Office of the Superintendent of Financial Institutions Canada
Office of the Chief Actuary

Bureau du surintendant des institutions financières Canada
Bureau de l'actuaire en chef

ACTUARIAL REPORT

on the Pension Plan for the

PUBLIC SERVICE OF CANADA

as at 31 March 2017

Canada

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7 September 2018

The Honourable Scott Brison, P.C., M.P.
President of the Treasury Board
Ottawa, Canada
K1A 0R5

Dear Minister:

Pursuant to Section 6 of the *Public Pensions Reporting Act*, I am pleased to submit the report on the actuarial review as at 31 March 2017 of the pension plan for the Public Service of Canada. This actuarial review is in respect of pension benefits and contributions which are defined by Parts I, III and IV of the *Public Service Superannuation Act*, the *Special Retirement Arrangements Act* and the *Pension Benefits Division Act*.

Yours sincerely,

Jean-Claude Ménard

Jean-Claude Ménard, F.S.A., F.C.I.A.
Chief Actuary
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I. Executive Summary

This actuarial report on the pension plan for the Public Service of Canada (PSPP) was made pursuant to the *Public Pensions Reporting Act* (PPRA).

This actuarial valuation is as at 31 March 2017 and is in respect of pension benefits and contributions defined by Parts I, III and IV of the *Public Service Superannuation Act* (PSSA), the *Special Retirement Arrangements Act* (SRAA), which covers the Retirement Compensation Arrangements Regulations No. 1 and No. 2 (RCA), and the *Pension Benefits Division Act* (PBDA).

The previous actuarial report was prepared as at 31 March 2014. The date of the next periodic review is scheduled to occur no later than 31 March 2020.

A. Purpose of Actuarial Report

The purpose of this actuarial valuation is to determine the state of the Public Service Superannuation Account (Superannuation Account), the Public Service Pension Fund (Pension Fund) and the RCA Accounts, as well as to assist the President of the Treasury Board in making informed decisions regarding the financing of the government's pension benefit obligations.

B. Valuation Basis

There have been no changes to the plan provisions since the previous valuation. This report is based on pension benefit provisions enacted by the legislation summarized in Appendices 1 and 2.

The financial data on which this valuation is based on are composed of invested assets that the government has earmarked for the payment of benefits for service since 1 April 2000 (Pension Fund). The Superannuation Account was established to track the government's pension benefit obligations for service prior to 1 April 2000. The RCA Accounts were established to track the benefit obligations in excess of those that can be provided under the *Income Tax Act* limits for registered pension plans. These pension assets and account balances are summarized in Appendix 3.

The membership data are provided by the Department of Public Services and Procurement Canada (PSPC). Membership data and tests performed on them are summarized in Appendix 4. Tests on membership data were performed to evaluate the consistency and reliability of the information provided for the purpose of this valuation. Furthermore, additional tests were performed to evaluate the potential impact of the Phoenix-related issues on the valuation data. The data validation showed that these issues had no impact on the sufficiency and reliability of the data for valuation purposes.

The valuation was prepared using accepted actuarial practices, methods and assumptions, which are summarized in Appendices 5 to 9.

All actuarial assumptions used in this report are best-estimate assumptions. They are, individually and in aggregate, reasonable for the purposes of the valuation as at the date of this report.

Actuarial assumptions used in the previous report were revised based on economic trends and demographic experience. A complete description of the assumptions is

detailed in Appendices 6 to 9. Table 1 presents a summary of the ultimate economic assumptions used in this report and those used in the previous report.

Table 1 Ultimate Best-Estimate Economic Assumptions

	31 March 2017	31 March 2014
Assumed level of inflation	2.0%	2.0%
Real increase in average pensionable earnings	0.8%	0.9%
Real rate of return on the Pension Fund	4.0%	4.1%
Real projected yield on the Superannuation Account	2.7%	2.8%
Real projected yield on the RCA No.1 and No.2 Accounts	2.7%	1.4%

C. Main Findings

The proposed amounts to be credited to (or debited from) the Accounts and the Pension Fund are shown on a calendar year basis in this section, beginning with calendar year 2019, which is the first calendar year that follows the expected tabling of this report. Valuation results on a plan year[1] basis are shown in Section II.

1) Superannuation Account (Service prior to 1 April 2000)

As at 31 March 2017, the balance of the Superannuation Account is $94,270 million and the actuarial liability for service prior to 1 April 2000[2] is $97,137 million. The resulting shortfall is $2,867 million.

In accordance with the PSSA, the actuarial shortfall could be amortized over a maximum period of 15 years beginning on 31 March 2019. If the shortfall is amortized over the maximum period, 15 equal annual credits of $260 million could be made to the Superannuation Account. The time, manner and amount of such credits are to be determined by the President of the Treasury Board.

It is expected that the government will eliminate the actuarial shortfall of the Superannuation Account by making a one-time credit of $3,107 million as at 31 March 2019 to take into account the interest on the shortfall accumulated from 31 March 2017.

2) Pension Fund (Service since 1 April 2000)

a) Member Contribution Rates

Table 2 shows the member contribution rates for the three calendar years following the expected tabling of this report.

1 Any reference to a given plan year in this report should be taken as the 12-month period ending 31 March of the given year.
2 The actuarial liability for service prior to 1 April 2000 refers to the actuarial liability for service accrued prior to that date except for service elections made on or after 1 April 2000. Service elections made on or after 1 April 2000 are deemed to be service accrued since the date.

Table 2 Member Contribution Rates

	Group 1		Group 2	
Calendar year	Below YMPE	Above YMPE	Below YMPE	Above YMPE
2019	9.56%	11.78%	8.68%	10.18%
2020	9.53%	11.72%	8.69%	10.15%
2021	9.49%	11.67%	8.68%	10.18%

b) Current Service Cost [1]

The estimated PSSA total current service cost, borne jointly by the contributors and the government, is $4,777 million for calendar year 2019. The estimated member[2] contributions are $2,380 million and the estimated government contributions are $2,397 million for calendar year 2019. The Pension Fund's administrative expenses of $52 million were included in the total current service cost for calendar year 2019.

Table 3 shows the projected current service cost, the projected current service cost expressed as a percentage of the expected pensionable payroll[3] and the ratio of government current service cost to contributor current service cost for the three calendar years following the expected tabling of this report. Tables 4 and 5 show the same results for Group 1[4] and Group 2[5], respectively.

Projected current service costs shown in these tables are based on the member contribution rates in Table 2 above.

Table 3 PSSA Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributor Current Service Cost
	Contributors	Government	Total	Contributors	Government	Total	
2019	2,380	2,397	4,777	9.95	10.02	19.97	1.01
2020	2,469	2,490	4,959	9.88	9.96	19.84	1.01
2021	2,554	2,577	5,131	9.81	9.90	19.71	1.01

Table 4 PSSA Current Service Cost on a Calendar Year Basis – Group 1

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributor Current Service Cost
	Contributors	Government	Total	Contributors	Government	Total	
2019	1,762	1,779	3,541	10.36	10.46	20.82	1.01
2020	1,725	1,746	3,471	10.32	10.45	20.77	1.01
2021	1,690	1,713	3,403	10.30	10.44	20.74	1.01

1 Also called normal cost.
2 Any reference to member in this report should be read as *contributor* as defined in the PSSA.
3 *Pensionable payroll* means the aggregate of pensionable earnings of all contributors with less than 35 years of service.
4 Members who entered the PSPP prior to 1 January 2013.
5 Members who entered the PSPP on or after 1 January 2013.

Table 5 PSSA Current Service Cost on a Calendar Year Basis – Group 2

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributor Current Service Cost
	Contributors	Government	Total	Contributors	Government	Total	
2019	618	618	1,236	8.95	8.95	17.90	1.00
2020	744	744	1,488	8.97	8.97	17.94	1.00
2021	864	864	1,728	8.98	8.98	17.96	1.00

c) Financial Position

As at 31 March 2017, the actuarial value of the assets in respect of the Pension Fund is $92,956 million and the actuarial liability is $87,313 million, resulting in an actuarial surplus of $5,643 million. Therefore, no special payment is required.

d) Non-permitted Actuarial Surplus[1]

In the opinion of the President of the Treasury Board, if there exists a non-permitted actuarial surplus in the Pension Fund, no further government contributions for current service cost are permitted until there is no longer such a surplus. As well, member contributions to the Pension Fund may also be reduced in a manner and for a period of time as recommended by the President of the Treasury Board, and approved by the Treasury Board. A third possible response, with Treasury Board approval based on a recommendation from the President of the Treasury Board, is taking an amount identified at the time out of the Pension Fund into the Consolidated Revenue Fund[2]. The results of this valuation do not indicate the existence of a non-permitted actuarial surplus as at 31 March 2017.

However, the plan has an actuarial smoothing adjustment of $6,672 million as at 31 March 2017. As the unrecognized investment gains and losses are gradually recognized, and if the expected investment earnings are realized, the plan is projected to reach a non-permitted surplus status as at 31 March 2018.

3) RCA No. 1 Account

As at 31 March 2017, the balance of the RCA No. 1 Account is $2,379 million and the actuarial liability is $1,618 million, resulting in an excess of $761 million.

The estimated total current service costs with respect to the RCA No. 1 Account, borne jointly by the contributors and the government, are $54 million, $57 million and $59 million for calendar years 2019, 2020 and 2021, respectively. Table 6 shows the projected current service cost as a percentage of the expected pensionable payroll

[1] A non-permitted actuarial surplus exists when the amount by which the actuarial value of assets exceeds liabilities for service since 1 April 2000 is greater than the lesser of (a) and (b), where:
(a) is 20% of the amount of liabilities for service since 1 April 2000, and
(b) is the greater of (i) and (ii) where:
(i) is twice the estimated amount, for the calendar year following the date of that report, of the total of
(A) the current service cost contributions that would be required of contributors, and
(B) the current service cost contributions that would be required of the government, and
(ii) is 10% of the amount of liabilities for service since 1 April 2000.

[2] The Consolidated Revenue Fund of Canada is the account into which taxes and revenue are deposited, and from which funds are drawn in order to defray the costs of public services. Funds are deposited and withdrawn by the Receiver General for Canada.

and the ratio of government current service cost to contributor current service cost for the three calendar years following the expected tabling of this report.

Table 6 RCA No. 1 Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributor Current Service Cost
	Contributors	Government	Total	Contributors	Government	Total	
2019	11.3	42.8	54.1	0.05	0.18	0.23	3.79
2020	11.8	44.8	56.6	0.05	0.18	0.23	3.80
2021	12.3	46.6	58.9	0.05	0.18	0.23	3.79

4) RCA No. 2 Account

As at 31 March 2017, the balance of the RCA No. 2 Account is $1,449 million and the actuarial liability is $1,208 million, resulting in an excess of $241 million.

II. Valuation Results

This report is based on the pension benefit provisions enacted by the legislation, summarized in Appendices 1 and 2, and the financial and membership data, summarized in Appendices 3 and 4, respectively. The valuation was prepared using accepted actuarial practices, methods and assumptions summarized in Appendices 5 to 9. Emerging experience that differs from the corresponding assumptions will result in gains or (losses), which would be revealed in subsequent reports.

A. PSSA – Financial Position

Beginning on 1 April 2000, member and government contributions to the PSPP are no longer credited to the Superannuation Account. Rather, they are credited to the Pension Fund, and the total amount of contributions net of benefits paid and administrative expenses is transferred to the Public Sector Pension Investment Board (PSPIB) and invested in the financial markets. The valuation results in this section show the financial positions for both PSSA financing arrangements as at 31 March 2017. The results of the previous valuation are also shown for comparison.

Table 7 State of the Superannuation Account (Service prior to 1 April 2000) ($ millions)

	31 March 2017	31 March 2014
Recorded Account balance	94,209	96,424
Present value of prior service contributions	61	106
Total	**94,270**	**96,530**
Actuarial Liability		
Active contributors	17,142	23,369
Non-active contributors	80	99
Retirement pensioners	69,978	64,135
Disability pensioners	2,617	2,659
Surviving dependents	6,526	6,273
Outstanding payments	12	30
Administrative expenses	782	646
Total Actuarial Liability	97,137	97,211
Actuarial Excess/(Shortfall)	**(2,867)**	**(681)**

In accordance with the PSSA, the actuarial shortfall of $2,867 million could be amortized over a maximum period of 15 years beginning on 31 March 2019. If the shortfall is amortized over the maximum period, 15 equal annual credits of $260 million could be made to the Superannuation Account. The time, manner and amount of such credits are to be determined by the President of the Treasury Board. It is expected that the government will eliminate the actuarial shortfall of the Superannuation Account by making a one-time credit of $3,107 million as at 31 March 2019 to take into account the interest on the shortfall accumulated from 31 March 2017.

Table 8 Balance Sheet – Pension Fund (Service Since 1 April 2000) ($ millions)		
	31 March 2017	31 March 2014
Assets		
Market value of assets	98,770	68,668
Actuarial smoothing adjustment[1]	(6,672)	(6,243)
Present value of prior service contributions	858	726
Total actuarial value of assets	**92,956**	**63,151**
Actuarial Liability		
Active contributors	57,387	47,494
Non-active contributors	114	58
Retirement pensioners	27,617	17,703
Disability pensioners	1,435	936
Surviving dependents	624	381
Outstanding payments	136	203
Total Actuarial Liability	**87,313**	**66,775**
Actuarial Surplus/(Deficit)	**5,643**	**(3,624)**

Taking into account the actuarial smoothing adjustment, the Pension Fund has a surplus of $5,643 million. As such, no special payment is required.

The actuarial smoothing adjustment of $6,672 million will disappear over the next five years as the unrecognized investment gains and losses are gradually recognized. As the unrecognized investment gains and losses are gradually recognized, and if the expected investment earnings are realized, the plan is projected to reach a non-permitted surplus status as at 31 March 2018.

[1] Includes the unrecognized investment gains and losses as well as the impact of the application of corridor, if applicable.

B. PSSA – Reconciliation of the Changes in Financial Position

Table 9 shows the reconciliation of the changes in the financial positions of the Superannuation Account and the Pension Fund. Explanations of the items largely responsible for the changes follow the table.

Table 9 Reconciliation of PSSA Financial Position ($ millions)

	Superannuation Account Actuarial Excess/(Shortfall)	Pension Fund Actuarial Surplus/(Deficit)
As at 31 March 2014	**(681)**	**(3,624)**
Recognized investment gains as at 31 March 2014	-	6,243
Retroactive changes to the population data	(516)	(534)
Revised Initial Financial Position as at 31 March 2014	**(1,197)**	**2,085**
Expected interest on initial financial position	(181)	354
Special credits / payments	712	1,177
Net experience gains and (losses)	1,370	11,014
Revision of actuarial assumptions	(2,938)	(2,202)
Change in the present value of administrative expenses	(229)	-
Change in the present value of prior service contributions	4	287
Deferred Population Recognized at 31 March 2017	(408)	(400)
Unrecognized investment gains as at 31 March 2017	-	(6,672)
As at 31 March 2017	**(2,867)**	**5,643**

1) Recognized Investment Gains as at 31 March 2014

An actuarial asset valuation method that minimizes the impact of short-term fluctuations in the market value of assets was used in the previous valuation report, causing the actuarial value of the Pension Fund assets to be $6,243 million less than its market value.

2) Retroactive Changes to the Population Data

The population data maintained by PSPC is constantly subject to retroactive changes such as new collective agreements. The impacts of these changes increase the Superannuation Account shortfall by $516 million and increase the initial Pension Fund deficit by $534 million.

3) Expected Interest on Revised Initial Financial Position

The amount of interest expected to accrue during the intervaluation period increase the revised shortfall by $181 million for the Superannuation Account and increase the revised surplus by $354 million for the Pension Fund. These amounts of interest were based on the Superannuation Account yields and the Pension Fund returns projected in the previous report for the three-year intervaluation period.

4) Special Credits and Payments Made in the Intervaluation Period

A shortfall of $681 million was reported in the Superannuation Account as at 31 March 2014, and the government took the decision to make a one-time special

credit of $681 million, that resulted in an increase of $712 million in assets after factoring the expected interest.

Deficits were reported in the Pension Fund as at 31 March 2011 and 31 March 2014 which were to be amortized over a period of 15 years in accordance with the legislation. A total of $1,115 million of special payments was made to the Pension Fund during the intervaluation period that resulted in an increase of $1,177 million in assets after factoring the expected interest.

5) Experience Gains and (Losses)

Since the previous valuation, experience gains and (losses) have decreased the revised Superannuation Account shortfall by $1,370 million and have increased the revised Pension Fund surplus by $11,014 million. The main items are shown in Table 10.

Table 10 Experience Gains and (Losses) ($ millions)

	Superannuation Account	Pension Fund
Demographic experience (i)		
New members	(33)	(242)
Rehired pensioner members	1	(5)
Terminations with a deferred annuity	14	38
Terminations with a cash-out	31	(25)
Retirements	(99)	(307)
Disabilities with an annuity	(4)	(48)
Active deaths with survivor(s)	(63)	(109)
Active deaths without survivors	(24)	(37)
Retired pensioner mortality	(269)	(59)
Disabled pensioner mortality	(1)	(3)
Widow(er) mortality	(41)	0
Total	**(488)**	**(797)**
Investment earnings (ii)	(82)	9,230
Service/contributions difference (iii)	24	(162)
Expected/actual disbursements (iv)	15	20
Pension indexation (v)	962	331
Promotional and seniority increases (vi)	535	1,337
Economic salary increases (vii)	347	1,038
YMPE increases	(19)	(75)
Outstanding payments	18	67
Pension benefit division	(15)	(38)
Administrative expenses	(9)	15
Miscellaneous	82	48
Experience Gains and (Losses)	**1,370**	**11,014**

(i) The net impact of the demographic experience increased the revised Superannuation Account shortfall by $488 million and decreased the revised Pension Fund surplus by $797 million. These increases in liability were largely

due to the more than expected retirements with immediate annuity and the accumulation of losses in most of the demographic assumptions during the intervaluation period.

(ii) The rates of interest credited to the Superannuation Account were in aggregate smaller than the corresponding projected Account yields in the previous valuation; consequently the experience loss was $82 million. The return realized on the Pension Fund by PSPIB exceeded the expected return for plan years 2015 and 2017, 14.2% and 12.8% versus 6.1% and 5.0% respectively, but was less for plan year 2016, 0.7% versus 5.0%. Consequently, the Pension Fund experienced an investment gain of $9,230 million over the three-year intervaluation period.

(iii) Unexpected revised credited service resulted in a decrease of $24 million in the revised Superannuation Account shortfall. Higher than expected contributions, mostly from the higher than anticipated number of new entrants were more than offset by unexpected revised credited service, resulting in a decrease of $162 million in the revised Pension Fund surplus.

(iv) Smaller than anticipated pension payments resulted in a decrease of $15 million in the revised Superannuation Account shortfall and an increase of $20 million in the revised Pension Fund surplus.

(v) The January 2016 and 2017 pension benefit indexation rates were lower than the projected pension indexation by 0.7%, resulting in a $962 million decrease in the revised Superannuation Account shortfall. The impact on the revised Pension Fund surplus was an increase of $331 million.

(vi) Lower than expected promotional salary increases resulted in a decrease of $535 million in the revised Superannuation Account shortfall and an increase of $1,337 million in the revised Pension Fund surplus.

(vii) Smaller than anticipated economic salary increases resulted in a decrease of $347 million in the revised Superannuation Account shortfall and an increase of $1,038 million in the revised Pension Fund surplus.

6) Revision of Actuarial Assumptions

Actuarial assumptions were revised based on economic trends and demographic experience as described in Appendices 6 to 9. These revisions have increased the revised Superannuation Account shortfall by $2,938 million and decreased the revised Pension Fund surplus by $2,202 million. The impact of these revisions is shown in Table 11 with the most significant items discussed thereafter.

Table 11 Revision of Actuarial Assumptions ($ millions)

Assumptions	Superannuation Account	Pension Fund
Economic assumptions		
Yields and Rates of return	(3,954)	(3,792)
Increase in average pensionable earnings	218	1,354
Pension indexation	423	168
Total	**(3,313)**	**(2,270)**
Retirement pensioner mortality rates	184	(23)
Widow(er) mortality rates	51	23
Retirement rates	(107)	(127)
Age of spouse difference at death of member	114	37
Promotional and Seniority increases	(10)	44
Disabled pensioner mortality rates	35	29
Proportion married at death of member	148	91
Remaining duration of coverage for children at death of member	0	(1)
Active mortality rates	(16)	(60)
Withdrawal rates	3	85
Proportion married at termination/divorce rate for TV benefit	1	52
Methodology Improvements	(29)	(163)
Other items	1	81
Net impact of revision	**(2,938)**	**(2,202)**

The net impact of the revision of the assumptions is largely attributable to the changes in economic assumptions.

The following revisions were made to the economic assumptions used in the previous report:

- ultimate real rate of return on the Pension Fund decreased from 4.1% to 4.0%;
- the ultimate real projected yield on the Superannuation Account was changed from 2.8% to 2.7%;
- real new money rates and real rates of return are lower over the first 10 years of the projection than assumed in the previous valuation; and
- ultimate real increase in average pensionable earnings decreased from 0.9% to 0.8%.

Details of the changes in economic assumptions are described in Appendix 6.

7) Change in the Present Value of Administrative Expenses

The previous report annual administrative expense assumption of 0.50% of total pensionable payroll decreased to 0.45% in this report. This decrease is based on an analysis of the trend in administrative expenses charged to both the Superannuation Account and the Pension Fund over the last five years.

For plan year 2018, 56% of total administrative expenses are being charged to the Superannuation Account; it is assumed that the proportion charged to the Superannuation Account will reduce at the rate of 2.0% per year, a decline from 2.8% from the previous report. These changes in the annual administrative expenses resulted in an increase of $229 million of the revised Superannuation Account shortfall as at 31 March 2017.

8) Change in the Present Value of Prior Service Contributions

The expected total government cost is shown in Table 22 on page 23. The government is expected to make additional contributions in excess of the current service cost for members' expected prior service elections. The change in the present value of prior service contributions corresponds to members' elections since the last report where the members opted to pay for these elections by instalments. Members' prior service elections paid through instalments have the effect of decreasing the revised Superannuation Account shortfall by $4 million and increasing the revised Pension Fund surplus by $287 million.

9) Deferred Population Recognition as at 31 March 2017

The deferred population recognition, which is done as part of continual data updates, resulted in an increase of $408 million in the revised Superannuation Account shortfall and a decrease of $400 million in the revised Pension Fund surplus.

10) Unrecognized Investment Gains

The actuarial asset valuation method described in the previous report, which is to minimize the impact of short-term fluctuations in the market value of assets, was also used for this valuation. For this valuation, the method resulted in an actuarial value of assets that is $6,672 million less than the market value of the Pension Fund assets as at 31 March 2017.

C. PSSA – Cost Certificate

1) Current Service Cost

The details of the current service cost for plan year 2019 and reconciliation with the 2016 current service cost are shown below.

Table 12 Current Service Cost for Plan Year 2019 ($ millions)	
Member required contributions	2,296
Government current service cost	2,302
Total current service cost	**4,598**
Expected pensionable payroll	22,806
Total current service cost as % of expected pensionable payroll	**20.16%**

Table 13 Reconciliation of PSSA Current Service Cost (% of pensionable payroll)	
For plan year 2016	**20.48**
Expected current service cost change	(0.53)
Change in demographics	(0.24)
Changes in assumptions	
Economic assumptions	0.62
Seniority and promotional salary increases	(0.01)
Proportion married at termination/divorce rate for tv benefit	(0.04)
Proportion married at death	(0.02)
Contributors mortality rates	0.02
Future Population Increase	(0.03)
Withdrawals	(0.08)
Other items	(0.01)
For plan year 2019	**20.16**

2) Projection of Current Service Costs

The current service cost is borne jointly by the plan members and the government. The member contribution rates have changed since the last valuation. They are determined on a calendar year basis and are shown in Table 2. Group 1 and Group 2 member contribution rates are determined such that the government share of the current service cost contribution is 50%. Current service costs on a plan year basis, expressed in dollar amount as well as in percentage of the projected pensionable payroll, are shown in Table 14.

Table 14 Projection of Current Service Cost on a Plan Year Basis

Plan Year	$ millions			Percentage of Pensionable Payroll			Portion Borne by the Government
	Contributors	Government	Total	Contributors	Government	Total	
2019	2,296	2,302	4,598	10.07	10.09	20.16	50.1%[1]
2020	2,398	2,417	4,815	9.94	10.02	19.96	50.2%
2021	2,490	2,512	5,002	9.87	9.96	19.83	50.2%
2022	2,575	2,599	5,174	9.80	9.89	19.69	50.2%

3) Administrative Expenses

Based upon the assumptions described in Section B of Appendix 7, the Pension Fund administrative expenses are included in the total current service costs. As in the previous report, the expected administrative expenses exclude the PSPIB operating expenses, as these are recognized implicitly through a decrease in the real rate of return. The total administrative expenses are estimated to be as follows:

[1] Actual operational members of CSC contribute the same rates as Group 1 members and deemed operational members of CSC contribute 0.62% of total earnings in addition to Group 1 member's rates, resulting in overall portion borne by the Government being slightly more than 50%.

Table 15 Pension Fund Administrative Expenses

Plan Year	($ millions)
2019	49
2020	53
2021	58
2022	63

The Superannuation Account administrative expenses have been capitalized and are shown as a liability in the balance sheet.

4) Contributions for Prior Service Elections

Based on the valuation data and the assumptions described in Section B of Appendix 7, member and government contributions for prior service elections were estimated as follows.

Table 16 Estimated Contributions for Prior Service BuyBack ($ millions)

	Superannuation Account		Pension Fund	
Plan Year	Contributors	Government	Contributors	Government
2019	7	7	104	103
2020	4	4	104	105
2021	3	3	103	105
2022	2	2	100	103

D. Sensitivity of Valuation Results to Variations in Longevity Improvement Factors

This valuation assumes that the current mortality rates applicable to members of the PSPP will improve over time. This assumption is based on the longevity improvement assumption[1] contained in the 26th Actuarial Report on the Canada Pension Plan. Table 17 measures the effect on the plan year 2019 current service cost and the liabilities for service prior to 1 April 2000 and for service since that date, under various longevity improvement assumptions. The current longevity improvement assumption is described in Table 63 of Appendix 7.

Table 17 Sensitivity of Valuation Results to Variations in Longevity Improvement Factors

	Current Service Cost as a percentage of pensionable payroll		Actuarial Liability ($ millions)				Age 65 Life Expectancy in 2017 (Age nearest in years)	
			Service prior to April 2000		Service since April 2000			
Longevity improvement factors	2019	Effect		Effect		Effect	Male	Female
Current basis	20.16	None	97,137	None	87,313	None	21.9	23.7
- if 0%	19.36	(0.80)	94,027	(3,110)	84,636	(2,677)	20.9	22.7
- if ultimate 50% higher	20.50	0.34	98,342	1,205	88,422	1,109	22.3	24.1
- if ultimate 50% lower	19.97	(0.19)	96,895	(242)	86,856	(457)	21.9	23.6
- if kept at 2018 level	20.85	0.69	99,315	2,178	89,482	2,169	22.7	24.2

[1] In this report, 'longevity improvement assumption' is equivalent to 'mortality improvement assumption' discussed in the 26th Actuarial Report on the Canada Pension Plan.

E. Sensitivity of Valuation Results to Variations in Key Economic Assumptions

The information required by statute, which is presented in the main report, has been derived using best-estimate assumptions regarding future demographic and economic trends. The key best-estimate assumptions, i.e. those for which changes within a reasonable range have the most significant impact on the long-term financial results, are described in Appendices 6 and 7. Both the length of the projection period and the number of assumptions required ensure that actual future experience will almost certainly not develop precisely in accordance with the best-estimate assumptions. Individual sensitivity tests have been performed, projecting the pension plan's financial status using alternative assumptions.

Table 18 shows the effect on the plan year 2019 current service cost and the liabilities for service prior to 1 April 2000 and for service since that date when key economic assumptions are varied by one percentage point per annum.

Table 18 Sensitivity of Valuation Results to Variations in Key Economic Assumptions

	Current Service Cost (%)		Actuarial Liability ($ millions)			
			Service prior to April 2000		Service since April 2000	
Assumption(s) Varied	2019	Effect		Effect		Effect
None (i.e. current basis)	20.16	None	97,137	None	87,313	None
Investment yield						
- if 1% higher	16.05	(4.11)	86,598	(10,539)	73,483	(13,830)
- if 1% lower	25.81	5.65	109,998	12,861	105,375	18,062
Inflation						
- if 1% higher	22.90	2.74	108,837	11,700	98,598	11,285
- if 1% lower	17.93	(2.23)	87,273	(9,864)	77,964	(9,349)
Salary, YMPE and MPE						
- if 1% higher	22.28	2.12	97,646	509	92,111	4,798
- if 1% lower	18.36	(1.80)	96,660	(477)	83,103	(4,210)
All economic assumptions						
- if 1% higher	19.79	(0.37)	96,753	(384)	86,348	(965)
- if 1% lower	20.54	0.38	97,535	398	88,314	1,001

The differences between the results above and those shown in the valuation can also serve as a basis for approximating the effect of other numerical variations in one of a key assumptions to the extent that such effects are linear.

F. RCA – Financial Position

This section shows the financial position of the RCA accounts as at 31 March 2017. The results of the previous valuation are also shown for comparison.

Table 19 State of the RCA No. 1 Account ($ millions)

	31 March 2017	31 March 2014
RCA No.1 recorded account balance	1,193	1,040
Refundable tax	1,184	1,019
Present value of prior service contributions	2	2
Total	**2,379**	**2,061**
Actuarial Liability		
Pensionable excess earnings		
• Active contributors	592	1,104
• Pensioners	666	589
Survivor Allowance		
• Active contributors	97	153
• Pensioners	228	193
Former deputy heads	35	34
Total Actuarial Liability	**1,618**	**2,073**
Actuarial Excess/(Shortfall)	**761**	**(12)**

The sum of the recorded balance of the RCA No. 1 Account, the refundable tax and the present value of prior service cost contributions as at 31 March 2017 is $2,379 million, which exceeds the actuarial liability of $1,618 million by $761 million.

Table 20 State of the RCA No. 2 Account ($ millions)

	31 March 2017	31 March 2014
RCA No.2 Recorded Account Balance	718	730
Refundable tax	731	734
Total	**1,449**	**1,464**
Actuarial Liability	**1,208**	**1,593**
Actuarial Excess/(Shortfall)	**241**	**(129)**

Since the last valuation as at 31 March 2014, the RCA No. 2 Account evolved from an actuarial shortfall of $129 million to an actuarial excess of $241 million as at 31 March 2017.

G. RCA No. 1 Current Service Cost

The projected current service cost, which is borne jointly by the members and the government, decreased by 0.24% to 0.23% of pensionable payroll in this valuation for plan year 2019 from 0.47% of pensionable payroll calculated in the previous actuarial report.

The RCA No. 1 current service cost is estimated to be 0.23% of pensionable payroll for plan year 2019 to 2022.

Table 21 shows the estimated RCA No. 1 current service cost for the next four plan years.

Table 21 RCA No. 1 – Current Service Cost ($ millions)

	Plan Year			
	2019	2020	2021	2022
Total current service cost				
Pensionable excess earnings	41.8	44.2	46.3	48.2
Survivor allowance	9.8	10.5	11.1	11.5
Former deputy heads	0.3	0.2	0.2	0.2
Total	**51.9**	**54.9**	**57.6**	**59.9**
Member contributions				
Pensionable excess earnings	11.3	11.5	12.0	12.6
Former deputy heads	0.1	0.1	0.1	0.1
Total	**11.4**	**11.6**	**12.1**	**12.7**
Government current service cost	**40.5**	**43.3**	**45.5**	**47.2**
Total current service cost as % of pensionable payroll	**0.23%**	**0.23%**	**0.23%**	**0.23%**

H. Summary of Estimated Government Costs

Table 22 summarizes the estimated total government costs on a plan year basis.

Table 22 Estimated Government Cost ($ millions)

Plan Year	Current Service Cost		Expected Special Credits	Total Prior Service Contributions	Total Government Cost
	Pension Fund	RCA No. 1	Superannuation Account		
2019	2,302	41	3,107	110	5,560
2020	2,417	43	0	109	2,569
2021	2,512	46	0	108	2,666
2022	2,599	47	0	105	2,751

III. Actuarial Opinion

In our opinion, considering that this report was prepared pursuant to the *Public Pensions Reporting Act*,

- the valuation input data on which the valuation is based are sufficient and reliable for the purposes of the valuation;
- the assumptions that have been used are, individually and in aggregate, appropriate for the purposes of the valuation;
- the methods employed are appropriate for the purposes of the valuation; and
- this report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

In particular, this report was prepared in accordance with the Standards of Practice (General Standards and Practice-Specific Standards for Pension Plans) published by the Canadian Institute of Actuaries.

To the best of our knowledge, after discussion with Public Services and Procurement Canada and the Treasury Board of Canada Secretariat, there were no subsequent events between the valuation date and the date of this report that would have a material impact on the results of this valuation.

The payment of accrued pension benefits being the responsibility of the government, the likelihood of the plan being wound-up and its obligation not being fulfilled is practically nonexistent. Further, the legislation does not define the benefits payable upon wind-up. Therefore, a hypothetical wind-up valuation has not been performed.

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Chief Actuary

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Senior Actuary

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Actuary

Ottawa, Canada

7 September 2018

Appendix 1 – Summary of Pension Benefit Provisions

The government has been providing its employees with a pension plan since 1870. Pensions for members of the Public Service are provided primarily under the *Public Service Superannuation Act* (PSSA) as enacted in 1954 and modified thereafter. Benefits are also provided to public servants under the *Special Retirement Arrangements Act*. Benefits may be modified in accordance with the *Pension Benefits Division Act* if there is a breakdown of a spousal union.

Changes Since the Last Valuation

The previous valuation report was based on the pension benefit provisions as they stood as at 31 March 2014. There were no changes to the plan provisions since the last valuation.

Summary of Pension Benefit Provisions

Summarized in this Appendix are the pension benefits provided under the PSSA registered provisions, which are in compliance with the *Income Tax Act*. The portion of the benefits in excess of the *Income Tax Act* limits for registered pension plans is provided under the retirement compensation arrangements described in Appendix 2.

In case of any discrepancy between this summary and the legislation, the legislation shall prevail.

A. Membership

Subject to the exceptions mentioned in the next paragraph, membership in the plan is compulsory for all full-time and part-time employees working 12 or more hours per week (except those who were grandfathered as at 4 July 1994) in the Public Service. This includes all positions in any department or portion of:

- the Executive Government of Canada;
- the Senate and the House of Commons;
- the Library of Parliament; and
- any board, commission or corporation listed in a Schedule to the Act, as well as those designated as contributors by the President of the Treasury Board either individually or as members of a class for persons engaged as seasonal employees and some others.

The main groups of persons employed in the Public Service to which the Act does not apply are:

- part-time employees working less than 12 hours per week;
- persons locally engaged outside Canada;
- employees of some Crown corporations, boards or commissions covered by their own pension plans; and
- seasonal employees, and some others, unless designated as contributors by the President of the Treasury Board.

Since the previous valuation, no entities have left the plan.

B. Contributions

1. Members

Different contribution rates apply to Group 1 and Group 2 contributors. The expected rates are consistent with the government objective of maintaining a 50:50 employer to employee current service cost sharing ratio.

During the first 35 years of pensionable service, members contribute according to the rates shown in Table 23.

Table 23 Member Contribution Rates

	Group 1		Group 2	
Calendar year	Below YMPE	Above YMPE	Below YMPE	Above YMPE
2017[1]	9.47%	11.68%	8.39%	9.94%
2018[2]	9.83%	12.13%	8.77%	10.46%
2019	9.56%	11.78%	8.68%	10.18%
2020	9.53%	11.72%	8.69%	10.15%
2021	9.49%	11.67%	8.68%	10.18%

The contribution rates shown after calendar year 2019 are estimates and subject to change.

After 35 years of pensionable service, members contribute only 1% of pensionable earnings.

In order to keep their rights to an early retirement benefit, deemed operational members of Correctional Service Canada (CSC) contribute 0.62% of total earnings during a calendar year in addition to the above contribution rates.

2. Government

a) Current Service

The government determines the normal monthly contribution as the amount which, when combined with the required contributions by members in respect of current service and expected interest earnings, is sufficient to cover the cost, as estimated by the President of the Treasury Board, of all future payable benefits that have accrued in respect of pensionable service during that month and the Pension Fund administrative expenses incurred during that month.

b) Elected Prior Service

The government matches member contributions made to the Superannuation Account for prior service elections; however, it makes no contributions if the member is paying the double rate.

Government contributions to the Pension Fund in respect of elected prior service are as described for current service; however, the government contributes only a portion

[1] The contributions rates established in 2017 were based on the economic assumptions of 2015 Actuarial Report on the Pension Plans for the Royal Canadian Mounted Police and 2016 public service data.

[2] The contribution rates established in 2018 were based on the economic assumptions of 2016 Actuarial Report on the Canadian Forces and 2017 public service data.

of the member contribution if the member is paying the double rate. The percentage varies depending on the government contribution where a member is paying the single rate.

c) Actuarial Excess and Surplus

The *Public Sector Pension Investment Board Act* (S.C. 1999, c. 34), which received Royal Assent on 14 September 1999, gives the government the authority to:

- debit the excess of the balance of the Superannuation Account over the actuarial liability subject to limitations, and
- deal with any actuarial surplus, subject to limitations, in the Pension Fund as they occur, either by reducing employer contributions or by reducing employer and employee contributions or by making withdrawals.

d) Actuarial Shortfall and Deficit

In accordance with the PSSA, if an actuarial shortfall is identified through a triennial statutory actuarial valuation, the actuarial shortfall can be amortized over a period of up to 15 years, such that the amount that in the opinion of the President of the Treasury Board will, at the end of the fifteenth fiscal year following the tabling of that report or at the end of the shorter period that the President of the Treasury Board may determine, together with the amount that the President of the Treasury Board estimates will be to the credit of the Superannuation Account at that time, meet the cost of the benefits payable in respect of pensionable service prior to April 2000.

Similarly, if an actuarial deficit is identified through a triennial statutory actuarial valuation, the actuarial deficit can be amortized over a period of up to 15 years, such that the amount that in the opinion of the President of the Treasury Board will, at the end of the fifteenth fiscal year following the tabling of that report or at the end of the shorter period that the President of the Treasury Board may determine, together with the amount that the President of the Treasury Board estimates will be to the credit of the Pension Fund at that time, meet the cost of the benefits payable in respect of pensionable service since April 2000.

C. Summary Description of Benefits

The objective of the PSPP is to provide an employment earnings–related lifetime retirement pension to eligible members. Benefits to members in case of disability and to the spouse and children in case of death are also provided.

Subject to coordination with the pensions paid by the Canada Pension Plan (CPP) or the Québec Pension Plan (QPP), the initial rate of retirement pension is equal to 2% of the highest average of annual pensionable earnings over any period of five consecutive years, multiplied by the number of years of pensionable service not exceeding 35. Once in pay, the pension is indexed annually with the Consumer Price Index. Such indexation also applies to deferred pensions during the deferral period. Detailed notes on the following overview are provided in the following section.

Contributor's Type of Termination	Benefit
With less than two years of service[1]	Return of contributions
With two or more years of service[1]**; and**	
▪ Disability	Immediate annuity
▪ Death leaving no surviving spouse or eligible children	Minimum benefit
▪ Death leaving surviving spouse and/or eligible children	Survivor allowance(s)
▪ Leaving prior to age 45, except for death or disability	
– Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
– Actual operational service 25 years or more	Immediate annuity
– Otherwise	Deferred annuity or transfer value
▪ Leaving at ages 45 to 49, except for death or disability, and	
– Deemed operational service 20 years or more	Deemed operational service annual allowance[3]
– Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
– Actual operational service 25 years or more	Immediate annuity
– Otherwise	Deferred annuity or transfer value
▪ Leaving at age 50 or over, except for death or disability, and	
– Deemed operational service between 20 and 25 years	Deemed operational service annual allowance [3]
– Deemed operational service 25 years or more	Immediate annuity
– Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
– Actual operational service 25 years or more	Immediate annuity
– Otherwise, but Group 1, age 60 or over, or age 55 or over and service 30 years or more	Immediate annuity
– Otherwise, but Group 2, age 65 or over, or age 60 or over and service 30 years or more	Immediate annuity
– Otherwise	Deferred annuity or annual allowance

Deferred and Immediate Pensioner's Type of Termination	Benefit
▪ Group 1 disability before age 60 while entitled to a deferred annuity or an annual allowance	Immediate annuity
▪ Group 2 disability before age 65 while entitled to a deferred annuity or an annual allowance	Immediate annuity
▪ Death leaving no eligible survivor	Minimum benefit
▪ Death leaving eligible survivor(s)	Survivor allowance(s)

1 Thresholds are determined using total pensionable service, including operational service.
2 Based on actual operational service only. Additional non-operational and/or deemed operational service, if any, results in the applicable non-operational benefit and/or deemed operational benefit (see Note 10).
3 Based on deemed operational service only. Additional non-operational service, if any, results in the applicable non-operational benefit (see Note 9).

D. Explanatory Notes

1. Pensionable Earnings

Pensionable earnings means the annual employment earnings (excluding overtime but including pensionable allowances such as bilingual bonuses) of a contributor.

Pensionable payroll means the aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

2. Indexation

a) Level of Indexation Adjustments

All immediate and deferred annuities (pensions and allowances) are adjusted every January to the extent warranted by the increase, as at 30 September of the previous year, in the 12-month average Consumer Price Index relative to the corresponding figure one year earlier. If the indicated adjustment is negative, annuities are not decreased for that year; however, it is carried-forward and the next positive adjustment is diminished accordingly.

b) First Indexation Adjustment

Indexation adjustments accrue from the end of the month in which employment terminates. The first annual adjustment following termination of employment is prorated accordingly.

c) Commencement of Indexation Payments

The indexation portion of a retirement, disability or survivor pension normally starts being paid when the pension is put into pay. However, regarding an operational service retirement pension, indexation payments start only when the pensioner is either

- at least 55 years old, provided the sum of age and pensionable service is at least 85; or
- at least 60 years old.

3. Pensionable Service, Actual Operational Service and Deemed Operational Service

Pensionable service of a contributor includes any period of service in the Public Service for which the contributor has been required to contribute or has elected to contribute, if eligible to do so, and such other types of service for which the contributor has elected to make the required special contributions to the Superannuation Account or the Pension Fund. Pensionable service is limited to 35 years.

Actual operational service refers to CSC employees working in federal correctional facilities, parole offices and community correctional centres. More specifically, operational service is defined as service by a person employed by CSC whose principal place of work is not: the national headquarters or a regional headquarters of CSC; the offices of the CSC Commissioner; or a regional CSC Staff College or any other institution that provides similar training to CSC employees.

Deemed operational service refers to CSC employees in operational service for one or more periods totalling at least 10 years, who then cease to be engaged in operational

service but continue to be employed by CSC and elect to continue to accumulate operational service and contribute an additional 0.62% of earnings.

4. Return of Contributions

Return of contributions means the payment of an amount equal to the accumulated current and prior service contributions paid or transferred by the contributor into the plan. Interest is credited quarterly on returned contributions in accordance with the investment return on the Pension Fund.

5. Immediate Annuity

Immediate annuity means an unreduced pension that becomes payable immediately upon a pensionable retirement or pensionable disability. The annual amount is equal to 2% of the highest average of annual pensionable earnings of the contributor over any period of five[1] consecutive years, multiplied by the number of years of pensionable service not exceeding 35. For contributors with periods of part-time pensionable service, earnings used in the five-year average are based on a full 37.5-hour workweek but the resulting average is multiplied by the proportion of the actual workweek over a full workweek averaged by the contributor over the entire period of pensionable service.

When a pensioner attains age 65 or becomes entitled to a disability pension from the CPP or the QPP, the annual pension amount is reduced by a percentage of the *indexed CPP annual pensionable earnings*[2] (or, if lesser, the indexed five-year[1] pensionable earnings average on which the immediate annuity is based), *multiplied by the years of CPP pensionable service*[3]. The applicable percentage (it was 0.7% before 1 January 2008) depends on the year the pensioner attains age 65 or becomes entitled to a disability pension. The following table shows the applicable percentage:

	Calendar Years				
	2008	2009	2010	2011	2012+
Coordination Percentage	0.685%	0.670%	0.655%	0.640%	0.625%

Annuities are payable at the end of month until the month in which the pensioner dies or until the disabled pensioner recovers from disability (the last payment would then be pro-rated). Upon the death of the pensioner, either a survivor allowance (Note 13) or a residual death benefit (Note 14) may be payable.

6. Deferred Annuity

Deferred annuity means an annuity that normally becomes payable to a former Group 1 contributor who reaches age 60 or a former Group 2 contributor who reaches age 65. The annual payment is determined as for an immediate annuity (Note 5) but is also

1 If the number of years of pensionable service is less than five, then the averaging is over the entire period of pensionable service.

2 *Indexed CPP annual pensionable earnings* means the average of the YMPE, as defined in the CPP, over the five calendar years leading up to and including the one in which pensionable service terminated, increased by indexation proportionate to that accrued in respect of the immediate annuity.

3 *Years of CPP pensionable service* mean the number of years of PSSA pensionable service after 1965 or after attaining age 18, whichever is later, but not exceeding 35.

adjusted to reflect the indexation (Note 2) from the date of termination to the commencement of benefit payments.

The deferred annuity of a former Group 1 contributor becomes an immediate annuity during any period of disability beginning before age 60. If the disability ceases before age 60, the immediate annuity reverts to the original deferred annuity unless the pensioner elects an annual allowance (Notes 8, 9 and 10) that is the prescribed actuarial equivalent to the deferred annuity. Similarly, the deferred annuity of a former Group 2 contributor becomes an immediate annuity during any period of disability beginning before age 65, and reverts back to the original deferred annuity if the disability ceases before age 65, unless the pensioner elects an annual allowance as described above.

7. Transfer Value

A contributor who has ceased to be employed in the public service and has to his credit two or more years of pensionable service, is a Group 1 contributor and is under age 50, or is a Group 2 contributor and is under age 55, and is eligible for a deferred annuity may elect to transfer the commuted value of his benefit, determined in accordance with the regulations, to

- a locked-in Registered Retirement Savings Plan of the prescribed kind; or
- another pension plan registered under the *Income Tax Act;* or
- a financial institution for the purchase of a locked-in immediate or deferred annuity of the prescribed kind.

8. Annual Allowance For Members

For a Group 1 member, *annual allowance* means an annuity payable immediately on retirement or upon attaining age 50, if later. The amount of the allowance is equal to the amount of the deferred annuity to which the member would otherwise be entitled, reduced by 5% for each year between 60 and the age when the allowance becomes payable. However, if the member is at least 50 years old at termination, and has at least 25 years of pensionable service[1], then the difference is reduced (subject to the above as a maximum) to the greater of

- 55 minus the age, and
- 30 minus the number of years of pensionable service[1].

For a Group 2 member, the eligibility age is increased by 5 years, so that a*nnual allowance* means an annuity payable immediately on retirement or upon attaining age 55 if later. The amount of the allowance is equal to the amount of the deferred annuity to which the member would otherwise be entitled, reduced by 5% for each year between 65 and the age when the allowance becomes payable. However, if the member is at least 55 years old at termination, and has at least 25 years of pensionable service[1], then the difference is reduced (subject to the above as a maximum) to the greater of

- 60 minus the age, and

[1] For privatized members who elected not to transfer their PSSA benefits to their new employer's pension plan, service (including any operational) with the new employer is included.

- 30 minus the number of years of pensionable service[1].

The Treasury Board can waive all or part of the reduction for Group 1 contributors who are involuntarily retired at ages 55 and over with at least 10 years of Public Service employment, or for Group 2 contributors who are involuntarily retired at ages 60 and over with at least 10 years of Public Service employment.

When a Group 1 member in receipt of an annual allowance becomes disabled before reaching age 60, or a Group 2 member in receipt of an annual allowance becomes disabled before reaching age 65, the annual allowance becomes an immediate annuity adjusted in accordance with the regulations to take into account the amount of any annual allowance received prior to becoming disabled.

9. Deemed Operational Service - Immediate Annuity and Annual Allowance

A deemed operational service immediate annuity differs from an immediate annuity (Note 5) only in that it is available as early as age 50 with 25 years of operational service.

A deemed operational service annual allowance differs from an annual allowance (Note 8) in two ways. Firstly it is available as early as age 45 with 20 years of operational service. Secondly the reduction factor is 5% multiplied by the greater of

- 50 minus the age, and
- 25 minus the years of operational service.

The foregoing operational service–related benefits are calculated in relation to both deemed and actual operational service only. Additional non-operational service results in the applicable non-operational benefit where any thresholds or reductions are based on total pensionable service, including operational service.

10. Actual Operational Service - Immediate Annuity and Annual Allowance

An actual operational service immediate annuity differs from an immediate annuity (Note 5 and Note 9) only in that it is available when the member has accrued 25 years of actual operational service.

An actual operational service annual allowance differs from other annual allowances (Note 8 and Note 9) in two ways. Firstly it is available as soon as 20 years of actual operational service is accrued. Secondly the reduction factor is 5% multiplied by

- 25 minus the years of actual operational service.

The foregoing operational service-related benefits are calculated in relation to actual operational service only. Additional non-operational service results in the applicable non-operational benefit where any thresholds or reductions are based on total pensionable service, including operational service. Also, additional deemed operational service results in the applicable deemed operational benefit where any thresholds or reductions are based on operational pensionable service.

[1] For privatized members who elected not to transfer their PSSA benefits to their new employer's pension plan, service (including any operational) with the new employer is included.

11. Eligible Surviving Spouse

Eligible surviving spouse means the surviving spouse (includes a common-law or same-sex partner recognized under the plan) of a contributor or pensioner except if:

- the contributor or pensioner died within one year of commencement of the spousal union, unless the Treasury Board is satisfied that the health of the contributor or pensioner at the time of such commencement justified an expectation of surviving for at least one year; or
- the pensioner married after ceasing to be a contributor, unless after such marriage the pensioner either:
  - became a contributor again, or
  - made an optional survivor benefit election within 12 months following marriage to accept a reduced pension so that the new spouse would be eligible for a survivor benefit. This reduction is reversed if and when the new spouse predeceases the pensioner or the spousal union is terminated for reason other than death.

12. Eligible Surviving Children

Eligible surviving children includes all children of the contributor or pensioner who are under age 18, and any child of the contributor or pensioner who is age 18 or over but under 25, in full-time attendance at a school or university, having been in such attendance substantially without interruption since he or she reached age 18 or the contributor or pensioner died, whichever occurred later.

13. Annual Allowance for Eligible Survivor(s)

Annual allowance means, for the eligible surviving spouse and children of a contributor or pensioner, an annuity that becomes payable immediately upon the death of that individual. The amount of the allowance is determined with reference to a basic allowance that is equal to 1% of the highest average of annual pensionable earnings of the contributor over five consecutive years, multiplied by the number of years of pensionable service not exceeding 35.

The annual allowance for a spouse is equal to the basic allowance unless the spouse became eligible as a result of an optional survivor benefit election, in which case it is equal to the percentage of the basic allowance specified by the pensioner making the election.

The annual allowance for an eligible surviving child is equal to 20% of the basic allowance, subject to a reduction if there are more than four eligible surviving children in the same family. The allowance otherwise payable to an eligible surviving child is doubled if there is no eligible surviving spouse.

Survivor annual allowances are not integrated with the CPP or the QPP and are payable in equal monthly instalments in arrears until the end of the month in which the survivor dies or otherwise loses eligibility. If applicable, a residual benefit (Note 14) is payable to the estate upon the death of the last survivor.

14. Minimum and Residual Death Benefits

If a contributor or a pensioner dies leaving no eligible survivor, the lump sum normally paid is the excess of five times the annual amount of the immediate annuity to which the contributor would have been entitled, or the pensioner was entitled, at the time of death, less any pension payments already received. Indexation adjustments are excluded from these calculations.

The same formula is used to determine the residual death benefit, which is the lump sum payable upon the death of an eligible survivor but also subtracting all amounts (excluding indexation adjustments) already paid to the survivor.

15. Division of Pension with Former Spouse

In accordance with the *Pension Benefits Division Act*, upon the breakdown of a spousal union (including common-law), a lump sum can be debited by court order or by mutual consent from the accounts and/or the Pension Fund, as the case may be, to the credit of the former spouse of a contributor or pensioner. The maximum transferable amount is half the value, calculated as at the transfer date, of the retirement pension accrued by the contributor or pensioner during the period of cohabitation. If the member's benefits are not vested, the maximum transferable amount corresponds to half the member's contributions made during the period subject to division, accumulated with interest at the rate applicable on a refund of contributions. The accrued benefits of the contributor or pensioner are then reduced accordingly.

Appendix 2 – Retirement Compensation Arrangement Benefit Provisions

Retirement compensation arrangements (RCAs) are arrangements for benefits in excess of benefit limitations of registered pension plans and therefore are less tax-advantageous as the fund must transfer a 50% refundable tax to the Canada Revenue Agency (CRA) immediately. Under the PSSA RCA a debit is made from the RCA Account such that in total roughly half the recorded balance in the Superannuation Account is held as a tax credit (CRA refundable tax). This Appendix describes the Public Service pension benefits financed through retirement compensation arrangements (RCA No. 1 and RCA No. 2) rather than through the registered PSSA provisions that have a material impact on this valuation

Effective 15 December 1994, RCA No. 1 was established pursuant to the *Special Retirement Arrangements Act* (SRAA) to provide for all pension benefits in excess of those that may, in accordance with the *Income Tax Act* (ITA) restrictions on registered pension plans, be paid under the PSSA registered provisions.

Effective 1 April 1995, RCA No. 2 was established by the RCA regulations as a program for certain Public Service employees declared surplus before 1 April 1998 as part of the downsizing initiative. Participation was limited to individuals between ages 50 and 54 who met the conditions specified in the regulations. RCA No. 2 pays the difference between a pension unreduced for early retirement and the reduced pension payable in accordance with the PSSA. It is financed entirely by the government.

The following benefits have been provided under RCA No. 1 since 20 November 1997, unless otherwise indicated, to the extent that they are in excess of the ITA limit.

Benefit	PSSA Registered Provisions limit
Survivor allowance for service from 1 January 1992 onward (see Note 13 of Appendix 1)	Pre-retirement death • Maximum spouse allowance is two-thirds of greater of A and B; and • Maximum aggregate dependants' allowance is the greater of A and B, where A is the amount of member annuity earned to date of death, and B is the lesser of the hypothetical amount of member's annuity projected to age 65 based on current salary history and 1.5 times the YMPE in effect during the year of the member's death. Post-retirement death The amount of spouse allowance is limited in any year to a maximum of two-thirds the retirement benefit that would have been payable to the member in that year.

Benefit	PSSA Registered Provisions limit
Minimum lump sum death benefit (see Note 14 of Appendix 1)	Pre-retirement death The amount of pre-retirement death benefit if the member has no eligible dependants is limited to the greater of the member contributions with interest and the present value of the member's accrued benefits on the day prior to death. Post-retirement death If the member has no eligible dependants at retirement, then the minimum death benefit is limited to the member contributions with interest.
Continued benefit accrual for former deputy heads (provided since 15 December 1994 for service since then)	This entire benefit is outside the registered plan limit. Deputy heads ceasing employment under age 60 may elect to be deemed full-time employees absent from the Public Service on leave without pay up to age 60.
Elective service for service prior to 1 January 1990	The amount of lifetime retirement benefits for each such year of service is limited to two-thirds of the defined benefit limit (i.e. $2,944.44 for calendar year 2018) for the year in which the lifetime retirement benefits commence to be paid. For years subsequent to the commencement year of lifetime retirement benefits, this amount can be adjusted to reflect increases in the Consumer Price Index.
Excess pensionable earnings (provided since 15 December 1994 for service since then)	The highest average of pensionable earnings is subject to a prescribed yearly maximum that varies by calendar year and the registered plan's benefit formula. The calendar year 2018 Maximum Pensionable Earnings is $164,700.

Appendix 3 – Assets, Accounts and Rates of Return

A. Assets and Account Balances

The government has a statutory obligation to fulfill the pension promise enacted by legislation to members of the Public Service. Since 1 April 2000, the government has earmarked invested assets (the Pension Fund) to meet the cost of pension benefits.

With respect to the unfunded portion of the PSPP, accounts were established to track the government's pension benefit obligations, such as the Superannuation Account for service prior to 1 April 2000, and the RCA No. 1 and No. 2 Accounts for benefits in excess of those that can be provided under the *Income Tax Act* limits for registered pension plans.

1. Public Service Superannuation Account

PSSA member contributions, government costs and benefits earned up to 31 March 2000 are tracked entirely through the Public Service Superannuation Account, which forms part of the Accounts of Canada.

The Superannuation Account was credited with all PSSA member contributions and government costs prior to 1 April 2000, as well as with prior service contributions and costs for elections made prior to 1 April 2000 and for periods before 1 April 2000 but credited after that date. It is charged with both the benefit payments made in respect of service earned under the Superannuation Account and the allocated portion of the plan administrative expenses.

The Superannuation Account is credited with interest earnings as though net cash flows were invested quarterly in 20-year Government of Canada bonds issued at prescribed[1] interest rates and held to maturity. No formal debt instrument is issued to the Superannuation Account by the government in recognition of the amounts therein. Interest is credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

[1] Under Section 42 (1) (b) of the *Public Service Superannuation Act*, rates may be prescribed by Regulations. The interest rates are defined under Section 46 (2) (a) of the *Public Service Superannuation Regulations*.

Table 24 Reconciliation of Balances in Superannuation Account ($ millions)				
Plan Year	2015	2016	2017	2015-2017
Public Accounts opening balance	96,424	95,876	95,566	96,424
INCOME				
Interest earnings	4,798	4,443	4,128	13,369
Employer contributions	14	11	9	34
Member contributions	18	14	11	43
Transfers received	-	-	-	-
Actuarial liability adjustments	-	681	-	681
Subtotal	**4,830**	**5,149**	**4,148**	**14,127**
EXPENDITURES				
Annuities	5,240	5,328	5,381	15,949
Pension divisions	18	23	26	67
Return of contributions	1	-	1	2
Pension transfer value payments	34	30	20	84
Transfers to other pension plans	10	5	4	19
Minimum benefits	16	13	18	47
Administrative expenses	59	60	55	174
Subtotal	**5,378**	**5,459**	**5,505**	**16,342**
Public Accounts closing balance	**95,876**	**95,566**	**94,209**	**94,209**

Since the last valuation, the Account balance has decreased by $2.2 billion (a 2.3% reduction) to reach $94.2 billion as at 31 March 2017.

2. Public Service Pension Fund

Since 1 April 2000, PSSA contributions (except for prior service elections made prior to 1 April 2000) have been credited to the Pension Fund. The Pension Fund is invested in the financial markets with a view to achieving maximum rates of return without undue risk.

The Pension Fund has been credited with all PSSA contributions since 1 April 2000, as well as with prior service contributions in respect of elections made since that date. The Pension Fund is also credited with the net investment returns generated by the capital assets managed by PSPIB. It is debited with both the benefit payments made in respect of service earned and prior service elections made since 1 April 2000 and the allocated portion of the plan administrative expenses.

Table 25 Reconciliation of Balances in Pension Fund ($ millions)

Plan Year	2015	2016	2017	2015-2017
Opening balance	**68,668**	**81,750**	**85,078**	**68,668**
INCOME				
Investment earnings	9,959	583	11,012	21,554
Employer contributions	2,560	2,411	2,332	7,303
Member contributions	1,863	1,984	2,155	6,002
Transfers received	29	33	28	90
Actuarial liability adjustments	435	340	340	1,115
Subtotal	**14,846**	**5,351**	**15,867**	**36,064**
EXPENDITURES				
Annuities	1,344	1,559	1,780	4,683
Pension divisions	26	30	39	95
Return of contributions	11	16	12	39
Pension transfer value payments	279	317	254	850
Transfers to other pension plans	52	47	36	135
Minimum benefits	11	12	12	35
Administrative expenses	41	42	42	125
Subtotal	**1,764**	**2,023**	**2,175**	**5,962**
Closing balance	**81,750**	**85,078**	**98,770**	**98,770**

Since the last valuation, the Pension Fund balance has increased by $30.1 billion (a 43.8% increase) to reach $98.8 billion as at 31 March 2017.

3. Public Service RCA No. 1 Account

The amount in the RCA No. 1 Account is composed of the recorded balance in the Retirement Compensation Arrangements Account, which forms part of the Accounts of Canada, and a tax credit (CRA refundable tax). Each calendar year, a debit/credit is made from the RCA Account such that in total roughly half the recorded balance in the RCA Account is held as a tax credit (CRA refundable tax).

No formal debt instrument is issued to the RCA No. 1 Account by the government in recognition of the amounts therein. Interest earnings are credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 26 Reconciliation of Balances in RCA No.1 Account ($ millions)

Plan Year	2015	2016	2017	2015-2017
Public Accounts opening balance	**1,040**	**1,104**	**1,163**	**1,040**
INCOME				
Interest earnings	54	54	52	160
Employer contributions	91	77	58	226
Member contributions	12	11	9	32
Transfers received	1	0	0	1
Actuarial liability adjustments	0	12	0	12
Subtotal	**158**	**154**	**119**	**431**
EXPENDITURES				
Annuities	31	36	41	108
Pension divisions	1	1	0	2
Return of contributions	0	0	0	0
Pension transfer value payments	1	1	1	3
Transfers to other pension plans	0	0	0	0
Minimum benefits	0	0	0	0
Amount transfer to CRA	61	57	47	165
Subtotal	**94**	**95**	**89**	**278**
Public Accounts closing balance	**1,104**	**1,163**	**1,193**	**1,193**
CRA Refundable tax	**1,080**	**1,137**	**1,184**	**1,184**

Since the last valuation, the RCA No. 1 Account balance has grown by $153 million (a 14.7% increase) to reach $1,193 million as at 31 March 2017 and the refundable tax has increased by $165 million (a 16.2% increase) to reach $1,184 million.

4. Public Service RCA No. 2 Account

The amount in the RCA No. 2 Account is composed of the recorded balance in the Retirement Compensation Arrangements Account, which forms part of the Accounts of Canada, and a tax credit (CRA refundable tax). Each calendar year, a debit/credit is made from the RCA Account such that in total roughly half the recorded balance in the RCA Account is held as a tax credit (CRA refundable tax).

No formal debt instrument is issued to the RCA No. 2 Account by the government in recognition of the amounts therein. Interest earnings are credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 27 Reconciliation of Balances in RCA No.2 Account ($ millions)

Plan Year	2015	2016	2017	2015-2017
Public Accounts opening balance	**730**	**709**	**807**	**730**
INCOME				
Interest earnings	36	32	34	102
Actuarial liability adjustments	8	129	0	137
Subtotal	**44**	**161**	**34**	**239**
EXPENDITURES				
Annuities	85	85	84	254
Amount transfer to CRA	(20)	(22)	39	(3)
Subtotal	**65**	**63**	**123**	**251**
Public Accounts closing balance	**709**	**807**	**718**	**718**
CRA Refundable tax	**714**	**692**	**731**	**731**

Since the last valuation, the RCA No. 2 Account balance has decreased by $12 million (a 1.6% reduction) to $718 million as at 31 March 2017 and the refundable tax has decreased by $3 million (a 0.4% reduction) to $731 million.

B. Rates of Interest (Return)

The interest earnings in respect of the Superannuation Account were calculated using the entries in Table 24, which are based on book values since the notional bonds are deemed to be held to maturity. The interest earnings were computed using the dollar-weighted approach and assume that cash flows occur in the middle of the plan year (except for actuarial liability adjustments, which occur on 31 March). The Pension Fund rates of return are those from the PSPIB 2017 Annual Report.

Table 28 Rates of Interest (Return)

Plan Year	Superannuation Account	Pension Fund
2015	5.1%	14.2%
2016	4.8%	0.7%
2017	4.4%	12.8%

C. Sources of Asset Data

The Superannuation Account, the RCA No. 1 Account, the RCA No. 2 Account and the Pension Fund entries shown in Section A above were taken from the Public Accounts of Canada and the financial statements of the Public Sector Pension Investment Board.

Appendix 4 – Membership Data

A. Sources of Membership Data

The valuation input data required in respect of contributors (both active and non-active), pensioners and survivors are extracted from master computer files maintained by the Department of Public Services and Procurement Canada (PSPC).

The main valuation data file supplied by PSPC contained the historical status information on all members up to 31 March 2017.

B. Validation of Membership Data

1. Status-Related Tests

The following status tests were performed on the main valuation data file:

- a consistency check that a status could be established for each record of a member. The status of a member may change over time but at a given point in time it can be only one of the following: contributor, outstanding termination, pensioner, deceased leaving an eligible survivor;
- a consistency check of the changes in status of a member during the intervaluation period; e.g.
  - if a contributor record indicated that the member retired, then a corresponding pensioner record should exist; and
  - if a contributor or pensioner record indicated that the member died leaving an eligible survivor, then a corresponding survivor record should exist;
- a reconciliation between the status of members as at 31 March 2017 from the current valuation data and the status of the members as at 31 March 2014 from the previous valuation data; and
- a comparison of the valuation data as at 31 March 2017 with the membership shown in the Report on the Administration of the *Public Service Superannuation Act* for the fiscal year ending 31 March 2017.

2. Benefit-Related Tests

Consistency tests were performed to ensure that all information required to value the member benefits based on individual statuses as at 31 March 2017 was included by verifying that

a) For Active Members

- the pensionable service was reasonable in relation to the attained age;
- the salary was included and, if not, the average salary rate based on the age, service and gender of that member was used;
- the salary was reasonable relative to the historical salaries of the member;
- the pensionable salary included the bonus, when applicable; and

- the pensionable salary increase reflected the renewed collective agreements, when applicable. Adjustments were applied on pensionable salaries for members under collective agreements that were not renewed or renewed, but not implemented in the data received.

b) For Pensioners and Survivors in Receipt of an Annuity

- the amount of the annuity, including indexation, was included;
- the benefits were indexed up to 1 January 2018;
- the benefits were consistent with amounts being paid to the member; and
- for new pensioners and survivors, the benefits were consistent with the previous valuation data.

c) For Outstanding Terminations

- the lump sum payment was recognized.

d) For Adjustments to Status and Benefit Data

- appropriate adjustments were made to the basic data, after consulting with the data providers, based on the omissions and discrepancies identified by the tests described herein, as well as other additional tests.

C. Membership Data

A summary of the valuation data as at 31 March 2017 and reconciliations of contributors, pensioners and survivors during the period from 31 March 2014 to 31 March 2017 are shown in Tables 29 to 35. Detailed membership data upon which this valuation is based are shown in Appendix 12.

Table 29 Summary of Membership Data

	As at 31 March 2017	As at 31 March 2014
Contributors[1]		
Number	295,881	294,475
Average Annual Earnings	$79,495	$76,049
Average Pensionable Service	12.63	12.13
Retirement Pensioners[2]		
Number	229,045	203,318
Average Annual Pension	$29,399	$28,782
Average Age	67.64	68.57
Disabled Pensioners		
Number	15,159	14,660
Average Annual Pension	$18,345	$16,420
Average Age	64.10	64.05
Surviving Spouses		
Number	49,206	51,521
Average Annual Pension	$14,516	$13,310
Average Age	78.89	78.74
Surviving Children		
Number	1,068	990
Average Annual Pension	$2,388	$2,263
Average Age	14.42	14.69

1 Excludes non-participating and non-accruing members.
2 Include retirement pensioners with an annuity in pay or a deferred annuity.

Table 30 Reconciliation of Group 1 Contributors

	Participating Accruing		Participating Non-accruing		Total	Non-Participating Non-Accruing		
	Male	Female	Male	Female	Participating	Male	Female	Total
As at 31 March 2014	**120,698**	**153,260**	**2,438**	**1,577**	**277,973**	**405**	**400**	**805**
Data corrections	(183)	603	286	29	735	184	422	606
New contributors								
Re-qualifying contributors[1]	710	1,087	6	3	1,806	101	226	327
Rehired pensioners	213	347	1	-	561	8	30	38
Subtotal	**923**	**1,434**	**7**	**3**	**2,367**	**109**	**256**	**365**
Changes of								
Participating accruing	(1,944)	(2,290)	1,576	1,759	(899)	368	531	899
Participating non-accruing	-	1	(42)	(12)	(53)	42	11	53
Non-participating non-accruing	286	643	1	1	931	(287)	(644)	(931)
Subtotal	**(1,658)**	**(1,646)**	**1,535**	**1,748**	**(21)**	**123**	**(102)**	**21**
ROC or TV[2]	(2,526)	(3,258)	(100)	(12)	(5,896)	(80)	(161)	(241)
Pensionable terminations								
Disabled Pensioners	(616)	(1,424)	(13)	(5)	(2,058)	(1)	-	(1)
Deferred Retired Pensioners	(3,229)	(4,282)	(13)	(3)	(7,527)	(50)	(107)	(157)
Retired Pensioners in Pay	(10,479)	(12,891)	(1,639)	(1,584)	(26,593)	(215)	(178)	(393)
Death (no survivors)	(161)	(203)	(14)	(7)	(385)	(7)	(6)	(13)
Death (with survivors)	(386)	(295)	(19)	(9)	(709)	(11)	(1)	(12)
Subtotal	**(14,871)**	**(19,095)**	**(1,698)**	**(1,608)**	**(37,272)**	**(284)**	**(292)**	**(576)**
As at 31 March 2017	**102,383**	**131,298**	**2,468**	**1,737**	**237,886**	**457**	**523**	**980**

1 Re-qualifying contributors are members who were deemed deferred as at the previous valuation, but returned to work. Since they never cash-out their benefits accrued before their first termination, they return as members of Group 1.
2 Termination of membership resulting in a refund of contributions or a payment of transfer value.

Table 31 Reconciliation of Group 2 Contributors

	Participating Accruing		Participating Non-accruing		Total	Non-Participating Non-Accruing		
	Male	Female	Male	Female	Participating	Male	Female	Total
As at 31 March 2014	**7,376**	**9,124**	**1**	**1**	**16,502**	**71**	**131**	**202**
Data corrections	(476)	(810)	17	3	(1,266)	29	45	74
New contributors								
New entrants	22,084	27,754	49	9	49,896	240	345	585
Rehired cash-out	1,067	1,818	2	-	2,887	14	28	42
Rehired pensioners	9	18	-	-	27	-	-	-
Subtotal	23,160	29,590	51	9	52,810	254	373	627
Changes of								
Participating accruing	(203)	(292)	30	4	(461)	173	288	461
Participating non-accruing	1	-	(1)	-	-	-	-	-
Non-participating non-accruing	145	212	-	-	357	(145)	(212)	(357)
Subtotal	**(57)**	**(80)**	**29**	**4**	**(104)**	**28**	**76**	**104**
ROC or TV[1]	(4,441)	(5,965)	(13)	(4)	(10,423)	(142)	(271)	(413)
Pensionable terminations								
Disabled Pensioners	(1)	(6)	-	-	(7)	-	-	-
Deferred Retired Pensioners	(396)	(540)	-	-	(936)	(2)	(6)	(8)
Retired Pensioners in Pay	(46)	(47)	-	(1)	(94)	(1)	(2)	(3)
Death (no survivors)	(19)	(15)	-	-	(34)	-	-	-
Death (with survivors)	(12)	(4)	-	-	(16)	-	-	-
Subtotal	**(474)**	**(612)**	**-**	**(1)**	**(1,087)**	**(3)**	**(8)**	**(11)**
As at 31 March 2017	**25,088**	**31,247**	**85**	**12**	**56,432**	**237**	**346**	**583**

[1] Termination of membership resulting in a refund of contributions or a payment of transfer value.

Table 32 Reconciliation of Pensioners

	Deferred Retired Pensioners			Disabled Pensioners			Retired Pensioners in Pay[1]		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Retirement Pensioners	2,131	2,645	4,776	6,175	8,485	14,660	109,306	80,091	189,397
Deemed Pensioners	3,828	5,145	8,973	-	-	-	93	79	172
As at 31 March 2014	**5,959**	**7,790**	**13,749**	**6,175**	**8,485**	**14,660**	**109,399**	**80,170**	**189,569**
Data corrections	3,221	3,875	7,096	(142)	(48)	(190)	(6)	(38)	(44)
New pensioners	3,705	4,954	8,659	631	1,436	2,067	12,396	14,737	27,133
Transfer status to									
Rehired	(186)	(323)	(509)	(1)	-	(1)	(44)	(72)	(116)
Disabled Pensioners	(13)	(20)	(33)	13	20	33	-	-	-
Retired Pensioners in Pay	(1,203)	(1,519)	(2,722)	-	-	-	1,203	1,519	2,722
Subtotal	**(1,402)**	**(1,862)**	**(3,264)**	**12**	**20**	**32**	**1,159**	**1,447**	**2,606**
Cash paid out	(1)	(4)	(5)	-	-	-	-	-	-
Death (no survivors)	(9)	(9)	(18)	(412)	(423)	(835)	(5,484)	(4,297)	(9,781)
Death (with survivors)	(11)	(11)	(22)	(409)	(166)	(575)	(5,636)	(997)	(6,633)
Subtotal	**(21)**	**(24)**	**(45)**	**(821)**	**(589)**	**(1,410)**	**(11,120)**	**(5,294)**	**(16,414)**
As at 31 March 2017	**11,462**	**14,733**	**26,195**	**5,855**	**9,304**	**15,159**	**111,828**	**91,022**	**202,850**

[1] Retired Pensioners include both members receiving an Immediate Annuity and those receiving an Annual Allowance.

Table 33 Reconciliation of Surviving Spouses

	Widows	Widowers	Total
As at 31 March 2014	**45,853**	**5,668**	**51,521**
Data corrections	(178)	38	(140)
New from Contributors	403	287	690
New from Pensioners	6,031	1,184	7,215
Spouse deaths	(9,159)	(921)	(10,080)
As at 31 March 2017	**42,950**	**6,256**	**49,206**

Table 34 Reconciliation of Children Survivors

	Children	Students	Total
As at 31 March 2014	**731**	**259**	**990**
Data corrections	6	288	294
New from Contributors	328	106	434
New from Pensioners	43	42	85
Termination of benefits	(190)	(545)	(735)
Eligible as student	(113)	113	-
As at 31 March 2017	**805**	**263**	**1,068**

Table 35 Reconciliation of Pensioners with ERI Benefits

	Male	Female	Total
As at 31 March 2014	**6,256**	**4,033**	**10,289**
Data corrections	(2)	(1)	(3)
Pensioner deaths	(286)	(128)	(414)
Rehired	-	-	-
As at 31 March 2017	**5,968**	**3,904**	**9,872**

Appendix 5 – PSSA Valuation Methodology

A. Plan Assets

1. Public Service Superannuation Account

The balance of the Superannuation Account forms part of the Accounts of Canada. The underlying notional bond portfolio described in Appendix 3 is shown at the book value.

The only other Superannuation Account–related amount consists of the discounted value of future member contributions and government credits in respect of prior service elections. The discounted value of future member contributions was calculated using the projected Superannuation Account yields. The government is assumed to match these future member contributions when paid at a single rate but it makes no contributions if the member is paying the double rate.

2. Public Service Pension Fund

For valuation purposes, an adjusted market value method is used to determine the actuarial value of assets in respect of the Pension Fund. The method is unchanged from the previous valuation.

Under the adjusted market value method, the difference between the observed investment returns during a given plan year and the expected investment returns for that year based on the previous report assumptions, is recognized over five years at the rate of 20% per year. The actuarial value is then determined by applying a 10% corridor, such that the actuarial value of assets is within 10% of the market value of assets. As a result, the actuarial value of assets is a five-year smoothed market value where the investment gains or losses are recognized at the rate of 20% per year subject to a 10% corridor to the market value of assets. The value produced by this method is related to the market value of the assets but is more stable than the market value.

The only other Pension Fund–related asset consists of the discounted value of future member and government contributions in respect of prior service elections[1]. The discounted value of future member and government contributions was calculated using the assumed rates of return on the Pension Fund. The government is assumed to contribute in the same proportion as for the PSSA current service cost when member contributions are paid at the single rate, but is assumed to contribute only a portion of the member contribution if the member is paying the double rate. The percentage varies depending on the government contribution where a member is paying the single rate.

The actuarial value of the assets, determined as at 31 March 2017, under the adjusted market value method is $92,956 million and was determined as follows:

[1] As defined in Appendix 1B.2.b) Elected Prior Service.

Table 36 Actuarial Value of Pension Fund Assets ($ millions)

Plan Year	2013	2014	2015	2016	2017	
Actual net investment return (A)	5,097	9,150	9,959	583	11,012	
Expected investment return (B)	2,688	3,280	4,270	4,147	4,312	
Investment gains (losses) (A-B)	2,410	5,870	5,690	(3,564)	6,700	
Unrecognized percentage	0%	20%	40%	60%	80%	
Unrecognized investment gains (losses)	-	1,174	2,276	(2,138)	5,360	
Market value as at 31 March 2017						**98,770**
Less						
Total Unrecognized investment gains (losses)						6,672
Actuarial value as at 31 March 2017 (before application of corridor)						92,098
Impact of application of corridor[1]						-
Actuarial value as at 31 March 2017 (after application of corridor)						92,098
Plus						
Present value of prior service contributions						858
Actuarial value as at 31 March 2017						**92,956**

B. Actuarial Cost Method

As benefits earned in respect of current service will not be payable for many years, the purpose of an actuarial cost method is to assign costs over the working lifetime of the members.

As in the previous valuation, the projected accrued benefit actuarial cost method (also known as the projected unit credit method) was used to determine the current service cost and actuarial liability. Consistent with this cost method, pensionable earnings are projected up to retirement using the assumed annual increases in average pensionable earnings (including seniority and promotional increases). The yearly maximum salary cap and other benefit limits under the *Income Tax Act* described in Appendix 2 were taken into account to determine the benefits payable under the PSSA and those payable under the RCA No. 1.

1. Current Service Costs and Member Contribution Rates

Under the projected accrued benefit actuarial cost method, the current service cost, also called the normal cost, computed in respect of a given year is the sum of the value, discounted in accordance with the actuarial assumptions for the Pension Fund, of all future payable benefits considered to accrue in respect of that year of service. The Pension Fund administrative expenses are also included in the total current service cost.

Under this method, the current service cost for an individual member will increase each year as the member approaches retirement. However, all other things being equal, the current service cost for the total population, expressed as a percentage of total pensionable payroll, can be expected to remain stable as long as the average age and

[1] The corridor is 90% - 110% of market value, that is ($88,393 - $108,647).

service of the total population remain constant. This is true to the extent that the plan population is mature and stable. For a given year, the government current service cost is the total current service cost reduced by the members contributions during the year.

Member contribution rates were determined such that the members and the government share the total current service at 50/50[1].

In general, and once determined, the contribution required by a member will constitute a bigger or smaller portion of the actual 50% share of total current service cost based on the age of the member. For a mature and stable population, a younger member will pay a bigger portion of the actual 50% share of total current service cost, while a member close to retirement will pay a smaller portion of the actual 50% share of total current service cost. This creates a subsidy from younger to older members.

With the implementation of Division 23 of Part 4 of the *Jobs and Growth Act, 2012* (S.C. 2012, c. 31), the average current service cost for Group 2 members will be lower than the corresponding average current service cost for Group 1 members because the pension entitlement for Group 2 members is postponed by five years, that is, the immediate annuity is available at age 65 rather than at age 60. However, based on the definition of the projected unit credit cost method, there is still a need to have younger members (Group 2) subsidizing older members (Group 1) in order to properly fund the accrual of benefits, even though the benefits accruing for each group are different. Consequently, the determination of the current service cost for each group is still based on the projected unit credit cost method, with a small variant that will respect the spirit of the projected unit credit cost method.

The current service costs for Group 1 and Group 2 were determined as follows:

i) the current service cost and member contribution rates were determined for Group 1 contributors based on the total Public Service population (i.e., Group 1 and Group 2 members) and on the benefits available to Group 1 members. The result effectively levels the current service cost of Group 1 contributors since members of Group 2 are treated as though they are entitled to pre-2013 retirement benefits. Determining the cost in this fashion avoids too large an increase in the average cost of Group 1 contributors since their average age is expected to increase because there will be no new entrants to the Group 1 population;

ii) an amount equal to the excess of the actual current service cost for Group 1 contributors over the average current service cost of the combined Group 1 and Group 2 population determined in i) above was determined;

iii) the excess amount determined in ii) above was then added to the current service cost for Group 2, which was determined based on the Group 2 population and the benefits available to Group 2 contributors. Member contribution rates for Group 2 contributors were determined based on this increased current service cost amount, effectively providing the subsidy from younger to older members fundamental to the projected unit credit cost method; and

[1] For the determination of member contribution rates, the benefits for operational service were excluded. As a result, the government contributions are slightly higher than member contributions.

iv) the following adjustments were made given member contribution rates are effective on a calendar basis:

a. valuation runs were performed as at 31 December 2016;

b. active member population was assumed to be the same at 31 December 2016 as at 31 March 2017, with salaries adjusted for 3 months; and

c. mortality decrements and expected rates of return were adjusted to be applied on a calendar year basis.

This modified cost method respects the fundamental attributes of the projected unit credit cost method and provides an appropriate allocation of the cost between Group 1 and Group 2 contributors.

2. Actuarial Liability

The actuarial liability with respect to contributors corresponds to the value, discounted in accordance with the actuarial assumptions, of all future payable benefits accrued as at the valuation date in respect of all previous service. For pensioners and survivors, the actuarial liability corresponds to the value, discounted in accordance with the actuarial assumptions, of future payable benefits.

3. Actuarial Excess/(Shortfall) and Surplus/(Deficit)

It is very unlikely that the actual experience will develop precisely in accordance with the assumptions that underlie the actuarial estimates. Thus, a balancing item must be calculated under this cost method to estimate the necessary adjustments. Adjustments may also be necessary if the terms of the pension benefits enacted by the legislation are modified or if the assumptions need to be updated.

The actuarial excess/(shortfall) or surplus/(deficit) is the difference between the account balance or the total value of assets and the actuarial liability. A new actuarial shortfall/deficit may be amortized over a period not exceeding 15 years through special credits/payments and the disposition of any actuarial excess/surplus is defined in the PSSA.

4. Government Contributions

The recommended government contribution corresponds to the sum of:

- the government current service cost;
- the government contributions for prior service; and
- as applicable, special credits/payments in respect of a shortfall/deficit or as the case may be, debits when an actuarial surplus exists.

C. Projected Yields

The projected yields (shown in Appendix 6) assumed for computing the present value of accrued benefits to be credited to the Superannuation Account are the projected annual yields on the combined book value of the Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

The projected Account yields were determined by an iterative process involving the following:

- the combined notional bond portfolio of the three Superannuation Accounts as at the valuation date;
- the assumed future new money interest rates (also shown in Appendix 6);
- the expected future benefits payable in respect of all pension entitlements accrued up to 31 March 2000;
- the expected future contributions for prior service elections made up to 31 March 2000; and
- the expected future administrative expenses,

taking into account that each quarterly interest credit to a Superannuation Account is calculated as if the principal at the beginning of a quarter remains unchanged during the quarter.

The projected rates of return (shown in Appendix 6) assumed for computing the present value of the benefits accrued or accruing to be credited to the Pension Fund were developed on the basis that the Pension Fund holds a diversified mix of assets.

D. Membership Data

For valuation purposes, individual data on each member were used.

The member data shown in Appendices 4 and 12 were provided as at 31 March 2017. This valuation is based on the member data as at the valuation date.

The information in respect of the contributions for elected prior service was provided as at 31 March 2017. Future member contributions in respect of elected prior service take into account only the payment streams that were in effect at 31 March 2017. Only payments due after 31 March 2017 were included.

Appendix 6 – PSSA Economic Assumptions

The payment of accrued pension benefits is the responsibility of the government, therefore the likelihood of the plan being wound-up and its obligation not being fulfilled is practically nonexistent. Consequently, all of the assumptions used in this report are best-estimate assumptions, i.e., they reflect our best judgement of the future long-term experience of the plan and do not include margins.

A. Inflation-Related Assumptions

1. Level of Inflation

Price increases, as measured by changes in the Consumer Price Index (CPI), tend to fluctuate from year to year. In 2016, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2021. However in recent years, the level of inflation has been lower than the 2% target. In this report, it is assumed that the level of inflation will increase from 1.6% in plan year 2018 to its ultimate rate of 2.0% in 2019. The ultimate rate of 2.0% is unchanged from the assumed rate in the previous valuation.

2. Increase in Pension Factor

As described in Appendix 1, pensions are adjusted each January based on the 12-month average Consumer Price Index increase as at 30 September of the previous year. This pension indexation factor ensures that pensions maintain their purchasing power over time. A pension indexation assumption is therefore required in the valuation process.

B. Employment Earnings Increases

1. Increase in the Year's Maximum Pensionable Earnings (YMPE)

As described in Appendix 1, the plan is coordinated with the Canada Pension Plan and the Québec Pension Plan. Since the benefit payable under the plan when a pensioner attains age 65[1] is calculated based on the YMPE, an assumption for the increase in the YMPE is required in the valuation process. The assumed increase in the YMPE for a given calendar year is derived, in accordance with the Canada Pension Plan, to correspond to the increase in the average weekly earnings (AWE), as calculated by Statistics Canada, over successive 12-month periods ending on 30 June. The AWE, and thus the YMPE, is deemed to include a component for seniority and promotional increases. The YMPE is equal to $55,900 for calendar year 2018. Future increases in the YMPE correspond to the assumed real[2] increase in the AWE plus assumed increases in the CPI.

The real-wage differential (real increase in the AWE) is developed taking into account historical trends, a possible labour shortage and an assumed moderate economic growth for Canada; it is assumed to be 0.3% for plan year 2019, and is assumed to gradually increase to the ultimate assumption of 1.1% by 2024 (1.1% in plan year 2020 in the

[1] Or becomes entitled to a disability pension from the CPP or the QPP.
[2] Note that all of the real rates presented in this report are actual differentials, i.e. the difference between the effective annual rate and the rate of increase in prices. This differs from the technical definition of a real rate of return, which, for example in the case of the ultimate Pension Fund assumption would be 3.9% (derived from 1.060/1.020) rather than 4.0%.

previous valuation). The ultimate real-wage differential assumption combined with the ultimate price increase assumption results in an assumed annual increase in nominal wages of 3.1% in 2024 and thereafter. Thus, the ultimate rate of increase for the YMPE is 3.1%.

2. Increase in Average Pensionable Earnings

Average pensionable earnings are applicable to PSPP members only, whereas the YMPE applies to the general working population in Canada. In addition, increases in average pensionable earnings are exclusive of seniority and promotional increases, which are considered under a separate demographic assumption. Thus, the annual increase in average pensionable earnings is assumed to be 0.3% lower than the corresponding increase in the YMPE (0.2% lower in the previous valuation). This correspond to an ultimate value of 2.8% (2.9% in the previous valuation) in 2024.

3. Increase in Maximum Pensionable Earnings (MPE)

Since the plan is coordinated with the Canada Pension Plan and the Québec Pension Plan, the tax-related maximum pensionable earnings were derived from both the maximum annual pension accrual under a registered defined benefit plan and the YMPE. The maximum annual pension accrual of $2,914.44 for 2017 will increase to $$2,944.44 for 2018, in accordance with Income Tax Regulations. Thereafter, the maximum annual pension accrual is assumed to increase in accordance with the assumed annual increase in the YMPE, which is the same as the assumed annual increase in the AWE.

Beginning with calendar year 2012, the coordination factor is 0.625%. The MPE is equal to $164,700 for calendar year 2018.

C. Investment-Related Assumptions

1. New Money Rate

The new money rate is the nominal yield on 10-year-plus Government of Canada bonds and is set for each year in the projection period. The real yield on 10-year-plus federal bonds is equal to the new money rate less the assumed rate of inflation.

Recognizing recent experience, the annual real yield on 10-year-plus federal bonds is assumed to be 0.8% in plan year 2018, and is predicted to increase gradually to its ultimate level of 2.7% in plan year 2028. This increase is consistent with the average of private sector forecasts. The ultimate real yield was 2.8% in the previous valuation. The real new money rates over the first ten years of the projection are on average 0.8% lower than assumed for the corresponding years in the previous valuation.

2. Projected Yields on Superannuation Account

These yields are required for the computation of present values of benefits to determine the liability for service prior to 1 April 2000. The methodology used to determine the projected yields on the Superannuation Account is described in Appendix 5. The methodology is unchanged from previous valuations. However, since the real projected yields are determined based on the real new money rates, they are projected to be lower than assumed in the previous valuation (the ultimate projected yield is 0.1% lower than in the previous valuation).

3. Rate of Return on the Pension Fund

The expected annual nominal rates of return on the Pension Fund are required for the computation of present values of benefits to determine the liability for service since 1 April 2000 and the current service cost. The following sections describe how the rates of return on the Pension Fund are determined.

a) Investment Strategy

Since 1 April 2000, government and employee contributions, net of benefit payments and administrative expenses, are invested in capital markets by the Public Sector Pension Investment Board (PSPIB). PSPIB aims to maximize returns without undue risk of loss according to the investment policy set and approved by its Board of Directors that takes into account the needs of contributors and beneficiaries, as well as financial market constraints. For the purpose of this report, the investments have been grouped into four broad categories: fixed income securities, equities, real assets and credit. Fixed income securities consist of a mix of federal, provincial and real return bonds. Equities consist of public (Canadian and foreign) and private equities. Real assets include real estate, infrastructure and natural resources. Credit is composed of private debt investments.

As at 31 March 2017, PSPIB's assets consisted of 18% fixed income securities (including 2% cash), 53% equity, 26% real assets and 3% credit. PSPIB has developed a long-term target Policy Portfolio (approved by its Board of Directors in the fall of 2017 and subject to an annual review), which consists of 20% fixed income securities, 43% equity, 30% real assets and 7% credit. The Policy Portfolio asset mix weights represent long-term targets. Therefore, it is assumed that the initial asset mix (derived using the actual investments reported by PSPIB as at 31 March 2017) will slowly converge towards the long-term target Policy Portfolio. The ultimate asset mix will be reached in plan year 2022 in the projection period.

Net cash flows (contributions less expenditures, disregarding special payments) are expected to become negative during plan year 2030 at which point a portion of assets will be required to pay benefits. Changes to the assumed asset mix may be required in the future to reduce funding risks and to take into account the maturity of the plan.

Table 37 shows the assumed asset mix for each plan year throughout the projection period.

Table 37 Asset Mix

Plan Year	Fixed Income Securities[1]	Cash	Public Equity	Private Equity	Real Assets	Credit
2018	16%	2%	41%	12%	26%	3%
2019	16%	2%	39%	12%	27%	4%
2020	17%	2%	36%	12%	28%	5%
2021	18%	2%	33%	12%	29%	6%
2022+	18%	2%	30%	13%	30%	7%

b) Rates of Return by Asset Class

Rates of return are determined for each asset class in which the Pension Fund assets are invested. With the exception of fixed income securities and cash, rates of return are assumed to remain constant for the entire projection period. The expected progression of fixed income securities' rates of return reflects the current context of extremely low yields and the general outlook that yields will increase over the coming years. A constant rate of return is assumed for more volatile asset classes, reflecting the difficulty to predict annual market returns.

The rates of return were developed by looking at historical returns (expressed in Canadian dollars); these returns were then adjusted upward or downward to reflect future expectations. Given the long projection period, future gains and (losses) due to currency variations were expected to offset each other over time. Hence, it was assumed that currency variations will not have an impact on the long-term rates of return.

The assumed rates of return also include an allowance for diversification that is achieved through the rebalancing of the portfolio that keeps the asset mix constant over time. If the expected rates of return for each asset class were not increased to reflect their respective share of this allowance, then the expected long-term portfolio rates of return calculated as the weighted average rate of return of each asset class would be underestimated.

All rates of return described in this section are shown before reduction for assumed investment expenses; Subsection C) describes how the returns are adjusted for investment expenses.

Fixed Income Securities

As at 31 March 2017, PSPIB had 18% of its portfolio invested in fixed income securities, including Canadian fixed income, inflation-linked bonds (mostly US Treasury Inflation-Protected Securities (TIPS)) and cash. It is assumed that the proportion invested in fixed income securities will increase to 20% of Pension Fund assets in plan year 2022 and remain at that level for the projection period.

[1] For presentation purposes, PSPIB includes real return bonds as part of real return assets. However, for the purpose of this report, real return bonds are allocated to fixed income securities.

The fixed income securities' ultimate mix (excluding cash) in plan year 2022 is expected to consist of 25% federal bonds, 25% provincial bonds and 50% US TIPS, which reflects PSPIB's long-term target allocation.

As described in Section 1 above, the assumed real yield on 10-year-plus federal bonds is expected to increase from 0.8% in plan year 2018 to an ultimate rate of 2.7% in plan year 2028. This increase in real yield is consistent with the average private sector forecasts. The initial spread for long-term provincial bonds over the 10-year-plus federal bond real yield is assumed to be 100 basis points while the ultimate spread is assumed to be 65 basis points (in plan year 2028). The initial spread on inflation-linked bonds is assumed to be 20 basis points and is expected to decrease to 10 basis points in plan year 2028.

Since the current PSPIB policy portfolio and its long-term target Policy Portfolio is composed of universe bonds (long, mid and short terms), it is assumed that fixed income securities are composed of universe bonds for the entire projection period. Due to their overall shorter maturity, the yields on universe bonds are lower than the yields on long-term bonds. The spread between the 10-year-plus federal bonds and the universe of federal bonds is assumed to decrease from 105 basis points in plan year 2018 to 70 basis points in plan year 2028. The spread between universe federal bonds and universe provincial bonds is assumed to decrease from 130 basis points to 85 basis points between plan year 2018 and plan year 2028.

The expected real rates of return for individual bonds take into account the coupons and market value fluctuations due to the expected movement of their respective yield rates. The 10-year-plus federal bonds yield is assumed to increase between plan years 2018 and 2028. Therefore, bond returns are quite low for the first ten years of the projection. The assumed ultimate real rate of return for 10-year-plus federal bonds is 2.7% starting in plan year 2028. An ultimate fixed income real rate of return of 2.7% is also assumed for 2028 and thereafter.

Equity

Currently, approximately half of the assets of the Pension Fund are invested in equities (both public and private). In the derivation of the real rates of return for these equity investments, consideration was given to the long-term equity risk premiums. The rates of return also include dividends from the equities and market value fluctuations. No distinction is made between realized and unrealized capital gains.

Consistent with the assumption that risk taking must be rewarded, equity returns are developed by adding an equity risk premium to the 10-year-plus federal bonds' real rate of return. The historical equity risk premium over long-term government bonds' returns for 23 countries, representing about 91% of global stock market value, for the 118-year and 50-year periods ending in 2017 were 3.2% and 0.8% respectively[1]. Historically, the equity risk premium over 118 years was higher than expected due to several non-repeatable factors (mainly diversification and globalization). As a result, the long-term expected equity risk premium is assumed to be lower than what was

[1] Source: Elroy Dimson, Paul Marsh and Mike Staunton, Credit Suisse Global Investment Returns Yearbook 2018.

realized in the past 118 years. However, given the low bond returns over the first ten years of the projection period, the equity risk premium is assumed to originally be higher and to slowly decrease to its ultimate rate of 2.1% for public equities. The equity risk premium for private equities is expected to be 80 basis points higher than for public equities, reflecting the additional risk inherent with investments in the private markets.

As described in the previous section, the 10-year-plus federal bond real rate of return is set at 2.7% for plan years 2028 and thereafter. The real rates of return for public and private equities are thus projected at 4.8% and 5.6% respectively.

Real Assets

Real assets such as real estate, infrastructure and natural resources are considered to be a hybrid of fixed income and equity. They are assumed to share characteristics of both of these asset classes in the proportion of 30% fixed income and 70% public equity. The change since the last report reflects the evolution of market conditions as well as discussions with PSPIB. Hence, the assumed return on real assets is composed of 30% of the return on fixed income securities and 70% of the return on public equity. Considering the inherent difficulties in modelling short-term returns for volatile assets, real assets are projected to earn 4.2% throughout the projection period.

Credit

Credit is also considered to be a hybrid of fixed income and equity. It is assumed to share characteristics of both of these asset classes in equal proportions. Hence, the assumed return on credit is composed of 50% of the return on fixed income securities and 50% of the return on public equity. Considering the inherent difficulties in modelling short-term returns for volatile assets, credit is projected to earn 3.7% throughout the projection period.

Table 38 summarizes the assumed real rates of return by asset type throughout the projection period, prior to reduction for investment expenses.

Table 38 Real Rate of Return by Asset Type (in percentage)

Plan Year	Fixed Income Securities	Cash	Public Equity	Private Equity	Real Assets	Credit
2018	(3.1)	(0.8)	4.8	5.6	4.2	3.7
2019	(3.5)	(0.7)	4.8	5.6	4.2	3.7
2020	(0.1)	(0.2)	4.8	5.6	4.2	3.7
2021	0.1	(0.1)	4.8	5.6	4.2	3.7
2022	0.3	0.1	4.8	5.6	4.2	3.7
2023	0.3	0.2	4.8	5.6	4.2	3.7
2024	0.1	0.4	4.8	5.6	4.2	3.7
2025	0.3	0.6	4.8	5.6	4.2	3.7
2026	0.5	0.8	4.8	5.6	4.2	3.7
2027	1.7	1.0	4.8	5.6	4.2	3.7
2028+	2.7	1.1	4.8	5.6	4.2	3.7

c) Investment Expenses

Over the last three plan years, PSPIB's operating and asset management expenses have averaged 0.6% of average net assets. It is assumed that going forward PSPIB investment expenses will average 0.6% of average net assets. The majority of those investment expenses were incurred through active management decisions.

The active management objective is to generate returns in excess of those from the policy portfolio, after reduction for additional expenses. Thus, the additional returns from a successful active management program should equal at least the cost incurred to pursue active management. In eight of the past ten years, PSPIB's additional returns from active management exceeded related expenses. For the purpose of this valuation, it is assumed that additional returns due to active management will equal additional expenses related to active management. These expenses are assumed to be the difference between total investment expenses of 0.6% and the assumed expenses of 0.2% that would be incurred for passive management of the portfolio.

The next section shows the overall rate of return on the fund net of investment expenses.

d) Overall Rate of Return on Assets of the Pension Fund

The best-estimate rate of return on total assets is derived from the weighted average assumed rate of return on all types of assets, using the assumed asset mix proportions as weights. The best-estimate rate of return is further increased to reflect additional returns due to active management and reduced to reflect all investment expenses. The ultimate real rate of return is developed as follows:

	Nominal	Real
Weighted average rate of return[1]	6.2%	4.2%
Additional returns due to active management	0.4%	0.4%
Expected investment expenses		
Expenses due to passive management	(0.2%)	(0.2%)
Additional expenses due to active management	(0.4%)	(0.4%)
Total expected investment expenses	(0.6%)	(0.6%)
Rate of return net of investment expenses	6.0%	4.0%

[1] Including an allowance of 45 basis points for rebalancing and diversification.

The resulting nominal and real rates of return for each projection year are as follows:

Table 39 Rates of Return on Assets in Respect of the Pension Fund (in percentage)

Plan Year	Nominal	Real
2018	4.7	3.1
2019	5.1	3.1
2020	5.5	3.5
2021	5.5	3.5
2022	5.5	3.5
2023	5.5	3.5
2024	5.5	3.5
2025	5.6	3.6
2026	5.6	3.6
2027	5.8	3.8
2028+	6.0	4.0
2018-2022	5.3	3.3
2018-2027	5.4	3.5
2018-2037	5.7	3.7

It is assumed that the ultimate real rate of return on investments will be 4.0% in 2028, net of all investment expenses. This represents a reduction of 0.1% from the previous valuation. The real rates of return over the first ten years of the projection are on average 0.4% lower than assumed in the previous valuation. The real rate of return on assets takes into account the assumed asset mix as well as the assumed real rate of return for all categories of assets. The nominal returns projected for the Pension Fund are simply the sum of the assumed level of inflation and the real return.

Using the variable real rates on return on assets in the previous table is equivalent to using a flat real discount rate of 3.7% for the purpose of calculating the liability as at 31 March 2017 for service since 1 April 2000.

4. Transfer Value Real Interest Rate

Interest rates for transfer values are determined in accordance with the Standards of Practice published by the Canadian Institute of Actuaries. In particular, the real interest rates to be used for the computation of commuted values as at a particular date are as follows:

First 10 years: $r_7 + 0.90\%$

After 10 years: $r_L + 0.5 \times (r_L - r_7) + 0.90\%$

Where

$$r_7 = r_L \times \left(\frac{i_7}{i_L}\right)$$

r_L is the long-term real-return Government of Canada bond yield, annualized

i_L is the long-term Government of Canada benchmark bond yield, annualized and

i_7 is the 7-year Government of Canada benchmark bond yield, annualized

The obtained rates of interest are rounded to the nearest multiple of 0.10%.

For example, for plan year 2020, the assumed real rates of interest are 1.9% for the first 10 years and 2.4% thereafter. The rates are derived from the assumed CPI increase, the assumed 10-year-plus Government of Canada benchmark bond yield which corresponds to the new money rate in this valuation and the assumed spreads[1] between the new money rate and the long-term real-return Government of Canada bond yield, the long-term Government of Canada benchmark bond yield and the 7-year Government of Canada benchmark bond yield.

Table 40 shows the assumed transfer value real interest rates used in this report:

Table 40 Transfer Value Real Interest Rates (As a percentage)

					Real Interest Rates	
Plan Year	r_L	i_L	i_7	r_7	First 10 Years	After 10 Years
2018	0.83	2.48	1.92	0.64	1.50	1.80
2019	0.88	2.98	2.33	0.69	1.60	1.90
2020	1.33	3.48	2.74	1.04	1.90	2.40
2021	1.51	3.68	2.91	1.20	2.10	2.60
2022	1.60	3.78	2.99	1.27	2.20	2.70
2023	1.69	3.88	3.07	1.34	2.20	2.80
2024	1.87	4.08	3.24	1.48	2.40	3.00
2025	2.05	4.29	3.40	1.62	2.50	3.20
2026	2.23	4.49	3.52	1.75	2.70	3.40
2027	2.43	4.69	3.72	1.93	2.80	3.60
2028+	2.53	4.79	3.82	2.02	2.90	3.70

[1] The spreads for the first year are based on the average spreads for plan year 2018 of 4, 8 and -47 basis points between 10-year-plus Government of Canada bond yield and the bonds underlying r_L, i_L and i_7 respectively. The ultimate spreads of -13, 9 and -86 basis points, starting in fiscal year 2026, are based on the average spreads over the last 10 years. An interpolation reflecting the variation in new money rates is applied for intermediate years.

5. Summary of Economic Assumptions

The economic assumptions used in this report are summarized in the Table 41.

Table 41 Economic Assumptions[1] (As a percentage)

	Inflation		Employment Earning Increases				Interest	
Plan Year	CPI Increase[2]	Pension Indexation[3]	YMPE[3]	Average Pensionable Earnings[4]	Maximum Pensionable Earnings[3,5]	New Money Rate	Projected Yield on Account	Projected Return on Fund
2018	1.6	**1.6**	**1.1**	1.6	**1.0**	2.4	4.2	4.7
2019	2.0	1.8	2.3	2.0	2.3	2.9	4.0	5.1
2020	2.0	2.0	2.6	2.3	2.6	3.4	3.8	5.5
2021	2.0	2.0	2.9	2.6	2.9	3.6	3.7	5.5
2022	2.0	2.0	3.0	2.7	3.0	3.7	3.6	5.5
2023	2.0	2.0	3.0	2.7	3.0	3.8	3.5	5.5
2024	2.0	2.0	3.1	2.8	3.1	4.0	3.4	5.5
2025	2.0	2.0	3.1	2.8	3.1	4.2	3.4	5.6
2026	2.0	2.0	3.1	2.8	3.1	4.4	3.3	5.6
2027	2.0	2.0	3.1	2.8	3.1	4.6	3.3	5.8
2030	2.0	2.0	3.1	2.8	3.1	4.7	3.2	6.0
2035	2.0	2.0	3.1	2.8	3.1	4.7	3.5	6.0
2040	2.0	2.0	3.1	2.8	3.1	4.7	4.4	6.0
2045+	2.0	2.0	3.1	2.8	3.1	4.7	4.7	6.0

As a reference, for periods ending December 2016, the following table was prepared based on the Canadian Institute of Actuaries Report on Canadian Economic Statistics 1924 - 2016.

Period of Years Ending 2016	15	25	50
Level of Inflation	1.9%	1.8%	4.0%
Real Increases in Average Earnings	0.7%	0.4%	0.8%
Real Yield on Long-Term Canada Bonds	1.8%	3.2%	3.2%
Real Return on Long-Term Canada Bonds	4.7%	6.2%	4.0%
Average Real Return on Diversified Portfolios	4.7%	6.3%	4.7%

1 Bold figures denote actual experience.
2 Assumed to be effective during Plan Year.
3 Assumed to be effective as at 1 January.
4 Assumed to be effective as at 1 April. Exclusive of seniority and promotional increases.
5 Calendar year 2018 Maximum Pensionable Earnings is $164,700.

Appendix 7 – PSSA Demographic and Other Assumptions

A. Demographic Assumptions

Given the size of the population subject to the PSSA, the plan's own experience, except where otherwise noted, was deemed to be the best model to determine the demographic assumptions. Assumptions from the previous valuation were updated to reflect past experience to the extent it was deemed credible.

1. Seniority and Promotional Salary Increases

Seniority means length of service within a classification, and promotion means moving to a higher paid classification. The experience of the last three years compares closely to the assumption reported in the last valuation report. The assumption of the previous report was changed by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation.

Table 42 Sample of Assumed Seniority and Promotional Salary Increases (Percentage of annual earnings)

Completed Years of Pensionable Service	Male	Female
0	5.6	5.7
1	5.1	5.1
2	4.5	4.5
3	4.0	3.9
4	3.5	3.5
5	3.1	3.1
6	2.8	2.8
7	2.6	2.6
8	2.4	2.4
9	2.2	2.2
10	2.0	2.1
15	1.5	1.6
20	1.2	1.4
25	1.1	1.2
30	1.0	1.0

2. New Contributors

It was assumed that the distribution of new participants by age and sex would be the same as that of participants with less than one year of service at the valuation date. The assumed percentage increase in the number of contributor for each plan year is shown in Table 43.

Table 43 Assumed Annual Increases in Number of Contributors

Plan Year	Percentage
2018	1.67
2019	4.00
2020	2.00
2021+	0.50

The initial salary of new members in a given age-sex cell in plan year 2018 is assumed to be the same as the corresponding experience in plan year 2017 with an economic salary increase for plan year 2018. Initial salary is assumed to increase in future years in accordance with the assumption for average pensionable earnings increases.

3. Pensionable Retirement

The pensionable retirement assumption was revised to reflect the intervaluation experience.

For Group 1 contributors, the retirement assumption was developed by giving full credibility to the experience between 1 April 2014 to 31 March 2017. The impact on the combined male and female assumption is an average increase of 26% of pensionable retirement rates for members entitled to an annual allowance and an average increase of 8% of pensionable retirement rates for members entitled to an immediate annuity at or below age 60. For both male and female members expected to retired between the ages of 60 to 65, the pensionable retirement rates have decreased by an average of 3%.

For Group 2 contributors, the retirement assumption was developed using the same methodology as in the previous valuation. The Group 1 retirement rates between the ages of 49 and 59 were used as the basis for the Group 2 retirement rates between the ages of 54 and 64. These retirement rates were further increased to account for the additional retirement rates between the ages of 59 to 64 for Group 2, with the objective of having equal probability of survival as an active contributor to age 65, for a contributor age 54 from either Group 1 or Group 2.

The assumed rates of pensionable retirement for the operational service group have been revised by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation. The assumed pensionable retirement rates are on average 10% lower than that in the previous valuation.

Tables 44 to 49 provide sample rates of pensionable retirement.

Table 44 Sample of Assumed Rates of Retirement – Main Group 1 – Male (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	20	29	30	35
50	93	58	17	13	26	14	0
55	74	73	25	25	253	191	290
60	128	126	86	155	268	232	353
65	216	243	225	260	299	318	393
70	316	265	305	320	389	417	489

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 45 Sample of Assumed Rates of Retirement – Main Group 1 – Female (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	20	29	30	35
50	98	78	15	10	19	16	0
55	121	108	40	38	346	251	439
60	151	143	109	187	309	250	391
65	236	223	258	295	245	295	354
70	333	280	295	423	444	304	391

Table 46 Sample of Assumed Rates of Retirement – Main Group 2 – Male (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	20	29	30	35
55	95	61	20	18	26	14	0
60	92	94	54	64	276	191	290
65	216	243	225	260	299	318	393
70	316	265	305	320	389	417	489

Table 47 Sample of Assumed Rates of Retirement – Main Group 2 – Female (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	20	29	30	35
55	101	81	19	15	19	16	0
60	137	130	74	94	367	251	439
65	236	223	258	295	245	295	354
70	333	280	295	423	444	304	391

Table 48 Sample of Assumed Rates of Retirement – Operational Service Group Actual (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	19	20	30	35
34-47	-	-	-	2	2	63	-
48	-	-	-	5	3	79	-
50	96	68	16	7	9	135	43
55	98	91	33	30	30	233	523
60	140	135	98	143	171	241	372
65	226	233	242	270	278	307	374

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 49 Sample of Assumed Rates of Retirement – Operational Service Group Deemed (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	2	10	19	20	30	35
34-43	-	-	-	-	-	-	-
44	-	-	-	5	5	-	-
48	-	-	-	5	3	79	-
50	96	68	16	7	9	135	43
55	98	91	33	30	30	233	523
60	140	135	98	143	171	241	372
65	226	233	242	270	278	307	374

4. Disability Retirement

The disability incidence rate assumption was revised to reflect the intervaluation experience. By age 60, Group 1 contributors are eligible to receive a fully unreduced annuity hence disability rates are not required for ages above 59. Group 2 contributors, however, can potentially take a disability retirement until age 65, thus the disability rate assumption for Group 2 contributors includes ages 59 to 64. The assumed disability incidence rates were revised by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation. The rates for males below age 60 are on average 19% lower than that in the previous valuation. The assumed disability incidence rates for females below age 60 are on average 15% higher than that in the previous valuation. Rates for Group 2 contributors (male and female) above age 60 are those of the previous valuation.

It is assumed that 75% of future new disability pensioners will receive a C/QPP disability pension at the onset of disability. This is unchanged from the previous valuation.

Table 50 Sample of Assumed Rates of Pensionable Disability (Per 1,000 individuals)

Age Last Birthday[1]	Group 1		Group 2	
	Male	Female	Male	Female
25	0.05	0.05	0.05	0.05
35	0.36	1.01	0.36	1.01
45	1.61	2.94	1.61	2.94
55	4.20	7.92	4.20	7.92
58	6.12	8.96	6.12	8.96
59	-	-	7.25	10.13
60	-	-	8.78	11.38
61	-	-	10.66	12.63
62	-	-	12.73	13.76
63	-	-	14.65	14.63

[1] Expressed in completed years calculated at the beginning of the plan year.

5. Withdrawal

Withdrawal with less than two years of service includes termination of employment for any reason. Withdrawal with two or more years of service means termination of employment for reasons other than death, disability or retirement with an immediate annuity or an annual allowance.

The previous assumption for rates below age 45 were determined on the basis that Group 1 and Group 2 contributors are expected to have similar experience regardless of different locking-in ages. Locking-in age is the age when the availability of the transfer value option is no longer available. For Group 1 contributors, lock-in occurs at the attainment of age 50 whereas for Group 2 contributors it occurs at age 55. The withdrawal assumption for ages below 45 and for all services were revised by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation.

The Group 1 contributor withdrawal assumption for ages 45 to 49 was revised by giving equal credibility to the plan's experience of Group 1 contributors over the last three plan years and the assumption from the previous valuation.

For Group 2 contributors from age 45 to 54 with three years or more of service, no credible experience exists for the period between 1 April 2014 to 31 March 2017. As such, the Group 2 contributor withdrawal assumption between the ages of 50 to 54 was carried forward from the previous report. The Group 2 contributor withdrawal assumption from age 44 to 49 with more than two years of service was revised by linearly interpolating between the Group 1 contributor rates at age 44 and the Group 2 rates at age 49.

For Group 2 contributors with less than three years service, credible experience exists for the period between 1 April 2014 to 31 March 2017. The Group 2 contributor withdrawal assumption from age 50 to 54 with less than three years of service were revised by giving equal credibility to the plan's experience of Group 2 contributors over the last three plan years and the assumption from the previous valuation.

In the previous report, the CSC contributors were assumed to be subject to the same assumption regardless of which contributor group they belong. This valuation will continue with this assumption for all CSC contributors under the age of 50 at termination. New withdrawal rates will be introduced for Group 2 CSC contributors terminating between the ages of 50 and 54 with less than 20 years of service.

The withdrawal rates for Group 1 and Group 2 CSC contributors, which apply to those who have less than 20 years of service and below age 50, were derived by giving full credibility to the last six year plan experience, from 1 April 2011 to 31 March 2017. Withdrawal rates for Group 2 CSC contributors between the ages of 50 and 54 were derived by blending the withdrawal rates of male and female Group 2 contributor rates at a 50-50 percent ratio.

CSC deemed contributors are subject to the same assumption as CSC actual contributors except for those who have service above 18 years and age below 44. Termination of CSC deemed contributors at such age and service combination would entitle the members to a deferred annuity or a transfer value. Due to low number of occurrence, the

withdrawal rates of the previous assumption are used for CSC deemed contributors in this age and service combination.

The rates for Group 1 contributor male and Group 1 contributor female are on average 42% and 10% greater than in the previous valuation. The rates for Group 2 contributor male and Group 2 contributor female are on average 39% and 6% greater than in the previous valuation.

The average increase in the withdrawal rates applicable to Group 1 and Group 2 CSC contributors is at around 2%.

Tables 51 to 56 provide samples of the assumed rates of withdrawal.

Table 51 Sample of Assumed Rates of Withdrawal – Main Group 1 – Male (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	0	1	5	10	20	25	30
20	363	365	60	-	-	-	-
25	143	131	36	34	-	-	-
30	107	93	31	14	-	-	-
35	95	83	27	13	3	-	-
40	98	86	25	17	9	20	-
45	99	84	24	17	6	9	5
48	111	87	24	19	10	7	7
50	128	-	-	-	-	-	-
55	146	-	-	-	-	-	-
60	235	-	-	-	-	-	-

Table 52 Sample of Assumed Rates of Withdrawal – Main Group 1 – Female (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	0	1	5	10	20	25	30
20	349	349	84	-	-	-	-
25	132	117	27	8	-	-	-
30	117	99	23	9	-	-	-
35	106	92	25	14	3	-	-
40	113	96	25	17	7	5	-
45	122	104	25	18	9	5	8
48	139	108	27	21	11	8	4
50	179	-	-	-	-	-	-
55	202	-	-	-	-	-	-
60	268	-	-	-	-	-	-

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 53 Sample of Assumed Rates of Withdrawal – Main Group 2 – Male (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	0	1	5	10	20	25	30
20	363	365	60	-	-	-	-
25	143	131	36	34	-	-	-
30	107	93	31	14	-	-	-
35	95	83	27	13	3	-	-
40	98	86	25	17	9	20	-
45	99	84	22	16	5	9	6
48	111	87	17	14	5	4	3
50	128	63	17	13	5	4	2
53	141	74	17	14	7	4	5
55	146	-	-	-	-	-	-

Table 54 Sample of Assumed Rates of Withdrawal – Main Group 2 – Female (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	0	1	5	10	20	25	30
20	349	349	84	-	-	-	-
25	132	117	27	8	-	-	-
30	117	99	23	9	-	-	-
35	106	92	25	14	3	-	-
40	113	96	25	17	7	5	-
45	122	104	23	17	7	6	5
48	139	108	21	16	6	5	6
50	179	89	22	15	6	5	6
53	189	79	24	17	8	7	4
55	202	-	-	-	-	-	-

Table 55 Sample of Assumed Rates of Withdrawal – Operational Group Actual (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service					
	0	1	5	10	15	18
20	109	95	11	-	-	-
25	39	34	10	12	-	-
30	44	34	14	14	6	-
35	52	39	12	9	8	3
40	59	50	14	8	3	8
45	69	54	40	18	5	5
48	78	61	25	18	7	10
50	92	-	-	-	-	-
55	129	-	-	-	-	-
60	136	-	-	-	-	-

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 56 Sample of Assumed Rates of Withdrawal – Operational Group Deemed (Per 1,000 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	0	1	5	10	20	25	30
20	109	95	11	-	-	-	-
25	39	34	10	12	-	-	-
30	44	34	14	14	-	-	-
35	52	39	12	9	3	-	-
40	59	50	14	8	4	3	-
45	69	54	40	18	-	-	-
48	78	61	25	18	-	-	-
50	92	-	-	-	-	-	-
55	129	-	-	-	-	-	-
60	136	-	-	-	-	-	-

6. Proportions of Terminating Contributor Opting for a Deferred Annuity

Group 1 contributors with at least two years of service and less than 50 years of age upon termination can opt for a deferred annuity payable at age 60 or a commuted value of the deferred annuity to age 60. Group 2 contributors with at least two years of service and less than 55 years of age upon termination can opt for a deferred annuity payable at age 65 or a commuted value of the deferred annuity to age 65.

The assumption for the proportion of terminating contributor opting for a deferred annuity is tied to the withdrawal rate and is determined by combining the experience of Group 1 and Group 2 contributors whose termination are below age 50. The proportions were revised by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation for all age and service combinations where the exposures to a termination was significant.

Group 2 contributor proportions applicable for ages above 49 were carried forward from the previous valuation due to low exposure except for services below three years which were revised by giving equal credibility to the plan's experience over the last three plan years and the assumption from the previous valuation.

Tables 57 to 61 provide samples of the proportions of terminating contributors opting for a deferred annuity.

Table 57 Sample of Proportions Opting for a Deferred Annuity – Main Group 1 – Male (Per 100 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	5	10	15	20	25	30
20	3	79	-	-	-	-	-
25	14	49	74	-	-	-	-
30	18	53	41	34	-	-	-
35	18	50	56	48	33	-	-
40	19	53	52	43	48	44	-
45	17	53	56	46	56	38	25
48	15	53	51	44	46	36	11

Table 58 Sample of Proportions Opting for a Deferred Annuity – Main Group 1 – Female (Per 100 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	5	10	15	20	25	30
20	7	41	-	-	-	-	-
25	15	49	17	-	-	-	-
30	20	56	37	17	-	-	-
35	20	54	47	32	14	-	-
40	20	57	52	49	33	17	-
45	20	54	55	50	49	41	3
48	18	58	53	46	43	40	8

Table 59 Sample of Proportions Opting for a Deferred Annuity – Main Group 2 – Male (Per 100 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	5	10	15	20	25	30
20	3	79	-	-	-	-	-
25	14	49	74	-	-	-	-
30	18	53	41	34	-	-	-
35	18	50	56	48	33	-	-
40	19	53	52	43	48	44	-
45	17	53	56	46	56	38	25
50	33	45	55	41	50	46	24
53	33	50	55	36	36	30	11

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 60 Sample of Proportions Opting for a Deferred Annuity – Main Group 2 – Female (Per 100 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	5	10	15	20	25	30
20	7	41	-	-	-	-	-
25	15	49	17	-	-	-	-
30	20	56	37	17	-	-	-
35	20	54	47	32	14	-	-
40	20	57	52	49	33	17	-
45	20	54	55	50	49	41	3
50	27	61	47	43	41	37	11
53	25	58	46	42	39	32	30

Table 61 Sample of Proportions Opting for a Deferred Annuity – Operational Service Group (Per 100 individuals)

Age Last Birthday[1]	Completed Years of Pensionable Service						
	1	5	10	15	20	25	30
20	5	60	-	-	-	-	-
25	15	49	45	-	-	-	-
30	19	54	39	25	-	-	-
35	19	52	51	40	23	-	-
40	19	55	52	46	41	30	-
45	18	53	56	48	-	-	-
48	16	55	52	45	-	-	-

7. Mortality

As in the previous valuation, the mortality rates assumed for contributors, retirement pensioners and surviving spouses were derived by giving full credibility to the plan's experience over the last three years. With the availability of salary information at the date of retirement and current contributors salary, the mortality study was modified to account for different levels of salary. It is assumed that an above (below) average socio-economic status, which is partly dictated by salary level, leads to longer (shorter) life expectancy. By using salary-weighted mortality, the resulting mortality assumption would reflect life expectancy of pensioners with consideration of their socio-economic status.

A similar change in methodology was also made for the survivor mortality study. However, the corresponding weights on the mortality rates were replaced by pension amounts instead of salaries. Again, the weighting assumes that the amounts of pension the pensioners receive would have a similar impact on the life expectancy of the survivors. That is, a higher (lower) pension amount received leads to a longer (shorter) life expectancy.

The contributor and the retirement pensioner mortality study was initially performed without consideration of the salary levels in order to verify the expected trend in

[1] Expressed in completed years calculated at the beginning of the plan year.

mortality for the period between 1 April 2014 and 31 March 2017. Our findings show that for the first time over approximately the last 20 years, mortality did not improve in the period of study. Additionally, the observed mortality rates at ages above 60 were marginally worse than the base mortality rates used in the previous report. This finding is also observed for the surviving spouse mortality study but to a lesser extent.

Even though mortality rates have stagnated or even retrograded, the introduction of the salary-weighted methodology produced a reduction in the base mortality rates. For contributors and retirement pensioners the new base year assumed mortality rates decreased on average by 14% for male and 5% for female between the ages of 30 to 80.

Due to the limited disabled mortality experience over the three-year intervaluation period, the mortality rates for disabled pensioners were derived by giving equal credibility to the plan's experience during that time and the projected assumption from the previous valuation.

The assumed mortality rates for disability pensioners were marginally changed at specific ages but overall the average mortality rates remained unchanged from the mortality rates of the last valuation report.

Even though mortality rates have stagnated, the introduction of the pension amount weighted methodology resulted in a reduction in the base survivor mortality rates. For spouse survivors, the new base year assumed mortality rates decreased on average by 2% for male survivors and 6% for female survivors between the ages of 30 to 80.

Table 62 shows a sample of assumed rates of mortality.

Table 62 Sample of Assumed Rates of Mortality For Plan Year 2018 (Per 1,000 individuals)

Age Last Birthday[1]	Contributors and Retirement Pensioners		Disability Pensioners		Surviving Spouses	
	Male	Female	Male	Female	Male	Female
30	0.3	0.2	6.2	4.5	1.0	0.4
40	0.5	0.6	9.2	6.0	2.3	0.8
50	1.2	1.2	13.8	8.3	3.6	2.0
60	4.0	3.1	20.7	12.9	9.4	4.6
70	13.1	9.8	36.7	22.6	19.3	12.9
80	42.8	33.0	80.3	56.6	59.9	38.6
90	155.1	123.5	188.3	155.5	163.9	120.8
100	362.8	301.2	419.8	467.5	368.2	307.4
110	500.0	500.0	500.0	500.0	500.0	500.0

Beginning with the 2005 Actuarial Report, the longevity improvement assumptions are based on the corresponding assumptions published in the latest Actuarial Report on the Canada Pension Plan (CPP). The longevity improvement assumption of the previous report was based on the 26th CPP Actuarial Report. The 27th CPP Actuarial Report is the latest published report and the longevity improvement factors in this report are larger than those published in the 26th CPP Actuarial Report. Given that mortality during the

[1] Expressed in completed years calculated at the beginning of the plan year.

intervaluation period has not improved as expected, in contrary to the historical trend, the longevity improvement assumption stated in the latest 27th CPP Actuarial Report are not used in this report. Thus, the longevity improvement assumption of the previous report is carried over to this valuation.

A sample of assumed longevity improvement factors is shown in Table 63.

Table 63 Sample of Assumed Longevity Improvement Factors (applicable at the beginning of the plan year)

	Initial and Ultimate Plan Year Mortality Reductions (%)			
	Male		Female	
Age Last Birthday[1]	2018	2030	2018	2030
30	1.86	0.80	1.02	0.80
40	1.46	0.80	1.24	0.80
50	1.24	0.80	1.02	0.80
60	1.74	0.80	1.40	0.80
70	1.89	0.80	1.40	0.80
80	1.97	0.80	1.40	0.80
90	1.15	0.48	1.03	0.48
100	0.49	0.30	0.49	0.30
110+	0.21	0.23	0.21	0.23

Table 64 shows the calculated life expectancy for contributors and retirement pensioners based on the mortality assumptions described in this section.

Table 64 Life Expectancy of Contributors and Retirement Pensioners (Years)

	As at 31 March 2017		As at 31 March 2033	
Age Nearest	Male	Female	Male	Female
60	26.6	28.4	27.5	29.3
65	21.9	23.7	22.8	24.5
70	17.6	19.1	18.3	19.9
75	13.5	14.9	14.2	15.6
80	9.8	11.1	10.4	11.7
85	6.9	7.9	7.3	8.4
90	4.8	5.6	5.0	5.9

In Table 65, life expectancies based on the mortality assumption of the previous valuation are compared with those based on the mortality assumption described in this section.

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 65 Life Expectancy at Age 60 as at 31 March 2017 (Years)

	Current Report	Previous Report[1]	Increase/(Decrease)
Retired Males	26.6	26.4	0.2
Retired Females	28.4	28.7	(0.3)
Disabled Males	20.0	20.6	(0.6)
Disabled Females	23.3	23.7	(0.4)
Male Surviving Spouses	24.1	24.7	(0.6)
Female Surviving Spouses	27.5	27.4	0.1

8. Family Composition

The assumptions regarding spouse survivors were revised based on the intervaluation experience.

The assumption regarding the probability of a member, upon death, leaving a spouse eligible for a survivor pension were reduced between the ages of 30 and 80 for male. On average, a male member was 3.6% less likely to leave a surviving spouse than was assumed in the previous valuation. For female, the probabilities were marginally increased for most ages between 30 and 60 such that a female member was, on average, 0.5% more likely to leave a surviving spouse. For ages between 60 and 80, the probability was, on average, 1.0% less likely to leave a surviving spouse than was assumed in the previous valuation.

For male members, at most ages the assumed surviving spouse age was unchanged from the previous valuation. For female members at most ages from 75 to 90, the assumed surviving spouse age was increased slightly such that, on average, surviving male spouse was assumed to be 0.6 years older than was assumed in the previous valuation.

Table 66 Assumptions for Survivor Spouse Allowances[2]

	Male		Female	
Age Last Birthday[3]	Probability of an Eligible Spouse at Death of Member	Spouse Age Difference	Probability of an Eligible Spouse at Death of Member	Spouse Age Difference
30	0.40	(1)	0.54	2
40	0.51	(2)	0.58	3
50	0.61	(2)	0.57	2
60	0.66	(3)	0.51	2
70	0.65	(3)	0.39	1
80	0.61	(4)	0.22	0
90	0.41	(5)	0.06	(2)
100	0.11	(9)	0.00	-

The assumption regarding the number of eligible surviving children of a deceased contributor or pensioner who are under age 18, and between ages 18 and 25 who are in full-time attendance at a school or university was derived by giving equal credibility to

1 From the 31 March 2014 Actuarial Report projected to 31 March 2017.
2 Survivor pensions are not payable if the deceased member has less than two years of pensionable service.
3 Expressed in completed years calculated at the beginning of the plan year.

the plan's experience over the last three plan years and the assumption from the previous valuation.

For male members between the ages of 30 and 50 the average number children assumed to be eligible for a survivor allowance increased on average by 5.3% and decreased by 7.0% between the ages of 50 and 80. The average number of children assumed to be eligible for a survivor allowance decreased on average by 17% for female at ages below 40 and by 2.1% for ages above 40.

The assumption for the average age of eligible children was derived by giving equal credibility to the plan's experience over the last three years and the assumption from the previous valuation. In general, the average age of eligible children of a deceased contributor or pensioner increased on average by 0.4 year and 0.8 for ages below age 60 for both male and female members respectively. For ages above age 60, an average increase of 0.2 and 0.4 for male and female members, respectively.

As in the previous valuation, to determine the value of pension payable to eligible children, the rates of pension termination were assumed to be zero prior to age 17 and 16% per annum thereafter until expiry of the benefit on the 25th birthday.

The revisions to family composition assumptions have a negligible impact on the valuation results.

Table 67 Assumptions for Survivor Child Allowances

Age Last Birthday at Death	Male		Female	
	Average Number of Children	Average Age of Children	Average Number of Children	Average Age of Children
30	0.73	2	0.63	1
40	1.02	9	0.89	10
50	0.62	14	0.41	16
60	0.09	18	0.01	19
70	0.01	18	0.00	20

B. Other Assumptions

1. Pension Benefits Division/Optional Survivor Benefit/Leave Without Pay

The division of pension benefits has almost no effect on the valuation results because the liability is reduced, on average, by approximately the amount paid to the credit of the former spouse. Consequently, no future pension benefits divisions were assumed in estimating the current service cost and liability. However, past pension benefits divisions were fully reflected in the liability. Two other provisions, namely the optional survivor benefit and the suspension of membership while on leave without pay, were also treated like pension benefits divisions for the same reason.

2. Minimum Post-Retirement Death Benefit

This valuation does not take into account the minimum death benefit described in Note 14 of Appendix 1D, with respect to deaths occurring after retirement. The resulting understatement of the accrued liability and current service cost is not material since the majority of the relatively few pensioners who die in the early years of retirement leave an eligible survivor.

3. Administrative Expenses

In the previous report, the PSPIB operating expenses were implicitly recognized through a reduction in the real return on the Pension Fund. In this report, the operating expenses of the PSPIB are still recognized implicitly.

Administrative expenses are assumed to be 0.45% of pensionable payroll, a decrease from 0.50% in the previous valuation. This assumption is supported by an analysis of the administrative expenses over the last three years. For plan 2018, 55% of total administrative expenses are being charged to the Superannuation Account; it is assumed that the proportion charged for the Superannuation Account will reduce at an annual rate of 2.0%, a decline from the assumption of 2.8% used in the previous report. Expenses expected to be debited to the Superannuation Account in the future have been capitalized and are shown as a liability on the balance sheet, whereas the expenses to the Pension Fund are shown on an annual basis as they occur.

4. Financing of Elected Prior Service

The assumed future government credits in respect of prior service elections vary according to the rate paid by the contributor (i.e. single or double) and the vehicle into which the contributions are deposited (i.e. Account or Fund). The government matches member contributions made to the Superannuation Account for prior service elections; however, it makes no contributions if the member is paying the double rate. Government credits to the Pension Fund in respect of elected prior service are as described for current service; however, the government contributes only a portion of the member contribution if the member is paying the double rate. The percentage varies depending on the government contribution where a member is paying the single rate.

5. Outstanding Terminations

Amounts paid from 1 April 2017 onward for terminations that occurred prior to that date were estimated from actual payments made using PSPC historical information provided on 1 December 2017. After reviewing the information from PSPC, the amount for outstanding terminations was marginal and consequently no amount for outstanding payments was set aside for this valuation.

6. Disability Incidence Rates for Pensioners Below Retirement Age

Deferred pensioners, Group 1 pensioners who are receiving an annual allowance while under age 60, and Group 2 pensioners who are receiving an annual allowance while under age 65 were assumed to have a 0% disability rate. The resulting understatement of liability and current service cost is negligible.

7. Recovery Rates for Disability Pensioners

No recoveries are assumed for disabled pensioners. The resulting overstatement of liability and current service cost is negligible.

8. Sex of Surviving Spouses

The sex of each eligible surviving spouse is assumed to be the opposite of the deceased member’s.

Appendix 8 – Transfer Value Valuation Methodology and Assumptions

A. Valuation Methodology

A contributor who has ceased to be employed in the public service and has to his credit two or more years of pensionable service, is

- under age 50 and a Group 1 contributor, or
- under age 55 and a Group 2 contributor

and is eligible to a deferred annuity may elect to transfer the commuted value of the accrued pension benefits.

The transfer value payment made to the former contributor represents the present value of the benefit accrued at the time of termination. The present value evaluates the following benefits:

- the accrued pension payable from age 60 for a Group 1 contributor or from age 65 for a Group 2 contributor;
- the accrued pension payable immediately based on the probability that the contributor becomes disabled after termination but prior to age 60 for a Group 1 contributor or age 65 for a Group 2 contributor;
- 50% of the accrued pension payable to surviving spouses based on the probability that the former contributor has an eligible surviving spouse at the time of death.
- 10% of the accrued pension payable to children based on the probability that the former contributor has eligible children at the time of death.

B. Economic Assumptions

Interest rates for transfer value amounts are determined in accordance with Section "Pension Commuted Values" of the Standards of Practice – Pensions published by the Canadian Institute of Actuaries. The rates used for transfer value calculation are shown in Table 40 on page 62.

C. Demographic Assumptions

For the purpose of calculating the transfer value amount payable to a former contributor the following demographic assumptions are used:

1. Mortality

The mortality rates for the former contributor in receipt of an annuity, the expected former contributor becoming disabled after termination, and the expected surviving spouse upon the death of the former contributor are respectively the mortality rates for retirement pensioners, disability pensioners and surviving spouses shown in Table 62 on page 74.

2. Longevity Improvement

The longevity improvement factors shown in Table 63 on page 75 are applied to the mortality rates used for transfer value calculations.

3. Disability Incidence

The disability incidence rates are used to determine the proportion of former contributors becoming disabled during the period after termination and prior to the attainment of age 60 for former Group 1 contributors or age 65 for former Group 2 contributors. These are shown in Table 50 on page 67.

4. Probability of an Eligible Child at Death of Former Contributor

For the purpose of determining the amount associated with the expected transfer value payable from the pension plan, the assumptions of having an eligible child at time of death are those assumptions shown in Table 67 on page 77.

5. Probability of an Eligible Spouse at Death of Former Contributor

For the purpose of determining the liability amount associated with the expected transfer value payable from the pension plan, the assumption of having an eligible spouse at time of death differs from the assumption shown in Table 66 on page 76. Since the assumption shown on page 75 is derived from the experience of the pension plan of members who were deceased as a contributor or as a pensioner in receipt of a pension, it is inappropriate for the purpose of calculating the expected survivor benefit following a termination with a transfer value option.

In order to be eligible for a survivor benefit, an eligible spouse is expected to be married at time of termination and continues to be married up until the time of death of the former contributor. Given that the pension plan does not capture the marital status at time of termination, the best proxy to measure such proportions would be those of the Canadian population. As such, the expected proportion of the former contributors who are married at time of termination is determined by combining marital status of married (and not separated), separated (not living in common law) and living in common law and were extracted from the Statistics Canada CANSIM Table 051-0042 for the year 2017 for all ages below age 71.

Table 68 shows the expected proportions of former contributors who are married at time of termination.

Table 68 Sample of Assumed Proportion Eligible Spouse at Termination of Member[1]

Age Last Birthday	Male	Female
20	0.05	0.10
30	0.54	0.65
40	0.74	0.77
50	0.74	0.76
60	0.79	0.73
70	0.81	0.62

Once determined to be married at termination, a former contributor's probability of remaining in the marriage after the time of termination diminishes over time by reason of a possible divorce or death of the spouse before the member. The mortality assumption used to determine the survivorship of the spouse between the member's date

[1] Survivor pensions are not payable if the deceased member has less than two years of pensionable service.

of termination and date of death is the mortality assumption of surviving spouses shown in Table 62 on page 74.

Once married, an individual is subject to the possibility of a divorce which would remove the survivor coverage at the former contributor's time of death if the spouse has survived to such time. As no marital status data is available at the time of the former contributor's termination from the experience on the pension plan, the best proxy to measure the probability of divorce after marriage is that of the Canadian population. The latest available data on divorce rates are those published by Statistics Canada in the publication Divorces in Canada 84F0213X. The divorce rates were derived from the years 1996 to 2003.

Table 69 Sample of Assumed Divorce Rates

Age Last Birthday	Male	Female
20	0.020	0.022
30	0.019	0.019
40	0.016	0.015
50	0.011	0.009
60	0.005	0.004
70	0.002	0.001
80	0.002	0.001
90	0.002	0.001

For transfer value calculation purposes, it is assumed that at the date of terminations the age of the spouse is three years younger for a male contributor and three years older for a female contributor.

Appendix 9 – RCA Valuation Methodology and Assumptions

A. Valuation of the Account Balance

The amounts available for benefits comprise the recorded balances of the RCA (RCA No. 1 and RCA No. 2) Accounts, which form part of the Public Accounts of Canada as well as a tax credit (CRA refundable tax) with respect to the RCAs.

Interest is credited on the RCA Accounts every three months in accordance with the actual average yield on a book value basis for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces – Regular Force and RCMP pension plans. The actuarial value of the account balance is equal to the book value.

B. Valuation of Liabilities

Described in this Appendix are the liability valuation methodologies used and any differences in economic assumptions from those used in the PSSA valuation.

1. Terminally Funded RCA Benefits

The following RCA benefits are being terminally funded (i.e. not prefunded but on an occurrence basis):

- Early Retirement Incentive (ERI) program
- pre-retirement survivor benefits
- minimum death benefit
- elective service

Except for the now-closed ERI program, the above benefits are terminally funded because they are uncommon or of little financial significance. For example, the pre-retirement survivor benefit becomes payable only when the average salary is less than 1.4 times the YMPE. As well, the minimum death benefit is expected to occur only with deaths at younger ages, where the probability of death is small.

2. RCA No. 1 Post-Retirement Survivor Benefits

The limit on the amount of spousal annual allowance that can be provided under the PSSA decreases when the member's pension is reduced due to the CPP (or QPP) offset, which usually occurs at age 65.

This benefit was valued conservatively by assuming the plan limit is always coordinated with the CPP (or QPP). The liability overstatement is minor because the probability of the former contributor dying prior to age 65 is small. (This overstatement tends to be offset by the understatement of accrued liability caused by terminally funding the pre-retirement survivor benefit.) The projected accrued benefit cost method was used to estimate the liabilities and normal costs for this RCA No. 1 benefit.

3. RCA No. 1 Continued Benefit Accrual for Former Deputy Heads

All former deputy heads that have accrued or are accruing benefits are included. For those accruing benefits, it was assumed that they would cease to do so when first eligible to receive an immediate annuity.

4. RCA No. 1 Excess Pensionable Earnings

The projected accrued benefit cost method was used to estimate plan liability and current service costs for retirement benefits in excess of the Maximum Pensionable Earnings (MPE).

5. Administrative Expenses

To compute the liability and current service costs, no provision was made regarding the expenses incurred for the administration of either the RCA No. 1 Account or the RCA No. 2 Account. These expenses, which are not debited from the RCA Accounts, are borne entirely by the government and are commingled with all other government expenses.

C. Actuarial Assumptions

The valuation economic assumptions described in Appendix 6 were used without any modifications. This is a change from the last valuation where the discount rate used to determine the liabilities with respect to the RCA No. 1 and the RCA No. 2, and the current service cost with respect to the RCA No. 1, was one-half of the yield projected on the combined Superannuation Accounts.

D. Valuation Data

The RCA No. 1 and RCA No. 2 pension benefits in payment were provided as at 31 March 2017. RCA No. 1 and RCA No. 2 benefits expected to be paid in respect of contributors and accrued spousal allowances of current retired members were all derived from the membership data described in Appendix 4 and shown in Appendix 12.

Appendix 10 – Public Service Pension Plan Projection

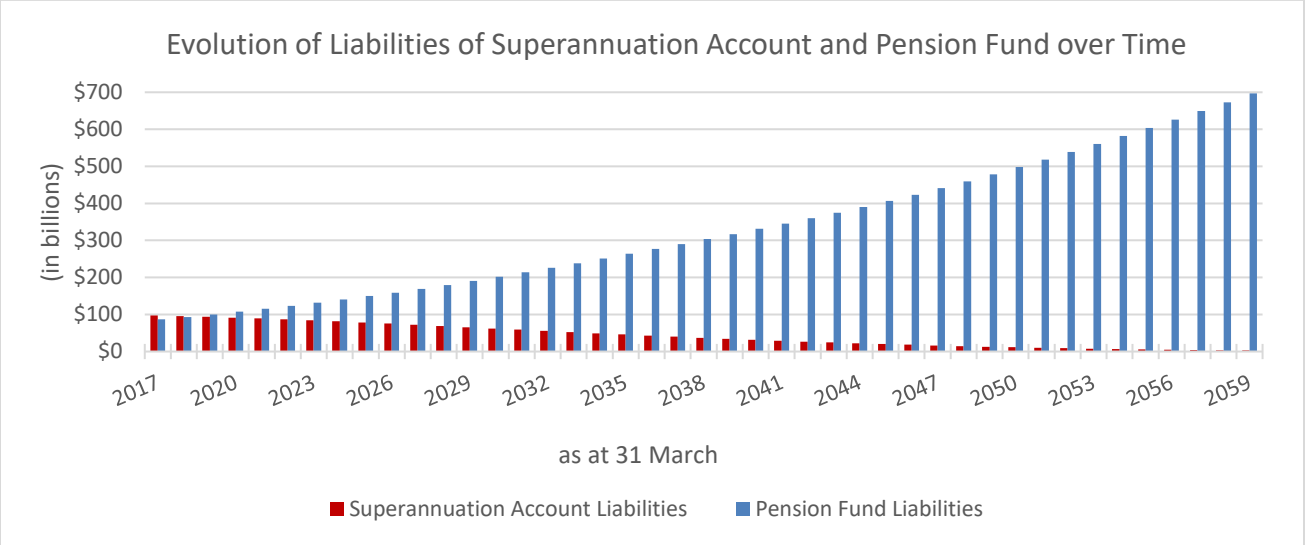
The results of the following projections were computed using the data described in Appendices 4 and 12, the methodology described in Appendix 5 and the assumptions described in Appendices 6, 7 and 8.

A. Projection of the Superannuation Account and the Pension Fund Liabilities

Prior to 1 April 2000, the PSSA Superannuation Account tracked all government pension benefit obligations related to the PSSA. The Superannuation Account is now debited only with benefit payments made in respect of service earned before that date and administrative expenses; it is credited with prior service contributions related to elections made prior to 1 April 2000 and interest earnings.

Starting 1 April 2000, the PSSA is financed through the Pension Fund. The Pension Fund is credited with employer and member contributions, investment earnings and prior service contributions for elections made since 1 April 2000. The Pension Fund is debited with benefit payments made in respect of service earned since that date and administrative expenses.

The following graph presents the evolution over time of the Superannuation Account liabilities for service prior to 1 April 2000 and the Pension Fund liabilities for service after 31 March 2000. It is expected that the Pension Fund liabilities will exceed the Superannuation Account liabilities in 2019.

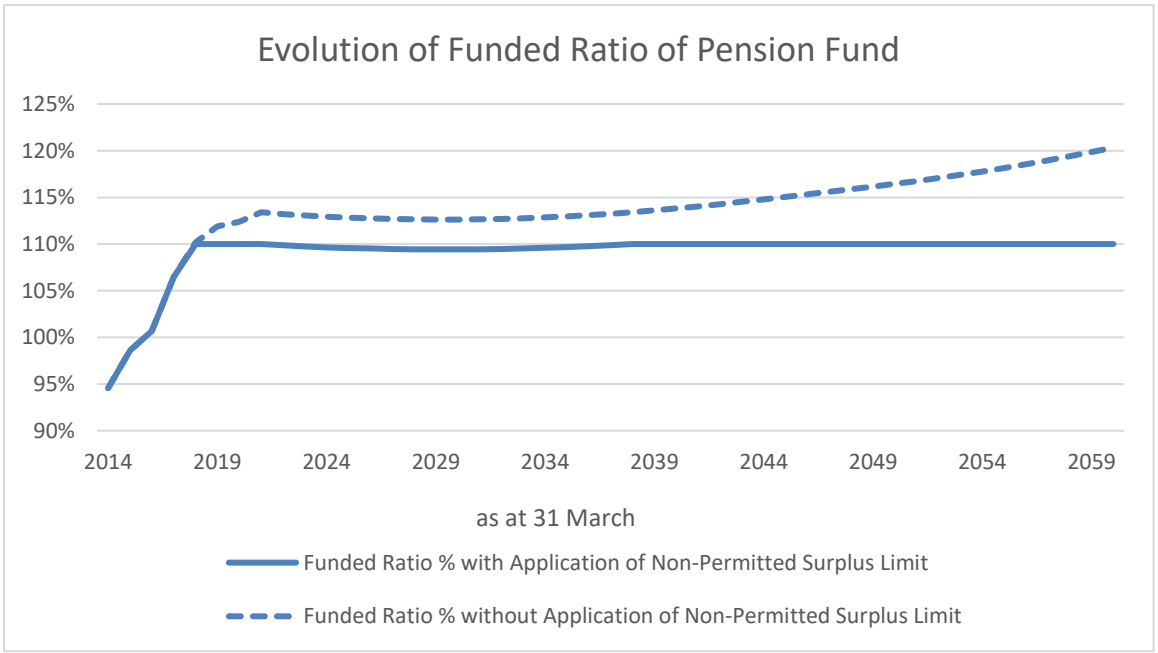


B. Non-Permitted Actuarial Surplus

The following graph presents the projection of the funding ratio for the Pension Fund, i.e., the ratio of the liabilities to the actuarial value of assets for service since 1 April 2000. The graph reflects the funding ratio implications of a non-permitted actuarial surplus[1] and the assumptions outlined below.

If there exists, in the opinion of the President of the Treasury Board, a non-permitted actuarial surplus in the Pension Fund, no further government contributions for current service cost are permitted until there is no longer such a surplus. As well, member contributions to the Pension Fund may also be reduced in a manner and for a period of time as recommended by the President of the Treasury Board, and approved by the Treasury Board. A third possible response, with Treasury Board approval based on a recommendation from the President of the Treasury Board, is taking an amount identified at the time out of the Pension Fund into the Consolidated Revenue Fund. It is projected that the Pension Fund will have a non-permitted actuarial surplus by 31 March 2018.

For projection purposes, we assumed that the non-permitted actuarial surplus would be taken out of the Pension Fund and put into the Consolidated Revenue Fund. The graph also presents the funding ratio without applying the non-permitted actuarial surplus limits for comparison purposes.

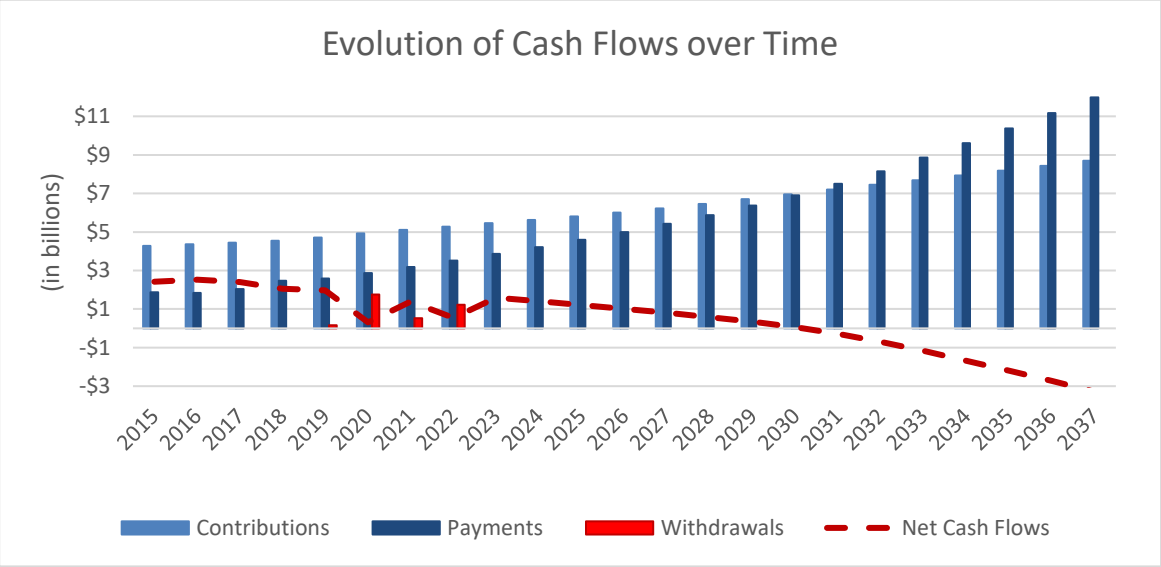


[1] A non-permitted actuarial surplus exists when the amount by which the actuarial value of assets exceeds liabilities for service since 1 April 2000 is greater than the lesser of (a) and (b), where:
(a) is 20% of the amount of liabilities for service since 1 April 2000, and
(b) is the greater of (i) and (ii) where:
(i) is twice the estimated amount, for the calendar year following the date of that report, of the total of
(A) the current service cost contributions that would be required of contributors, and
(B) the current service cost contributions that would be required of the government, and
(ii) is 10% of the amount of liabilities for service since 1 April 2000.

C. Evolution of Cash Flows under the Pension Fund

In plan year 2018, contributions to the Pension Fund are expected to reach $4,538 million, whereas payouts, including benefit payments and administrative expenses, are expected to reach $2,476 million. Contributions that are higher than payouts ensure that the Pension Fund has sufficient liquidity to cover all the payouts in a year. However, as the population of the Pension Fund matures, the amount of payouts will increase and will eventually exceed the contributions. This will result in negative cash flows to the Pension Fund.

It is expected that the Pension Fund will have negative cash flows from plan year 2031, at which point a portion of the assets will be required to pay benefits. This implies that from plan year 2031, some portion of the Pension Fund's assets must be invested in liquid investments in order to be readily available to cover the excess payouts. Nevertheless, it should be noted that although negative cash flows will begin in the plan year 2031, the Pension Fund's overall assets are expected to grow for the entire duration of the projection presented below when investment incomes are taken into consideration[1].



[1] As in the previous chart, it is assumed that any non-permitted surplus would be withdrawn from the Pension Fund.

Appendix 11 – Uncertainty of Results

A. Introduction

The projected financial status of the Pension Fund depends on many demographic and economic factors, including new contributors, average earnings, inflation, level of interest rates and investment returns. The projected long-term financial status of the Pension Fund is based on best-estimate assumptions. The objective of this section is to present alternative scenarios. The alternatives presented illustrate the sensitivity of the long-term projected financial position of the Pension Fund to changes in the future economic outlook. In this appendix, any references in Sections B and C, to assets, liabilities, surplus/(deficit), annual special payments and service cost are related to those of the Pension Fund.

Section B examines the sensitivity of the Pension Fund to different asset allocations. Five alternative investment portfolios are described, along with the volatility of each portfolio and the resulting impact on the Pension Fund's funding ratio and current service cost. The impact of financial market volatility on the financial status of the Pension Fund is explored in section C, where a severe one-time financial shock is applied to each of the three investment portfolios with the purpose of quantifying the impact on the funding ratio over the short-term horizon. Lastly, the impacts of prolonged low bond yields on the Superannuation Account and on the Pension Fund due to slower than expected economic growth are analyzed in section D.

B. Sensitivity of Investment Policy

A major risk all pension plans face is funding risk – the risk that pension assets are insufficient to meet pension obligations. If funding deficiencies or surpluses continue for an extended period of time, risk is transferred from one generation to another and may ultimately take the form of an increase or a decrease in the contribution rate.

Historically, equities have shown greater volatility than fixed income instruments (such as bonds); and long-term bonds have historically shown greater volatility than shorter term fixed income instruments. For instance, in the twenty-five years ending in 2016, the volatility (standard deviation) of Canadian equity returns (indicated by the S&P/TSX Total Return Index) was 16.9%[1] while the volatility of returns of the long-term federal bonds (10+ years) was 9.6% and the volatility of returns of the medium-term federal bonds (5-10 years) was 6.6% over the same period. Higher volatility in the returns implies a greater risk due to a wider range of possible outcomes of the returns. Hence, an investment in equities is considered riskier than an investment in bonds and an investment in the long-term bonds is riskier than an investment in the medium- or short-term bonds.

This also means that investing in a greater proportion of assets in equities can provide a wider range of possible returns, with a higher expected return. Conversely, investing in fixed income instruments only provides a narrower range of possible returns, with a lower expected return.

The PSPP represents a long-term obligation to pay pension benefits. Thus, a long-term approach must be taken to fund these obligations. Long-term Government of Canada bonds

[1] Source: the Canadian Institute of Actuaries' Report on Canadian Economic Statistics 1924 – 2016

are considered risk-free[1] and their yields are considered low. The real yield on long-term federal bonds was approximately 0.8% in March 2017. This is significantly below the ultimate best-estimate real return on assets of 4.0% that is currently used to determine the liabilities and contribution rates.

The government created the PSPIB to actively manage assets equal to the contributions in excess of the benefits and the administrative expenses with respect to service since 1 April 2000 in order to maximize the investment return on these assets without undue risk of loss. Due to active asset management, the current service cost is less than what it would have been if the investment policy had been restricted to solely invest in long-term government bonds.

Although the current service cost is reduced by diversifying the portfolio, by investing in securities that offer a higher rate of return than the risk-free[2] long-term federal bonds, the portfolio is also exposed to a greater degree of risk or volatility. Generally, an investment in riskier assets demands risk premiums to compensate for additional risk. A risk premium is the difference between the expected return on a risky asset (e.g. equities) and the expected return on a risk-free asset, such as the Government of Canada long-term bond mentioned above.

Of course, these higher returns are expected but not guaranteed, creating the possibility that the market will not perform as expected and liabilities will grow at a faster rate than investments for an extended period of time. Even if investment returns materialize as expected, other assumptions may not, causing the liabilities to grow at a faster rate than the assets. For example, salaries or inflation may increase more than expected. The amount of risk assumed by the plan sponsor depends on many factors, including the current funding status and economic outlook, among other things. Thus, the investment policy must balance the desire for a high real rate of return with the sponsor's ability to take risk and/or tolerance for risk.

Table 70 shows the impacts on the funding ratio, the long-term service cost and the relative volatility by various asset mixes.

Table 70 Impact of Various Investment Policies

	Asset Mix				Real Rate of Return		1-year	Funding Ratio	Annual Special	Long-term
Portfolio	Fixed Income	Equity	Credit	Real Assets	First 5 Years	Ultimate	Standard Deviation	as at 31 March 2017	Payment ($ millions)	Service Cost
#1	100%[3]	0%	0%	0%	(3.0%)	2.7%	7.8%	59%	4,417	29.7%
#2	100%[4]	0%	0%	0%	(2.1%)	2.9%	6.1%	65%	3,689	27.8%
#3	55%	35%	5%	5%	1.5%	3.5%	7.2%	89%	1,018	22.6%
#4	40%	40%	5%	15%	2.3%	3.8%	9.0%	97%	214	20.8%
Best-Estimate	20%	43%	7%	30%	3.3%	4.0%	11.3%	106%	0	19.6%
#5	0%	100%	0%	0%	4.4%	4.5%	17.1%	121%	0	17.2%

1 In this Section, "risk-free" refers to the default risk. A risk-free bond is still subject to return volatility given the changes in interest rates.
2 Long-term federal bonds are considered risk-free since they have no risk of default. However, their market value is volatile and therefore long-term federal bonds do exhibit market and funding risk over the course of their life.
3 Nominal long-term federal bonds only.
4 Diversified portfolio of long-term bonds (Portfolios 3 to 5 and Best-Estimate use a diversified portfolio of bonds with various maturities, that is, bond universe).

The last three columns of the previous table present the funding ratio, annual special payments over the next 15 years, and the long-term current service cost if the investment policy were changed to reflect the asset mix of the alternative portfolios. These deterministic outcomes do not take into account the expected portfolio volatility.

Portfolio #1 is invested in 10-year plus federal bonds. This portfolio does not result in a feasible scenario due to its prohibitive cost. Other portfolios with lower volatility and higher expected returns are available.

Portfolio #2 is invested in a marketable bond portfolio consisting of long-term federal, provincial and real return bonds. This diversification into three bond asset categories that are not perfectly correlated increases the real rate of return and reduces the volatility compared to the first portfolio. This portfolio produces a higher real rate of return compared to Portfolio #1, while maintaining a lower current service cost. This is also a low risk, low return portfolio. A portfolio with greater diversification in variable income assets is required in order to keep funding cost to a lower level.

Portfolio #3 and Portfolio #4 are more diversified than the first two portfolios and are invested 35% and 40%, respectively, in equity. This diversification in four broad asset categories that are not perfectly correlated, combined with shorter fixed-income maturities increases the real rate of return earned on these portfolios and keeps their volatility comparable to the first two portfolios. These portfolios have lower expected current service cost than Portfolio #1 and Portfolio #2 due to their higher expected returns. However, despite an increased real return, these portfolios are still not sufficient to maintain the current funding ratio and an increase in the plan's current service cost would be required with both portfolios.

Portfolio #5 is considered riskier because it is less diversified and has no allocation to fixed income securities. This portfolio is heavily invested in equity, which has much more volatile returns than that of the bonds' returns. Although Portfolio #5 leads to the highest expected return, the highest funding ratio and the lowest long-term service cost, its volatility is significantly higher which may lead to significant additional contribution requirements as illustrated in the next table.

Table 71 presents the expected median and 10 percent downside real returns over the next three years[1], the resulting funding ratio, and the ensuing expected contributions assuming the plan is fully funded as at 31 March 2017 under each portfolio. It further assumes that the ultimate real rate of return applies for the full discounting period (no select period with lower real rate of return and lower inflation).

[1] The 10 percent downside real returns over the next 3 years represent the expected 10th percentile average return over that period. That is, there is a 10% probability that the average real returns over the next 3 years will be lower than the 10 percent downside real returns.

Table 71 Median and 10% Downside Returns, Funding Ratio and Contributions for Various Portfolios

Portfolio	1-year Standard Deviation	Expected Average Annual Real Returns[1] (2018-2020) Downside 10th Pct	Median	Funding Ratio (31 March 2020) Downside 10th Pct	Median	Contributions (2020-21) (% of pensionable payroll) Current Service Cost (downside and median)	Special Payments (downside)	Total (downside)
#3	7.2%	(1.8%)	3.5%	94%	100%	22%	3%	25%
#4	9.0%	(2.9%)	3.8%	91%	100%	20%	4%	24%
Best-Estimate	11.3%	(4.4%)	4.0%	87%	100%	19%	6%	25%
#5	17.1%	(8.4%)	4.5%	75%	100%	17%	11%	28%

The previous table highlights the trade-off between risk and return as well as between higher current service cost with low downside risk and lower current service cost and high downside risk. A portfolio (Portfolio #3) exhibiting low volatility of returns has a high current service cost, but a low downside risk. Alternatively, a risky portfolio (Portfolio #5) would produce a much lower current service cost; however, the volatility of this portfolio is quite high, resulting in significant downside risk and total downside contributions compared to Portfolio #3 and greater than the best-estimate portfolio. By investing in a diversified portfolio, a reasonable current service cost can still be achieved along with lower volatility and lower downside risk than Portfolio #5, and therefore, a lower probability of significant losses and unforeseen additional contributions.

The best-estimate portfolio is invested 20% in fixed-income securities, 43% in equity, 30% in real assets and 7% in credit in the long-term, which is close to PSPIB's current long-term asset-mix objective. Such a portfolio produces an ultimate annual real return of 4.0% net of all investment expenses (assumed to total 0.20% of assets) with a standard deviation of 11.3%.

C. Financial Market Tail Events

This section focuses on the inherent volatility in the best-estimate portfolio and the extreme outcomes that could result. During plan year 2009, the nominal return on Pension Fund assets was (22.7%) due to the economic slowdown. Such an event could be characterized as low probability (also referred to as a "tail event"). However, when these events do occur, the impact on the funding ratio is significant. This section analyzes the impacts that tail-event returns would have on the plan's funding ratio. To illustrate this, returns other than the best-estimate are assumed to occur in plan year 2020. Two alternative portfolios were selected from Section B to show the potential variation in tail returns of a less risky (Portfolio #4: 40% equity, 40% fixed income, 15% real assets and 5% in credit) and a more risky (Portfolio #5: 100% equity) portfolio in relation to the best-estimate portfolio.

It is assumed that the returns of the three portfolios follow a normal distribution. The long-term mean and annual standard deviation for each portfolio is given in Table 70. Returns at two probability levels were selected to analyze: 1/10 and 1/50. The probabilities of earning

[1] For illustration purposes, it is assumed that ultimate returns apply for the entire projection period. Annual returns are assumed to follow a normal distribution and are assumed to be independent between the years (no mean reversion).

these returns can be thought of as once every 10 and 50 years, respectively. Since the normal distribution has two tails, a left tail and a right tail, both were examined. The left tail event is the occurrence of a nominal return such that the probability of earning that return or less is equal to 1/10 (or 1/50). The right tail event is the occurrence of a nominal return such that the probability of earning that return or more is equal to 1/10 (or 1/50).

For each portfolio a nominal return is calculated at the two probability levels. The nominal returns are given in Table 72.

Table 72 Tail-Event Portfolio Returns

Probability of return[1]	Tail	Portfolio 4: 40% Fixed Income/ 40% Equities/ 15% Real Assets/ 5% in Credit	Best-Estimate Portfolio: 20% Fixed Income/ 43% Equities/ 30% Real Assets/ 7% in Credit	Portfolio 5: 100% Equities
		Nominal Return	Nominal Return	Nominal Return
1/50	Left	(12.3%)	(16.5%)	(27.2%)
1/10	Left	(5.3%)	(7.8%)	(14.0%)
1/10	Right	17.7%	21.1%	29.9%
1/50	Right	24.7%	29.8%	43.1%

Table 73 shows the impact on the projected surplus/(deficit) as at 31 March 2020 (the expected date of the next actuarial review) if the nominal return for plan year 2018 happens to be equal to the returns presented in Table 72 for the best-estimate scenario. Following the various portfolio returns in plan year 2018, it is assumed that the return will revert back to its best-estimate value from plan year 2019.

Table 73 Sensitivity of the Projected Surplus (Deficit) as at 31 March 2020 ($ millions)

Assumption(s) Varied	Actuarial Value of Assets	Liability	Surplus/ (Deficit)	Annual Special Payments[2]
None (i.e. current basis)	121,095	107,762	13,333	0
Investment return				
- Left Tail event at 1/50th probability	106,087	107,762	(1,675)	179
- Left Tail event at 1/10th probability	112,246	107,762	4,484	0
- Right Tail event at 1/10th probability	132,673	107,762	24,911	0
- Right Tail event at 1/50th probability	138,821	107,762	31,059	0

D. Impact of Prolonged Low Bond Yields

This section explores the consequences of slower than expected economic growth through a reduction in expected bond yields and variable income securities over the full projection period. Current bond yields are much lower than their historical averages and, without stronger economic growth, might well remain low over the next few years. Over the last 15 and 50-year periods ending 31 December 2016, the average real yield of long-term

[1] The probability of earning the positive returns in the table corresponds to the probability that the annual return is greater than or equal to the indicated return. Similarly, the probability of earning a negative portfolio return corresponds to the probability of earning the indicated return or less.

[2] Equal annual special payments to amortize the deficit over the next 15 years starting 31 March 2019.

Government of Canada bonds was 1.8% and 3.2%, respectively. This is much higher than the 0.8% real yield on long-term federal bonds as at March 2017. This section looks at the impact of keeping the current 0.8% real yield for another year and reducing all subsequent long-term federal bond yields by 0.3% prolonging the current period of low bond yields for another year and reducing all subsequent long-term federal bond yields by 0.3%.

The best-estimate scenario assumes that the long-term federal bond real (nominal) yield reaches its ultimate value of 2.7% (4.7%) at the beginning of plan year 2028. This scenario assumes that economic growth will remain weak for another year and moderate thereafter. Consequently, the long-term federal bond nominal yield would not increase above its current level before the third year of projection, and would reach its ultimate real (nominal) value of 2.4% (4.4%) in plan year 2028. As a result, the new money rate will also be affected and would be about 0.3% lower over the full projection period. In addition, returns for equities, real assets and credit would also be lower for the entire projection period. Thus, returns would be 0.2% per year lower on average over the next 10 years and 0.3% lower ultimately than under the best-estimate scenario.

Table 74 shows the impact that such a scenario would have on the expected new money rates and projected fund returns, as well as the impact on accrued liabilities and annual special credits/payments required to fund the Superannuation Account shortfall and the Pension Fund deficit.

Table 74 Impact on the Superannuation Account and the Pension Fund of Prolonged Low Bond Yields ($ millions)

Superannuation Account	Best-Estimate	Low Bond Yields	Difference
2018-2027 Average New Money Rate	3.7%	3.4%	(0.3%)
Ultimate New Money Rate	4.7%	4.4%	(0.3%)
Total Actuarial Liability	97,137	98,434	1,297
Actuarial Excess/(Shortfall)	(2,867)	(4,164)	(1,297)
Special Credits	260	377	116
Pension Fund	**Best-Estimate**	**Low Bond Yields**	**Difference**
2018-2027 Average Return Projected on Fund	5.4%	5.2%	(0.2%)
Ultimate Return Projected on Fund	6.0%	5.7%	(0.3%)
Total Actuarial Liability	87,313	91,778	4,465
Actuarial Surplus/(Deficit)	5,643	1,178	(4,465)
Special Payments	-	-	-

Prolonging low bond yields for an additional year at 0.8% and reducing all subsequent long-term federal bond yield by 0.3% result in higher actuarial liability for both the Superannuation Account and the Pension Fund and higher special credits for the Superannuation Account.

Appendix 12 – Detailed Information on Membership Data

Table 75 Male Contributors (Main Group)
Number and Average Pensionable Earnings[1] as at 31 March 2017

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
To 24	2,445 $51,276	19 $66,160							2,464 $51,390
25-29	5,696 $60,945	1,375 $72,492	24 $77,863						7,095 $63,240
30-34	4,810 $66,201	5,825 $77,079	1,589 $82,880	24 $76,203					12,248 $73,558
35-39	3,385 $69,618	5,467 $79,396	5,175 $88,652	1,726 $92,226	11 $95,980				15,764 $81,751
40-44	2,491 $72,058	3,933 $81,159	4,575 $90,444	4,999 $95,190	571 $99,267	42 $95,870			16,611 $87,234
45-49	2,111 $75,392	2,850 $82,216	3,393 $89,945	4,451 $96,112	2,444 $100,487	1,414 $93,356	110 $89,420		16,773 $90,257
50-54	1,797 $78,110	2,233 $82,642	2,739 $87,999	3,543 $93,423	2,357 $98,908	4,541 $97,385	2,090 $90,396	347 $91,267	19,647 $91,255
55-59	1,163 $80,891	1,596 $82,559	1,864 $86,056	2,502 $91,301	1,733 $94,077	3,367 $97,629	2,473 $95,544	1,241 $87,805	15,939 $91,078
60-64	574 $83,687	833 $82,873	978 $87,072	1,315 $89,735	713 $91,078	1,212 $95,767	863 $102,796	912 $92,720	7,400 $91,150
65+	184 $82,985	290 $86,867	330 $90,470	396 $91,633	244 $90,073	368 $90,132	259 $97,914	496 $96,975	2,567 $91,628
All Ages	24,656 $67,448	24,421 $79,768	20,667 $88,438	18,956 $93,816	8,073 $97,412	10,944 $96,511	5,795 $94,757	2,996 $91,220	116,508 $84,820

	31 March 2017	31 March 2014
Average age[2]:	45.2 years	45.2 years
Average pensionable service[2]:	13.3 years	13.6 years
Annualized pensionable payroll[3]:	$9,882,176,480	$9,504,228,923
Total PBDA[4] indexed reduction to basic annuity:	$13,881,777	$13,300,396
Total PBDA[4] indexed reduction adjustment:	$2,695,531	$2,726,203

1 As defined in Note 1, Section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the Pension Benefits Division Act.

Table 76 Female Contributors (Main Group)
Number and Average Pensionable Earnings[1] as at 31 March 2017

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
To 24	3,250 $50,434	13 $65,438							3,263 $50,493
25-29	7,610 $60,094	1,768 $69,593	22 $71,565						9,400 $61,907
30-34	5,556 $63,751	7,082 $73,983	2,175 $77,932	38 $69,890					14,851 $70,723
35-39	3,997 $64,311	6,724 $74,782	7,250 $82,811	2,528 $84,946	4 $97,350				20,503 $76,837
40-44	3,090 $64,226	4,996 $74,965	6,126 $83,977	7,133 $89,271	789 $89,928	30 $83,028			22,164 $81,106
45-49	2,619 $64,556	3,803 $72,206	4,411 $80,354	5,864 $88,299	3,075 $93,055	2,135 $85,400	64 $83,184		21,971 $81,457
50-54	1,993 $64,660	3,066 $70,153	3,630 $76,190	4,409 $82,331	2,741 $88,065	5,486 $88,329	2,369 $82,849	312 $76,858	24,006 $80,386
55-59	1,317 $65,753	2,108 $68,694	2,577 $73,568	3,457 $76,831	2,145 $80,937	3,294 $86,481	1,919 $87,239	794 $77,148	17,611 $78,005
60-64	569 $67,033	986 $69,449	1,179 $71,093	1,621 $75,026	874 $79,368	1,020 $80,658	574 $85,950	487 $77,199	7,310 $75,325
65+	146 $66,874	247 $67,851	307 $68,330	402 $70,820	221 $72,032	285 $77,904	170 $80,589	199 $75,731	1,977 $72,262
All Ages	30,147 $61,810	30,793 $72,904	27,677 $79,896	25,452 $84,498	9,849 $87,092	12,250 $86,427	5,096 $84,780	1,792 $76,954	143,056 $76,590

	31 March 2017	31 March 2014
Average age[2]:	44.5 years	44.5 years
Average pensionable service[2]:	12.6 years	12.7 years
Annualized pensionable payroll[3]:	$10,956,684,666	$10,249,656,750
Total PBDA[4] indexed reduction to basic annuity:	$4,369,166	$3,569,729
Total PBDA[4] indexed reduction adjustment:	$951,643	$820,484

1 As defined in Note 1, Section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the Pension Benefits Division Act.

Table 77 Male Contributors (Operational Group)
Number and Average Pensionable Earnings[1] as at 31 March 2017

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
To 24	48 $63,912	1 $73,708							49 $64,112
25-29	278 $67,150	140 $74,965							418 $69,768
30-34	202 $69,168	594 $75,806	90 $77,557	1 $79,051					887 $74,476
35-39	114 $69,373	546 $76,317	320 $78,847	115 $78,020					1,095 $76,513
40-44	101 $68,389	380 $76,092	380 $78,737	550 $80,716	47 $79,374	1 $73,708			1,459 $78,095
45-49	72 $67,470	251 $77,229	232 $78,730	488 $81,709	274 $84,229	70 $74,223	1 $74,543		1,388 $79,777
50-54	62 $67,170	152 $75,257	80 $75,811	171 $78,103	198 $80,155	248 $79,397	77 $81,099	2 $75,962	990 $77,759
55-59	25 $63,829	90 $72,470	46 $74,735	80 $78,497	85 $80,400	154 $79,824	87 $77,199	12 $78,621	579 $77,068
60-64	18 $67,028	39 $76,351	34 $76,537	34 $82,253	21 $84,003	27 $76,654	25 $80,666	15 $84,220	213 $78,388
65+	7 $81,440	14 $76,875	5 $81,067	3 $82,918	6 $74,540	5 $78,091	8 $80,895	8 $86,942	56 $80,015
All Ages	927 $67,873	2,207 $75,932	1,187 $78,271	1,442 $80,444	631 $81,974	505 $78,639	198 $79,289	37 $82,546	7,134 $77,039

	31 March 2017	31 March 2014
Average age[2]:	43.3 years	41.6 years
Average pensionable service[2]:	12.7 years	11.3 years
Annualized pensionable payroll[3]:	$549,598,105	$543,192,475
Total PBDA[4] indexed reduction to basic annuity:	$388,370	$615,773
Total PBDA[4] indexed reduction adjustment:	$99,056	$158,972

1 As defined in Note 1, Section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the Pension Benefits Division Act.

Table 78 Female Contributors (Operational Group)
Number and Average Pensionable Earnings[1] as at 31 March 2017

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
To 24	42 $60,918								42 $60,918
25-29	228 $67,716	110 $73,359	1 $54,262						339 $69,507
30-34	181 $70,709	489 $76,742	75 $78,334						745 $75,436
35-39	116 $68,066	444 $76,560	347 $80,743	99 $78,556					1,006 $77,220
40-44	71 $67,247	301 $74,720	284 $79,017	436 $82,141	77 $81,442				1,169 $78,521
45-49	63 $59,993	237 $70,473	141 $79,204	321 $80,257	245 $81,754	67 $73,555	3 $87,994		1,077 $76,726
50-54	47 $58,891	164 $70,554	72 $70,223	132 $79,235	147 $76,729	147 $76,353	55 $65,602	3 $56,839	767 $73,188
55-59	24 $62,569	75 $69,449	42 $63,591	44 $69,971	63 $76,541	89 $73,281	47 $81,078	16 $80,325	400 $72,250
60-64	7 $67,986	48 $66,736	9 $63,162	24 $65,075	11 $66,286	23 $65,578	7 $85,942	8 $80,305	137 $67,817
65+	3 $75,659	12 $71,032	3 $76,516	8 $64,172	2 $100,986	6 $57,683	2 $71,430	2 $54,828	38 $69,023
All Ages	782 $66,775	1,880 $74,264	974 $78,112	1,064 $79,855	545 $79,510	332 $73,881	114 $73,923	29 $76,132	5,720 $75,416

	31 March 2017	31 March 2014
Average age[2]:	42.6 years	40.8 years
Average pensionable service[2]:	12.1 years	10.3 years
Annualized pensionable payroll[3]:	$431,378,088	$428,146,927
Total PBDA[4] indexed reduction to basic annuity:	$35,941	$33,435
Total PBDA[4] indexed reduction adjustment:	$10,822	$10,255

1 As defined in Note 1, Section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the Pension Benefits Division Act.

Table 79 Contributors on Leave Without Pay and Non-active Contributors Number and Average Pensionable Earnings[1] as at 31 March 2017

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
To 24	439 $44,882	1 $118,993							440 $45,050
25-29	1,174 $59,065	432 $67,794	3 $72,397						1,609 $61,434
30-34	1,407 $63,515	2,460 $73,239	452 $77,635	4 $92,940					4,323 $70,552
35-39	1,004 $64,669	2,047 $74,837	1,380 $80,722	251 $82,710					4,682 $74,814
40-44	529 $62,699	958 $72,790	975 $83,302	664 $84,135	50 $78,783	3 $80,285			3,179 $76,806
45-49	364 $62,159	555 $68,865	549 $78,570	532 $83,138	221 $86,765	127 $77,074	6 $77,349		2,354 $75,462
50-54	347 $60,504	476 $67,316	476 $73,118	394 $77,149	329 $82,455	381 $81,390	162 $80,261	18 $75,015	2,583 $73,840
55-59	300 $61,087	403 $65,989	390 $71,187	412 $77,336	227 $81,038	335 $80,871	167 $81,802	52 $73,915	2,286 $73,288
60-64	182 $61,977	200 $65,705	207 $69,513	184 $72,775	130 $78,192	122 $77,679	53 $83,053	37 $69,852	1,115 $70,698
65+	146 $73,029	164 $69,476	128 $73,452	123 $73,322	81 $76,326	89 $77,887	48 $88,402	113 $93,095	892 $76,630
All Ages	5,892 $61,167	7,696 $71,971	4,560 $78,381	2,564 $80,302	1,038 $81,874	1,057 $79,980	436 $82,047	220 $83,173	23,463 $72,505

	31 March 2017	31 March 2014
Average age[2]:	42.9 years	41.4 years
Average pensionable service[2]:	10.0 years	9.4 years
Annualized pensionable payroll[3]:	$1,701,195,495	$1,669,243,810
Total PBDA[4] indexed reduction to basic annuity:	$1,027,720	$719,751
Total PBDA[4] indexed reduction adjustment:	$226,977	$174,438

1 As defined in Note 1, Section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the Pension Benefits Division Act.

Table 80 Male Retired Pensioners
Number, Average Annual Pension[1] as at 31 March 2017

			RCA No. 1		RCA No. 2	
Age[2]	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
To 24	35	1,839	-	-	-	-
25-29	435	3,220	-	-	-	-
30-34	1,156	5,229	-	-	-	-
35-39	1,719	7,248	2	2,257	-	-
40-44	1,928	9,416	7	8,291	-	-
45-49	1,990	11,653	27	3,550	-	-
50-54	2,658	17,859	73	4,967	-	-
55-59	8,952	42,045	696	5,053	-	-
60-64	18,743	45,549	1,106	6,036	-	-
65-69	24,288	36,244	1,126	6,745	989	11,568
70-74	21,869	30,634	903	4,901	4,288	9,279
75-79	16,014	30,237	433	3,478	686	5,290
80-84	11,903	29,063	147	2,228	5	1,189
85-89	7,206	27,989	14	925	-	-
90-94	3,406	28,969	3	677	-	-
95-99	920	29,899	-	-	-	-
100-104	65	35,282	-	-	-	-
105+	3	18,428	-	-	-	-
All Ages	123,290	32,845	4,537	5,418	5,968	9,193

	31 March 2017	31 March 2014
Average age last birthday	69.3 years	70.0 years
Average age last birthday at termination	55.6 years	56.4 years
Average age last birthday at entitlement	58.3 years	58.1 years
Total annual pensions payable from		
PS Superannuation Account	$3,036 million	$3,047 million
PS Pension Fund	$1,013 million	$665 million
RCA No. 1 Account	$25 million	$17 million
RCA No. 2 Account	$55 million	$55 million

1 Includes deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 81 Female Retired Pensioners
Number, Average Annual Pension[1] as at 31 March 2017

			RCA No. 1		RCA No. 2	
Age[2]	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
To 24	40	2,026	-	-	-	-
25-29	564	3,166	-	-	-	-
30-34	1,557	4,782	1	19	-	-
35-39	2,368	6,718	4	1,630	-	-
40-44	2,520	9,134	8	3,973	-	-
45-49	2,525	10,929	13	3,000	-	-
50-54	3,347	16,949	59	5,297	-	-
55-59	13,176	37,067	759	3,464	-	-
60-64	21,892	36,936	966	4,398	-	-
65-69	21,198	25,615	435	6,686	717	9,601
70-74	14,119	18,163	198	5,502	2,783	7,892
75-79	8,796	15,877	59	4,261	398	4,958
80-84	6,368	14,373	8	1,789	6	1,264
85-89	4,010	14,092	1	1,411	-	-
90-94	2,411	14,069	-	-	-	-
95-99	764	13,915	-	-	-	-
100-104	96	12,649	-	-	-	-
105+	4	7,249	-	-	-	-
All Ages	105,755	24,230	2,511	4,593	3,904	7,897

	31 March 2017	31 March 2014
Average age last birthday	65.7 years	66.7 years
Average age last birthday at termination	54.7 years	55.7 years
Average age last birthday at entitlement	58.3 years	58.2 years
Total annual pensions payable from		
PS Superannuation Account	$1,598 million	$1,148 million
PS Pension Fund	$965 million	$591 million
RCA No. 1 Account	$12 million	$7 million
RCA No. 2 Account	$31 million	$30 million

1 Includes deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 82 Male Disabled Pensioners
Number, Average Annual Pension[1] as at 31 March 2017

			RCA No. 1	
Age[2]	Number	Pension ($)	Number	Pension ($)
To 24	-	-	-	-
25-29	-	-	-	-
30-34	11	5,780	-	-
35-39	32	9,687	-	-
40-44	84	11,873	-	-
45-49	182	15,441	-	-
50-54	478	19,917	5	1,511
55-59	795	23,133	7	8,957
60-64	1,047	24,621	7	714
65-69	1,001	18,456	2	234
70-74	760	17,018	-	-
75-79	644	17,001	-	-
80-84	458	18,390	-	-
85-89	239	18,430	-	-
90-94	90	18,678	-	-
95-99	33	18,654	-	-
100-104	1	16,317	-	-
105+	-	-	-	-
All Ages	5,855	19,704	21	3,606

	31 March 2017	31 March 2014
Average age last birthday	66.6 years	66.6 years
Average age last birthday at disability	50.2 years	50.3 years
Total annual pensions payable from		
Superannuation Account	$85 million	$91 million
Pension Fund	$31 million	$21 million
RCA Account	$0 million	$0 million

1 Includes deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 83 Female Disabled Pensioners
Number, Average Annual Pension[1] as at 31 March 2017

			RCA No. 1	
Age[2]	Number	Pension ($)	Number	Pension ($)
To 24	-	-	-	-
25-29	5	4,385	-	-
30-34	24	6,772	-	-
35-39	119	9,646	-	-
40-44	286	12,419	-	-
45-49	506	15,262	2	1,410
50-54	1,095	19,798	4	373
55-59	1,946	21,957	14	2,764
60-64	1,820	21,938	5	842
65-69	1,283	15,600	3	1,854
70-74	785	12,184	1	1,080
75-79	626	11,804	-	-
80-84	433	10,893	-	-
85-89	231	10,964	-	-
90-94	108	9,899	-	-
95-99	33	10,005	-	-
100-104	4	11,084	-	-
105+	-	-	-	-
All Ages	9,304	17,477	29	1,857

	31 March 2017	31 March 2014
Average age last birthday	62.5 years	62.2 years
Average age last birthday at disability	49.4 years	49.5 years
Total annual pensions payable from		
PS Superannuation Account	$98 million	$89 million
PS Pension Fund	$64 million	$41 million
RCA Account	$0 million	$0 million

1 Includes deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 84 Surviving Spouses
Number and Average Annual Allowance as at 31 March 2017

	Number			RCA No. 1			
				Allowance on Service Since 1992		Maximum Earnings Limit on Service Since 1994	
Age[1]	Widower	Widow	Allowance	Number	Allowance	Number	Allowance
To 24	3	5	12,640	3	1,597	-	-
25-29	2	5	6,521	3	6,766	-	-
30-34	3	20	8,395	3	474	-	-
35-39	21	55	7,527	4	2,027	-	-
40-44	54	99	9,481	11	2,579	-	-
45-49	119	212	10,048	28	2,971	-	-
50-54	262	517	11,608	93	1,987	-	-
55-59	447	1,190	13,424	268	1,586	-	-
60-64	654	2,161	14,818	591	1,152	-	-
65-69	983	3,600	15,190	1,367	1,110	-	-
70-74	959	4,677	15,076	1,911	909	1	27,790
75-79	906	6,060	14,732	1,708	743	-	-
80-84	833	7,377	14,393	1,144	660	-	-
85-89	617	8,146	14,158	541	690	-	-
90-94	306	6,391	14,162	130	640	-	-
95-99	81	2,169	13,620	15	594	-	-
100-104	6	248	13,849	1	512	-	-
105+	-	18	12,105	-	-	-	-
All Ages	6,256	42,950	14,370	7,821	918	1	27,790

	31 March 2017	31 March 2014
Male average age last birthday	72.2 years	71.7 years
Female average age last birthday	79.9 years	79.6 years
Total annual allowances payable from		
PS Superannuation Account	$667 million	$658 million
PS Pension Fund	$40 million	$24 million
RCA Account	$7 million	$4 million

[1] Expressed in completed years calculated at the beginning of the plan year.

Appendix 13 – Acknowledgements

The Superannuation Directorate of the Department of Public Services and Procurement Canada provided the data on plan members.

The co-operation and able assistance received from the above-mentioned data provider deserve to be acknowledged.

The following individuals assisted in the preparation of this report:

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