	(0.25%)
<b>Discount return assumption</b>	<b>6.00%</b>

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 0.84% and the allowance for passive investment management fees of 0.19% 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 will be fully implemented on January 1, 2024, we made an allowance of 0.03% for the effect of transition from the current asset mix. As the sustainable indexing target is not guaranteed, and the primary objective of the sustainable indexing approach is to improve intergenerational equity, it is not appropriate to include margins in the sustainable indexing basis. The Sustainable Indexing Valuation therefore assumed a nominal investment return of 6.25% and real investment return of 4.00%.

The long-term asset mix used to determine the expected returns as described above 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%
Government Bonds	18%
Corporate Bonds	8%
Private Debt	7%
Mortgages	4%
<b>Total Fixed Income</b>	<b>39%</b>
Canadian Equities	3%
Global Equities	16%
Emerging Markets	7%
Private Equity	15%
<b>Total Equity</b>	<b>41%</b>
Real Estate	17%
Infrastructure and Renewable Resources	13%
<b>Total Real Assets</b>	<b>30%</b>
<b>Total Porfolio</b>	<b>110%</b>

The total long-term asset mix adds to more than 100% as a result of the use of leverage. The discount rate reflects an assumed cost of borrowing to fund leverage in the portfolio.



#### **d) Real Return and Salary Relationships - Derive Salary Assumption**

The 6.25% investment return assumption used in the 2018 valuation was viewed as consisting of a real return component of 3.50% per annum plus a long-term underlying inflation assumption of 2.75% per annum. Continuing with the same real return component of 3.50% and applying it to the new 6.00% investment return assumption, we get a revised 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 4.0%), plus a margin for adverse deviations of 0.25%.

The general salary increase assumption used in the 2018 valuation was 3.50% per annum. This was viewed as consisting of the underlying inflation assumption of 2.75% per annum, plus a real salary increase component of 0.75% per annum. For this valuation, when the real salary increase assumption of 0.75% is added to the revised underlying inflation assumption of 2.50%, we get a revised 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%.

For the Sustainable Indexing Valuation, the general salary increase assumption is 3.00% per annum. This is made up of the best estimate inflation assumption of 2.25% plus real salary increase of 0.75%.

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

#### **e) Impact of Investment Return and Salary Assumptions on the Valuation**

During the **post-retirement period**, the excess investment return threshold is critical as this is the discount rate for the Basic Account post-retirement liabilities. It also sets the excess investment return threshold, which puts a ceiling on the amounts the Basic Account can effectively earn on the portion of the assets that support post-retirement liabilities. For example, if the threshold is 6.00%, then, provided the long-term returns exceed 6.00% on average, all of the excess will be transferred to the IAA, i.e. the Basic Account will only retain 6.00% on these assets.

During the **pre-retirement period**, it is the relationship, i.e. the net difference, between the investment return and general salary increase assumptions that is the key, rather than their absolute levels - projected benefits increase each year by the salary assumption and are then discounted by the investment assumption, i.e. the net result is that the liabilities are effectively being discounted by the net difference between the two assumptions. For example, the long-term assumptions we have used in this valuation (i.e. 6.00% 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 itself is not material to the result.

**f) Summary of Interrelationships**

The annual investment return and general salary increase assumptions, and their underlying economic interrelationships, are summarized below.

Assumptions (%)		2021			2018
		Best Est.	Margin	Valn.	Valn.
1	Nominal Investment Return	6.25	(0.25)	6.00	6.25
2	Real Investment Return	4.00	(0.50)	3.50	3.50
3	<b>Implied Inflation (1) – (2)</b>	<b>2.25</b>	<b>0.25</b>	<b>2.50</b>	<b>2.75</b>
4	Real Salary Growth	0.50	0.25	0.75	0.75
5	<b>Nominal Salary Growth (3) + (4)</b>	<b>2.75</b>	<b>0.50</b>	<b>3.25</b>	<b>3.50</b>
	Resulting Net Rates				
6	Pre-retirement			2.75	2.75
7	Post-retirement			6.00	6.25

**g) Actual vs. Expected Salaries; Adjust Data Salaries**

The 2021 valuation data indicates that average annual earnings increased by about 9.3%<sup>1</sup> from mid-2018 to mid-2021 (i.e. about 3.02% per annum), as compared with an expected increase of about 10.9% (i.e. about 3.50% per annum) on the basis of the assumptions used in the 2018 valuation.

The input data salaries provided to us for this valuation were the annualized earnings during fiscal 2021. 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 assumed that the YMPE under the Canada Pension Plan would increase at the general salary increase rate (Funding Valuation = 3.25% per year, Sustainable Indexing Valuation = 3.00%) from its 2022 level of \$64,900. In the previous valuation we assumed that the YMPE would increase at a rate of 3.50% per year for Funding Valuation and 3.25% per year for Sustainable Indexing Valuation from its 2019 level of \$57,400.

<sup>1</sup> Excluding SFU members who joined effective July 1, 2021

## **Pension Indexing**

### ***a) Basic Funding Valuation***

Indexing supplements 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 were fixed at 1.85% of salaries to be paid by each of the members and the employers, as of the valuation date. With respect to indexed supplements granted through August 31, 2021, the present values have been included in the actuarial liabilities for pensions in the course of payment and thus form part of the determination of the recommended contribution.

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

With regard to the vested pensions of members who have terminated employment, the amounts of deferred pensions quoted to us include indexing during the deferred period to date. We understand that such transfers from the Inflation Adjustment Account do not occur until retirement (theoretically, such transfers should be made on an annual basis as the indexing occurs, so as to reduce the inter-generational transfer of the costs of such indexing). The amounts of deferred pensions without indexing were also provided for this valuation, and we have used the non-indexed amounts so that the Basic Account liability is aligned with the allocation of assets between the Basic and IAA accounts. We adjusted the deferred pension amounts to remove indexing in the previous valuation, as the non-indexed pensions were not previously included in the data provided to us.

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 2.50% per annum during the deferral period to retirement.

### ***b) Sustainable Indexing Valuation***

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

For those on long term disability, we allow for escalation in the deferral period at a rate of 2.25% per annum, which equals the best estimate assumption for inflation. In other words, for the sustainable indexing valuation, the escalation assumption does not include the 0.25% margin taken into account in the funding valuation.

## **Asset Values**

The fund's annual reports record assets on a market value basis. We relied on these annual reports for the asset values used for the years ending August 31, 2019 to August 31, 2021.

Following the August 31, 2018 valuation a Rate Stabilization Account (RSA) was established in the amount of \$109.1 million, which represented 36% of the 2018 Basic Account valuation surplus. (The remaining 64% was transferred to the IAA). Interest is applied to the RSA based on the smoothed one-year fund return. The RSA is excluded from the Funding and Sustainable Indexing valuations. It can be drawn down as needed to stabilize the Basic contribution rate.

As in the previous valuation we applied a smoothing technique by adjusting the market values over a five year period. We believe a smoothing approach is appropriate as it cushions the actuarial valuation results against dramatic swings in market value that can occur.

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

### **a) Funding Valuation Assets**

The smoothed value of assets is then restricted to a range of 92% to 108% of market value, if necessary (the same range was applied in the previous valuation). This means that in periods of significant market decline (growth) the smoothed value does not become too large (low) relative to the market value - effectively the constraint accelerates recognition of very poor (strong) market returns and allows the contribution rate to more appropriately reflect the actual returns earned by the plan. This lower constraint of 92% applied as at August 31, 2021.

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

**Total Fund Smoothing**

Target Return	2018	2019	2020	2021
1. Aug-over-Aug increase in CPI	2.8%	1.9%	0.1%	4.1%
2. Base return = (1) + 3.5%	6.3%	5.4%	3.6%	7.6%
Year-end asset values – \$millions				
3. Market value	5,071.0	5,343.6	5,747.1	6,695.8
4. Smoothed value	4,810.8	5,158.2	5,451.0	6,160.1
5. Ratio of (4) ÷ (3)	0.949	0.965	0.948	0.920
Annual Returns				
6. Market value	10.3%	5.8%	8.0%	16.8%
7. Smoothed value	10.5%	7.7%	6.1%	13.3%

SFU members joined the plan on July 1, 2021, and additional funds were required to cover the unfunded liability that arose and to ensure that the 2018 surplus was not diluted. Following the 2018 valuation, the Basic surplus was allocated 36% to the RSA and 64% to the IAA. Therefore, based on the principal that SFU joining should have a neutral affect on the plan’s finances, the surplus component of the SFU required payment needs to be allocated to these two accounts in the same proportions. These allocations are not reflected in the 2021 financial statements. Accordingly we have made the following adjustments for this valuation. The surplus amount owed by SFU was \$11.6 million as at July 1, 2021. This increases with interest to \$11.9 million as at August 31, 2021. We have notionally allocated this amount, \$4.3 million (36%) to the RSA and \$7.6 million (64%) to the IAA as reflected in the table below.

Market values (\$ millions)	2021 Financial Statements	Adjustment	2021 Valuation
Basic Account	5,348.4	(7.6)	5,340.8
RSA (included in above amount)	141.4	4.3	145.7
IAA	1,347.4	7.6	1,355.0
<b>Total (Basic + IAA)</b>	<b>6,695.8</b>	<b>-</b>	<b>6,695.8</b>

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 – \$millions**

<b>Basic Account (including RSA)</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
1. Market value	4,319.9	4,534.8	4,631.2	5,340.8
2. Smoothed value	4,098.2	4,377.5	4,392.6	4,912.9
3. Ratio of (2) ÷ (1)	0.949	0.965	0.948	0.920
<b>Inflation Adjustment Account</b>				
4. Market value	751.1	808.8	1,115.9	1,355.0
5. Smoothed value	712.6	780.7	1,058.4	1,247.2
6. Ratio of (5) ÷ (4)	0.949	0.965	0.948	0.920
<b>RSA</b>				
7. Market Value and Smoothed Value	109.1	117.6	124.8	145.7
<b>Basic Account excluding RSA</b>				
8. Market value	4,210.8	4,417.2	4,506.4	5,195.1
9. Smoothed value	3,989.1	4,259.9	4,267.8	4,767.2

**b) Sustainable Indexing Valuation Assets**

As mentioned previously, a primary reason for using a sustainable indexing approach is to improve intergenerational equity. Intergenerational equity would be best served by using best estimate assumptions (as we are doing) and not smoothing the assets. However, an important secondary objective is to attempt to stabilise the indexing target over time. This secondary objective is aided by smoothing the assets. In discussion with the Board, it was concluded that using a best estimate basis together with a low smoothing limit would provide a suitable balance between these two objectives. Accordingly, in our assessment we have used the five year smoothed value of assets, restricted to a range of 95% to 105% of the market value of assets. This lower constraint applied as at both August 31, 2018 and August 31, 2021 where the smoothed assets for the sustainable indexing purposes were capped at 95% of market value.

**Mortality**

We examined the mortality experience of the Plan’s pensioners over the period September 1, 2012 to August 31, 2021. Actual deaths over the period were broadly in line with the assumptions made for the 2018 valuation, and we decided to continue with the same assumptions for this valuation, namely:

- a) The incidence of mortality both prior to and after retirement (other than employees retired on account of disability) was assumed to be in accordance with 70% for males and 60% for females of the rates in the 2014 Public Sector Mortality Table (CPM2014Publ) for ages below 80, and 100% for males and 90% for females of the rates of CPM2014Publ for ages 80 and above, all projected using CPM Improvement Scale B (CPM-B).

- b) For deferred vested pensions, mortality was ignored during the deferral period before retirement.
- c) For employees retired on account of disability we used 85% for males and 85% for females of the mortality rates (applicable from April 1, 2020 to March 31, 2021) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2020. This is equivalent to the assumptions used in the previous valuation (75% for males and 80% for females based on the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011). We also applied the CPM improvement scale B for this valuation (no mortality improvement assumed in the previous valuation).

**Withdrawal**

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period September 1, 2018 to August 31, 2021 and compared this with the experience observed and the rates used for previous valuations. The observed rates were generally higher than assumed in previous valuations. As a result, we increased most withdrawal rates used for the previous valuation by 5% as shown in the table below.

**Multiples Applied to 2018 Rates**

	In the first 3 years of service			After 3 years of service
	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	
Males	105%	100%	105%	100%
Females	105%	105%	105%	105%

Sample withdrawal rates are shown in the following tables.

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

Age at Entry	2018 Valuation			2021 Valuation		
	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year
<b>Males</b>						
20	.210	.165	.119	.221	.165	.125
30	.210	.165	.119	.221	.165	.125
40	.210	.165	.119	.221	.165	.125
50	.210	.165	.119	.221	.165	.125
<b>Females</b>						
20	.089	.111	.097	.093	.117	.102
30	.231	.232	.150	.243	.244	.158
40	.204	.140	.111	.214	.147	.117
50	.204	.140	.111	.214	.147	.117

**B. Withdrawal Rates Applicable After 3 Years of Service**

Attained Age	Males		Females	
	2018 Valuation	2021 Valuation	2018 Valuation	2021 Valuation
23	.092	.092	.133	.140
33	.055	.055	.092	.097
43	.038	.038	.039	.041
53	.038	.038	.036	.038

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. Because of limited experience, and given the similarity of the plans, we have continued to use the experience observed for the B.C. Teachers' Pension Plan to adjust the rates used for the valuation of the Pension Plan for the Public Service of Canada. The rates used for this valuation are 120% for males and 105% 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 most recent valuation of the BC Teachers' Pension Plan used the equivalent disability rates, but applied the adjustments to the rates used for the 2011 valuation of the Pension Plan for the Public Service of Canada. For the 2018 valuation of the College Pension Plan, we used 120% for males and 100% for females of the 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 recent experience 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 64 (or, immediately, for those older than age 64). Commencement at age 63 was assumed in the 2018 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 - the rates used have been reduced from the observed disability incidence to implicitly allow for such recoveries.



**Sample Disability Rates**

Age	2018 Valuation		2021 Valuation	
	Males	Females	Males	Females
25	.0002	.0001	.0001	.0001
35	.0002	.0007	.0005	.0009
45	.0014	.0022	.0017	.0029
55	.0046	.0059	.0049	.0074

**Retirement**

We examined the 2018-2021 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 show 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 continue to see increasing numbers of members retiring after age 65. We gave partial recognition to the observed experience by slightly decreasing most of the assumed retirement rates below age 65, and by introducing an allowance for some members retiring after age 65.

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

**Retirement Rates From Active Service**

Age	Service	2018 valuation		2021 valuation	
		Males	Females	Males	Females
55-59	at least 10 years, but age plus service add to less than 80	.02	.03	.02	.03
55-59	age plus service add to at least 80	.10	.12	.08	.10
55-59	35	.25	.22	.25	.20
60	10	.25	.32	.20	.30
61	10	.15	.22	.13	.20
62	10	.17	.20	.15	.18
63	10	.14	.24	.14	.20
64	10	.20	.28	.18	.25
65	0	1.00	1.00	.50	.50
66	0	n/a	n/a	.50	.50
67	0	n/a	n/a	.50	.50
68	0	n/a	n/a	1.00	1.00

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 at least 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 August 31, 2021 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 Earnings Rates**

Age	2018 and 2021 valuations	
	Males	Females
25	.036	.026
35	.022	.018
45	.007	.008
55	.002	.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 this valuation. The same assumption was made in the previous valuation.

**Growth of Active College Population**

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

## Expenses

Administration expenses are paid out of the College fund. These amounts totaled 0.54%, 0.49% and 0.52% of salaries during fiscal 2019, 2020 and 2021 respectively. The projected expenses provided by the Pension Corporation for the next three years anticipated that the administration expenses will continue at a similar rate. Therefore, we reduced the expense provision to 0.55% of payroll from 0.60% 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. This provision represents the average projected expenses, expressed as a percentage of projected payroll, over the next valuation period. We also include a provision for the present value of expenses in the statement of actuarial position. The same methodology was used in the previous valuation.

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

## Recognition of Child-Rearing Periods for Pension Eligibility

We continued to assume that this would only affect female members (while males are eligible for this benefit, the take-up rate for males does not justify an assumption that males will utilize it), and that, on average, it would increase the member's contributory service (which is used for determining pension eligibility) by 2 years; there would, of course, be no increase to the member's pensionable service (which is used for determining pension amounts). The impact of this would be to reduce the eligibility requirement for unreduced pensions from 35 years to 33 years, and we assumed that there would be no impact on the eligibility assumptions made for other benefits. The same assumption was made in the previous valuation.

## Plan Termination

The Standards of Practice issued by the Canadian Institute of Actuaries 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 15.4 and 15.5, it is our, and the Board's, opinion that the benefits on wind-up are not defined. Accordingly, we do not comment on the financial position of the plan if were to be wound up.

## Funding Valuation: Fully Indexed Valuations – Assumption Changes

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

- We combined the assets in the Basic and Inflation Adjustment Accounts, resulting in a smoothed asset value of \$6,014.4 million, net of the assets in the RSA;

- We applied an indexing assumption equal to the full assumed underlying inflation rate, i.e. 2.50% per annum. This indexing rate was applied both to pensions after retirement and during the pre-retirement period in the case of deferred vested pensions and disability salary accruals. Indexing is applied annually, in arrears; and
- We combined the contribution rates to Basic and IAA, i.e. we assumed a total member contribution rate of  $8.39\% + 1.85\% = 10.24\%$ , and a total employer rate of  $8.49\% + 1.85\% = 10.34\%$ .

### Funding Valuation: Maximum Pension Rule – Assumption Changes

As noted earlier, we have not applied the maximum pension rules when doing the primary Basic and 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:

- (i) \$3,245.56 in 2021 (\$3,420.00 in 2022) multiplied by the years of service; and
- (ii) 2% multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

While the Plan applies the *ITA* limits only in respect of service after 1991, we have, for ease of calculation, assumed that this limit applies on all service; this assumption does not affect the future normal costs, but the accrued liabilities will be slightly understated.

For an individual in this Plan to be currently affected by the \$3,245.56 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 \$3,420.00 limit is automatically indexed each year after 2022 in accordance with increases in the average wage. Accordingly, we have applied a 3.25% per annum increase to the \$3,420.00 limit after 2022. (At the previous valuation the corresponding dollar limit was \$2,944.44 for 2018, \$3,025.56 for 2019, and was scheduled to be automatically indexed each year after 2019 in accordance with increases in the average wage; an increase rate of 3.5% was applied after 2019 to the \$3,025.56 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, full RSA assets are included.

**Appendix C: Active Member Data as at August 31, 2021**

Age group <sup>1</sup>	Active members August 31, 2021 <sup>2</sup>				New entrants Sept. 1, 2016 to Aug. 31, 2021 and still active Aug. 31, 2021	
	Number	Average annual earnings <sup>3</sup> \$	Average Pre 2016 service (years)	Average Post 2015 service (years)	Number	Average annual earnings <sup>3</sup> \$
<b>Males</b>						
19-24	18	47,453	0.0	0.2	43	56,402
25-29	85	68,757	0.0	1.0	168	79,080
30-34	313	81,728	0.1	1.5	394	82,608
35-39	615	86,829	0.4	2.3	416	86,591
40-44	809	93,375	1.2	2.8	331	90,226
45-49	880	103,152	2.6	3.2	283	93,764
50-54	991	103,464	4.0	3.5	189	97,244
55-59	1,023	105,288	6.8	3.8	152	98,073
60-64	760	108,995	7.9	4.0	70	90,655
65 & over	512	107,036	8.1	3.7	25	89,078
<b>Total males</b>	<b>6,006</b>	<b>99,879</b>	<b>4.1</b>	<b>3.2</b>	<b>2,071</b>	<b>88,141</b>
<b>Females</b>						
19-24	14	44,801	0.0	0.4	42	57,748
25-29	170	68,248	0.0	0.8	321	73,851
30-34	538	78,660	0.1	1.6	595	81,174
35-39	939	85,257	0.6	2.3	537	82,978
40-44	1,043	89,597	1.4	2.9	477	85,620
45-49	1,187	94,436	2.7	3.2	351	89,132
50-54	1,214	99,097	4.8	3.7	277	90,747
55-59	1,146	99,258	6.3	4.0	151	94,624
60-64	807	102,773	7.5	4.0	68	88,659
65 & over	388	105,101	7.1	3.6	19	93,945
<b>Total females</b>	<b>7,446</b>	<b>93,731</b>	<b>3.6</b>	<b>3.2</b>	<b>2,838</b>	<b>83,987</b>
<b>Total males &amp; females</b>	<b>13,452</b>	<b>96,476</b>	<b>3.8</b>	<b>3.2</b>	<b>4,909</b>	<b>85,739</b>

The average age of the 13,452 active members is 49.3.

<sup>1</sup> Age nearest birthday at August 31, 2021 for actives and at entry for new entrants.

<sup>2</sup> 2,986 actives reclassified as inactive data.

<sup>3</sup> Actual earnings in fiscal 2021 for those employed all year and annualized for others. Zero or very low earnings figures were replaced by the average earnings in the same age-sex group or the closest age group if there is only one member.

A comparison of the August 31, 2021 active membership with the August 31, 2018 active membership is as follows:

Active membership	Aug. 31, 2018	Aug. 31, 2021	Change 2018 to 2021
<b>Males</b>			
Number	5,179	6,006	+16.0%
Proportion of total	44.3%	44.6%	+0.3%
Average age (at 8.31)	50.5	50.3	-0.2 years
Average service	8.1	7.3	-0.8 years
Average salary	\$86,315	\$99,879	+15.7%
<b>Females</b>			
Number	6,512	7,446	+14.3%
Proportion of total	55.7%	55.4%	-0.3%
Average age (at 8.31)	48.8	48.5	-0.3 years
Average service	7.3	6.8	-0.5 years
Average salary	\$82,719	\$93,731	+13.3%

The above comparison indicates a significant increase in both the male and female membership during the 3 year inter-valuation period, due mainly to the 1,184 SFU members who joined the Plan in 2021 and are still active at the valuation date. Of the 15.1% overall increase in active membership, 10.1% relates to SFU. There was a slightly larger increase in the number of male members.

The average age has decreased slightly for both males and females. SFU members are older, and the average age would decrease by a further 0.1 years if the SFU members were excluded.

The average service has decreased by more than 0.5 years, due mainly to the SFU members with only two months of service, and it would be almost unchanged if the SFU members were excluded.

The large increase in the average salary compared to the previous valuation is also mainly due the SFU members. The average salary increase would be 9.0% for males and 9.7% for female if the SFU members were excluded.

In calculating the entry age normal cost we assume that future new entrants will join the plan at ages and with salaries that are the same as recent new entrants (defined for this plan as members who joined the plan in the last five years). For this purpose SFU members have only been included in the new entrant profile based on their original hire date by SFU and not based on the date they joined the plan (July 1, 2021 for most SFU members). This ensures that the entry age normal cost is not inappropriately increased by treating long serving SFU members as new entrants.

A comparison of the new entrant subset used at August 31, 2021 with that used at August 31, 2018 in determining the entry-age normal costs is as follows:

New entrants	Aug. 31, 2018	Aug. 31, 2021	Change 2018 to 2021
<b>Males</b>			
Number	1,840	2,071	+ 12.6%
Proportion of total	43.2%	42.2%	- 1.0%
Average age at entry	42.3	41.5	- 0.8 years
Average salary	\$79,073	\$88,141	+ 11.5%
<b>Females</b>			
Number	2,422	2,838	+ 17.2%
Proportion of total	56.8%	57.8%	+ 1.0%
Average age at entry	41.1	40.4	- 0.7 years
Average salary	\$75,110	\$83,987	+ 11.8%

The number of new entrants has increased for both males and females, and the proportion of males to females has decreased. The average age of new entrants has decreased for both males and females, and by more than the general reduction in the average age of active members as a whole. The increase in average salary for new entrants is lower than the increase in average salary for the actives for both males and females.

## Appendix D: Inactive Member Data as at August 31, 2021

### 1. Inactive Members Assumed Reactivated on Valuation Date

Age group <sup>1</sup>	Males				Females			
	Number	Average annual earnings <sup>2</sup> (\$)	Average Pre 2016 service (years)	Average Post 2015 service (years)	Number	Average annual earnings <sup>2</sup> (\$)	Average Pre 2016 service (years)	Average Post 2015 service (years)
Below 35	4	82,421	0.5	1.4	8	79,516	0.9	2.8
35-39	16	88,232	0.7	1.8	29	86,095	1.0	1.9
40-44	31	95,702	1.2	1.8	49	90,154	1.7	1.8
45-49	37	102,263	1.7	1.1	43	95,254	2.3	1.4
50-54	45	103,197	3.1	1.5	74	98,297	2.9	1.3
55-59	51	104,865	3.2	1.1	52	99,123	3.0	1.0
60 & over	67	108,594	2.1	0.9	86	103,276	2.7	1.0
<b>Total</b>	<b>251</b>	<b>102,628</b>	<b>2.2</b>	<b>1.3</b>	<b>341</b>	<b>96,646</b>	<b>2.4</b>	<b>1.4</b>

	Number	Average age	Average annual earnings <sup>2</sup>	Average service
Total males & females	592	52.5	\$99,183	3.6 years

### 2. Members on Long-Term Disability

Age group <sup>1</sup>	Males				Females			
	Number	Average annual earnings (\$)	Average Pre 2016 service (years)	Average Post 2015 service (years)	Number	Average annual earnings (\$)	Average Pre 2016 service (years)	Average post 2015 service (years)
35-39 <sup>3</sup>	-	-	-	-	13	83,993	1.0	3.4
40-44	-	-	-	-	17	90,814	3.8	4.6
45-49 <sup>3</sup>	8	100,274	3.0	5.3	25	98,373	6.8	5.1
50-54	12	97,543	6.2	5.0	33	94,333	6.7	4.9
55-59	21	92,191	9.4	5.4	45	90,475	11.0	5.1
60 & over	34	97,894	10.6	5.4	65	91,149	14.2	5.3
<b>Total</b>	<b>75</b>	<b>96,495</b>	<b>8.7</b>	<b>5.3</b>	<b>198</b>	<b>91,940</b>	<b>9.5</b>	<b>5.0</b>

<sup>1</sup> Age nearest birthday at August 31, 2021.

<sup>2</sup> Assumed same earnings as per the average for active members of the in same age and sex.

<sup>3</sup> 1 female age 30-34 is included in the 35-39 row due to privacy. 1 male age 40-44 is included in the 45-49 row due to privacy



	Number	Average age	Average annual earnings	Average service
Total males & females	273	55.2	\$93,191	14.3 years

	Number	Average age	Average pensionable service	Average salary	Expected average remaining Service life
Active and LTD Combined	13,725	49.4	7.2	\$96,411	8.7

### 3. Other Inactive Members Assumed Electing Vested Pensions

Age group <sup>1</sup>	Males			Females		
	Average annual vested pensions			Average annual vested pensions		
	Number	Initial <sup>2</sup> (\$)	Offset at age 65(\$)	Number	Initial <sup>2</sup> (\$)	Offset at age 65(\$)
20-29	84	204	0	104	414	0
30-34	166	444	0	301	764	2
35-39	329	854	4	531	844	13
40-44	436	1,234	26	685	1,383	25
45-49	503	1,507	47	729	2,002	64
50-54	584	2,412	102	789	2,753	98
55-59	663	2,585	149	783	2,668	114
60 & over	1,030	1,797	71	1,008	1,946	78
<b>Total</b>	<b>3,795</b>	<b>1,750</b>	<b>70</b>	<b>4,930</b>	<b>1,897</b>	<b>64</b>

	Number	Average age	Average annual vested pension - Initial	Average annual vested pension - Offset at age 65
Total males & females	8,725	50.9	1,833	67

### 4. Remaining Inactive Members

	Number	Member contributions with interest
Value at 2 x contribution with interest	742	\$926,696

Average age is 52.0.

<sup>1</sup> Age nearest birthday at August 31, 2021.

<sup>2</sup> These pensions are assumed to commence at the first age at which the member is entitled to an unreduced pension (based on the provisions for pre-2016 service) assuming this is no earlier than age 60 i.e. at various ages between 60 and 65.

## Appendix E: Pensioner Data as at August 31, 2021

### 1. Former Contributors

Age group <sup>1</sup>	Number of pensioners <sup>2</sup>	Annual Pensions (\$000's) <sup>3</sup>				
		Single life	Joint life & survivor	Joint life & survivor with guarantee	Single life with guarantee	Temporary life
<b>Male pensioners</b>						
Less than 60	97	0	0	1,156	575	358
60-64	428	428	473	5,847	2,353	1,736
65-69	882	2,137	3,123	10,891	4,422	298
70-74	1,168	4,796	6,451	11,460	5,239	0
75-79	948	6,798	10,004	6,341	1,841	0
80-84	459	4,526	5,969	362	272	0
85-89	177	2,115	1,734	0	0	0
90 & over	87	845	359	0	0	0
<b>Total</b>	<b>4,246</b>	<b>21,645</b>	<b>28,113</b>	<b>36,057</b>	<b>14,702</b>	<b>2,392</b>
<b>Female pensioners</b>						
Less than 55	4	16	0	0	38	0
55-59	160	0	0	1,323	1,178	
60-64	677	1,214	464	5,788	5,476	392
65-69	1,299	5,850	2,158	9,993	9,771	2,477
70-74	1,246	11,963	4,308	5,896	7,552	293
75-79	745	10,757	3,803	1,338	1,611	0
80-84	280	4,340	988	36	56	0
85-89	111	1,468	126	0	0	0
90 & over	62	804	6	0	0	0
<b>Total</b>	<b>4,584</b>	<b>36,412</b>	<b>11,853</b>	<b>24,374</b>	<b>25,682</b>	<b>3,162</b>
<b>Grand Total</b>	<b>8,830</b>	<b>58,057</b>	<b>39,966</b>	<b>60,431</b>	<b>40,384</b>	<b>5,554</b>

Supplemental pensions included in the above amounts are as follows:

<b>Supplemental Pensions included</b>	<b>240</b>	<b>243</b>	<b>284</b>	<b>141</b>	<b>-</b>
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Average age of the 8,830 pensioners is 71.7.

<sup>1</sup> Age nearest birthday at August 31, 2021.

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

<sup>3</sup> Including supplements to January 1, 2021.

2. Beneficiaries

Age group <sup>1</sup>	Number of beneficiaries <sup>2</sup>	Annual Pensions (\$000's) <sup>3</sup>	
		Single life	Single life with guarantee
<b>Male beneficiaries</b>			
Less than 60	7	25	17
60-64	6	19	114
65-69	19	186	82
70-74	26	436	146
75-79	25	358	164
80-84	13	165	15
85-89	10	79	-
90 & over	4	31	-
<b>Total</b>	<b>110</b>	<b>1,299</b>	<b>538</b>
<b>Female beneficiaries</b>			
Less than 50	5	6	41
50-54	8	16	76
55-59	19	86	174
60-64	37	354	209
65-69	64	521	619
70-74	92	1,261	573
75-79	90	1,811	234
80-84	99	1,798	43
85-89	62	844	-
90 & over	62	730	-
<b>Total</b>	<b>538</b>	<b>7,427</b>	<b>1,969</b>
<b>Remaining guarantees</b>	<b>34</b>	<b>-</b>	<b>895</b>
<b>Grand Total</b>	<b>682</b>	<b>8,726</b>	<b>3,402</b>

Supplemental pensions included in the above amounts are as follows:

<b>Supplemental Pensions included</b>	<b>48</b>	<b>-</b>
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Average age of the 648 beneficiaries is 76.2.

	Number	Average age	Average annual life pension
Total Pensioners & Beneficiaries	9,512	72.0	\$22,179

<sup>1</sup> Age nearest birthday at August 31, 2021.

<sup>2</sup> These numbers include spouses (or estates) currently receiving benefits where the former contributor is deceased.

<sup>3</sup> Including supplements to January 1, 2021.

## Appendix F: Additional Results Detail

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

The results herein are as those contained in Schedules 1 and 4 - 8 in the body of the report, but in some cases expand on the details. 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 August 31, 2021

#### Present Plan – (\$millions)

	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
<b>Assets</b>				
Market value of Fund net of RSA	5,195.1	6,550.1	5,195.1	6,550.1
Asset smoothing adjustment	(427.9)	(535.7)	(427.9)	(535.7)
<b>Smoothed value of Fund net of RSA</b>	<b>4,767.2</b>	<b>6,014.4</b>	<b>4,767.2</b>	<b>6,014.4</b>
Present values of:				
– SFU amortization contributions	29.7	39.0	29.7	39.0
– Future contributions at entry-age rates	1,628.1	2,194.3	1,606.0	2,162.4
<b>Total Assets</b>	<b>6,425.0</b>	<b>8,247.7</b>	<b>6,402.9</b>	<b>8,215.8</b>
<b>Actuarial present values for:</b>				
pensions being paid	2,403.0	3,005.9	2,392.3	2,992.6
– inactive members	271.8	406.5	271.8	406.5
– active members	3,495.3	4,622.0	3,471.2	4,591.4
– future expenses	53.2	53.2	53.2	53.2
<b>Total Liabilities</b>	<b>6,223.3</b>	<b>8,087.6</b>	<b>6,188.5</b>	<b>8,043.7</b>
<b>Surplus (Unfunded Liability)</b>	<b>201.7</b>	<b>160.1</b>	<b>214.4</b>	<b>172.1</b>
<b>Accessible Going Concern Excess</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Schedule F2 – Current and Required Contribution Rates – August 31, 2021**

	Without Tax Limits		With Tax Limits	
	Basic Only (%)	Basic + Indexed (%)	Basic Only (%)	Basic + Indexed (%)
<b>Current contribution rates</b>				
Member <sup>1</sup>	8.39	10.24	8.39	10.24
Employer <sup>1</sup>	8.49	10.34	8.49	10.34
<b>Combined member/employer</b>	<b>16.88</b>	<b>20.58</b>	<b>16.88</b>	<b>20.58</b>
<b>Required contribution rates</b>				
<b>Entry age normal cost rate</b>	<b>16.83</b>	<b>22.69</b>	<b>16.57</b>	<b>22.36</b>

**Schedule F3 – Accrued Liabilities and Funded Ratio – August 31, 2021**

(\$millions)	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
<b>Assets – smoothed value</b>	<b>4,912.9</b>	<b>6,160.1</b>	<b>4,912.9</b>	<b>6,160.1</b>
<b>Accrued Liabilities</b>				
pensions being paid	2,403.0	3,005.9	2,392.3	2,992.6
– inactive members	271.8	406.5	271.8	406.5
– active members	1,761.1	2,320.6	1,755.0	2,313.0
<b>Total Accrued Liabilities</b>	<b>4,435.9</b>	<b>5,733.0</b>	<b>4,419.1</b>	<b>5,712.1</b>
<b>Surplus (Unfunded Actuarial Liability)</b>	<b>477.0</b>	<b>427.1</b>	<b>493.8</b>	<b>448.0</b>
<b>Funded Ratio – Fund ÷ Total Accrued Liabilities</b>	<b>111%</b>	<b>107%</b>	<b>111%</b>	<b>108%</b>
<b>Assets in RSA</b>	(145.7)	(145.7)	(145.7)	(145.7)
<b>Adjusted surplus (unfunded liability) net of RSA</b>	<b>331.3</b>	<b>281.4</b>	<b>348.1</b>	<b>302.3</b>

<sup>1</sup> Non-indexed costs ignore IAA contribution; indexed costs include IAA contributions of 1.85% for both employee and employer

## Appendix G: Plausible Adverse Scenarios

The following analysis does not impact the funding requirements of the Plan and is for information purposes only and to meet disclosure requirements. In practice, the Board generally considers additional factors and analysis when monitoring plan risks.

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 August 31, 2021	Plausible Adverse Scenario Results at August 31, 2021		
		Interest Rate Risk	Deterioration of Asset Values	Longevity Risk
<b>Basic Account (\$millions)</b>				
Smoothed Value of Fund	4,913	4,991	4,719	4,913
Less RSA	(146)	(148)	(140)	(146)
PV of SFU member amortization	30	30	30	30
Actuarial present values of future contributions at entry-age rates	1,628	1,698	1,628	1,644
<b>Total Assets</b>	<b>6,425</b>	<b>6,572</b>	<b>6,237</b>	<b>6,441</b>
<b>Total Liabilities</b>	<b>6,223</b>	<b>6,389</b>	<b>6,223</b>	<b>6,310</b>
<b>Surplus / (unfunded liability)</b>	<b>202</b>	<b>183</b>	<b>13</b>	<b>131</b>
Funded Ratio: Total Assets ÷ Total Liabilities	103%	103%	100%	102%
<b>Entry-age normal cost rates</b>	<b>16.83%</b>	<b>17.44%</b>	<b>16.83%</b>	<b>17.00%</b>
Discount rate	6.00%	5.83%	6.00%	6.00%
Adjusted market value of assets (including RSA)	5,341	5,426	4,665	5,341

## 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 0.17% to 5.83% as of August 31, 2021.

With respect to the impact on fixed income assets, the scenario results in a decrease in long term yields on fixed income investments of 0.65%.

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 3.95% as of August 31, 2021. Note that market value of assets is assumed to decrease by 12.63%; 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. The impact of this scenario was determined by assuming that mortality rates are 90% of those in the mortality table used for the going concern valuation as of August 31, 2021, that is, a more conservative mortality assumption than currently employed.