



Actuarial Valuation Results as of January 1, 2019

Pension & Benefits Committee Meeting on March 8, 2019

Prepared by Retirement & Investment

Presentation to University of Waterloo



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Understanding the Actuarial Process

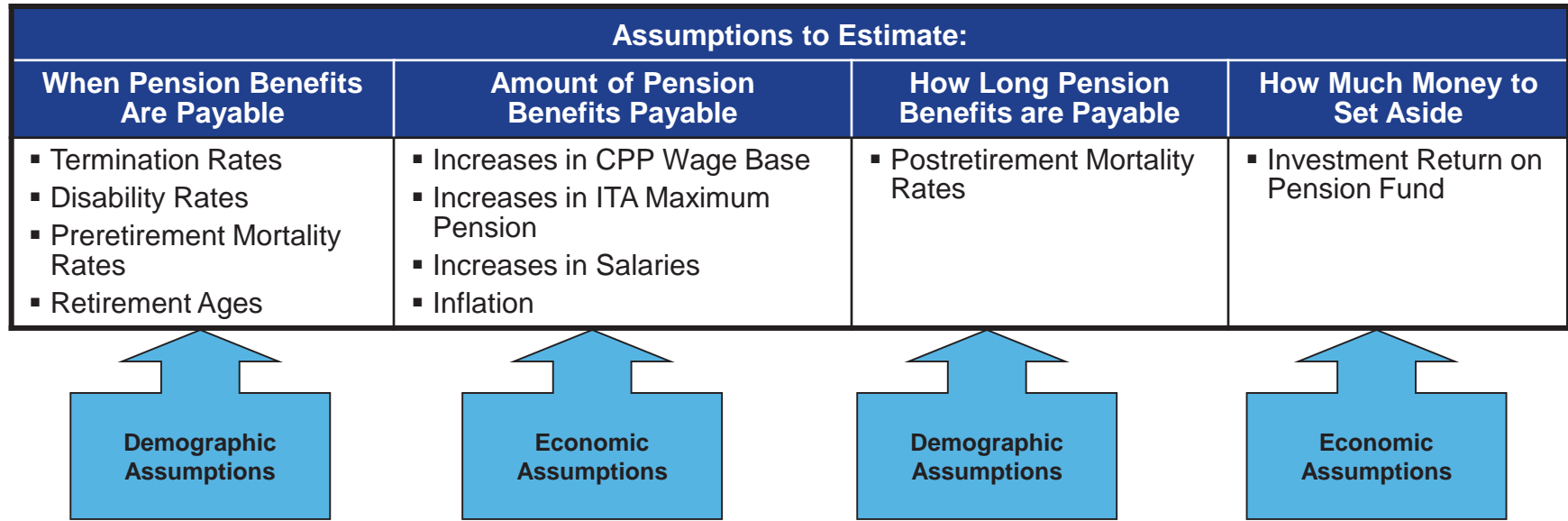
- Ultimate cost of Pension Plan equals the sum of benefits paid
- Cost is funded by University and member contributions and investment earnings, net of expenses
- Actuarial process from a funding perspective:
 - Using actuarial estimates to make periodic funding contributions in a systematic manner to meet the ultimate cost

Understanding the Actuarial Process (Cont'd)

- Elements of an actuarial valuation:

Pension Plan:	Contractually promises to pay benefits defined by the plan formula(s) on retirement, death, disability and termination
Plan Members:	Current employees, retirees and beneficiaries in this group will be or are entitled to the benefits promised by the plan. Specific data is gathered and validated for all members
Actuarial Assumptions:	Actuary uses these to estimate who will receive a benefit, what the amount of benefit will be, when the benefit will start, and how long it will be paid
Actuarial Cost Method:	Used to allocate the cost of the estimated benefits (determined using the member data and actuarial assumptions) to various time periods

Actuarial Assumptions for Going Concern Valuation



Pension Liability/Asset Relationship

Growth in Liabilities From Year to Year	Growth in Assets From Year to Year
Liabilities at beginning of year (representing discounted present value of pension benefits earned in respect of service up to the valuation date)	Value of pension fund assets at beginning of year
Plus	Plus
Interest on liabilities at rate used to discount the liabilities	Rate of return on pension fund assets
Plus	Plus
New liability for benefits earned by members in the year (current service) and increase/(decrease) in liability from experience losses/(gains)	Contributions made by members and University
Less	Less
Pension payments and lump-sum transfers	Pension payments, lump-sum transfers, fees and expenses

Highlights of January 1, 2019 Valuation Results

- This material includes the going concern valuation results for the Registered Pension Plan (RPP) and the Payroll Pension Plan (PPP) as at January 1, 2019
- This January 1, 2019 actuarial valuation of the RPP is not required to be filed with the regulators:
 - The next actuarial valuation report that must be filed with the regulators must be prepared no later than as at January 1, 2021
- The going concern results have been determined using the set of assumptions discussed with the Pension and Benefits Committee on January 18, 2019:
 - Impact of adopting Canadian Institute of Actuaries CPM-Public Mortality Table has also been provided
- There may be further adjustments made based on audited financial statements

Plan Members – Demographics

	January 1, 2018	January 1, 2019
Active Members (Including Leaves)		
Number	4,476	4,733
Average age	47.3	46.8
Average years of credited service	10.3	9.8
Average pensionable earnings ¹	\$ 97,834	\$ 99,487
Total pensionable earnings ¹	\$ 437,904,000	\$ 470,870,000
LTD Members		
Number	86	91
Average age	55.4	55.9
Average years of credited service	16.8	16.8
Average pensionable earnings ¹	\$ 62,215	\$ 63,221
Total pensionable earnings ¹	\$ 5,350,000	\$ 5,753,000
Suspended Members		
Number	9	3
Average age	34.8	34.6
Average years of credited service	2.1	2.1

¹ Year following valuation date

Plan Members – Demographics (Cont'd)

	January 1, 2018	January 1, 2019
Pensioners and Survivors		
Number	1,932	2,024
Average age	74.4	74.5
Average annual pension	\$ 30,202	\$ 30,980
Total annual pension	\$ 58,349,000 ¹	\$ 62,705,000 ¹
Deferred Members: Eligible to COLA for All Service		
Number	299	301
Average age	56.5	56.8
Average annual pension	\$ 7,680	\$ 8,039
Deferred Members: Eligible for COLA on Pre-2008 Service		
Number	113	109
Average age	45.5	46.1
Average annual pension	\$ 8,765	\$ 8,946
Deferred Pensions: Not Eligible for COLA		
Number	122	150
Average age	42.4	42.3
Average annual pension	\$ 4,310	\$ 4,246

¹ Does not reflect increase as of May 1, 2018 or 2019, as applicable

Actuarial Assumptions for Going Concern Valuation – Economic Assumptions

Economic Assumptions	January 1, 2018 (Last Filed Valuation)	January 1, 2019
Increase in Consumer Price Index (CPI)	2.00% per year	No change
Increase in Year's Maximum Pensionable Earnings under Canada Pension Plan	2.75% per year (CPI + 0.75%)	No change
Increase in <i>Income Tax Act</i> maximum pension	\$2,944.44 in 2018; increased after 2018 at 2.75% per year up to \$3,200 ¹	\$3,025.56 in 2019; increased after 2019 at 2.75% per year up to \$3,200 ¹
Increase in salaries ²	4.00% per year (CPI + 2.00%)	No change
Increase in salaries (disabled)	2.00% per year (CPI + 0.00%)	No change
Interest rate used to discount liabilities	5.60% per year (CPI + 3.60%)	5.70% per year (CPI + 3.70%)
Interest rate used to calculate 50% rule	1.30% ³ per year for 10 years; 1.50% per year thereafter	No change
Interest rate for crediting on required member contributions	3.00% per year	No change
Loading for administrative expenses	Explicitly added to current service cost	No change
Provision for Adverse Deviation (PfAD)	6.95% of non-indexed liabilities and current service cost	8.50% of non-indexed liabilities and current service cost

¹ PPP limit of \$3,400 in 2019

² Across the board increases plus grid steps / merit / promotion

³ 1.70% / 1.90% for 75% indexed benefits in 2018; 1.90% / 2.10% for 75% indexed benefits in 2019

Actuarial Assumptions for Going Concern Valuation – Demographic Assumptions

Demographic Assumptions	January 1, 2018 (Last Filed Valuation)	January 1, 2019																		
Retirement age	Age 64, but no earlier than one year after valuation date	No change																		
Mortality rates	2014 Canadian Pensioners Combined Table (“CPM2014 Combined”) with Improvements under Scale MI-2017	No change – consider 2014 Canadian Pensioners Public Table (“CPM2014Public”) with Improvements under Scale MI-2017																		
Termination rates	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th style="border-bottom: 1px solid black;">Age</th> <th style="border-bottom: 1px solid black;">Rates Per 100</th> </tr> </thead> <tbody> <tr><td>20</td><td>10.0</td></tr> <tr><td>25</td><td>10.0</td></tr> <tr><td>30</td><td>5.6</td></tr> <tr><td>35</td><td>3.2</td></tr> <tr><td>40</td><td>2.2</td></tr> <tr><td>45</td><td>1.7</td></tr> <tr><td>50</td><td>1.2</td></tr> <tr><td>55</td><td>0.7</td></tr> </tbody> </table>	Age	Rates Per 100	20	10.0	25	10.0	30	5.6	35	3.2	40	2.2	45	1.7	50	1.2	55	0.7	No change
Age	Rates Per 100																			
20	10.0																			
25	10.0																			
30	5.6																			
35	3.2																			
40	2.2																			
45	1.7																			
50	1.2																			
55	0.7																			

Reconciliation of Plan Assets (Market Value)

	Total
Market Value of Assets, January 1, 2018 (Unaudited)	\$ 1,677,543,000
Plus	
Member contributions	\$ 33,073,000
University contributions	55,750,000
Flex contributions	0
Transfers in from other plans	1,392,000
Investment income	3,913,000
Net transfers from other accounts	<u>0</u>
	\$ 94,128,000
Less	
Pensions and lump-sum refunds paid	\$ 72,785,000
Expenses and fees	<u>4,585,000</u>
	\$ 77,370,000
Market Value of Assets, December 31, 2018	\$ 1,694,301,000
Rate of return (net of expenses and fees)	0.23%

Development of Actuarial Value of Assets

- The Actuarial Value of Assets as of January 1, 2018 and January 1, 2019 is set equal to the Market Value of Assets at that date, net of adjustments for amounts payable/receivable

Pension Fund Asset Mix as of December 31, 2018

Asset Class	Current Asset Mix	Target Asset Mix
Cash and short term	11%	2%
Fixed-income	38%	33%
Equities	41%	55%
Infrastructure	7%	5%
Real estate	<u>3%</u>	<u>5%</u>
Total	100%	100%

Going Concern Valuation Results as of January 1, 2019

Registered Pension Plan – Past Service

	January 1, 2018 (Last Filed Valuation)	January 1, 2019
Past Service		
Actuarial value of assets	\$ 1,675,862,000 ¹	\$ 1,694,301,000 ¹
Less: Accrued liability		
Active members	\$ 892,146,000	\$ 909,769,000
Disabled and suspended members	15,975,000	17,103,000
Pensioners and beneficiaries	695,394,000	732,786,000
Deferred vested members	37,052,000 ²	37,288,000 ³
Additional voluntary contribution balances	356,000	604,000
Members flex contribution balances	1,253,000	1,090,000
Cost of living increase effective May 1	<u>11,384,000</u>	<u>16,699,000</u>
Total	\$ 1,653,560,000	\$ 1,715,339,000
Going concern position	\$ 22,302,000	\$ (21,038,000)
Provision for Adverse Deviation (PfAD)	<u>(98,514,000)</u>	<u>(126,243,000)</u>
Funding excess/(unfunded liability)	\$ (76,212,000)	\$ (147,281,000)
Market value of assets	\$ 1,675,862,000	\$ 1,694,301,000

¹ Reflects in-transit benefit payments of \$814,000 in 2018

² Reflects actual indexation as of May 1, 2018 of 1.60% (1.20% for 75% indexed benefits), and expected indexation in following two years

³ Reflects actual indexation as of May 1, 2019 of 2.27% (1.70% for 75% indexed benefits), and expected indexation in following two years

Going Concern Valuation Results as of January 1, 2019

Registered Pension Plan – Current Service

	January 1, 2018 to December 31, 2018		January 1, 2019 to December 31, 2019	
	\$ Amount	% of Pensionable Earnings	\$ Amount	% of Pensionable Earnings
Current Service				
Total current service cost	\$ 69,210,000	15.61%	\$ 71,711,000	15.05% ¹
Provision for non-investment expenses	1,500,000	0.35%	1,560,000	0.33%
PfAD in respect of current service cost	4,255,000	0.96%	5,526,000	1.16%
Less: Members' required contributions	<u>(32,650,000)</u>	<u>(7.37%)</u>	<u>(34,998,000)</u>	<u>(7.34%)</u>
University current service cost	\$ 42,315,000	9.55%	\$ 43,799,000	9.20%
As a % of members' required contributions	129.6%		125.2%	
Pensionable earnings	\$ 443,254,000		\$ 476,623,000	

¹ 15.41% before change in discount rate

Analysis of Experience

In \$ Millions

Funding excess/(unfunded liability) as of January 1, 2018	\$ (76.2)
Plus: University contributions for current service	42.9
Member contributions for current service	33.1
Special payments	12.8
Less: Total current service cost	(73.5)
Plus: Interest at 5.60% per year	<u>(3.8)</u>
Equals: Expected funding excess/(unfunded liability) as of January 1, 2019	\$ (64.7)
Plus: Gains (losses) due to:	
Return on actuarial value of assets	(93.7)
COLA adjustment higher than assumed	(1.9)
Salary increases lower than assumed	2.7
Change in ITA maximum pension YMPE higher than assumed	-
Mortality experience	(1.0)
Retirement experience	6.5
Termination experience	(0.9)
Additional year of COLA for deferred members	(0.6)
Data adjustments	1.6
Miscellaneous experience	<u>1.3</u>
Equals: Funding excess/(unfunded liability) as of January 1, 2019, before change in discount rate	\$ (150.7)
Plus: Impact of change in discount rate from 5.60% to 5.70%	25.6
Impact of increase in PfAD from 6.95% to 8.50%	<u>(22.2)</u>
Equals: Funding excess/(unfunded liability) as of January 1, 2019	\$ (147.3)

Going Concern Valuation Results as of January 1, 2019

Payroll Pension Plan

	January 1, 2018 ¹	January 1, 2019 ²
Past Service		
Market value of assets	\$ 41,266,000	\$ 38,920,000
Less: Accrued liability		
Active members	\$ 30,625,000	\$ 28,683,000
Pensioners and beneficiaries	16,470,000	18,392,000
PfAD	N/A	N/A
Total	\$ 47,095,000	\$ 47,075,000
Funding excess/(unfunded liability)	\$ (5,829,000)	\$ (8,155,000)
Current Service		
University current service cost	\$ 1,833,000	\$ 1,963,000
As a % of pensionable earnings	0.41%	0.41%

¹ Reflects maximum benefit in 2018 of \$3,371 per year of credited service, indexed at 2.75% per year up to \$3,400

² Reflects maximum benefit in 2019 of \$3,400 per year of credited service

Total Current Service Cost for 2019

	RPP		PPP		Total	
	\$ Amount	% of Pensionable Earnings	\$ Amount	% of Pensionable Earnings	\$ Amount	% of Pensionable Earnings
Total current service cost ¹	\$ 78,797,000	16.54%	\$ 1,963,000	0.41%	\$ 80,760,000	16.95%
Less: Members' required contributions	<u>(34,998,000)</u>	<u>(7.34%)</u>	<u>-</u>	<u>-</u>	<u>(34,998,000)</u>	<u>(7.34%)</u>
University current service cost	\$ 43,799,000	9.20%	\$ 1,963,000	0.41%	\$ 45,762,000	9.61% ²

¹ Including PfAD and provision for non investment expenses in the RPP only

² Total University contributions shown on following page

Contributions for 2019 – Based on 2018 Filed Valuation

Member Contributions:	\$ 34,998,000	7.34% of pensionable earnings
University Contributions:	1.69 x \$ 34,998,000	12.40% of pensionable earnings
	= \$ 59,147,000	
	\$ 45,357,000	Allocated to pay University current service cost under RPP in 2019 (129.6% of member contributions under 2018 valuation)
	8,772,000	Allocated to pay University statutory special payments to amortize unfunded liability
	<u>5,018,000</u>	Additional contributions allocated to fund the unfunded liability
	\$ 59,147,000	Total University contributions

- Assumes no contribution to Payroll Pension Plan

Going Concern Valuation Results – Impact of CPM Public Mortality Table

- If CPM Public Mortality Table were adopted for this valuation the impact would be as follows:
 - RPP Accrued Liability + \$13,000,000
 - RPP Current Service Cost + \$400,000

 - PPP Accrued Liability + \$300,000
 - PPP Current Service Cost + \$15,000

Solvency and Wind Up Valuations

- The solvency and wind up valuations are performed at January 1, 2019 using assumptions that are prescribed by legislation and actuarial standards
- The solvency and wind up valuations are both performed assuming the plan were to wind up on the valuation date and all benefits are settled either through an annuity purchase or the payment of lump-sum (commuted) values to members
- The solvency valuation excludes the value of indexation from the liabilities; solvency deficit is subject to funding requirements
- The wind up valuation represents the estimated liability of all benefits to be settled; wind-up deficit is calculated for reporting purposes but is not required to be funded
- The wind up valuation is based on the premise that a market for fully-indexed annuities exists, which may not be practical for a pension plan of this size

Actuarial Assumptions for Solvency and Wind-Up Valuations

Assumptions	January 1, 2018 (Last Filed Valuation)	January 1, 2019
Retirement Ages	Age between 55 and 65 that produces highest value	No change
Mortality Rates	CPM2014 Combined with Generational Improvements Under Scale CPM-B	CPM2014 Combined with Generational Improvements Under Scale CPM-B
Interest Rates— Solvency Valuation (Per Year)		
Active Members Age 55 and Over, Pensioners and Deferred Pensioners ¹	3.03%	3.23% ³
Active Members Under Age 55 ²	2.80% for 10 years; 3.30% thereafter	2.80% for 10 years; 3.20% thereafter
Interest Rates— Wind-Up Valuation (Per Year)		
Active Members Age 55 and Over, Pensioners and Deferred Pensioners ¹	-0.13% ³ (100% indexed) 0.66% ³ (75% indexed)	0.08% ³ (100% indexed) 0.87% ³ (75% indexed)
Active Members Under Age 55 ²	1.30% for 10 years; 1.50% thereafter (100% indexed) 1.70% for 10 years; 1.90% thereafter (75% indexed)	1.60% for 10 years; 1.70% thereafter (100% indexed) 1.90% for 10 years; 2.10% thereafter (75% indexed)

¹ Settled through annuity purchase

² Settled through commuted value

³ Based on guidance released by Canadian Institute of Actuaries for January 1, 2019 actuarial valuations

Solvency and Wind Up Valuation Results as of January 1, 2019

	January 1, 2018		January 1, 2019	
	Solvency Valuation	Wind Up Valuation	Solvency Valuation	Wind Up Valuation
Market Value of Assets	\$ 1,675,862,000	\$ 1,675,862,000	\$ 1,694,301,000	\$ 1,694,301,000
Less: Wind up expenses	<u>(500,000)</u>	<u>(500,000)</u>	<u>(500,000)</u>	<u>(500,000)</u>
Solvency/wind up assets	\$ 1,675,362,000	\$ 1,675,362,000	\$ 1,693,801,000	\$ 1,693,801,000
Solvency/Wind Up Liabilities				
Active members	\$ 1,046,401,000	\$ 1,570,940,000	\$ 1,080,215,000	\$ 1,556,201,000
Disabled and suspended members	19,559,000	29,962,000	21,029,000	31,603,000
Pensioners and beneficiaries	742,991,000	1,002,616,000	775,614,000	1,036,388,000
Deferred vested members	46,996,000	95,096,000	47,047,000	89,306,000
Voluntary contribution balances	356,000	356,000	604,000	604,000
Member flex contribution balances	<u>1,253,000</u>	<u>1,253,000</u>	<u>1,090,000</u>	<u>1,090,000</u>
Total	\$ 1,857,556,000	\$ 2,700,223,000	\$ 1,925,599,000	\$ 2,715,192,000
Solvency Excess/(Deficiency)	\$ (182,194,000)	\$ (1,024,861,000)	\$ (231,798,000)	\$ (1,021,391,000)
Transfer ratio (market value of assets/wind up liabilities)	N/A	0.62	N/A	0.62
Solvency ratio (market value of assets/solvency liabilities)	0.90	N/A	0.88	N/A

Note: Difference between Solvency and Wind Up Valuation is that Wind Up Valuation includes indexation under plan, whereas Solvency Valuation excludes the indexation.