Public Service Pension Plan

Actuarial Valuation as at December 31, 2021

Registration number: 0208769

June 10, 2022

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1. Executive Summary

Going Concern Funded Status	December 31, 2020 ($ million)	December 31, 2021 ($ million)
Going concern assets		
Market value	15,634	18,058
Asset fluctuation adjustment	134	(1,075)
Total assets	15,768	16,983
Going concern liabilities		
Best estimate liabilities	13,265	13,184
Provision for adverse deviation (PfAD)	1,990	1,978
Total liabilities	15,255	15,162
Actuarial excess (unfunded liability)	513	1,821
Going concern funded ratio	103.4%	112.0%

Minimum Contribution Requirements	December 31, 2020 % of pensionable earnings	December 31, 2021 % of pensionable earnings
Level Rate on All Earnings		
Normal actuarial cost	15.24%	14.38%
Provision for adverse deviation (PfAD)	2.29%	2.16%
Unfunded liability payments	0.00%	0.00%
Provision for non-investment expenses	0.50%	0.50%
Total required contribution rate	18.03%	17.04%
Split Rates (Members and Employers, each)		
Earnings below YMPE	8.3%	7.9%
Earnings above YMPE	11.8%	11.3%

Current Contribution Rates	December 31, 2020 % of pensionable earnings	December 31, 2021 % of pensionable earnings
Level Rate on All Earnings	23.12%	20.99%
Split Rates (Members and Employers, each)		
Earnings below YMPE	10.47%	9.6%
Earnings above YMPE	14.95%	13.7%

Key Inputs	December 31, 2020	December 31, 2021
Interest rate	5.7%	5.9%
Provision for adverse deviation	15%, applied to both the actuarial liabilities and the normal actuarial cost	15%, applied to both the actuarial liabilities and the normal actuarial cost
Inflation rate	2.0%	2.0%
Interest rate used for lump sums upon termination	4.7%	4.9%
Inflation rate used for lump sums upon termination	2.0%	2.0%
Mortality	Males: 2014 CPM Private Table projected with Scale MI-2017 Females: 2014 CPM Private Table projected with Scale MI-2017	Males: 2014 CPM Private Table projected with Scale MI-2017 Females: 2014 CPM Private Table projected with Scale MI-2017
Number of active members	39,447	38,152
Average age of active members	44.9	45.1
Average PSPP service (actives)	10.3 years	10.4 years
Average annualized earnings (actives)	$73,857	$73,835

2. Introduction

We have been retained by the PSPP Corporation, the "Administrator" of the Public Service Pension Plan (the "Plan"), to conduct an actuarial valuation of the Plan as at December 31, 2021. The last complete valuation that was filed with the appropriate authorities was conducted as at December 31, 2020.

This report was prepared for its intended users, the PSPP Corporation, the Sponsor Board, the Office of the Alberta Superintendent of Pensions ("Employment Pensions"), and the Canada Revenue Agency ("CRA"), for the following purposes:

- to determine the funded status of the Plan on a going concern basis;
- to determine the normal actuarial cost;
- to determine the acceptable range of contributions to the Plan under the *Employment Pension Plans Act* (the "Act") and the *Employment Pension Plans Regulation* (the "Regulation"), subject to exemptions granted in the *Act* and *Regulation*;
- to determine the funded status of the Plan on a solvency basis; and
- to provide the information and the actuarial opinion required by the *Act* and the *Income Tax Act (Canada)*.

While readers of this report may extend beyond the intended users noted above, notably Plan members, we shall not communicate the terms of our engagement or results of our work with other readers unless directed to do so by the Administrator. This report is not intended nor necessarily suitable for purposes other than those listed above.

Changes Since the Last Valuation

The last actuarial valuation of the Plan was prepared as at December 31, 2020. Since the last actuarial valuation, the following changes have occurred:

1. The PSPP Sponsor Board adjusted the member and employer contribution rates from 10.47% up to YMPE and 14.95% over YMPE to 9.6% up to YMPE and 13.7% over YMPE, effective January 1, 2022.
2. A new collective agreement was ratified by AUPE and the Alberta Government which applies to about half of the active members of the Plan. Future salary increases in the agreement have been factored into the development of the going concern assumptions.
3. The other going concern economic assumptions were updated to reflect changes in expected future experience.
4. The solvency basis was updated to reflect market conditions as at the valuation date and to follow the Canadian Institute of Actuaries' *Educational Note – Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates on or after December 31, 2021 and no later than December 30, 2022*.

Details of the above changes that affect the funded status and/or future acceptable range of contributions are outlined in this report.

Subsequent Events

As of the date of this report, we have not been made aware of any other subsequent events nor any extraordinary changes to the Plan, membership or other data that would materially affect the results of this valuation.

Terms of Engagement

This report has been prepared in accordance with the Plan's Funding Policy Statement revised on November 30, 2021.

Filings

An actuarial valuation must be filed with Employment Pensions as at the effective date of the Plan and not more than three years after the last actuarial valuation. Unless the Plan specifies otherwise, the date of each actuarial valuation must be at the Plan's fiscal year-end. If an amendment to the Plan or a change in Plan membership materially affects the cost of benefits provided by the Plan or creates an unfunded liability, an actuarial valuation must be prepared. In the intervening period, contributions must be made in accordance with the last filed valuation.

Should the Sponsor Board wish to have contributions be made in accordance with this report, it must be filed with Employment Pensions. If it is not filed, the next actuarial valuation must be prepared and filed with Employment Pensions no later than as at December 31, 2023.

For an employer contribution to be eligible under a defined benefit provision, it must be recommended by an actuary in whose opinion the contribution is required to be made and the actuary's recommendation must be approved by the CRA. As such, in accordance with Section 147.2 of the *Income Tax Act (Canada)*, this entire valuation report must be filed with the CRA in support of eligibility of employer contributions should the Sponsor Board wish to have contributions be made in accordance with this report.

We will file this report with the appropriate authorities on the PSPP Corporation's behalf or as otherwise instructed.

3. Actuarial Opinion

This opinion is given with respect to the Public Service Pension Plan. We conducted a valuation of the Plan as at December 31, 2021. The administrator has confirmed that, between December 31, 2021 (the effective date of the data provided) and the date of this report, no subsequent events nor any extraordinary changes to the membership that would materially affect the results of this valuation have occurred, except as indicated in this report.

In our opinion, for the purposes of this report:

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

We hereby certify that, in our opinion, as at December 31, 2021:

1. With respect to the purpose of determining the Plan's funded status on a going concern basis:
   a. The Plan has a going concern surplus (excess of assets over liabilities) of $1,821 million, based on going concern assets of $16,983 million and going concern liabilities of $15,162 million. The funded ratio is 112.0%. Going concern liabilities include the provision for adverse deviation of $1,978 million.
   b. There is no excess surplus as defined by Section 147.2(2) of the *Income Tax Act (Canada)*.
2. With respect to the purpose of determining the normal actuarial cost and acceptable range of contributions that are applicable to the Plan for years after the valuation date:
   a. The Plan's normal actuarial cost is estimated to be 17.04% of pensionable earnings. Of this cost, 14.38% is attributable to the cost of benefits accruing in the year following the valuation date, 2.16% is attributable to the provision for adverse deviation, and 0.50% is attributable to a provision for non-investment expenses that are paid from the fund.
   b. As the Plan is fully funded on the going concern basis, there are no additional, required contributions necessary to fund unfunded liabilities.
   c. If the minimum level of contributions is made until the next actuarial certification, the total contribution rate translates to the following for each member and their employer:
      - Contribution rate below YMPE: 7.9%
      - Contribution rate above YMPE: 11.3%
   d. Should the Sponsor Board wish to have contributions remitted at a rate higher than the minimum level outlined above, the Plan's normal actuarial cost on the basis outlined under the valuation for Maximum Contribution Determination (Appendix F) is estimated to be 18.77% of pensionable earnings. Of this cost, 15.89% is attributable to the cost of benefits accruing in the year following the valuation date, 2.38% is attributable to the provision for adverse deviation, and 0.50% is attributable to a provision for non-investment expenses that are paid from the fund.

e. If the maximum level of contributions outlined under d. is made until the next actuarial certification, the total contribution rate translates to the following for each member and their employer:

- Contribution rate below YMPE: 8.7%
- Contribution rate above YMPE: 12.4%

3. With respect to the purpose of determining the Plan's funded status on a solvency basis:

   a. The Plan has a solvency deficit of $5,180 million, determined as solvency assets of $18,023 million less solvency liabilities of $23,203 million.

   b. The solvency ratio is 77.7%.

   c. The liabilities of the Plan would exceed the Plan's assets by $5,180 million if the Plan was terminated and wound-up on the valuation date.

4. We are not aware of any subsequent events, that have not already been taken into consideration, that could materially affect the results of this valuation.

5. The next valuation should be conducted no later than as at December 31, 2024.

This valuation was conducted in accordance with the *Employment Pension Plans Act* (the "Act") and the *Employment Pension Plans Regulation* (the "Regulation"), subject to exemptions granted in the *Act* and *Regulation*. Further, the calculations have been prepared in accordance with subsection 147.2(2) of the *Income Tax Act (Canada)*.

The content herein has been prepared exclusively from a financial viewpoint. This report does not constitute a legal opinion on the rights and duties of the Administrator, the Sponsor Board, or the members concerning the Plan.

Actuarial valuation results are estimates only and are based on assumptions and methods developed in accordance with actuarial standards of practice. Emerging experience differing from the assumptions used will result in gains or losses which will be revealed in future valuations, and which may affect future actuarial opinions.

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

We would be pleased to discuss any questions the user may have regarding the valuation.

[Original Signed By]

Gregory M. Heise
Fellow, Canadian Institute of Actuaries

[Original Signed By]

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Fellow, Canadian Institute of Actuaries

George & Bell Consulting Inc.
June 10, 2022

4. Going Concern Valuation Results

4.1 Going Concern Funded Status

The following table describes the Plan's funded status on a going concern basis. The going concern liabilities are based on the benefits earned up to the valuation date assuming the Plan continues indefinitely.

Going Concern Funded Status	December 31, 2020 ($ million)	December 31, 2021 ($ million)
Going concern assets		
Market value	15,634	18,058
Asset fluctuation adjustment	134	(1,075)
Total assets	15,768	16,983
Best estimate actuarial liabilities		
Active members	5,230	4,893
Retirees & beneficiaries	6,573	6,835
CPS suspended members	732	662
Deferred members	714	777
Hold on deposit members	16	17
Total best estimate liabilities	13,265	13,184
Best estimate funded status	**2,503**	**3,799**
Best estimate funded ratio	**118.9%**	**128.8%**
Provision for adverse deviation (PfAD)	1,990	1,978
Total going concern liabilities (including PfAD)	15,255	15,162
Actuarial excess (unfunded liability)	**513**	**1,821**
Going concern funded ratio	**103.4%**	**112.0%**

4.2 Reconciliation of Going Concern Funded Status

The following table reconciles the change in the going concern funded status over the course of the inter-valuation period.

Reconciliation of Going Concern Funded Status (Best Estimate)	($ million)
Actuarial excess (unfunded liability) at December 31, 2020	2,503
Expected interest	143
Special payments	198
Expected actuarial excess (unfunded liability) at December 31, 2021	2,844
Gain (loss) on investments	1,581
Asset Fluctuation Adjustment	(1,217)
Experience gains and losses	
Salary	189
Retirement	22
Termination	12
Mortality	25
COLA	(26)
YMPE	21
Miscellaneous	(3)
Total	240
Assumption changes	
Change in general earnings increase rate	59
Change in employee contribution interest rate	2
Change in interest rate	356
Total	417
Gain (loss) from changes on valuation method	(66)
Actuarial excess (unfunded liability) at December 31, 2021	3,799

4.3 Reconciliation of Normal Actuarial Cost Rate

The table below identifies the main components of the changes in the normal actuarial cost rate (the rate of pensionable earnings reflecting the cost of current service benefits accruing under the Plan) from the prior valuation to this valuation.

Reconciliation of Normal Actuarial Cost Rate (Best Estimate)	% of pensionable earnings
Normal actuarial cost rate at December 31, 2020	15.24%
New data and demographic changes	0.01%
Assumption changes	
Decreased cost sharing from lower contribution rate	(0.03%)
Interest rate to 5.9%	(0.62%)
Total assumption changes	(0.65%)
Change in valuation method	(0.22%)
Normal actuarial cost rate at December 31, 2021	14.38%

5. Solvency Valuation Results

5.1 Solvency Funded Status

A solvency valuation is required by the Act to assess the Plan's funded status should it wind-up on the valuation date; however, the Act does not require the Plan to be funded on the solvency basis. A hypothetical wind-up valuation measures the same funded status, with minor differences, and is required under accepted actuarial practice. Since all benefits have been valued under this solvency valuation and assuming that the asset liquidation value would be equal to the market value of assets, the hypothetical wind-up funded status would be the same as the solvency funded status shown below.

The solvency funded status of the Plan is determined by reducing the market value of the assets by an allowance for estimated wind-up expenses and comparing the result to the actuarial liability for benefits earned up to the valuation date. Liabilities are determined assuming the Plan is terminated on the valuation date, with immediate settlement of obligations.

Based on the Plan's provisions, membership data, asset information, and solvency assumptions and methods described in the Appendices, in conjunction with the requirements of the Act, the solvency funded status of the Plan is shown in the table below.

Solvency Funded Status	December 31, 2020 ($ million)	December 31, 2021 ($ million)
Solvency assets		
Market value of assets	15,634	18,058
Expense allowance	(35)	(35)
Total assets	15,599	18,023
Solvency liabilities		
Active members	10,507	9,850
Retirees & beneficiaries	10,081	10,385
CPS suspended members	1,510	1,318
Deferred members	1,494	1,633
Hold on deposit members	16	17
Total liabilities	23,608	23,203
Solvency excess (deficiency)	(8,009)	(5,180)
Solvency ratio	66.1%	77.7%

5.2 Incremental Cost

The incremental cost on the solvency basis represents the present value of the expected aggregate change in the solvency liabilities from the valuation date to the next valuation date, adjusted for expected benefit payments in the inter-valuation period. The present value of the incremental cost figures shown in the table below are as of the beginning of each period shown. These figures are required to be disclosed under accepted actuarial practice.

Incremental Cost	($ million)
January 1, 2022 to December 31, 2022	887
January 1, 2023 to December 31, 2023	984
January 1, 2024 to December 31, 2024	1,082

5.3 Solvency Sensitivity

The effect on the solvency liabilities of using discount rates 1% lower than those used for the solvency valuation would be an increase in the solvency liabilities of $5,064 million. All other assumptions and methods as used in this valuation were maintained.

6. Contribution Rates

6.1 Contribution Rate in Respect of Normal Actuarial Costs

The normal actuarial cost is the cost, on the going concern basis, of benefits accruing under the Plan as a result of service after the valuation date. Based on the Plan provisions, membership data, and going concern assumptions and methods described in the Appendices, the following table provides details on the breakdown of the normal actuarial cost, provision for adverse deviation, and provision for non-investment expenses, along with the resulting total normal actuarial contribution rate.

	December 31, 2020	December 31, 2021
Normal actuarial cost	$423,838,000	$382,752,000
Provision for adverse deviation (PfAD)	$63,576,000	$57,413,000
Provision for non-investment expenses	$13,905,000	$13,310,000
• Next year's expected pensionable earnings	$2,781,000,000	$2,662,000,000
Normal actuarial cost rate	15.24%	14.38%
PfAD	2.29%	2.16%
Provision for non-investment expenses	0.50%	0.50%
Total normal actuarial contribution rate	18.03%	17.04%

6.2 Contribution Rate in Respect of Unfunded Liability

As the Plan was fully funded as at the last valuation date, there were no amortization schedules that were established prior to the valuation date.

Furthermore, the plan continues to be fully funded and no amortization of unfunded liabilities are required.

6.3 Actuarial Excess Usage

As defined in the *Regulation*, accessible going concern excess means the amount by which the going concern assets values exceed 105% of the going concern liabilities values. As at this valuation date, the Plan has accessible going concern excess as the funded ratio is at 112.0%. Section 60(10) of the *Regulation* outlines the manner and the conditions applicable in which accessible going concern excess can be utilized.

In addition, the Plan's Funding Policy Statement outlines actions to be contemplated which are contingent on the Plan's funded status and contribution sufficiency. Based on that funding framework, the use of the Plan's accessible going concern excess is not expected and is assumed to remain in the Plan.

6.4 Contribution Rate in Respect of Solvency Deficiency

The Act does not require additional contributions to fund the solvency deficiency.

6.5 Maximum Permissible Contributions

The *Income Tax Act (Canada)* limits the amount of employer contributions that can remitted to the defined benefit provision of a registered pension plan to contributions recommended by an actuary as being required to fund the benefits provided under the Plan in respect of service rendered prior to the end of the contribution year. In making the recommendation, the actuary may ignore a certain amount of excess funding, and may include an allowance for cost-of-living increases that are reasonable to expect will be provided, whether or not those increases are stipulated in the Plan's provisions.

In general, the maximum is defined as 25% of the going concern actuarial liability (with allowances for cost-of living, if applicable).

As at the valuation date, the Plan does not have an excess surplus on the valuation for Maximum Contribution Determination basis, nor the going concern basis; therefore, employer contributions are not affected by the prescribed excess surplus limit.

As the Plan has no excess surplus, the maximum permissible contribution is 18.77% of pensionable earnings, as described in the valuation for Maximum Contribution Determination. The detailed funded position, contribution information, and valuation assumptions with respect to the valuation for Maximum Contribution Determination, for determining the maximum eligible contributions, are outlined under Appendix F.

6.6 Total Contribution Rate

The following table outlines the acceptable range of contributions required under the Act and the Regulation and permitted under the *Income Tax Act* (*Canada)* based on this valuation.

Total Contribution Rates (% of pensionable earnings)	Minimum Required	Maximum Permitted
Level Rate on All Earnings		
Total Normal actuarial cost rate	17.04%	18.77%
Unfunded liability special payments	0.00%	0.00%
Required application of excess surplus	0.00%	0.00%
Total contribution rate	17.04%	18.77%
Split Rate Below/Above YMPE (Members and Employers, each)		
On earnings below YMPE	7.9%	8.7%
On earnings above YMPE	11.3%	12.4%

Contributions for the period until the next actuarial valuation must fall between the minimum and maximum contributions permitted above and in accordance with the Funding Policy Statement. The Plan's current contribution rates are:

Total Contribution Rates (% of pensionable earnings)	Members	Employers	Total
Split Rate Below/Above YMPE (Members and Employers, each)			
On earnings below YMPE	9.6%	9.6%	19.2%
On earnings above YMPE	13.7%	13.7%	27.4%

The Plan's current contribution rates are not within the acceptable range formed by the requirements of the *Act* and *Regulation* and the *Income Tax Act (Canada)*. Should the Sponsor Board establish contribution rates that are within the acceptable range formed by the requirements of the Act and Regulation and the *Income Tax Act (Canada)*, as outlined above, such contributions will satisfy the requirements of applicable legislation.

7. Funding Policy Considerations

7.1 Provision for Adverse Deviation

In accordance with the Funding Policy Statement, an explicit provision for adverse deviation ("PfAD") has been added to liabilities and normal actuarial costs. The purpose of the PfAD is to reduce the potential adverse effect of the uncertainty inherent in going concern assumptions. If the future unfolds in accordance with the best estimate assumptions (that is, the assumptions without margin), then the PfAD will be released into surplus.

The target amount of PfAD to use for the going concern valuation is 15%. The Funding Policy Statement mandates that the PfAD must be within the range of 5% to 25%. This is the same policy in place as at the last valuation.

To aid the reader in the assessment of the level of the PfAD, the following table illustrates the interest rates, including margins, that would produce liabilities and normal actuarial costs equivalent to the best estimate liabilities and normal actuarial costs plus the 15% PfAD.

	PfAD %	Best Estimate Value ($ million)	PfAD ($ million)	Interest Rate that would generate PfAD	Resulting Margin in Interest Rate
Liabilities	15%	$13,184	$1,978	4.9%	1.0%
Normal actuarial cost	15%	14.38%	2.16%	5.3%	0.6%

Commuted Values

In accordance with Bill 22, commuted value calculations must use the actuarial assumptions used in the current actuarial valuation report (to determine the going concern liabilities value of the Plan) or any simplified actuarial assumptions that reasonably reflect those actuarial assumptions.

Based on the above, the simplified actuarial assumptions to be used in preparing commuted value calculations should include an interest rate of 4.9%, which falls between the above calculated interest rates. At this valuation date, an interest rate of 4.9% reasonably reflects the Funding Policy Statement's 15% PfAD.

Transfer Agreements

As a result of the change in assumptions at this valuation and the approach to use best estimate assumptions in conjunction with an explicit PfAD, the Administrator may wish to consider reviewing inter-plan transfer agreements and the actuarial assumptions used.

7.2 Long-Term Funding Test

In order to assess the long-term sustainability of the Plan, the Funding Policy Statement requires that a Long-Term Funding Test be performed in conjunction with each actuarial valuation and incorporated into the contribution rates-setting process. The test is conducted by comparing *Funds Available* to *Funds Required*, as follows:

Funds Available:
A. Actuarial value of assets
B. Present value of contributions (over the next 25 years)

Funds Required:
C. Going concern liabilities
D. Present value of normal actuarial costs (over the next 25 years)
E. Present value of non-investment expenses (over the next 25 years)

Long-Term Funding Ratio = (A + B)/(C+D+E)

Further, an allowance for new entrants is included in both B and D above. The number of new entrants may not result in growth in the number of members who are contributing towards accruing benefits (i.e., no growth in the active membership of the Plan may be included in the Long-Term Funding Test). The age, gender and salary of new entrants are assumed to represent the active member population with less than 5 years of service. The calculation of the present value of future contributions assumes that the contribution rates remain at their current levels over the 25-year period.

If the Long-Term Funding Ratio is greater or equal to 105%, the Plan passes the Long-Term Funding Test. The following table summarizes the results of the test, based on current contribution rates:

Long-Term Funding Test (Current Contribution Rates)	December 31, 2020 $000s	December 31, 2021 $000s
Funds Available		
Going concern assets	15,768,000	16,983,000
Present value of 25 Years' Contributions	12,180,000	10,629,000
Total Funds Available	**27,948,000**	**27,612,000**
Funds Required		
Going concern liabilities	13,265,000	13,184,000
Present value of 25 Years' normal actuarial costs and non-investment expenses	9,032,000	7,958,000
Total Funds Required	**22,297,000**	**21,142,000**
Long-Term Funding Ratio	**125%**	**131%**

To assess contribution adequacy, the Long-Term Funded Ratio was also calculated assuming the minimum required contribution rates reported in this valuation report are contributed over the next 25 years:

Long-Term Funding Test (Minimum Required Contribution Rates)	**December 31, 2021 $000s**
Funds Available	
Going concern assets	16,983,000
Present value of 25 Years' Contributions	8,751,000
Total Funds Available	**25,734,000**
Funds Required	
Going concern liabilities	13,184,000
Present value of 25 Years' normal actuarial costs and non-investment expenses	7,897,000
Total Funds Required	**21,081,000**
Long-Term Funding Ratio	**122%**

As illustrated in the tables above, the Long-Term Funding Test would be satisfied with contribution rates set at either minimum required or current contribution rates.

8. Stress and Sensitivity Testing

Stress and sensitivity tests have been conducted to assess certain risks to which the Plan is exposed. The tests and their disclosure have been prepared with reference to applicable actuarial standards and guidance. At this valuation, the following risks have been assessed:

- interest rate risk,
- deterioration of asset values,
- public sector employment, and
- longevity risk.

The following sections provide the results of these tests on the going concern assets, going concern liabilities, going concern funded status, going concern normal actuarial costs, and resulting minimum contribution requirements.

8.1 Asset-Liability Mismatch: Interest Rate Sensitivity

As the assumed interest rate has a significant impact on the Plan's liabilities, accepted actuarial practice requires that the impact on the going concern liabilities and normal actuarial cost of a 1.0% decrease in the assumed interest rate be disclosed.

The following table illustrates the effect of an immediate 1.0% decrease in the interest rate with a corresponding 1.0% decrease in interest rates (affecting fixed income assets), including a 1.0% decrease in the interest rate used for commuted values. The effect on fixed income assets is determined by estimating the immediate capital gain on such assets resulting from a 1.0% decrease in their yields.

Funded Status and Contribution Margin – December 31, 2021	Current Valuation	Interest Rate -1%
Going concern assets ($ million)		
Market value	18,058	18,334
Asset fluctuation adjustment	(1,075)	(1,295)
Going concern assets	16,983	17,039
Going concern liabilities ($ million)		
Best estimate liabilities	13,184	15,156
Best estimate funded status	3,799	1,883
Best estimate funded ratio	128.8%	112.4%
PfAD	1,978	2,273
Total going concern liabilities	15,162	17,429
Actuarial excess (unfunded liability)	**1,821**	**(390)**
Funded ratio	**112.0%**	**97.8%**
Contribution requirements (% of pensionable earnings)		
Normal actuarial cost	14.38%	18.01%
PfAD	2.16%	2.70%
Non-investment expense allowance	0.50%	0.50%
Unfunded liability special payments	0.00%	1.12%
Total minimum required	**17.04%**	**22.33%**
Split rates for members/employers (% of pensionable earnings)		
Earnings below YMPE	7.9%	10.4%
Earnings above YMPE	11.3%	14.8%

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8.2 Asset-Liability Mismatch: Deterioration of Asset Values

Investment policy may create an asset-liability mismatch should one asset class not produce the actual returns necessary to match the liabilities.

The following table illustrates the effect on the Plan's funded status of an immediate 10% decrease in the Plan's assets as at December 31, 2021

Funded Status & Contribution Requirements – December 31, 2021	Current Valuation	Immediate 10% Drop in Market Value of Assets
Going concern assets ($ million)		
Market value	18,058	16,253
Asset fluctuation adjustment	(1,075)	370
Going concern assets	16,983	16,623
Going concern liabilities ($ million)		
Best estimate liabilities	13,184	13,184
Best estimate funded status	3,799	3,439
Best estimate funded ratio	128.8%	126.1%
PfAD	1,978	1,978
Total going concern liabilities	15,162	15,162
Actuarial excess (unfunded liability)	**1,821**	**1,461**
Funded ratio	**112.0%**	**109.6%**
Contribution requirements (% of pensionable earnings)		
Normal actuarial cost	14.38%	14.38%
PfAD	2.16%	2.16%
Non-investment expense allowance	0.50%	0.50%
Unfunded liability special payments	0.00%	0.00%
Total minimum required	**17.04%**	**17.04%**
Split rates for members/employers (% of pensionable earnings)		
Earnings below YMPE	7.9%	7.9%
Earnings above YMPE	11.3%	11.3%

8.3 Public Sector Employment

Given the economic challenges currently being experienced in Alberta, future employment levels in Alberta's public sector could be negatively impacted. It is conceivable that the Plan's active membership could decrease. This test contemplates an immediate 10% payroll reduction (as a result of fewer members, not lower salaries), resulting in lower future total contributions, with no changes to current contribution rates:

Funded Status & Contribution Requirements – December 31, 2021	Current Valuation	Immediate 10% Payroll Reduction
Going concern assets ($ million)		
Market value	18,058	18,058
Asset fluctuation adjustment	(1,075)	(1,075)
Going concern assets	16,983	16,983
Going concern liabilities ($ million)		
Best estimate liabilities	13,184	13,184
Best estimate funded status	3,799	3,799
Best estimate funded ratio	128.8%	128.8%
PfAD	1,978	1,978
Total going concern liabilities	15,162	15,162
Actuarial excess (unfunded liability)	**1,821**	**1,821**
Funded ratio	**112.0%**	**112.0%**
Contribution requirements (% of pensionable earnings)		
Normal actuarial cost	14.38%	14.38%
PfAD	2.16%	2.16%
Non-investment expense allowance	0.50%	0.50%
Unfunded liability special payments	0.00%	0.00%
Total minimum required	**17.04%**	**17.04%**
Split rates for members/employers (% of pensionable earnings)		
Earnings below YMPE	7.9%	7.9%
Earnings above YMPE	11.3%	11.3%

As there are no special payments required, immediately lowering pensionable earnings due to a reduction in active members has no effect on the contribution requirements at this valuation date. A funded status greater than 100% is an indicator of protection against this risk.

8.4 Demographic Experience: Increased Longevity

This stress test illustrates the effect of members living longer than expected. The test offsets the mortality rates applicable to each member by one year, extending their life expectancies. The timing of all other decrements was unchanged. The following table illustrates the effect of this increased longevity.

Funded Status & Contribution Requirements – December 31, 2021	Current Valuation	Increased Longevity
Going concern assets ($ million)		
Market value	18,058	18,058
Asset fluctuation adjustment	(1,075)	(1,075)
Going concern assets	16,983	16,983
Going concern liabilities ($ million)		
Best estimate liabilities	13,184	13,449
Best estimate funded status	3,799	3,534
Best estimate funded ratio	128.8%	126.3%
PfAD	1,978	2,017
Total going concern liabilities	15,162	15,466
Actuarial excess (unfunded liability)	**1,821**	**1,517**
Funded ratio	**112.0%**	**109.8%**
Contribution requirements (% of pensionable earnings)		
Normal actuarial cost	14.38%	14.58%
PfAD	2.16%	2.19%
Non-investment expense allowance	0.50%	0.50%
Unfunded liability special payments	0.00%	0.00%
Total minimum required	**17.04%**	**17.27%**
Split rates for members/employers (% of pensionable earnings)		
Earnings below YMPE	7.9%	8.0%
Earnings above YMPE	11.3%	11.4%

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Appendix A — Plan Provisions

A.1 Plan Provisions

The Plan is continued under the *Joint Governance of Public Sector Pension Plans Act*, Bill 27, in force December 11, 2018 (the "JGPSPPA"). Effective January 1, 2021, the plan text document referenced under subsections 34(1) and (5) of the JGPSPPA has been approved and outlines the formal provisions of the Plan.

This summary contains the main provisions of the Plan as at the valuation date. For a complete description, reference should be made to the Plan text.

This summary does not constitute a legal interpretation of the Plan. All pertinent documents, acts, and regulations should be referred to for an interpretation in any specific circumstance.

Provision	Detail
Effective date	The Plan was established effective April 1, 1947. In accordance with the *Joint Governance of Public Sector Pension Plans Act*, Bill 27 ("JGPSPPA"), the Plan is continued under the plan text effective January 1, 2021.
Eligibility	Full-time and part-time employees of the Government of Alberta, and of the agencies, boards and Provincial corporations identified in the section 28 of Schedule 2 of the JGPSPPA are eligible to participate in the Plan.
Current service contributions	With effect from January 1, 1992, the current service benefit accruals of the PSPP are funded in equal parts by contributions from employers and plan members which, in total, are equal to the normal actuarial cost of the benefit accruals attributable to the years for which the contributions are made. With effect from January 1, 2019, a higher contribution rate was paid by all employees and employers for the CPS provision.
Unfunded liability contributions	Any unfunded liability of the Plan arising after 1998 is to be funded over a period not exceeding 15 years from the applicable valuation date, in equal parts by contributions from PSPP members and their employers.
Solvency contributions	The JGPSPPA does not require funding of any solvency deficit.
Purchase of service	Members are entitled to contribute for the purchase of certain periods of service. The actuarial basis for determining the purchase price approximates the going-concern actuarial liability that will arise in respect of that service.
Credited interest	Prior to 1994, Plan member contribution accounts were credited with interest at the rate of 4% per annum. Effective January 1, 1994, the interest credited to accumulated member contributions is equal to the rate of return credited on 5-year term deposits by Canadian chartered banks as reported in CANSIM series V80691336 maintained by Statistics Canada.

Provision	Detail
Combined pensionable service (CPS)	Combined Pensionable Service ("CPS") affects members who transfer to (or from) employment covered by the Plan from (or to) employment covered by either the Management Employees Pension Plan ("MEPP") or the Universities Academic Pension Plan ("UAPP"). When a member of MEPP or UAPP transfers to PSPP, the member's PSPP pensionable service is the only service recognized for purposes of calculating the PSPP accrued pension. However, determination of eligibility to benefits from PSPP, such as vesting, early retirement, and the amount of early retirement reduction, is based on the member's CPS. In this case, the member's CPS is equal to his pensionable service under PSPP plus the pensionable service earned under the former plan. Similarly, when a PSPP member transfers to UAPP or to MEPP, the member's PSPP pensionable service up to the time of transfer is the only service used to calculate the PSPP accrued pension. However, the member's CPS is used to determine benefit eligibility as described above. In this case, the member's CPS is equal to the pensionable service under PSPP plus the pensionable service under the new plan. In either case, the member's accrued PSPP pension is based on the highest five-year average earnings over the member's entire CPS. The aggregate of the periods that are considered in determination the length of the CPS shall not exceed 35 years. CPS results in benefits that are higher than they otherwise would be in its absence, resulting in additional costs.
Commuted values	The lump sum present value of a member's accrued benefits; prior to April 1, 2020, commuted values were determined in accordance with accepted actuarial practice. Effective April 1, 2020, in accordance with Bill 22 (*Reform of Agencies, Boards and Commissions and Government Enterprises Act*, 2019), commuted values are determined based on simplified actuarial assumptions used in the current actuarial valuation report to determine the going concern liabilities of the Plan.
Normal retirement date	First day of the month coincident with or following the member's 65th birthday.
Unreduced early retirement	A member who has attained age 55, and whose age and years of pensionable service total 85 or more, is entitled to an unreduced retirement pension commencing immediately.
Reduced early retirement	A member who has attained age 55, but whose age and years of pensionable service do not total 85, may elect to receive a pension commencing immediately that is reduced by an early retirement reduction. The early retirement reduction is 3% multiplied by the number of years the member is short of age 65 or 85 points, whichever is less (without recognition of potential service).
Postponed retirement	A member who is eligible for immediate retirement may defer pension commencement, up to the latest age permitted under the *Income Tax Act (Canada)*. An actuarial increase applies in the case of postponement beyond the later of termination of employment and attaining eligibility for an unreduced pension.

Provision	Detail
Normal form of pension	The normal form of pension is a 5-year guaranteed life annuity. Members can select an alternative form of pension that is actuarially equivalent to the normal form of pension.
Years of pensionable service	The number of complete years and any fraction of a remaining year of pensionable service, up to a maximum of 35 years, less any combined pensionable service.
Highest average salary	The member's average annual pensionable salary in the 60 consecutive months in which such average salary was the highest (including during continuing employment after attainment of 35 years of pensionable service). The pensionable salary of part time employees is grossed up to an annual basis to determine average pensionable salary.
Average YMPE	The average of the Year's Maximum Pensionable Earnings (as defined in the Canada Pension Plan) over the same period over which pensionable earnings are averaged.
Normal retirement benefit	The benefit payable at normal retirement age is an annual pension equal to the sum of: (a) 2.0% of average pensionable salary multiplied by years of pensionable service earned or credited in respects of periods prior to January 1, 1966, plus (b) 1.4% of average pensionable salary up to the average YMPE multiplied by years of pensionable service earned or credited in respect of periods after January 1, 1966, plus (c) 2.0% of average pensionable salary in excess of average YMPE, multiplied by years of pensionable service earned or credited in respect of periods after January 1, 1966.
Maximum pensionable earnings	Effective January 1, 1992, and only in respect of pensionable service after 1991, pensionable earnings for each calendar year are limited to the sum of: (a) 50 times the defined benefit annual maximum pension limit for the year under the *Income Tax Act (Canada)*, plus (b) 30% of the YMPE for the year.
Cost of living increases	Pensions payable to retired members, former members with deferred pensions and survivors will be increased annually to reflect 60% of the increase in the Consumer Price Index for Alberta. The Sponsor Board may approve additional ad hoc cost-of-living increases.
Vesting	Benefits vest on attainment of 2 years of combined pensionable service or age 65.
Termination benefits	(a) *Non-vested benefit:* A non-vested terminated member is entitled to payment of the member's contributions with interest. (b) *Vested benefit:* The vested termination benefit is a deferred pension, commencing at or after age 55 calculated to reflect the early retirement discount applicable at the actual date of retirement of the member (i.e., 3% per annum) and reflecting only pensionable service performed to the date of termination. Portability of the member's commuted value is permitted, although commuted values have been determined on a going concern basis effective with the December 31, 2019 valuation.
Death benefits	*Prior to retirement:* (a) *Non-vested benefit:* The non-vested death benefit is a refund of the member's required contributions with interest.

Provision	Detail
	(b) *Vested benefit:* The vested death benefit is payment of the commuted value of the member's termination/retirement benefit. However, a surviving pension partner has the option to elect a monthly pension in lieu of the commuted value. Such a monthly pension is determined as the survivor's pension as if the member had retired on an unreduced pension and elected a Joint-and-Survivor 100% optional form. *After retirement:* The post-retirement death benefit is dependent on the form of pension selected at retirement.
Disability benefits	A member, or a former member who remains entitled to a deferred pension, is entitled to receive an immediate unreduced pension, provided that he/she: (a) joined the Plan prior to July 1, 2007, (b) is totally disabled, (c) has completed two years of pensionable service, and (d) is not receiving benefits under an approved disability plan. A person who satisfies the above conditions, but is only partially disabled, is entitled to receive a pension commencing immediately that is reduced as for early retirement. A person who is receiving benefits from an approved disability plan is not entitled to receive, concurrently, a disability pension from the Plan. While in receipt of benefits from an approved disability plan, participation in the Plan continues. Salary, for the purpose of current service contributions or for the purpose of determining any pension to which the member may subsequently become entitled, is the salary that was being earned immediately before disability benefits commenced, increased by any subsequent general increases applicable to the pre-disability class of employment of the member.
Excess Employee Contributions	Upon a member's retirement or upon commuted value transfer upon termination or death, if the member's vested contributions with interest are greater than the commuted value of the benefit otherwise payable, then the member/spouse/beneficiary receives a refund of such excess.
Portability agreements – other public sector plans	Portability agreements have been established with other public sector pension plans, under which a member who transfers between the PSPP and such other plan has the option to transfer service credits from his former plan to his new plan, with a corresponding transfer of funds between the plans. The amounts of such service transfer and fund transfer are generally based on the estimated respective actuarial funding valuation liability for such member in each of the plans.
Plan termination	The Plan is expected to remain in force indefinitely however the Sponsor Board may unanimously decide to terminate it.

Appendix B — Plan Membership

B.1 Source of Data

Alberta Pensions Services Corporation (APSC) provides administration services to the Plan and maintains pension records of Plan members on behalf of the Administrator. The relevant information to carry out this valuation was provided by APSC. We have reviewed the data to ensure its sufficiency and reliability, and consistency with the data used in the last valuation. Specific tests included:

1. A member by member reconciliation of the membership group between valuation dates.
2. Tests for reasonableness of the data elements of the record of each individual entitled to or potentially entitled to a benefit under the Plan, including, but not limited to:
   a. Comparison of changes in age, salaries, and pensionable service
   b. Comparison of the terminated and retired members with the files used for the prior valuation and the retirements, terminations, and deaths that occurred during the inter-valuation period
   c. Validation with APSC regarding all inconsistencies in comparison with the data used for the previous actuarial valuation, with adjustments made where necessary
   d. Comparison of the data provided with information contained in the Plan's financial statements.

The results of the above tests demonstrate that the membership data is substantially complete; however, the 2022 salary rate was missing for about 470 active/CPS members. To estimate this missing data, these members' 2022 salary rates were derived using:

- the highest of the member's annualized pensionable earnings from the last five years; or
- the average 2022 annual salary rate for the active group ($74,000), if no historical pensionable earnings were available.

In addition, manual adjustments have been made for pensionable service for about 1,799 active members due to incomplete 2021 year-end calculations. We note that the salary rates provided by APSC for these members were not adjusted.

These estimates do not materially affect the results of the valuation. The membership data is sufficient and reliable for the purposes of this valuation.

B.2 Summary of Membership Data

There were the following members as of the current and last valuation dates:

Active Members

Membership Summary	December 31, 2020	December 31, 2021
Number of members	39,447 [1]	38,152
Male	13,039	12,659
Female	26,406	25,493
Average age	44.9	45.1
Male	44.5	44.7
Female	45.1	45.3
Average Plan service (years)	10.3	10.4
Male	10.1	10.2
Female	10.4	10.5
Average annualized earnings	$73,857	$73,835
Male	$80,010	$79,635
Female	$70,819	$70,955

[1] *As at December 31, 2020, two members did not have gender, birthdate, and service reported in the data and were not included in the valuation.*

Retirees & Beneficiaries

Membership Summary	December 31, 2020	December 31, 2021
Number of members	28,973	29,908
Male	10,451	10,664
Female	18,522	19,244
Average age	73.1	73.4
Male	73.4	73.6
Female	73.0	73.2
Average current pension (including any coordination)	$18,025	$18,561
Male	$20,876	$21,469
Female	$16,416	$16,949

CPS Suspended Members

Membership Summary	December 31, 2020	December 31, 2021
Number of members	4,365	4,090
Male	1,853	1,722
Female	2,512	2,368
Average age	47.8	48.5
Male	48.3	48.9
Female	47.5	48.2
Average Plan service (years)	8.0	8.0
Male	8.0	8.0
Female	8.1	8.0
Average CPS service (years)	8.0	8.6
Male	8.6	9.2
Female	7.5	8.1
Average annualized earnings	$113,066	$114,866
Male	$115,521	$116,451
Female	$111,158	$113,633

Deferred Members

Membership Summary	December 31, 2020	December 31, 2021
Number of members	10,524	11,637
Male	3,449	3,826
Female	7,075	7,811
Average age	48.5	48.1
Male	48.8	48.4
Female	48.3	48.0
Average deferred pension[1,2]	$6,604	$6,838
Male	$7,709	$7,874
Female	$6,066	$6,330

[1] *Includes cost of living adjustments to the January 1st following the valuation date.*
[2] *Does not include the actuarial equivalent increases for qualified members.*

Hold-On-Deposit Members

Membership Summary	December 31, 2020	December 31, 2021
Number of members	4,554	4,611
Male	1,529	1,540
Female	3,025	3,071
Average age	51.1	51.4
Male	51.8	52.3
Female	50.7	50.9
Average contributions with interest	$3,555	$3,589
Male	$3,692	$3,704
Female	$3,485	$3,532

B.3 Changes in Membership Data

The following table shows the changes in the Plan membership since the last valuation date:

Reconciliation of Membership Data	Active Members	CPS Suspended Members	Deferred/ Hold-on-Deposit	Retirees and Beneficiaries	Total
As at December 31, 2020	39,447	4,365	15,078	28,973	87,863
New entrants	3,081	4	189	16	3,290
Return to active status	235	(26)	(209)	-	-
New CPS	(148)	155	(7)	-	-
Terminations - deferred	(2,276)	(195)	2,471	-	-
Paid out/transfers	(1,135)	(50)	(955)	-	(2,140)
Retirements	(1,046)	(163)	(311)	1,520	-
Deaths or expiry of guarantee	-	-	-	(507)	(507)
Data adjustments	(6)	-	(8)	(94)	(108)
As at December 31, 2021	38,152	4,090	16,248	29,908	88,398

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B.4 Active Members — Detail

Distribution of Pensionable Service and Contribution Balances — All Active

Age	Under 5	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 35	Total
Under 25	407	2						409
	$51,886	*						*
	$5,499	*						*
25 – 29	2,254	313	1					2,568
	$60,443	$65,789	*					*
	$12,511	$41,557	*					*
30 – 34	2,860	1,894	196					4,950
	$67,465	$73,653	$72,225					$70,021
	$17,770	$54,449	$81,830					$34,341
35 – 39	2,236	2,239	1,114	128				5,717
	$69,473	$76,604	$80,089	$77,951				$74,524
	$18,737	$60,835	$96,903	$116,368				$52,641
40 – 44	1,598	1,667	1,433	641	118			5,457
	$69,959	$76,969	$80,879	$83,067	$81,856			$76,769
	$19,734	$62,842	$103,025	$129,380	$143,655			$70,334
45 – 49	1,170	1,318	1,157	809	474	28		4,956
	$71,201	$75,583	$80,968	$83,364	$86,295	$76,712		$78,108
	$21,083	$64,101	$105,647	$134,409	$155,245	$155,419		$84,355
50 – 54	859	1,070	1,053	752	692	215	124	4,765
	$70,782	$73,925	$77,984	$82,140	$81,580	$79,853	$73,757	$76,927
	$20,436	$63,309	$104,618	$135,291	$154,175	$162,409	$164,945	$96,381
55 – 59	607	774	881	710	615	323	591	4,501
	$72,526	$73,777	$73,793	$77,599	$79,652	$78,797	$75,799	$75,643
	$21,669	$63,981	$100,078	$126,488	$149,295	$162,474	$171,606	$108,057
60 - 64	352	574	654	589	592	280	909	3,950
	$71,234	$69,922	$72,929	$72,420	$74,676	$74,483	$73,763	$72,829
	$23,038	$62,156	$100,812	$118,229	$142,585	$155,905	$164,173	$115,608
65 +	46	123	164	141	107	59	239	879
	$75,383	$71,420	$72,891	$75,666	$73,991	$72,399	$77,061	$74,495
	$24,018	$65,182	$103,501	$125,944	$143,867	$148,939	$167,075	$122,829
Total	12,389	9,974	6,653	3,770	2,598	905	1,863	38,152
	$67,326	*	*	$79,802	$80,111	$77,231	$74,831	73,835
	$17,699	*	*	$128,781	$149,672	$159,326	$166,955	$74,088

** Not shown for confidentiality reasons.*

Each cell shows: Number of members
Average annual pensionable earnings
Average contributions with interest

Distribution of Pensionable Service and Contribution Balances — Male Active

Age	Under 5	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 35	Total
Under 25	139							139
	$55,461							$55,461
	$5,398							$5,398
25 – 29	785	107	1					893
	$61,608	$70,505	*					*
	$12,519	$46,319	*					*
30 – 34	987	664	60					1,711
	$69,214	$75,705	$76,599					$71,992
	$17,646	$58,923	$91,453					$36,253
35 – 39	739	754	393	55				1,941
	$72,374	$79,285	$83,223	$81,916				$77,526
	$19,628	$66,625	$106,954	$126,615				$58,597
40 – 44	556	549	441	256	43			1,845
	$76,495	$83,141	$84,941	$86,504	$89,622			$82,186
	$22,360	$71,701	$115,093	$140,494	$166,554			$78,959
45 – 49	381	431	380	303	172	10		1,677
	$79,580	$84,234	$86,401	$87,713	$90,352	$84,033		$84,926
	$25,195	$77,067	$120,920	$148,766	$170,722	$177,973		$98,381
50 – 54	289	353	315	247	252	71	29	1,556
	$78,086	$83,250	$85,761	$90,108	$89,538	$86,306	$79,770	$84,981
	$22,539	$73,779	$122,326	$156,588	$176,227	$176,986	$186,775	$110,643
55 – 59	220	245	252	228	192	114	188	1,439
	$79,813	$85,839	$84,155	$87,930	$92,209	$86,388	$81,531	$85,285
	$24,166	$80,442	$120,251	$147,676	$180,993	$185,907	$193,291	$125,977
60 - 64	124	173	204	136	159	83	283	1,162
	$80,425	$80,132	$81,750	$83,513	$87,737	$83,561	$82,996	$82,826
	$25,854	$73,388	$120,139	$144,937	$176,977	$181,322	$193,570	$136,051
65 +	21	48	56	37	29	16	89	296
	$83,903	$81,224	$84,824	$91,475	$87,279	$91,369	$87,049	$86,270
	$26,352	$77,449	$126,508	$158,140	$178,420	$200,210	$198,262	$146,045
Total	4,241	3,324	2,102	1,262	847	294	589	12,659
	$71,345	$80,542	*	$87,381	$89,897	$85,761	$82,982	79,635
	$18,892	$68,912	*	$147,319	$175,914	$182,967	$193,855	$83,480

** Not shown for confidentiality reasons.*

Each cell shows: Number of members
Average annual pensionable earnings
Average contributions with interest

Distribution of Pensionable Service and Contribution Balances — Female Active

Age	Under 5	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30 – 35	Total
Under 25	268	2						270
	$50,031	*						*
	$5,551	*						*
25 – 29	1,469	206						1,675
	$59,821	$63,340						$60,254
	$12,506	$39,083						$15,775
30 – 34	1,873	1,230	136					3,239
	$66,544	$72,544	$70,295					$68,980
	$17,835	$52,034	$77,585					$33,331
35 – 39	1,497	1,485	721	73				3,776
	$68,041	$75,243	$78,380	$74,964				$72,981
	$18,297	$57,895	$91,425	$108,647				$49,580
40 – 44	1,042	1,118	992	385	75			3,612
	$66,462	$73,938	$79,073	$80,782	$77,404			$73,999
	$18,333	$58,492	$97,660	$121,990	$130,526			$65,928
45 – 49	789	887	777	506	302	18		3,279
	$67,166	$71,379	$78,310	$80,760	$83,985	$72,645		$74,623
	$19,098	$57,801	$98,178	$125,812	$146,431	$142,889		$77,181
50 – 54	570	717	738	505	440	144	95	3,209
	$67,079	$69,334	$74,665	$78,242	$77,022	$76,671	$71,921	$73,021
	$19,370	$58,155	$97,060	$124,874	$141,545	$155,221	$158,281	$89,466
55 – 59	387	529	629	482	423	209	403	3,062
	$68,384	$68,180	$69,641	$72,713	$73,953	$74,656	$73,125	$71,111
	$20,250	$56,358	$91,996	$116,466	$134,907	$149,693	$161,490	$99,636
60 - 64	228	401	450	453	433	197	626	2,788
	$66,235	$65,517	$68,930	$69,089	$69,880	$70,659	$69,589	$68,662
	$21,506	$57,310	$92,051	$110,211	$129,956	$145,197	$150,884	$107,088
65 +	25	75	108	104	78	43	150	583
	$68,226	$65,145	$66,704	$70,041	$69,051	$65,340	$71,135	$68,517
	$22,057	$57,331	$91,572	$114,489	$131,020	$129,861	$148,571	$111,042
Total	8,148	6,650	4,551	2,508	1,751	611	1,274	25,493
	$65,234	*	$75,256	$75,989	$75,377	$73,127	$71,063	70,955
	$17,079	*	$94,581	$119,453	$136,977	$147,950	$154,518	$69,424

** Not shown for confidentiality reasons.*

Each cell shows: Number of members
Average annual pensionable earnings
Average contributions with interest

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B.5 Retirees & Beneficiaries — Detail

Distribution of Annual Pension

Age	Years Since Retirement[1]					
	Under 5	5 – 14	15 – 24	25 – 34	35 +	Total
Under 60	905	85	18	8	1	1,017
	$26,027	$13,420	$6,858	$4,919	*	*
60 – 64	1,927	1,425	46	19		3,417
	$26,609	$25,565	$10,141	$8,162		$25,849
65 – 69	2,809	3,902	100	44	9	6,864
	$20,944	$22,659	$10,846	$9,285	$3,862	$21,674
70 – 74	794	4,217	1,394	88	14	6,507
	$20,897	$20,946	$15,650	$8,798	$4,218	$19,605
75 – 79	81	2,105	2,577	194	22	4,979
	$23,328	$19,431	$14,195	$10,139	$5,581	$16,362
80 – 84	3	232	1,659	1,421	41	3,356
	$42,719	$17,895	$13,470	$11,597	$7,969	$12,942
85 – 89		2	601	1,900	57	2,560
		*	$10,882	$11,028	$9,364	*
90 +		1	27	925	255	1,208
		*	$10,656	$10,221	$11,129	*
Total	6,519	11,969	6,422	4,599	399	29,908
	$23,358	*	$13,897	$10,922	*	$18,561

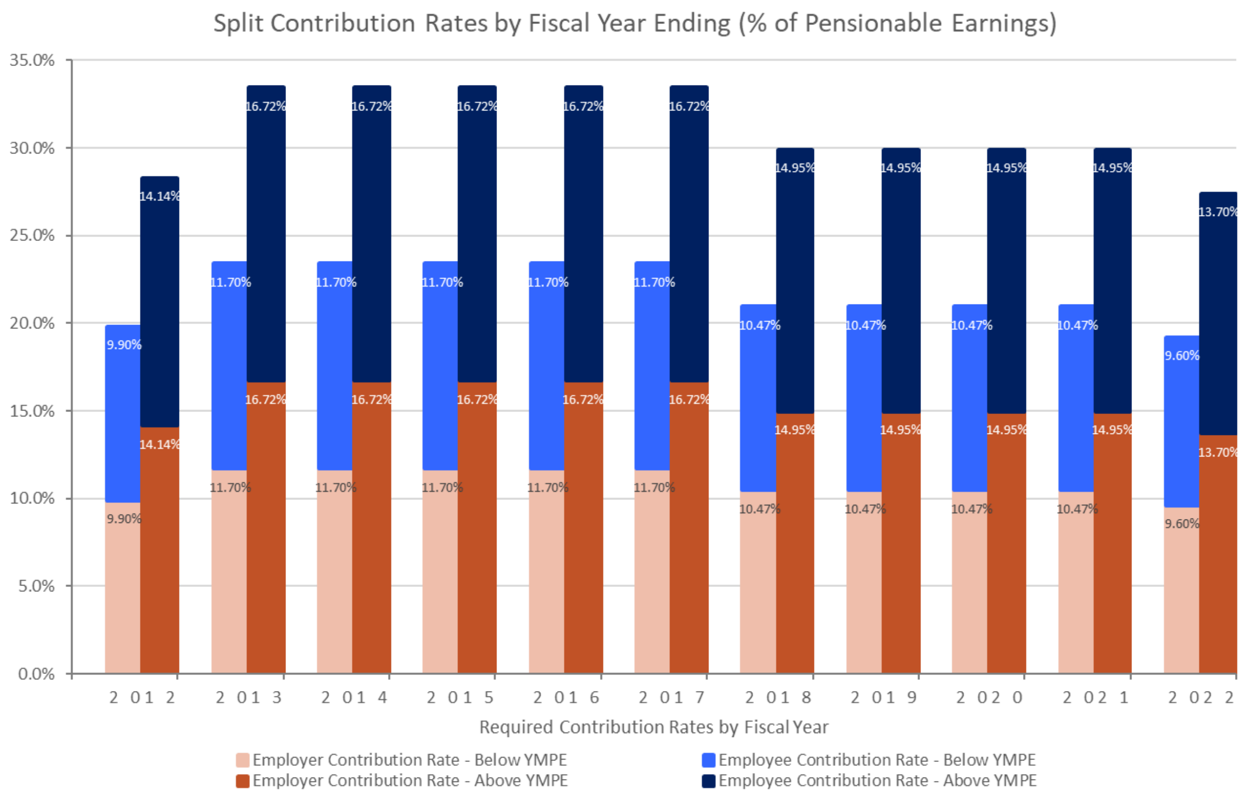
* *Not shown for confidentiality reasons.*

1 *This table includes surviving spouses and beneficiaries; in their case, Years Since Retirement applies to the former member.*

Each cell shows: Number of members
Average annual pension

B.6 Historical Contribution Rates

The contribution rates in effect in recent periods prior to the valuation date are provided in the chart below.



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Appendix C — Assets

C.1 Plan Asset Information

Plan assets are held in trust and managed by Alberta Investment Management Corporation. The fund is audited annually by the Auditor General of Alberta. The asset data required for the valuation in respect of the Plan's trust fund was taken from the Plan's audited financial statements at December 31, 2021.

The asset value has been tested and reconciled with the value at the last valuation. The benefits paid from the fund have also been examined and tested against the membership data.

C.2 Statement of Plan Assets and Asset Mix

A breakdown of the market value of the fund as at the valuation date, with the last valuation shown for comparison, is shown in the following table:

	December 31, 2020		December 31, 2021	
Asset Class	Amount ($ millions)	Asset Mix (%)	Amount ($ millions)	Asset Mix (%)
Cash and Short-Term	97	0.6%	36	0.2%
Other Fixed Income	3,213	20.6%	3,547	19.7%
Equities	8,965	57.4%	10,877	60.3%
Alternatives	3,304	21.1%	3,555	19.7%
Strategic Opportunities	40	0.3%	26	0.1%
Subtotal	15,619	100.0%	18,041	100.0%
Adjustments				
Accounts Receivable	21		22	
Accounts Payable	(6)		(5)	
Subtotal	15		17	
Total	15,634		18,058	

C.3 Changes to the Plan Assets

The following table shows the changes to the market/assigned value of the assets during the inter-valuation period:

Beginning of Period	January 1, 2021 ($ million)
Opening Asset Value	15,634
Contributions	
Employers	309
Employees	295
Past service	6
Transfers from other plans	3
Subtotal	613
Benefit Payments	
Pension payments	(525)
Disability payments	(2)
Termination benefits	(85)
Death benefits	(23)
Transfers to other plans	(11)
Subtotal	(646)
Expenses	
Investment expenses	(14)
Non-investment expenses	(129)
Subtotal	(143)
Investment Earnings	2,600
Closing Asset Value	18,058
End of Period	**December 31, 2021**

C.4 Long Term Asset Mix

PSPP Corporation has adopted an investment policy that includes the following long-term asset mix:

Asset Class	Target %
Universe bonds	9.0%
Private mortgages	5.0%
Opportunistic Fixed Income	4.0%
Canadian equities	5.0%
Global equities (traditional)	22.0%
Global equities (low volatility)	12.0%
Emerging market equities	8.0%
Private equities	8.0%
Canadian real estate	8.0%
Foreign real estate	5.0%
Infrastructure	11.0%
Timber/Farmland	3.0%
Total	100.0%

The target asset allocation above incorporates the change to the target asset mix which was approved by PSPP Corporation on April 14, 2021.

C.5 Fund Rates of Return

The rate of return history of the market value of assets, net of investment management fees, is shown below.

Year	Market Value
2012	11.5%
2013	14.4%
2014	12.1%
2015	9.8%
2016	7.0%
2017	11.3%
2018	1.6%
2019	12.3%
2020	1.6%
2021	15.8%

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C.6 Development of Actuarial Value of Assets

The actuarial value of assets is determined by adjusting for fluctuations in market value to moderate the effects of market volatility on the Plan's funded status. The projected asset values are calculated by starting with the market value of assets for the specific year and projecting forward with the assumed rate of return and actual cash flows for each year until the valuation date. The corridor approach is used so that if the calculated value is more than 10% above the market value, then 110% of the market value will be used as the actuarial value. Similarly, if the calculated value is less than 10% below the market value, then 90% of the market value will be used as the actuarial value.

	2017 $ millions	2018 $ millions	2019 $ millions	2020 $ millions	2021 $ millions
Market value at Dec. 31, 2017	13,426				
Net cash flow	76				
Assumed return (6.10%)	821				
Projected/Market value at Dec. 31, 2018	14,323	13,713			
Net cash flow	12	12			
Assumed return (6.10%)	874	837			
Projected/Market value at Dec. 31, 2019	15,209	14,562	15,418		
Net cash flow	(32)	(32)	(32)		
Assumed return (6.00%)	912	873	924		
Projected/Market value at Dec. 31, 2020	16,089	15,403	16,310	15,634	
Net cash flow	(47)	(47)	(47)	(47)	
Assumed return (5.70%)	916	877	928	890	
Projected/Market value at Dec. 31, 2021	16,958	16,233	17,191	16,477	18,058
	Five-Year Average of Projected / Market Values (rounded)				16,983
	Corridor Maximum (110% of Market Value of Plan Assets)				19,864
	Corridor Minimum (90% of Market Value of Plan Assets)				16,252
	Actuarial Value of Assets				**16,983**

C.7 Impact of Asset Fluctuation Adjustment

The historical actuarial and market values of assets, along with the resulting asset fluctuation adjustment and the year-by-year change in the adjustment, are shown below:

Year	Actuarial Value ($ millions)	Market Value ($ millions)	Asset Fluctuation Adjustment ($ millions)	Change in Asset Fluctuation Adjustment ($ millions)
2011	6,739	6,481	258	
2012	7,030	7,300	(270)	(528)
2013	7,988	8,559	(571)	(301)
2014	9,002	9,787	(785)	(214)
2015	10,087	10,937	(850)	(65)
2016	11,346	11,911	(565)	285
2017	12,691	13,426	(735)	(170)
2018	13,741	13,713	28	763
2019	14,853	15,418	(565)	(593)
2020	15,768	15,634	134	699
2021	16,983	18,058	(1,075)	(1,209)

Appendix D — Actuarial Methods

D.1 Actuarial Cost Method — Going Concern Valuation

The projected unit credit actuarial cost method has been used for this valuation, as was the case in the previous valuation. Under this method, the going concern liabilities at the valuation date are the actuarial present value of benefits in respect of service prior to the valuation date, but based on pensionable earnings projected to retirement. For the timing of active decrements, we have assumed they occur at the beginning of the year. In the prior valuation, we had assumed decrements occurred at the middle of the year, except where a retirement rate was 100%; in those years, the active member was assumed to retire at the beginning of the year. The normal actuarial cost is the present value, at the middle of the ensuing year, of benefits that accrue to active members in the ensuing year, again based on projected pensionable earnings.

Benefits in respect of excess contributions are determined as of the date the member's benefits are determined by comparing accumulated total service contributions with total service benefits and then the difference, if any, is allocated between past and future service periods on a pro-rata basis.

The pattern of future contributions necessary to pre-fund future benefit accruals for any one particular individual will increase gradually as a percentage of his or her pensionable earnings as the individual approaches retirement. For a stable population (i.e., one where the demographics of the group remain relatively constant from year to year), the normal actuarial cost will remain relatively level as a percentage of pensionable earnings.

An actuarial excess is the excess of the going concern assets over the going concern liabilities; an unfunded liability is the excess of the going concern liabilities over the going concern assets.

D.2 Actuarial Cost Method — Solvency Valuation

The *Act* requires disclosure of the Plan's financial position at the valuation date under the solvency valuation provision. The Plan is not required to fund any solvency deficit.

As in the last valuation, the solvency liabilities have been calculated as the actuarial present value of the benefits to which a member would be entitled if participation in the Plan was terminated on the valuation date. It is further noted that the solvency liabilities do not take into consideration any benefit reductions that may be required in the event of actual Plan termination on the valuation date.

D.3 Asset Valuation Method — Going Concern and Solvency Valuations

The going-concern asset valuation method determines the value that will be assigned to the assets on the valuation date. The actuarial value of assets has been determined by applying a smoothing methodology to the Plan's market value of assets at the valuation date. The same method was used in the previous valuation.

The actuarial value of assets is based on the market value of Plan assets (adjusted for accrued contributions and payments), plus an Asset Fluctuation Adjustment. This adjustment is based on a five-year smoothing of market rates of return over the expected long-term rate of return, specifically:

- investment income is assumed to accrue each year at a rate equal to the expected long-term rate of return assumed in the most recent valuation as at the beginning of that year;
- actual market values of the Plan's assets from each of the four previous year-ends are then projected to the current valuation date, using actual annual net cash flows and imputed investment income at these assumed rates for each year;
- these four projected results at the current valuation date, together with the actual market value at the current valuation date, are then averaged;
- this averaged value is then constrained to be no less than 90%, and no greater than 110%, of the current market value;
- the Asset Fluctuation Adjustment is calculated as the excess (positive or negative) of this constrained averaged value over the market value.

The actuarial asset value is then determined as the market asset value at the valuation date, plus the Asset Fluctuation Adjustment. Calculation of the Asset Fluctuation Adjustment for the current valuation is detailed in Appendix C of this report.

For purposes of the solvency valuation, assets have been valued at market value.

D.4 Provision for Adverse Deviation

A provision for adverse deviation has been included in the going concern valuation. This acts as a funding target aimed at reducing the potential adverse effect of the uncertainty inherent in the going concern assumptions. If the future unfolds in accordance with what are considered to be best estimate assumptions (that is, assumptions with no such margins), then the provision will be released into surplus.

D.5 Incremental Cost Method for Solvency Valuation

The incremental cost represents the present value, at the beginning of each period shown (time t), of the expected aggregate change in the solvency liabilities between time t and time t+1, adjusted upwards for expected benefit payments between time t and time t+1.

The calculation methodology can be described as follows:

1. the present value at time t of expected benefit payments between time t and time t+1, discounted to time t; plus

2. the projected solvency liabilities at time t+1, discounted to time t, allowing for, if applicable to the pension plan being valued:
    - expected decrements and related changes in membership status between time t and time t+1,
    - accrual of service to time t+1,
    - expected changes in benefits to time t+1, and
    - a projection of pensionable earnings to time t+1; less
3. the solvency liabilities at time t.

The actuarial assumptions used to calculate the incremental cost can be described as follows:

- The assumptions for expected benefit payments in item 1. above and decrement probabilities, service accruals, and projected changes in benefits and pensionable earnings in the item 2. above are consistent with the assumptions used in the Plan's going concern valuation.
- The assumptions used to calculate the projected solvency liabilities at time t+1 would generally be consistent with the assumptions for the solvency liabilities at time t, assuming that interest rates remain at the levels applicable at time t, that the select period is reset at time t for interest rate assumptions that are select and ultimate, and that the Standards of Practice for the calculation of commuted values and the guidance for estimated annuity purchase costs in effect at time t remain in effect at time t+1.

Active and inactive plan members as of time t and assumed new entrants over the period between time t and time t+1 are considered in calculating the incremental cost.

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Appendix E — Actuarial Assumptions

E.1 Actuarial Assumptions — Going Concern Valuation

The going concern valuation is based on the assumption that the Plan will continue to operate indefinitely into the future. At each valuation, past experience is compared to the assumptions made at the last valuation to determine if, together with known changes to plan provisions, investment policy, and expectations of future trends, the assumptions should be changed.

In this valuation, we reviewed the history of experience gains and losses and have provided a rationale for any assumption changes from the prior valuation which are described below. Emerging experience differing from these assumptions will result in experience gains and losses that will be revealed in future valuations.

The actuarial assumptions used in this and the last valuations are summarized in the following table. All rates and percentages are annualized unless otherwise noted.

Going Concern Assumptions	December 31, 2020	December 31, 2021
Economic		
Long-term rate of return	5.7%	5.9%
Interest rate	5.7%	5.9%
Provision for adverse deviation	15% PfAD	15% PfAD
Inflation rate	2.0%	2.0%
Interest rate used for commuted values upon termination	4.7%	4.9%
Inflation rate used for commuted values upon termination	2.0%	2.0%
Increases in pensionable earnings		
• General earnings increase rates	0.0% per year until March 31, 2021; 3.0% per year thereafter	1.6% per year on April 1, 2022; 3.0% per year thereafter
• Merit and promotion increase rates	Age based rates on 2020 study	Age based rates on 2020 study
Initial salary increase rate for CPS members	15%	15%
YMPE and Maximum Pension Limit	3.0%	3.0%
Cost-of-living adjustments	1.2%	1.2%
Interest on member contributions	3.0%	3.0%
Expenses	0.5% of pensionable earnings	0.5% of pensionable earnings

Going Concern Assumptions	December 31, 2020	December 31, 2021
Demographic		
Mortality	CPM Private Table projected with Scale MI-2017	CPM Private Table projected with Scale MI-2017
Termination	5-year select, gender distinct, age-based table based on 2020 experience study	5-year select, gender distinct, age-based table based on 2020 experience study
Transfer to MEPP/UAPP under CPS provision	370 active members transfer to MEPP/UAPP per year	370 active members transfer to MEPP/UAPP per year
Retirement	Active: age and unreduced retirement eligibility-based, gender distinct table based on 2020 experience study Deferred: age 55	Active: age and unreduced retirement eligibility-based, gender distinct table based on 2020 experience study Deferred: age 55
Proportion of vested terminated members electing a lump sum	80% if service less than 5 years, 50% if service between 5 and 15, 60% if service between 15 and 20, 70% if service between 20 and 25, 75% if service greater than 25	80% if service less than 5 years, 50% if service between 5 and 15, 60% if service between 15 and 20, 70% if service between 20 and 25, 75% if service greater than 25
Proportion of members with spouses	100% married	100% married
Spousal age differential	Male spouse 3 years older	Male spouse 3 years older
Future Plan membership for funding the unfunded liability	Plan active membership will remain stable and the aggregate pensionable earnings base will increase at the rate of increase for general earnings	Plan active membership will remain stable and the aggregate pensionable earnings base will increase at the rate of increase for general earnings

Further detail concerning these assumptions is summarized below.

Economic assumptions

Inflation Rate

As the level of inflation influences the rate of increase in several economic factors that affect the Plan, it is necessary for a going-concern valuation to make an assumption regarding the future inflation rate. As at the last valuation, the inflation rate is assumed to be 2.0% per year. This assumption is considered to be best estimate considering current economic and financial market conditions.

Long-term rate of return

The primary economic assumption used in the going concern valuation is the rate of return that the fund is expected to earn over the long term. In this valuation, we have used a long-term rate of return of 5.9% per year. At the last valuation, the assumed long-term rate of return was 5.7% per year.

Long-term rate of return	%
Expected inflation	2.0
Expected real return	3.6
Value added for rebalancing/diversification	0.3
Value added for active management	0.3
Expected investment expenses	(0.3)
Expected non-investment expenses	0.0
Rate of return	5.9

In deriving the long-term rate of return, we have assumed that the assets would be invested according to the target asset mix that was approved by PSPP Corporation on April 14, 2021.

The expected returns for the fund were estimated using our expected returns for applicable asset classes taking into account the target asset mix as outlined under the Plan's investment policy. Return assumptions for all asset classes are based on long-term expectations of at least 25 years.

The frequency of rebalancing the fund's weight in each asset class to its target in the investment policy, the weights themselves, and the time horizon, will all influence the long-term return. The long-term return is also influenced by the diversification of the fund. The expected effect of rebalancing and diversification on the fund's return was estimated based on a log-normal distribution.

A provision has been considered in the interest rate to consider the added value associated with active management for traditional asset classes. This provision is less than the estimated fees corresponding to active management for those asset classes.

The rate of return has been adjusted to consider expected investment management expenses on traditional asset classes. No investment management expenses have been considered for non-traditional asset classes as the expected real returns for those classes are assumed to be net of investment management fees.

Interest rate

The interest rate equals the long-term rate of return assumption, or 5.9% per year.

According to the Funding Policy Statement, the current target PfAD is 15%. We have estimated that a single interest rate at 4.9% per year is an approximate interest rate which results in the same liability as using the combination of a best estimate interest rate of 5.9% per year and an explicit PfAD of 15%.

The interest rate used in the previous valuation was 5.7% per year and the explicit PfAD was 15%.

Interest rate and inflation rate used for lump sums upon termination

As it is assumed that a portion of vested terminated members will elect a lump sum settlement in lieu of a deferred pension, an assumption regarding the rate that will be used to determine the value of the lump sum amount is necessary. The interest rate for determining commuted values is assumed to be 4.9%, which effectively represents the interest rate at 5.9% with a PfAD of 15%.

The previous valuation assumed the interest rate to be 4.7%.

Increases to average wages

As the rate of increase in average wages in the economy influences the rates of increase in the YMPE, member salaries, and other economic factors that affect the Plan, it is necessary for a going concern valuation to make an assumption regarding the future increases in average wages. Average wages are assumed to increase at 3.0% per year. This assumption is considered best estimate and is comprised of an annual increase of 2.0% on account of inflation, plus a best-estimate assumed increase of 1.0% on account of productivity.

Increases in pensionable earnings

As the benefits paid to a member from the Plan are dependent on the member's future pensionable earnings, it is necessary for a going concern valuation to make an assumption regarding the future increases in such earnings. A member's pensionable earnings are assumed to increase in line with the rate of general earnings increases, plus age-related merit and promotion increases as follows.

General Earnings Increases

To reflect current expectations of short-term increases, pensionable earnings have been assumed to increase 1.6% on April 1, 2022. For clarity, as the increase has been assumed to be applied on April 1, 2022, we have applied an earnings increase of 1.20% (i.e., ¾ of 1.6%) to the salary rates received from the administrator, that were applicable at the valuation date. For years after 2022, the best estimate general earnings increase rate for pensionable earnings in the long-term is equal to the rate of average wage increase of 3.0% per year and such increases are assumed to be applied on April 1st of each year.

The previous valuation assumed general earnings increases of 0.0% until March 31, 2021 and 3.0% per year thereafter.

Merit and Promotion Increases

The assumed age-related merit and promotion increases used for this valuation were updated as a result of the experience study conducted in 2020 and are as outlined in the following table of rates. These rates are considered best estimate. While merit and promotion increases generally occur on April 1 of each year, we have assumed such increases occur in the middle the year for simplicity.

The merit and promotion increases assumed for the previous valuation were based on the same experience study conducted.

2020 Experience Study – Merit and Promotion Increases

Age	Rate of Increase	Age	Rate of Increase
<23	7.75%	40	0.50%
23	7.25%	42	0.50%
24	6.00%	42	0.25%
25	5.75%	43	0.25%
26	4.75%	44	0.25%
27	4.25%	45	0.25%
28	3.75%	46	0.25%
29	3.25%	47	0.25%
30	3.00%	48	0.25%
31	2.50%	49	0.25%
32	2.25%	50	0.25%
33	1.75%	51	0.25%
34	1.75%	52	0.25%
35	1.50%	53	0.25%
36	1.25%	54	0.25%
37	1.25%	55	0.25%
38	1.00%	≥56	0.00%
39	0.75%		

Initial salary increases for CPS members

The effect of CPS transfers on the Plan remains material. For members who transfer from the Plan to either MEPP or UAPP, the members' salary rate is assumed to increase by 15% at the time of transfer. This assumption was developed based on an analysis of the historical earnings information for CPS transfers.

YMPE increases

As the benefits paid to a member from the Plan are dependent on the future YMPE, it is necessary to make an assumption regarding the future increases in the YMPE. The YMPE is assumed to increase, up until the time the member retires, dies or terminates from active employment, at the assumed increase in average wages or 3.0% per year.

Increases in maximum pension limit

Pensions are limited to the maximum limits under the *Income Tax Act (Canada)*. Consistent with the provisions of the *Act,* it is assumed that the maximum pension limit will increase at the assumed increase in average wages or 3.0% per year.

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Cost of living adjustments ("COLA")

As the Plan's benefits are increased after termination/retirement at 60% of inflation, it is necessary to make an assumption regarding the rate of COLA that will be applied in the future. It has been assumed that COLA will be applied at 60% of the assumed inflation rate of 2.0%, or 1.2% per year.

Interest on Member Contributions

As the Plan's benefits are dependent to some degree on the member contribution account balances (due to the "excess contributions" test), it is necessary to make an assumption regarding interest that will be credited to member contribution account balances in the future. It has been assumed that member contribution account balances will be credited with interest at the assumed inflation rate plus 1.0%, or at 3.0% per year. This assumption is based on the long-term expected spread of five-year term deposit rates over inflation and is considered best estimate.

Demographic assumptions

Members may cease active status as a result of death, retirement, termination of membership, or disability and may cease to be entitled to monthly pension payments as a result of death. As noted, all of these demographic assumptions were reviewed in an experience study conducted in 2020 and have been updated to reflect the results of the study.

Mortality

For this valuation, the gender-distinct mortality rates have been assumed to be in accordance with 100% of the Canadian Pensioner Mortality (CPM) 2014 – Private Sector mortality table with future improvements in mortality in accordance with Scale MI-2017. The previous valuation made the same assumption.

Retirement

A member's benefit entitlement under the Plan is dependent on when the member decides to commence, or is deemed to commence, to receive a pension from the Plan (referred to as "retirement" from the Plan). Accordingly, an assumption with respect to when a member is expected to retire from the Plan has been made.

The retirement rates used for active/CPS members in the valuation are shown in the following tables. These rates are based on the results of a study performed in 2020 on the Plan's retirement experience and are considered best estimate.

The previous valuation assumed retirement rates based on the results of the same experience study.

For both this and the previous valuation, deferred vested members are assumed to retire at age 55, which is the age that maximizes the pension value for such members.

Male Retirement Rates — Active / CPS Members — 2020 Experience Study

Age[1]	Prior to Unreduced Retirement Date	At and After Unreduced Retirement Date
<55	0.0%	0.0%
55	5.0%	20.0%
56	5.2%	12.0%
57	5.8%	13.0%
58	5.8%	13.0%
59	6.5%	14.5%
60	7.6%	15.0%
61	7.6%	16.5%
62	9.5%	16.5%
63	9.5%	16.5%
64	15.5%	27.5%
65	n/a	33.0%
66	n/a	30.0%
67	n/a	30.0%
68	n/a	30.0%
69	n/a	30.0%
≥70	n/a	100.0%

[1] – *Notwithstanding the rates in the table above, members are assumed to retire 100% one year after they have reached 35 years of service.*

Female Retirement Rates — Active / CPS Members — 2020 Experience Study

Age[1]	Prior to Unreduced Retirement Date	At and After Unreduced Retirement Date
<55	0.0%	0.0%
55	6.8%	18.0%
56	6.8%	13.0%
57	6.8%	13.0%
58	7.5%	13.0%
59	7.8%	13.5%
60	9.5%	15.0%
61	10.0%	15.0%
62	10.0%	15.0%
63	10.5%	15.0%
64	19.0%	25.0%
65	n/a	35.0%
66	n/a	30.0%
67	n/a	30.0%
68	n/a	30.0%
69	n/a	30.0%
≥70	n/a	100.0%

[1] – *Notwithstanding the rates in the table above, members are assumed to retire 100% one year after they have reached 35 years of service.*

Termination

The termination rates used in the valuation are shown in the following tables. These rates are based on the results of a study performed in 2020 on the Plan's termination experience and are considered best estimate.

The previous valuation assumed termination rates based on the results of the same experience study.

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Male Termination Rates — 2020 Experience Study

Age	Less than 1 year	At least 1 but not 2	At least 2 but not 3	At least 3 but not 4	At least 4 but not 5	At least 5 years
<21	27%	26%	18%	13%	15%	12%
21	26%	26%	18%	13%	15%	12%
22	18%	25%	18%	13%	15%	12%
23	13%	20%	16%	13%	15%	12%
24	15%	20%	16%	13%	15%	12%
25	12%	20%	16%	13%	10%	12%
26	27%	20%	16%	13%	9%	12%
27	26%	20%	16%	13%	9%	12%
28	18%	18%	16%	13%	9%	8%
29	13%	18%	14%	13%	9%	8%
30	15%	15%	14%	11%	9%	7%
31	12%	15%	14%	11%	9%	7%
32	27%	15%	14%	11%	9%	7%
33	25%	15%	14%	11%	9%	7%
34	18%	15%	14%	11%	9%	7%
35	13%	13%	10%	9%	9%	5%
36	15%	13%	10%	9%	9%	5%
37	12%	13%	10%	9%	9%	5%
38	25%	13%	10%	9%	9%	5%
39	20%	13%	10%	9%	9%	5%
40	16%	12%	8%	9%	7%	4%
41	13%	12%	8%	9%	7%	4%
42	15%	12%	8%	9%	7%	4%
43	12%	12%	8%	9%	7%	4%
44	23%	12%	8%	7%	7%	4%
45	20%	12%	7%	7%	7%	4%
46	16%	12%	7%	7%	6%	3%
47	13%	12%	7%	7%	6%	3%
48	15%	12%	7%	7%	6%	3%
49	12%	12%	7%	7%	6%	3%
50	21%	11%	7%	7%	5%	3%
51	20%	11%	7%	6%	5%	3%
52	16%	11%	7%	6%	5%	3%
53	13%	11%	7%	6%	5%	3%
54	10%	11%	7%	6%	5%	3%

Female Termination Rates — 2020 Experience Study

Age	Less than 1 year	At least 1 but not 2	At least 2 but not 3	At least 3 but not 4	At least 4 but not 5	At least 5 years
<21	25%	23%	17%	14%	11%	11%
21	25%	23%	17%	14%	11%	11%
22	25%	22%	17%	14%	11%	11%
23	25%	20%	16%	14%	11%	11%
24	25%	20%	15%	14%	11%	11%
25	22%	19%	15%	13%	11%	10%
26	22%	18%	15%	13%	11%	10%
27	22%	18%	15%	13%	11%	9%
28	21%	18%	15%	13%	11%	9%
29	20%	17%	15%	13%	11%	9%
30	20%	17%	14%	11%	11%	8%
31	20%	16%	14%	11%	11%	8%
32	20%	15%	14%	11%	11%	8%
33	20%	15%	12%	11%	11%	8%
34	20%	15%	12%	11%	11%	8%
35	18%	15%	12%	11%	9%	6%
36	18%	13%	12%	11%	9%	6%
37	18%	13%	12%	11%	9%	6%
38	18%	13%	12%	11%	9%	6%
39	18%	13%	12%	11%	9%	6%
40	18%	13%	10%	10%	8%	5%
41	18%	13%	10%	10%	8%	5%
42	18%	13%	10%	10%	8%	5%
43	18%	13%	10%	10%	8%	4%
44	18%	13%	10%	10%	8%	4%
45	18%	13%	10%	10%	8%	4%
46	18%	13%	10%	10%	8%	4%
47	18%	13%	10%	10%	8%	4%
48	18%	13%	10%	8%	8%	4%
49	18%	13%	10%	7%	8%	4%
50	18%	12%	9%	7%	8%	4%
51	18%	12%	8%	7%	8%	4%
52	18%	12%	8%	7%	8%	4%
53	18%	12%	8%	7%	8%	4%
54	18%	12%	8%	7%	8%	4%

Transfer to MEPP/UAPP under CPS provision

We have assumed that 370 active members will transfer to MEPP/UAPP under the CPS provision each year. This assumption was developed based on an analysis of CPS member data for transfers that occurred from 2008 to 2016. This assumption has not changed from the previous valuation.

Disability

We have made no allowance for the occurrence of disability before retirement. To the extent that members do become disabled before retirement, there may be an experience gain or loss.

Proportion of vested terminated members electing a lump sum payment versus a deferred annuity

When a member elects a lump sum, they will essentially be receiving a payment which is roughly the same as the liability the Plan would hold if the member drew a pension directly from the Plan. As a result, the existing assumption is not necessary for assessing the Plan's liabilities, but it will have an effect when estimating future cash flows. We will monitor this assumption over the next few years, as there is currently insufficient experience to properly analyze any new election pattern. The proportion of future terminations electing a lump sum settlement is assumed to be in accordance with the following rates and is based on an experience study performed in 2015. This table was used in the previous valuation.

Years of Service at Termination	Proportion Assumed to Elect a Lump Sum Settlement
Less than 5	80%
Between 5 and 15	50%
Between 15 and 20	60%
Between 20 and 25	70%
More than 25	75%

Proportion of members with spouses and spousal age difference

Under the Plan terms, the value of pre-retirement death benefits depends on the existence and age of a surviving spouse. It has again been assumed that 100% of members are married to a spouse of the opposite gender, with the male spouse being 3 years older than the female spouse.

Future Plan membership for funding the unfunded liability

The Plan's unfunded liabilities are amortized in accordance with established amortization schedules as a level percentage of contributory payroll. For purposes of determining the applicable contribution rates, it has again been assumed that future new entrants will keep the active Plan membership stable following the valuation date, and that the total pensionable earnings of these active members will increase at the assumed rate of general wage increases for Plan members.

If the Plan salary base were to grow more rapidly than assumed, any existing unfunded liabilities might be eliminated sooner than assumed. Conversely, if the Plan salary base were to grow less rapidly than assumed, contribution increases may be required in order to eliminate any existing unfunded liabilities within the required timeframe.

Expenses

Expenses relating to investment management fees and certain administration and consulting fees incurred in relation to the Plan are paid from the Plan's assets. Consequently, it is appropriate that an assumption regarding such expenses be made.

Investment expenses expected to be paid from the fund in the future are considered in the long-term rate of return assumption. Administration and custodial expenses charged to the fund have been in the range of 0.4% to 0.5% of pensionable earnings over the past few years. A best estimate allowance for non-investment expenses of 0.5% of pensionable earnings has been included in the normal actuarial contribution rate. This expense assumption is unchanged from the previous valuation.

E.2 Actuarial Assumptions — Solvency Valuation

The following table provides the assumptions used in the solvency valuation. Further, the termination scenario used in the solvency and hypothetical wind-up valuations includes the following assumptions:

- Plan wind-up would not result from all participating employers' insolvencies.
- All assets could be realized at their reported market values.

The *Act* requires that a plan's solvency valuation liabilities be determined on a "plan termination basis", specifically that:

- is adequate and appropriate,
- is in accordance with accepted actuarial practice, and
- would apply to the plan if the plan is assumed to terminate as at the review date.

The following summarizes the prescribed assumptions, methods and benefits that make up the solvency basis for the Plan at the valuation date. Judgement must be exercised in setting certain assumptions, especially as related to determining:

- the proportion of the Plan's benefits expected to be settled by way of annuity purchase and by way of lump sum transfer; and
- the hypothetical annuity purchase rates at the valuation date.

Consequently, if the Plan was terminated and settled on the valuation date, these solvency liabilities may be different than the Plan's actual termination liabilities. Such differences may be attributed to:

- differences between the actual and assumed proportion of benefits being settled by annuity purchase and lump sum transfer; and
- an actual annuity purchase rate that is different than the rates assumed to be representative of the annuity market on the valuation date.

Solvency Assumptions	December 31, 2020	December 31, 2021
Discount Rates		
Lump sum transfers	n/a	n/a
Annuity Purchases	0.6%	0.8%
Mortality	2014 Canadian Pensioner Mortality Combined Table with fully generational projection using Scale CPM-B	2014 Canadian Pensioner Mortality Combined Table with fully generational projection using Scale CPM-B
Retirement	• Members who are entitled to retire from the Plan and commence an immediate pension on the valuation date are assumed to do so; • All other members are assumed to retire at age 55	• Members who are entitled to retire from the Plan and commence an immediate pension on the valuation date are assumed to do so; • All other members are assumed to retire at age 55
Termination	All members assumed to terminate and subsequently retire from the Plan in accordance with the retirement age assumption summarized above.	All members assumed to terminate and subsequently retire from the Plan in accordance with the retirement age assumption summarized above.
Wind-up expenses	$35,000,000	$35,000,000

Settlement Upon Plan Wind-up

It is assumed that all active and terminated members over age 55 will choose an immediate annuity, reduced accordingly for early retirement. Given the change in the commuted value basis (resulting in lower lump sum benefits), we assumed that active and inactive members who are under age 55 will choose a deferred annuity commencing at age 55 (with appropriate early retirement reductions). Those members that are currently in receipt of an immediate pension are assumed to have an immediate annuity purchased on their behalf.

Discount Rates and Mortality

We have assumed that no members elect a lump sum transfer and, as such, have made no assumptions regarding the discount rate and mortality to be applied.

The assumptions used to value the benefits of members and beneficiaries settled by the purchase of annuities with an insurance company are in accordance with the Canadian Institute of Actuaries in their *Educational Note – Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates on or after December 31, 2021 and no later than December 30, 2022.* The duration associated with the liabilities assumed to be settled via an annuity purchase was 14.0years.

No Margin for Adverse Deviation

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

Expenses

Allowance has been made for administrative, actuarial, investment and legal costs which would be incurred if the Plan were to be wound up. It is assumed that all benefits would be fully settled one year after the valuation date. Expenses related to the resolution of any surplus and deficit issues have not been considered. The amount of expenses is only an approximation and may differ significantly from real expenses incurred on Plan wind-up.

Appendix F — Actuarial Valuation for Maximum Contribution Determination

In accordance with subsection 147.2(2) of the *Income Tax Act (Canada)*, we have conducted an actuarial valuation for determining the maximum eligible contribution for the Plan. The valuation is prepared using the plan provisions, membership data, assets, actuarial assumptions and methods disclosed in Appendices A through E of this report with one exception: including an allowance for a higher cost-of- living adjustment (COLA) rate. The COLA offered under the current Plan provisions is 60% of inflation, however, it is within the Sponsor Board's power to consider COLA at a higher rate. It is reasonable to assume for purposes of determining the maximum level of contributions that may be made to the Plan that the rate of COLA may be increased to 100% of inflation in the future, subject to sufficient funding.

For further clarification, we have applied a COLA at the rate of 100% of the assumed inflation rate (2.0% per year) to the going concern basis to determine a maximum eligible contribution. The following summarizes the results at the current valuation date.

Going Concern Funded Status – Maximum Contribution Determination	December 31, 2020 ($ million)	December 31, 2021 ($ million)
Going concern assets		
Market value	15,634	18,058
Asset fluctuation adjustment	134	(1,075)
Total assets	15,768	16,983
Total best estimate actuarial liabilities	14,505	14,392
Best estimate funded status	**1,263**	**2,591**
Best estimate funded ratio	**108.7%**	**118.0%**
Provision for adverse deviation (PfAD)	2,176	2,159
Total going concern liabilities (including PfAD)	16,681	16,551
Actuarial excess (unfunded liability)	**(913)**	**432**
Funded ratio	**94.5%**	**102.6%**

Maximum Eligible Contributions	December 31, 2020 % of Pensionable Salary	December 31, 2021 % of Pensionable Salary
Normal actuarial cost (with PfAD)	19.43%	18.27%
Unfunded liability special payments*	11.39%	0%
Required application of excess surplus	0.00%	0.00%
Non-investment expense allowance	0.50%	0.50%
Maximum eligible contributions	31.32%	18.77%

** The amortization schedule for unfunded liability payment is 3 years (by the latest next valuation date).*