UNIVERSITY OF GUELPH

RETIREMENT PLAN OF UNIVERSITY OF GUELPH

Actuarial Valuation as at October 1, 2018

May 27, 2019

Registration Number: 0324624

WillisTowersWatson

DISCLAIMERS

This document is an actuarial valuation report of a pension plan. It is technical in nature and the reader should seek expert advice to fully understand it. The actuarial results presented here are based on numerous economic and demographic assumptions as to future events. Emerging experience, differing from the assumptions, will result in gains or losses that will be revealed in future actuarial valuations.

This report is based on the terms of engagement listed in Appendix A.

This report is based on the premise that all the plan's assets, including any letters of credit, are available to meet the plan's liabilities included in this valuation.

This report is based on the premise that the plan remains a going concern. This report does not address the disposition of any surplus assets remaining in the event of plan windup. If an applicable pension regulator or other entity with jurisdiction directs otherwise, certain financial measures contained in this report, including contribution requirements, may be affected.

The results presented in this report have been developed using a particular set of actuarial assumptions. Other results could have been developed by selecting different actuarial assumptions. The results presented in this report are reasonable actuarial results based on actuarial assumptions reflecting our expectation of future events.

Future contribution levels may change as a result of future changes in the actuarial methods and assumptions, the membership data, the plan provisions and the legislative rules, or as a result of future experience gains or losses, none of which have been anticipated at this time.

The results were developed with various data as at the valuation date that were provided to us: plan membership data, plan assets data, plan provisions and statement of investment policy. Towers Watson Canada Inc. ("Willis Towers Watson") has relied on these data after verifying them and assessing their reasonableness. However, Willis Towers Watson has not independently audited these data.

The information contained in this report was prepared for University of Guelph, for its internal use and for filing with the Pension authorities, in connection with the actuarial valuation of the plan prepared by Willis Towers Watson. This report is not intended, nor necessarily suitable, for other parties or for other purposes. Furthermore, some results in this report are based on assumptions mandated by legislation. These results may not be appropriate for purposes other than those for which they were prepared. Further distribution of all or part of this report to other parties (except where such distribution is required by applicable legislation) or other use of this report is expressly prohibited without Willis Towers Watson's prior written consent. Willis Towers Watson is available to provide additional information with respect to this report to the above-mentioned intended users upon request.

The numbers in this report are not rounded. The fact that numbers are not rounded does not imply a greater level of precision than if the numbers had been rounded.

Definitions:

Pension authorities means the Financial Services Commission of Ontario and the Canada Revenue Agency ("CRA").

Pension legislation means the *Pension Benefits Act (Ontario)* and Regulation thereto and the *Income Tax Act (Canada)* and Regulations thereto ("ITA").

Table of Contents

Introduction

Purpose

This report with respect to the Retirement Plan of University of Guelph has been prepared for University of Guelph, the plan administrator, and presents the results of the actuarial valuation of the plan as at October 1, 2018.

The principal purposes of the report are:

- to present information on the financial position of the plan on going concern, solvency and hypothetical windup bases;
- to provide the basis for employer contributions.

Significant Events since Previous Actuarial Valuation (August 1, 2016)

Changes to the going concern basis are described in Appendix C. Changes to the solvency basis are described in Appendix D.

Since the previous valuation there have been increases to member contribution rates for certain employee groups at various effective dates between September 1, 2017 and October 1, 2018. A supplemental report was filed with the Pension authorities effective April 1, 2018 in order to update the employer normal cost requirements as a result of the member contribution rate changes.

Since October 1, 2018, there have been increases to member contribution rates for the Exempt, Unifor, OPSEU, OSSTF, USW and UGFSEA Unit 1 membership groups effective May 1, 2019, and for the UGFSEA Unit 2 membership group effective August 1, 2019. These changes have been reflected in this report.

On October 31, 2016, Regulation 350/16 amended Regulation 178/11 to provide for an alternative funding option for plans with a First Subsequent Report valuation date on, or before, December 31, 2018. The August 1, 2016 valuation report was the First Subsequent Report. The alternative funding measures provided under Regulation 178/11 do not apply to the current report.

On May 19, 2017, the Ontario Ministry of Finance announced proposed reforms to the funding framework for defined benefit pension plans. On April 20, 2018, final regulations were released, and apply to reports with valuation dates on and after December 31, 2017 which are filed after April 30, 2018. As this report has an effective date on or after December 31, 2017 it has been prepared on the basis of the new funding rules.

Subsequent Events

We completed this actuarial valuation on May 10, 2019.

On May 21, 2019, amendments to the Pension legislation were released. These amendments are intended to clarify certain details related to the new funding framework that took effect on May 1, 2018. The impact, if any, of these amendments will be reflected in a subsequent valuation report.

Except as noted above, to the best of our knowledge and on the basis of our discussions with University of Guelph, no other events which would have a material financial effect on the actuarial valuation occurred between the actuarial valuation date and the date this actuarial valuation was completed.

Next Valuation

The next actuarial valuation of the plan must be performed with an effective date not later than October 1, 2019.

Section 1: Going Concern Financial Position

1.1 Statement of Financial Position

		October 1, 2018		August 1, 2016
Going Concern Value of Assets	$	418,692,000	$	354,232,000
Actuarial Liability				
Active and disabled members	$	183,306,615	$	201,636,029
Retired members and beneficiaries		183,471,265		167,072,887
Terminated vested members		4,422,336		4,906,415
Total actuarial liability	$	371,200,216	$	373,615,331
Actuarial Surplus (Unfunded Actuarial Liability)	$	47,491,784	$	(19,383,331)
Funded Ratio		113%		95%
Provision for Adverse Deviation (PfAD)	$	33,466,984		n.a.
Actuarial Surplus (Unfunded Actuarial Liability) After PfAD	$	14,024,800		(19,383,331)
Excess Actuarial Surplus[1]	$	0	$	0

Note:

[1] Considered to be nil if there is a hypothetical windup or solvency deficit.

1.2 Reconciliation of Financial Position

Actuarial surplus (unfunded actuarial liability) as at August 1, 2016		$ (19,383,331)
Net special payments		14,750,000
Expected interest on:		
■ Actuarial surplus (unfunded actuarial liability)	$ (2,451,290)	
■ Net special payments	742,369	(1,708,921)
Plan experience:		
■ Investment gains (losses)	$ 23,138,040	
■ Salary gains (losses)	8,488,093	
■ YMPE gains (losses)	(1,041,730)	
■ Cost-of-living adjustment gains (losses)	1,957,974	
■ Retirement gains (losses)	(812,506)	
■ Withdrawal gains (losses)	(3,923,992)	
■ Mortality gains (losses)	741,680	
■ Miscellaneous liability gains (losses)	(2,140,547)	26,407,012
Change in actuarial basis		27,427,024
Actuarial surplus (unfunded actuarial liability) as at October 1, 2018 before PfAD		$ 47,491,784

1.3 Contributions (Ensuing Year)

	October 1, 2018	August 1, 2016
Employer Normal Actuarial Cost		
Normal actuarial cost in respect of benefits	$ 12,840,029	$ 13,432,511
Provision for Adverse Deviation (PfAD)	$ 1,160,749	n.a.
Estimated member contributions	(6,546,424)[1]	(5,720,198)[2]
Employer normal actuarial cost	$ 7,454,354[1]	$ 7,712,313[2]
Employer normal actuarial cost as % of member contributions	114%[1]	135%[2]

Notes:

1 Member contribution rates will change effective May 1, 2019 for Exempt, Unifor, OPSEU, OSSTF, USW and UGFSEA Unit 1 and at August 1, 2019 for UGFSEA Unit 2. As a result of these changes, estimated member contributions for the year starting October 1, 2018 will be $188,000 higher on an annualized basis, with an offsetting reduction to the employer normal actuarial cost. The employer normal actuarial cost as a % of member contributions will change to 109% effective May 1, 2019 and 108% effective August 1, 2019.

2 Effective April 1, 2017 member contribution rates for USW members changed. Effective May 1, 2017 member contributions rates for CUPE 1334, OPSEU, UNIFOR, UGFSEA Units 1 & 2 and OSSTF members changed. As a result of these changes, estimated member contributions for the year starting August 1, 2016 was expected to be $271,000 higher on an annualized basis, with an offsetting reduction to the employer normal actuarial cost. The employer normal actuarial cost as a % of member contributions changed to 127% effective April 1, 2017 and 124% effective May 1, 2017.

Reconciliation of Employer Normal Actuarial Cost Rule

Employer normal actuarial cost as a % of member contributions at August 1, 2016	135%
■ Changes in membership profile and miscellaneous effects	(4)%
■ Changes in actuarial basis	(20)%
■ Changes in plan provisions	(15)%
■ Change in the PfAD level	18%
Employer normal actuarial cost as a % of member contributions at October 1, 2018	114%

Section 2: Solvency and Hypothetical Windup Financial Position

2.1 Statement of Solvency and Hypothetical Windup Financial Position

	October 1, 2018		August 1, 2016	
Solvency Value of Assets				
Market value of assets	$	426,824,000	$	369,698,000
Provision for plan windup expenses		(800,000)		(800,000)
Total solvency value of assets	$	426,024,000	$	368,898,000
Solvency Liability				
Active and disabled members	$	270,889,389	$	320,211,519
Retired members and beneficiaries		230,606,555		213,226,413
Terminated vested members		7,355,961		8,405,110
Total solvency liability	$	508,851,905	$	541,843,042
Solvency Surplus (Unfunded Solvency Liability)	$	(82,827,905)	$	(172,945,042)
Prior Year Credit Balance	$	0	$	0
Solvency ratio		84%		68%
Value of excluded benefits	$	81,043,199	$	89,908,469
Total hypothetical windup liability	$	589,895,104	$	631,751,511
Hypothetical Windup Surplus (Unfunded Hypothetical Windup Liability)	$	(163,871,104)	$	(262,853,511)
Lesser of estimated employer contributions for the period until the next actuarial valuation and the prior year credit balance	$	0	$	0
Transfer ratio		72%		59%
PBGF Information				
Ontario PBGF liability	$	508,851,905	$	541,843,042
Ontario asset ratio		100%		100%
Ontario portion of the fund	$	426,824,000	$	369,698,000
PBGF assessment base	$	82,027,905	$	172,145,042
Ontario additional PBGF liability	$	0	$	0

Comments:

- The solvency actuarial valuation results presented in this report are determined under a scenario where, following a plan windup, the employer discontinues its operations.

- The hypothetical windup valuation results presented in this report are determined under the same scenario used for the solvency valuation.

- *As* the transfer ratio is less than 1.00, transfer deficiencies must be paid over a maximum period of five years unless the cumulative transfer deficiencies are within the limits prescribed by the Pension legislation or the employer remits additional contributions in respect of the transfer deficiencies. Pursuant to Regulations 19(4) or 19(5) to the Pension legislation, approval of the Superintendent will be required to make commuted value transfers if there has been a significant decline in the transfer ratio after the actuarial valuation date.

2.2 Determination of the Statutory Solvency Excess (Deficiency)

In calculating the statutory solvency excess (deficiency), various adjustments can be made to the solvency financial position.

		October 1, 2018		August 1, 2016
Solvency surplus (unfunded solvency liability)	$	(82,827,905)	$	(172,945,042)
Adjustments to solvency position:				
▪ Present value of existing amortization payments	$	21,916,477	$	n.a.[2]
▪ Adjustment to reflect reduced solvency deficiency [1]		76,327,786		n.a.[2]
▪ Prior year credit balance		0		n.a.[2]
▪ Total	$	98,244,263	$	n.a.[2]
Statutory solvency excess (deficiency)	$	15,416,358	$	n.a.[2]

Notes:

[1] Equals 15% of the solvency liability.

[2] August 1, 2016 statutory solvency was prepared in accordance with the requirements set out in Regulation 178/11 which included amortization payments to fund 25% of the solvency deficit and interest payments on the solvency deficit not funded.

Details of Present Value of Existing Amortization Payments

Type of payment	Effective date	Month of last payment recognized in calculation	Annual amortization payment	Present value as at October 1, 2018 (at 3.37% per annum)
Solvency	Aug. 1, 2017	Jul. 2024	4,137,725	21,916,477

Amortization Payment Schedule after Adjustments (reflecting the current valuation results)

Type of payment	Effective date	Month of last payment recognized in calculation	Annual amortization payment	Present value as at October 1, 2018 (at 3.37% per annum)
Solvency[1]	Aug. 1, 2017	May 2020	4,137,725	6,500,119

Note:

1 The last monthly payment due in May 2020 is $133,652.

The employer may establish a letter of credit in order to cover all of or a portion of the above solvency amortization payments, to the extent the letter(s) of credit does not exceed 15% of the solvency liabilities.

Section 3: Contributions

3.1 Estimated Minimum Employer Contribution (Ensuing Year)

The estimated minimum employer contributions for the year beginning October 1, 2018 are shown in the table below. The amounts for the year beginning October 1, 2018 are before the adjustments to member contributions noted in Section 1.3 that come into effect after the valuation date.

Year Beginning		**October 1, 2018**
Employer Normal Actuarial Cost (including the PfAD)	$	7,454,354
Amortization Payments		
Going concern	$	0
Solvency		4,137,725
Sub-total	$	4,137,725
Application of Prior Year Credit Balance		0
Available actuarial surplus [1]	$	0
Estimated Minimum Employer Contribution	$	11,592,079

Note:

[1] The available actuarial surplus is the lesser of the going concern actuarial surplus after PfAD and the amount that, if it were deducted from the solvency assets of the plan, would reduce the solvency ratio to 105%.

3.2 Estimated Maximum Employer Contribution (Ensuing Year)

		October 1, 2018
Employer Normal Actuarial Cost (including the PfAD)	$	7,454,354
Greater of the Unfunded Actuarial Liability and the Unfunded Hypothetical Windup Liability		163,871,104
Estimated Maximum Employer Contribution	$	171,325,458

3.3 Timing of Contributions

Employer normal cost and member contributions: monthly and within 30 days of the month to which they pertain.

Amortization payments: monthly before the end of the month to which they pertain (or replaced by an equivalent letter of credit), if applicable.

Adjustment to contributions made since the valuation date: within 60 days from the date that this report is filed with the Pension authorities.

Section 4: Actuarial Opinion

In our opinion, for the purposes of the going concern, solvency and hypothetical windup valuations:

- the membership data on which the actuarial valuations are based are sufficient and reliable,
- the assumptions are appropriate, and
- the methods employed in the actuarial valuations are appropriate.

This report has been prepared, and our opinion has been given, in accordance with accepted actuarial practice in Canada. The actuarial valuations have been conducted in accordance with our understanding of the funding and solvency standards prescribed by the Pension legislation.

Towers Watson Canada Inc.

Melbourne, Geoffrey	Gonsalves, Davis
FCIA	FCIA

Toronto, Ontario
May 27, 2019

Appendix A: Significant Terms of Engagement and Certificate of the Plan Administrator

A.1 Significant Terms of Engagement

For purposes of preparing this actuarial valuation report, the plan administrator has directed that:

- The actuarial valuation is to be prepared as at October 1, 2018.
- No margins for adverse devations are to be used.
- For the purpose of determining the going concern discount rate, the investment policy dated April 20, 2018, which is the most up-to-date version, should be considered. There are no expectations that the target asset class distribution will be modified in the future.
- For purposes of determining the Provision for Adverse Deviation level as at October 1, 2018, the actual asset allocation based on the September 30, 2018 audited financial statements and additional information related to the investment categories provided directly by the plan administrator should be used.
- For purposes of determining the Provision for Adverse Deviation level, the plan is to be considered open to new entrants.
- The going concern value of assets is to be determined using the averaging technique described in the Asset Valuation Method section in Appendix C.
- The going concern actuarial cost method to be used is the projected unit credit prorated on service.
- For purposes of determining the solvency liabilities of the plan, the value of benefits arising from future inflation are to be excluded.
- The solvency and hypothetical windup valuation results are to be determined under a scenario where all expenses are paid from the pension fund.

Should these directions from the plan administrator be amended or withdrawn, Willis Towers Watson reserves the right to amend or withdraw this report.

A.2 Certificate of the Plan Administrator

I hereby certify that to the best of my knowledge and belief:

- the significant terms of engagement contained in Appendix A of this report are accurate and reflect the plan administrator's judgement of the plan provisions and/or an appropriate basis for the actuarial valuation of the plan;
- the information on plan assets, including the information on the investment policy and intended changes to the asset mix distribution after the valuation date, if any, forwarded to Towers Watson Canada Inc. and summarized in Appendix B of this report is complete and accurate;
- the data forwarded to Towers Watson Canada Inc. and summarized in Appendix E of this report are a complete and accurate description of all persons who are members of the plan, including beneficiaries who are in receipt of a retirement income, in respect of service up to the date of the actuarial valuation;
- the summary of plan provisions contained in Appendix F of this report is accurate; and
- except as noted in the Introduction of the report, there have been no events which occurred between the actuarial valuation date and the date this actuarial valuation was completed that may have a material financial effect on the actuarial valuation.

L Kimball
Signature

May 30/19
Date

Lori Kimball
Name

AVP Finance
Title

Martha Harley

May 30/19

MARTHA HARLEY

Assoc. VP Human Resources

Appendix B: Assets

B.1 Statement of Market Value(all plans)

The assets of the University of Guelph's three pension plans are held in a commingled fund managed by a number of investment managers. The master trustee as at October 1, 2018 is CIBC Mellon.

As at October 1, 2018, an amount of $1,191,000 was payable from the master trust, comprising the following:

	Professional Plan	Retirement Plan	Non-Professional Plan	Total
Employer normal cost contributions in transit	$ 495,000	$ 180,000	$ 0	$ 675,000
Member contributions in transit	427,000	152,000	5,000	584,000
Accrued investment management and trustee fees	(1,057,000)	(413,000)	(21,000)	(1,491,000)
Other net payables at October 1, 2018	(649,000)	(301,000)	(9,000)	(959,000)
Net receivable (payable)	$ (784,000)	$ (382,000)	$ (25,000)	$ (1,191,000)

	October 1, 2018		August 1, 2016	
Invested Assets				
Equities				
■ Canadian equities	$ 169,877,000	10.9%	$ 296,253,000	22.3%
■ U.S./international equities	686,655,000	44.3%	537,633,000	40.5%
■ Total equities	$ 856,532,000	55.2%	$ 833,886,000	62.7%
Fixed income and mortgage	$ 533,739,000	34.4%	$ 397,600,000	29.9%
Real estate and infrastructure	$ 116,064,000	7.5%	$ 61,784,000	4.6%
Cash and cash equivalents	$ 45,253,000	2.9%	$ 35,407,000	2.7%
Total Invested Assets	$ 1,551,588,000	100.0%	$ 1,328,677,000	100.0%
Other Assets				
Accrued Income	$ 2,937,000		$ 5,218,000	
Net accounts receivable/ (payable)	(1,191,000)		(563,000)	
Total other assets	$ 1,746,000		$ 4,655,000	
Total Assets	$ 1,553,334,000		$ 1,333,332,000	

Comments:

- The invested assets are held by CIBC Mellon under accounts TRDUGX UGXF00010002, TRDUGX UGXF00020002 and TRDUGX UGXF00030002.
- The data relating to the invested assets are based on the financial statements issued by CIBC Mellon and Ernst and Young. All such data has been relied upon by Willis Towers Watson following tests of reasonableness with respect to contributions, benefit payments and investment income. However, Willis Towers Watson has not independently audited or verified this data.

B.2 Asset Class Distribution

The following table shows the target asset allocation stipulated by the plan's investment policy in respect of major asset classes and the actual asset allocation as at October 1, 2018.

Asset Class	Target asset allocation[1]	Asset allocation as at October 1, 2018
Equities		
■ Canadian equities	13% (8% - 18%)	10.9%
■ U.S. Equities	13% (8% - 18%)	19.1%
■ International equities	14% (9% - 19%)	18.7%
■ Emerging market	5% (0% - 10%)	6.6%
Total equities	45% (40% - 50%)	55.3%
Real estate and infrastructure		
■ Real estate	10% (5% - 15%)	5.0%
■ Infrastructure	10% (5% - 15%)	2.5%
Total real estate/infrastructure	20% (15% - 25%)	7.5%
Fixed Income		
■ Mortgages	5% (0% - 10%)	7.4%
■ Canadian Fixed Income	22.5% (12.5% - 32.5%)	20.9%
■ Global High Yield Income	5% (0% - 10%)	6.0%
Total fixed income	32.5% (27.5% – 37.5%)	34.3%
Cash	2.5% (0% - 5%)	2.9%

Note:

[1] This information was obtained from the investment policy in effect for the plan as at October 1, 2018.

B.3 Reconciliation of Invested Assets (Market Value)

	Retirement Plan	All Plans
Assets as at August 1, 2016 (unaudited)	$ 369,698,000	$ 1,333,332,000
Reconciliations to audited balances	(195,000)	400,000
	$ 369,503,000	$ 1,333,732,000
Receipts:		
■ Contributions:		
– Employer normal actuarial cost	16,993,000	59,800,000
– Employer amortization payments	14,750,000	54,735,000
– Members' required contributions	13,462,000	47,774,000
– Members' other contributions	55,000	2,178,000
■ Investment return, net of investment expenses	61,421,000	220,949,000
■ Total receipts	$ 106,681,000	$ 385,436,000
Transfers from/(to) other University Plans	$ (7,063,000)	$ 0
Disbursements:		
■ Benefit payments:		
- Pension payments	$ 32,671,000	$ 130,407,000
- Lump sum settlements	8,742,000	32,289,000
■ Non-investment expenses	884,000	3,138,000
■ Total disbursements	$ 42,297,000	$ 165,834,000
Assets as at October 1, 2018	$ 426,824,000	$ 1,553,334,000

Comments:

- This reconciliation is based on the financial statements issued by CIBC Mellon and Ernst and Young.
- The rate of return earned on the market value of assets (all plans), net of all expenses, from August 1, 2016 to October 1, 2018 was approximately 7.2% per annum.

B.4 Development of the Going Concern Value of Assets

			Adjusted Market Value Beginning from September 30:				
			2014	2015	2016	2017	2018
(Adj) Market Value	September 30, 2014		1,245,373,000				
Net Contributions			(5,047,000)				
Assumed Interest		6.00%	74,571,000				
(Adj) Market Value	September 30, 2015		1,314,897,000	1,264,216,000			
Net Contributions			(14,686,000)	(14,686,000)			
Assumed Interest		6.00%	78,453,000	75,412,000			
(Adj) Market Value	September 30, 2016		1,378,664,000	1,324,942,000	1,358,901,000		
Net Contributions			(14,119,000)	(14,119,000)	(14,119,000)		
Assumed Interest		5.65%	77,496,000	74,460,000	76,379,000		
(Adj) Market Value	September 30, 2017		1,442,041,000	1,385,283,000	1,421,161,000	1,440,597,000	
Net Contributions			15,083,000	15,083,000	15,083,000	15,083,000	
Assumed Interest		5.65%	81,901,000	78,695,000	80,722,000	81,820,000	
(Adj) Market Value	September 30, 2018		1,539,025,000	1,479,061,000	1,516,966,000	1,537,500,000	1,554,525,000
Actuarial Value of Assets at October 1, 2018							1,525,415,000

Comments:

- The starting value of each column is the actual market value of assets, excluding net accounts receivable/(payable) at the indicated date.
- The rate of return earned on the going concern value of assets, net of all expenses, from August 1, 2016 to October 1, 2018 was approximately 8.4% per annum.

B.5 Going Concern Value of Assets by Plan

The going concern value of assets for the total fund is allocated to each of the three plans participating in the fund. The going concern value of invested assets, excluding the net accounts receivable/(payable) of $(1,191,000), is allocated in proportion to the number of units of the total fund held by each plan. The number of units held by each plan and the allocated going concern values of assets are as follows:

Plan	*Number of Units*	*Going Concern Value of Assets* [1]	*Pending Inter-Plan Transfers*	*Net Accounts Receivable / (Payable)*	*Total Going Concern Value of Assets* — *Before Collar* [2]	*Total Going Concern Value of Assets* — *After Collar* [2]
Professional	4,909,116	$ 1,079,874,000	$ 6,912,000	$ (784,000)	$ 1,086,002,000	$ 1,086,002,000
Retirement	1,937,224	426,137,000	(7,063,000)	(382,000)	418,692,000	418,692,000
Non-Professional	88,211	19,404,000	151,000	(25,000)	19,530,000	19,530,000
Total	6,934,551	$ 1,525,415,000	$ 0	$ (1,191,000)	$ 1,524,224,000	$ 1,524,224,000

Notes:

1 Excluding net accounts receivable / (payable).

2 Methodology used to determine the Going Concern Value of Assets includes provision that resulting amount must be within 90%-110% of market value of assets.

Appendix C: Actuarial Basis - Going Concern Valuation

C.1 Methods

Asset Valuation Method

The development of the going concern value of assets was performed for the three University plans, i.e., the Professional Plan, the Retirement Plan and the Non-Professional Plan, in total. The total invested assets were allocated among the three plans in proportion to the units allocated to each plan by the trustee, to which net outstanding amounts were then incorporated on a plan-by-plan basis.

The going concern value of assets was calculated as the average of the market value of invested assets at the valuation date and the adjusted market values at September 30 of the four previous years. To obtain these adjusted market values, the market values at September 30th of each of the four preceding years were accumulated to the valuation date with net contributions and assumed investment returns. Net contributions were calculated as contributions less benefit payments and were assumed to occur uniformly throughout each year. Assumed investment returns were calculated assuming that each year the assets earned interest at the going concern liability discount rate in effect during such year. The going concern value of invested assets was determined for all plans combined, with the result allocated pro-rata to each plan's market value of invested assets. This was then adjusted for net outstanding amounts and so that the value is within 90%/110% of market value on a plan-by-plan basis.

The objective of the asset valuation method is to produce a smoother pattern of going-concern surplus (deficit) and hence a smoother pattern of contributions, consistent with the long-term nature of a going concern valuation. The assumed investment return has been selected to equal the expected return on the assets over long periods with a margin for adverse deviations (where applicable). To the extent that such margins are reflected, it may be anticipated that, on average, the asset valuation method will tend to produce a result that is somewhat less than the market value of assets.

Actuarial Cost Method

The actuarial liability and the normal actuarial cost were calculated using the projected unit credit cost method (prorated on credited service). A middle of year decrement timing model has been applied.

C.2 Actuarial Assumptions

	October 1, 2018	August 1, 2016
Economic Assumptions (per annum)		
Liability discount rate	6.20%	5.65%
Rate of inflation	2.00%	Same
Rate of salary increase	4.00% (nil for disabled members)	Same
Escalation of YMPE under Canada/Québec Pension Plan [1]	3.00%	Same
Escalation of *Income Tax Act (Canada)* maximum pension limitation [2]	3.00%	Same
Post-retirement pension increases	0.60%	Same
Interest on members' contributions	6.20%	5.65%
Demographic Assumptions		
Mortality	125%/110% for males/females of CPM-2014 Public Sector Mortality Table, projected using Scale CPM-B	Same
Retirement from active membership	Age-related rates (see Table 1)	Same
Pension commencement after termination of employment	Earliest unreduced retirement date	Same
Withdrawal	Age-related rates (see Table 2)	Same
Percentage of involuntary terminations of employment	0%	Same
Disability incidence/recovery	Nil	Same
Other		
Percentage of members with an eligible spouse at pension commencement and electing joint and survivor pension form	75%	Same
Years male spouse older than female spouse	3	Same
Provision for non-investment expenses	None; return on plan assets is net of all expenses	Same

Notes:

[1] The YMPE of $55,900 for 2018 is the starting value for the YMPE projection as at the current actuarial valuation and is indexed starting in 2019.

[2] The *Income Tax Act (Canada)* maximum pension limit of $2,944.44 per year of service in 2018 is the starting value for maximum pension limit projection as at the current valuation and is indexed starting in 2019.

Table 1 — Retirement Rates

Age	Rate [1]
55 to 59	.05
60 to 64	.15
65 to 68	.50
69	1.00

Note:

[1] Plus 0.05 at age where member first attains 85 points if prior to age 65.

Table 2 — Withdrawal Rates

Age	Rate
20 to 29	.09
30 to 39	.07
40 to 44	.06
45 to 54	.03
55	0

C.3 Rationale for Actuarial Assumptions

The rationale for the material actuarial assumptions used in the going concern valuation is summarized below.

The going concern assumptions do not include margins for adverse deviations, as a separate Provision for Adverse Deviations has been applied to the actuarial liability and normal actuarial cost.

Liability discount rate

The assumption is an estimate of the expected long-term return on plan assets adjusted as follows:

■ Expected long-term return on plan assets before adjustments	5.60%
■ Effect of rebalancing and diversification	0.75%
■ Added value of active pension fund managers	0.00%
■ Investment management fees	(0.04)%
■ Adjustment for non-investment expenses paid by the plan	(0.11)%
■ Expected long-term return on plan assets after adjustments	6.20%

Post-retirement pension increases

Recognizing the asymmetric nature of the plan's indexation provision, this assumption was developed by determining the median level of post-retirement increases that results from the plan's indexation provision using the Willis Towers Watson's capital market model. The capital market model simulates inflation with this variable being developed through both the analysis of historical rates, and the application of econometric theory. In modeling inflation, current conditions and long term expectations are used.

Rate of inflation

Estimate of future rates of inflation considering economic and financial market conditions at the valuation date.

Rate of salary increase

■ Assumed rate of inflation	2.00%
■ Average increases in payroll above inflation for the overall plan membership	1.00%
■ Average expected increase as a result of individual employee merit and promotion	1.00%
■ Total rate of salary increase	4.00%

Escalation of YMPE under C/QPP and ITA limit

Indexed annually based on increases in the Industrial Aggregate Wage index for Canada, assumed to be a rate of inflation of 2.00% per annum, plus 1.00% per annum for the effect of real economic growth and productivity gains in the economy.

Mortality

Base mortality rates from the CPM-2014 Public Sector table are considered reasonable for the actuarial valuation of the plan since many university employees might be expected to have socio-economic characteristics more similar to the public sector.

Multipliers of 125% for males and 110% for females are applied to the base mortality rates and were developed based on a review of plan experience for the 10-year period ending August 1, 2013.

It has been observed that mortality experience gains and losses in the current and prior valuations do not suggest that the mortality assumptions are inappropriate.

Applying improvement scale CPM-B generationally provides allowance for improvements in mortality after 2018 and is considered reasonable for projecting mortality experience into the future.

No allowance has been made for mortality prior to retirement with respect to terminated vested members in order to approximate the value of pre-retirement death benefits.

Retirement from active membership

The rates of retirement were developed based on a review of plan experience for the 5-year period extending from April 1, 2008 to April 1, 2013 and an assessment of future expectations. All members are assumed to commence their pension at retirement date.

Pension commencement after termination of employment

All terminated members are assumed to commence their pension at the age that produces the highest liability.

Withdrawal

The rates of withdrawal were developed based on a review of plan experience for the 5-year period extending from April 1, 2008 to April 1, 2013 and an assessment of future expectations.

Percentage of involuntary terminations of employment

No allowance has been made for involuntary terminations of employment on the basis that this assumption would not have a material impact on the actuarial valuation results.

Disability incidence/recovery

No allowance has been made for incidences of disability or recovery therefrom on the basis that this assumption would not have a material impact on the actuarial valuation results.

Percentage of members with an eligible spouse at pension commencement and electing joint and survivor pension form

The assumed percentage of members with a spouse and the proportion electing a joint and survivor pension form are based on a review of plan experience for the 5-year period extending from April 1, 2008 to April 1, 2013.

Years male spouse older than female spouse

The assumption is based on a review of plan experience for the 5-year period extending from April 1, 2008 to April 1, 2013.

Provision for non-investment expenses

The liability discount rate is net of all expenses. The assumed level of expenses reflected in the liability discount rate is based on recent experience of the plan and an assessment of future expectations.

Appendix D: Actuarial Basis - Solvency and Hypothetical Windup Valuations

D.1 Methods

Asset Valuation Method

The market value of invested assets, adjusted for net outstanding amounts, has been used for the solvency and hypothetical windup valuations. The resulting value has been reduced by a provision for plan windup expenses.

Liability Calculation Method

The solvency and hypothetical windup liabilities for members were calculated using the unit credit cost method.

Other Considerations

The solvency and hypothetical windup valuations have been prepared on a hypothetical basis. In the event of an actual plan windup, the plan assets may have to be allocated between various classes of plan members or beneficiaries as required by applicable Pension legislation. Such potential allocation has not been performed as part of these solvency and hypothetical windup valuations.

D.2 Solvency Incremental Cost Actuarial Method

To calculate the Solvency Incremental Cost ("SIC"), we used the same method as for the solvency valuation.

No new entrants have been considered on the basis that such assumptions would not have a material impact on the SIC. The benefits and members' contributions were projected using the going concern valuation assumptions and the plan provisions.

The projected population, benefits and members' contributions were adjusted with the going concern actuarial assumptions and the plan provisions.

We adjusted the expected settlement method at the end of the projection period to reflect demographic evolution. We used the discount rate applicable to the settlement method at the valuation date for each member.

The liability discount rates are assumed to remain at their current level over the projection period.

D.3 Actuarial Assumptions

	October 1, 2018	August 1, 2016
Economic Assumptions (per annum)		
Liability discount rate (for solvency and before pension commencement for hypothetical windup)		
■ Annuity purchase	3.4%	2.8%
■ Commuted value transfer	3.3% for 10 years, 3.4% thereafter	1.7% for 10 years, 3.0% thereafter
Liability discount rate(after pension commencement for hypothetical windup)		
■ Annuity purchase	1.7%	1.0%
■ Commuted value transfer	3.3% for 10 years, 3.4% thereafter	1.7% for 10 years, 3.0% thereafter
Discount rate for determining amortization payments [1]	3.37%	2.40%
Demographic Assumptions		
Mortality	CPM2014 Canadian Pensioners' Mortality Table, projected generationally using Scale B	Same
Retirement/pension commencement	Described in section D.4	Same
Other		
Percentage of members with an eligible spouse at pension commencement and electing joint and survivor pension form	75%	Same
Years male spouse older than female spouse	3	Same
Percentage of members receiving settlement by commuted value transfer [2]		
■ Inactive members	0%	Same
■ Active members under 55 years old	100%	Same
■ Active members aged 55 years and over	25%	Same
Provision for expenses	$800,000	Same

Notes:

[1] Equal to the liability-weighted average of the liability discount rates for settlements by commuted value transfer (rate in effect for the first 10 years) and annuity purchase.

[2] The balance are assumed to receive settlement by annuity purchase.

D.4 Rationale for Actuarial Assumptions

The rationale for the material actuarial assumptions used in the solvency and hypothetical windup valuations is summarized below.

The actuarial assumptions used in the solvency and hypothetical windup valuations do not include margins for adverse deviations.

Liability discount rate

Portion of the solvency and hypothetical windup liabilities expected to be settled by a group annuity purchase: based on the CIA annuity purchase guidance applicable at the valuation date which corresponds to an approximation of the annuity purchase rate. The duration of the liabilities assumed to be settled through the purchase of non-indexed annuities is 11.3

Portion of the solvency and hypothetical windup liabilities expected to be settled by commuted value transfer: determined in accordance with the *Standards of Practice for Pension Commuted Values* in effect at the valuation date.

Mortality

For the benefits that are expected to be settled by a group annuity purchase: based on CIA annuity purchase guidance.

For benefits that are expected to be settled by commuted value transfer: determined in accordance with the *Standards of Practice for Pension Commuted Values* in effect at the valuation date. No pre-retirement mortality has been assumed in order to approximate the value of pre-retirement death benefits.

Retirement/pension commencement

- Active and disabled members: Pension commences at the age that produces the highest actuarial value (including statuory grow-in rights for members in Ontario).
- Terminated vested members: pension commences at earliest unreduced retirement date under the terms of the plan.

This is in accordance with the CIA Standards and consistent with the expected assumption that would have been used by insurers to price the group annuity.

Percentage of members with an eligible spouse at pension commencement and electing joint and survivor pension form

See rationale for going concern assumptions in Appendix C.

Percentage of members receiving settlement by commuted value transfer

This assumption has been determined by considering the benefit provisions of the plan, legislative requirements to offer specific settlement options to various classes of members, and, in particular, the options to be provided to members upon plan windup.

The assumption also reflects the expectation that members further from retirement are more likely to elect to settle their pension benefit by a commuted value transfer, while members closer to retirement are more likely to elect to settle their pension benefit through a group annuity purchase where this option is available.

Provision for expenses

Allowance was made for normal administrative, actuarial, legal and other costs which would be incurred if the plan were to be wound up (excluding costs relating to the resolution of surplus or deficit issues). The actuarial valuation is premised on a scenario in which all costs incurred as a result of plan windup were assumed to be paid from the pension fund.

Appendix E: Membership Data

	October 1, 2018	August 1, 2016
Active and disabled members		
■ Number	1,586	1,625
■ Average age	48.1	48.8
■ Average credited service	11.7	12.1
■ Annual payroll	$89,138,387	$88,972,930
■ Average salary	$56,203	$54,753
Retired members and beneficiaries		
■ Number	1,168	1,099
■ Average age	73.8	73.6
■ Total annual pension	$16,220,408	$14,113,214
■ Average annual pension	$13,887	$12,842
Terminated vested members		
■ Number	209	213
■ Average age	49.2	49.0
■ Total annual pension	$587,557	$545,468
■ Average annual pension	$2,811	$2,561

The following distribution relates to active and disabled members. The following meanings have been assigned to:

- Age: Age as at October 1, 2018
- Credited Service: Credited service as at October 1, 2018
- Salary: Pensionable earnings for year commencing October 1, 2018

		Credited Service								
Age		*0 - 4*	*5 - 9*	*10 - 14*	*15 - 19*	*20 - 24*	*25 - 29*	*30 - 34*	*35 +*	*Total*
< 20	Number	1								1
	Average Salary	*								*
20 - 24	Number	22								22
	Average Salary	45,335								45,335
25 - 29	Number	101	5							106
	Average Salary	48,752	*							49,298
30 - 34	Number	97	48	2						147
	Average Salary	52,257	60,316	*						55,018
35 - 39	Number	69	47	25	3					144
	Average Salary	55,345	58,822	63,021	*					57,753
40 - 44	Number	58	34	45	29	3				169
	Average Salary	54,631	61,247	59,116	60,664	*				58,490
45 - 49	Number	42	48	38	44	11	4			187
	Average Salary	53,400	61,872	55,328	58,013	62,941	*			57,798
50 - 54	Number	41	42	44	48	43	24	5		247
	Average Salary	48,627	57,055	57,870	58,612	59,481	57,436	62,608		56,676
55 - 59	Number	47	44	56	58	27	83	18	1	334
	Average Salary	48,394	54,840	56,392	57,372	61,788	59,167	57,324	*	*
60 - 64	Number	18	27	37	27	22	17	38	6	192
	Average Salary	48,719	53,500	56,372	54,831	62,371	56,866	56,693	66,870	56,157
65 +	Number	5	10	2	6	3	2	4	5	37
	Average Salary	*	52,142	*	52,843	*	*	*	*	57,985
Total	Number	501	305	249	215	109	130	65	12	1,586
	Average Salary	51,316	58,324	57,768	57,711	61,306	58,476	57,637	*	56,203

Average Age = 48.1 Average Credited Service = 11.7

Review of Membership Data

The membership data were supplied by University of Guelph's third-party administrator, Morneau Shepell, as at October 1, 2018.

Elements of the data review included the following:

- ensuring that the data were intelligible (i.e., that an appropriate number of records was obtained, that the appropriate data fields were provided and that the data fields contained valid information);
- preparation and review of membership reconciliations to ascertain whether the complete membership of the plan appeared to be accounted for;
- review of consistency of individual data items and statistical summaries between the current actuarial valuation and the previous actuarial valuation;
- review of reasonableness of individual data items, statistical summaries and changes in such information since the previous actuarial valuation date; and
- comparison of the membership data and the plan's financial statements for consistency.

However, the tests conducted as part of the membership data review may not have captured certain deficiencies in the data. We have also relied on the certification of the plan administrator as to the quality of the data.

Data Adjustments

For certain groups, credited service for the period between the termination benefit change date and retirement benefit change date is based on the membership data supplied by Morneau Shepell as of at August 1, 2016.

Membership Reconciliation

Active and disabled members:	
■ As at August 1, 2016	1,625
■ New entrants (including re-employed)	267
■ Retirements	(117)
■ Terminations:	
– Not settled	0
– With lump sum settlement	(83)
– With deferred pension entitlement	(39)
■ Deaths:	
– Not settled	0
– With lump sum settlement	(6)
– With survivor's pension	(3)
■ Transferred out	(63)
■ Transferred in	6
■ Data corrections	(1)
■ As at October 1, 2018	1,586
Retired members and beneficiaries:	
■ As at August 1, 2016	1,099
■ New retirements	124
■ New beneficiaries	24
■ Deaths:	
– Without survivor's pension	(59)
– With survivor's pension	(21)
■ Data corrections	1
■ As at October 1, 2018	1,168
Terminated vested members:	
■ As at August 1, 2016	213
■ New vested terminations	39
■ Lump sum settlements	(40)
■ Retirements	(7)
■ Deaths:	
– With lump sum settlement	(2)
– With survivor's pension	0
■ Data corrections	6
■ As at October 1, 2018	209

Appendix F: Summary of Plan Provisions

The following is an outline of the principal features of the plan which are of financial significance to valuing the plan benefits. This summary is based on the most recently restated plan document as at June 30, 2015, amendment #1 to amendment #5 and amendment #6 & #7 (expected to be filed in June 2019), as provided by the University of Guelph, and does not make any provisions for the possibility that a change or action (retroactive or otherwise) could be imposed by order of a regulatory body or a court. It is not a complete description of the plan terms and should not be relied upon for administration or interpretation of benefits. For a detailed description of the benefits, please refer to the plan document.

Plan Effective Date

September 1, 1965

Definitions

Best Average Earnings

Average earnings for the best 36 consecutive months prior to date of termination or retirement.

CPI Increase

Increase in average Canadian Consumer Price Index in the 12-month period ending in April of one year over a similar period in the previous year.

Credited Service

Continuous service since the Effective Date during which regular contributions are made. Proportionate Credited Service is granted to part-time Members. Credited Service is limited to 35 years.

Earnings

Basic earnings (annualized for part-time Employees), including deferred income, excluding bonuses, overtime payments and other payments. Earnings for disabled Members, during the period of disability, are deemed to be equal to the Member's earnings in the 12 months immediately prior to disability and increased annually to reflect the percentage increase in the salary base level for the Member’s union, association, or group, as applicable.

Employee

Full-time or part-time, permanent, non-professional staff.

YMPE Average

Average YMPE for the 60 consecutive months immediately prior to date of termination or retirement.

85 Points Date

The date where the sum of Member's age and Credited Service is equal to 85 (determined based on the presumption that the Member remained in active service).

Plan Participation

All new regular full-time Employees are required to join the Plan, as a condition of employment, as of the first day of the month coincident with or immediately following the date of hire, with the exception of members of UGFSEA Units 1 and 2 and OSSTF who were not enrolled in the plan on October 1, 2014, or who are hired on or after October 1, 2014; subject to meeting certain eligibility criteria, these members will join the Non-Professional Plan.

Membership in the Plan is available on an optional basis for a part-time Employee upon satisfaction of the minimum eligibility conditions prescribed under the Pension Benefits Act (Ontario).

Certain members of the PSPP and the OPSEU Plan affected by the Memorandum of Agreement between OMAFRA and the University became Members of the Plan upon their transfer to the University at April 1, 1997.

Member Contributions

Member contribution rates reflected in this current report vary by employee group as follows:

Employee Group	Effective Date	% Below YMPE	% Above YMPE
CUPE 1334	May 1/18	8.60	10.90
CUPE 1334 Unit 1	May 1/18	7.55	9.25
CUPE 3913 Unit 2	Sep. 1/18	7.55	9.25
Exempt Group	May 1/18	8.41	9.75
	May 1/19	8.66	10.00
OPSEU	May 1/17	7.05	8.75
	May 1/19	7.30	9.00
OSSTF	May 1/17	7.80	9.14
	May 1/19	8.05	9.39
UGFSEA Unit 1	May 1/17	7.32	9.02
	May 1/19	7.57	9.27
UGFSEA Unit 2	May 1/17	7.27	8.97
	Aug. 1/19	7.52	9.22
Unifor	Apr. 1/18	8.44	10.14
	May 1/19	8.69	10.39
USW	May 1/18	8.00	9.50
	May 1/19	8.25	9.75
Members not represented by a Union, Association or Group	Jul. 1/14	6.55	8.25

Earnings for contribution purposes are limited to an annually set maximum ($167,000 in 2018). Members are not required to contribute after completion of 35 years of Credited Service. Contributions are waived during disability.

Normal Retirement

Eligibility

First day of the month next following or coincident with attainment of age 65.

Basic Annual Pension

1.50% of the Member's Best Average Earnings not exceeding the YMPE Average, plus 2.00% of the Member's Best Average Earnings in excess of the YMPE Average, for each year of Credited Service.

Notwithstanding the above, effective May 1, 2007 for Exempt, OSSTF and USW Local 4120 and effective May 1, 2009 for CUPE 1334, the pension is determined as 1.60% of the Member's Best Average Earnings not exceeding the YMPE Average, plus 2.00% of the Member's Best Average Earnings in excess of the YMPE Average, for each year of Credited Service.

Maximum Pension

Current *Income Tax Act (Canada)* limit, or such higher amount as permitted from time to time. The plan provisions provide for limitation on pre-1990 past service benefits as defined in subsection 8504(6) of the Regulations to the *Income Tax Act (Canada)*.

Early Retirement

Eligibility

First day of the month next following or coincident with attainment of age 55.

Basic Annual Pension

Member’s pension is reduced by 1/4% for each month that retirement precedes the earliest of:

(a) normal retirement age; and

(b) Earliest Unreduced Date (“EUD”) as outlined below for each employee group.

Employee Group	EUD Change Date	Earliest Unreduced Date ("EUD") For service up to EUD Change Date	Earliest Unreduced Date ("EUD") For service on or after EUD Change Date
CUPE 1334	N/A	85 Points Date	85 Points Date
CUPE 3913 Unit 2	N/A	85 Points Date	85 Points Date
USW	N/A	85 Points Date	85 Points Date
UGFSEA Unit 2	N/A	85 Points Date	85 Points Date
UGFSEA Unit 1 and CUPE 1334 Unit 1	N/A	85 Points Date	85 Points Date
OPSEU, Unifor, Exempt Group and OSSTF	May 1/13	85 Points Date	90 Points Date and at least age 60
Members not represented by a Union, Association or Group	Jul. 1/13	85 Points Date	90 Points Date and at least age 60

Postponed Retirement

Eligibility

Retirement from the University after age 65, but in no event after age 69.

Annual Pension Income

Pension accrued at date of retirement.

Forms of Payment

Timing

Pensions are payable monthly on the last day of each calendar month.

Normal Form

Monthly pension payable at the end of each month for life, together with a continuation of 60% to the spouse on the Member's earlier death. A survivor's pension is payable to the Member's children under certain circumstances. A Member without a spouse receives a monthly pension payable for life, guaranteed for 60 months in any event.

Optional Forms

Optional forms of pension are available on an actuarial equivalent basis. Optional forms include variations in term certain guarantee and varying levels of continuation for spousal forms.

Death Benefit

Pre-Retirement

A lump sum payment equal to the value of the accrued pension assuming the member had terminated or retired, as applicable, on his date of death.

Post-Retirement

Based on normal form or optional form of pension elected by a Member.

Termination of Employment

Accrued pension commencing at normal retirement date, or as early as age 55 with the applicable reduction applied. The reduction varies depending on whether the benefit was earned before or after the Termination Benefit Change Date (outlined below):

- In respect of service up to the Termination Benefit Change Date, the accrued pension is reduced by ¼% for each month that pension commencement precedes the earlier of the normal retirement date and the 85 Points Date.
- In respect of service on or after the Termination Benefit Change Date, the accrued pension is actuarially reduced for pension commencement prior to the normal retirement date.

Alternatively a Member may elect to have the commuted value of his accrued pension transferred to a registered vehicle on a locked-in basis. For service up to the Termination Benefit Change Date the lump sum benefit is equal to the greater of twice his required contributions, with interest, and the commuted value.

The actuarial equivalent lump sum value of the benefit earned prior to January 1, 1987 shall not be less than the Member's contributions made during such period together with interest. Also, in the event the Member's contributions made subsequent to January 1, 1987 together with interest are greater than 50% of the actuarial equivalent lump sum value of the benefit earned during such period, a refund will be provided.

If the Member's termination of employment is involuntary and without cause, and the Member has at least 55 points (age plus continuous service) at termination of employment, the member is permitted to commence his or her accrued pension on or after age 55 based on the early retirement provisions described above that would have applied had the member continued in employment until such early retirement date.

Employee Group	**Termination Benefit Change Date**
USW and UGFSEA Unit 2	Jan. 1/12
UGFSEA Unit 1	May 1/12
OPSEU Local 231, Unifor, Exempt Group and OSSTF	May 1/13
Members not represented by a Union, Association or Group	Jul. 1/13
CUPE 1334 and CUPE 1334 Unit 1	Apr. 30/16
CUPE 3913 Unit 2	Sep. 1/16

Disability Benefit

Required Member contributions cease during disability; Credited Service continues to accrue and Earnings are indexed during disability.

Adjustment to Pension in Payment

Pensions are increased annually while in payment to reflect the excess, if any, by which the previous year's CPI increase (maximum 8%) is over 2.0%.

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Appendix G: Sensitivity Analysis and Other Disclosures

G.1 Sensitivity Information

Amounts determined with a discount rate 1% lower:

Going concern actuarial liability	$	422,701,954
Solvency actuarial liability	$	585,381,510
Employer normal actuarial cost as a % of member contributions		157%

G.2 Solvency Incremental Cost

Solvency Incremental Cost (up to next valuation date)	$	24,306,310

G.3 Provision for Adverse Deviation Level

Actual Asset Allocation for Fixed Income Assets

The actual asset allocation as at October 1, 2018 has been used to determine the Provision for Adverse Deviation level, as disclosed in the September 30, 2018 audited financial statements. We have relied on the direction from the plan administrator related to fixed income allocations and ratings. Fixed income investments listed below not meeting the minimum credit rating prescribed by the Pension legislation (within the global high yield bond allocation) have been categorized as non-fixed income.

	Actual asset allocation	Fixed income allocation	Non-fixed income allocation	Fixed income weight
Asset classes				
- Canadian equities	10.95	0	10.95	0%
- US equities	19.11	0	19.11	0%
- International equities	18.65	0	18.65	0%
- Emerging market equities	6.58	0	6.58	0%
- Real estate	4.96	2.48	2.48	50%
- Infrastructure	2.51	1.25	1.26	50%
- Mortgages	7.38	3.69	3.69	50%
- Fixed income	26.95	22.10	4.85	82%
- Cash and accrued income	2.91	2.91	0	100%
Total	100.00%	32.43%	67.57%	

Benchmark Discount Rate

Components	**Rate**
CANSIM V39056	2.48%
Risk Premium on Non-Fixed Income Assets[1]	3.38%
Risk Premium on Fixed Income Assets[2]	0.49%
Diversification Allowance	0.50%
Benchmark Discount Rate	6.85%

Notes:

[1] 5.00% of the non-fixed proportion of the assets.

[2] 1.50% of the fixed proportion of the assets.

Provision for Adverse Deviation Level

Components	Provision for Adverse Deviation level
Fixed	4.00%
Asset mix based	5.51%
Benchmark discount rate based[1]	0.00%
Provision for Adverse Deviation Level[2]	9.51%

Notes:

[1] Reflects going concern discount rate less benchmark discount rate (subject to a minimum of zero), multiplied by the going concern liabilities duration (refer to sub-section G.1)

[2] The Provision for Adverse Deviation is applied to the going concern actuarial liability and total normal cost, excluding any portion for future indexation.

Canada Revenue Agency / Agence du revenu du Canada

Actuarial Information Summary

See the instructions for completing this form. If an item does not apply, enter "N/A".

Part I – Plan Information and Contributions

A. 001. Name of registered pension plan
Retirement Plan of University of Guelph

B. 002. Registration number
Canada Revenue Agency: 0324624 Other:

C. 003. Is this plan a designated plan? ☐ Yes ☑ No

D. 004. Valuation date of report Year Month Day: 2018 10 01

E. 005. End date of period covered by report Year Month Day: 2021 09 30

F. 006. Purpose of the report (indicate all reasons for which the report was prepared)

☐ Initial report for a newly established plan
☑ Regular (triennial or annual) report for an ongoing plan
☐ Interim report in respect of an amendment to an ongoing plan
☐ Partial termination
☐ Termination
☐ Conversion
☐ Other (explain)

G. Contributions (prior to application of any credits or surplus) for covered period

Periods (see instructions)	Period 1	Period 2	Period 3	Period 4
007. Period start date (YYYY-MM-DD)	2018-10-01	2019-10-01	2020-10-01	
008. Period end date (YYYY-MM-DD)	2019-09-30	2020-09-30	2021-09-30	
Normal cost (defined benefit provision) **009.** Members	6,546,424	0	0	
010. Employer	7,454,354	0	0	
010a. Explicit expense allowance included in employer normal cost above				
Normal cost (money purchase provision) **011.** Members				
012. Employer				
Special payments Special payments for going-concern unfunded liability and solvency deficiency **013.** Employer	4,137,725	0	0	
013a. Members	0	0	0	
Fixed contributions **014.** Estimated dollar amounts of fixed employer and, if applicable, member contributions (defined benefit provision)				
014a. Estimated dollar amounts of fixed employer and, if applicable, member contributions (money purchase provision)				

Part II – Membership and Actuarial Information

H. Membership information	Number	Average age	Average pensionable service	Average salary	Average annual pension
015. Active members	1,586	48.10	11.70	56,203	N/A
016. Retired members	1,168	73.80	**N/A**	**N/A**	13,887
017. Other participants	209	49.20	**N/A**	**N/A**	2,811

I. Actuarial basis for going-concern valuation (see instructions)

020. Asset valuation method

☐ Market ☑ Smoothed Market ☐ Book ☐ Book and Market combination ☐ Other (specify)

021. Liability valuation method

☑ Accrued benefit (unit credit) ☐ Entry age normal ☐ Individual level premium ☐ Aggregate ☐ Attained Age

☐ Other (specify)

I. Actuarial basis for going-concern valuation (continued)

Selected actuarial assumptions

Where a flat rate is used, enter the rate under "Ultimate rate" and "N/A" under "Initial rate" and "Number of years".

Valuation interest rate	Initial rate (%)	Number of years	Ultimate rate (%)
025. Active members	N/A	N/A	6.20
026. Retired members	N/A	N/A	6.20
027. Rate of indexation	N/A	N/A	0.60
028. Rate of general wage and salary increase	N/A	N/A	4.00
029. YMPE escalation rate	N/A	N/A	3.00
030. *Income Tax Regulations*' maximum pension limit escalation	N/A	N/A	3.00
031. Rate of CPI increase	N/A	N/A	2.00

035. Year *Income Tax Regulations*' maximum pension limit escalation commences 2019

036. Mortality table

☐ 1994 GAM Static ☐ 1994 Group Annuity Reserving (GAR) ☐ 1994 UP ☐ 80% of 1983 GAM ☐ CPM2014

☑ CPM2014Publ ☐ CPM2014Priv ☐ Other (specify) ______

036a. Improvement scale

Has a projection of mortality improvement been made? .... ☑ Yes ☐ No

i) Has an assumption of generational mortality improvements been made? .... ☑ Yes ☐ No

ii) If applicable, what is the year in which the mortality improvements have been projected? .... ______

iii) Which scale have you used?

☐ Scale AA ☑ Scale CPM-B ☐ Scale CPM-B1D2014 ☐ Other (specify) ______

036b. Adjustment to the mortality table

i) Has an adjustment to the mortality table been made? .... ☑ Yes ☐ No

ii) If **yes**, which percentage did you apply to .... Male 125.0 Female 110.0

037. Allowance for promotion, seniority, and merit increases

☑ Included in (line **028**) above ☐ Separate scale based on age or service ☐ No allowance

038. Allowance for expenses

038a. Allowance for investment expenses

☑ Implicit ☐ Explicit ☐ Both explicit and implicit

038b. Allowance for administrative expenses

☑ Implicit ☐ Explicit ☐ Both explicit and implicit

039. If a multi-employer plan, number of hours of work per member per plan year ______

040. Was a withdrawal scale used? .... ☑ Yes ☐ No

041. Were variable retirement rates used? .... ☑ Yes ☐ No

042. If **no**, what is the assumed retirement age? .... ______

J. Actuarial basis for solvency valuation

Valuation interest rate	Initial rate (%)	Select period	Ultimate rate (%)
045. Benefits to be settled by lump sum transfer	3.30	10	3.40
046. Benefits to be settled by purchase of deferred annuity	N/A	N/A	3.40
047. Benefits to be settled by purchase of immediate annuity	N/A	N/A	3.40
048. Rate of indexation	N/A	N/A	N/A

049. Mortality table

Lump sum: ☐ 1994 UP Generational ☐ CPM2014Priv ☑ CPM2014 ☐ CPM2014Publ ☐ Other (specify) ______

Annuity Purchase: ☐ 1994 UP Generational ☐ CPM2014Priv ☑ CPM2014 ☐ CPM2014Publ ☐ Other (specify) ______

049a. Improvement scale used

Lump sum: ☐ Scale AA ☑ Scale CPM-B ☐ Scale CPM-B1D2014 ☐ Other (specify) ______ ☐ None

Annuity Purchase: ☐ Scale AA ☑ Scale CPM-B ☐ Scale CPM-B1D2014 ☐ Other (specify) ______ ☐ None

K. Balance sheet information (DB provisions, see instructions)

050. Market value of assets, adjusted for receivables and payables	426,824,000
051. Amount of contributions receivable included in market value above	332,000
Going-concern valuation	
052. Going-concern assets	418,692,000
053. Optional ancillary contributions account balance included in going-concern assets above for a flexible pension plan (if applicable)	
Going-concern liabilities	
060. For active members	183,306,615
061. For retired members	183,471,265
062. For other participants	4,422,336
063. For optional ancillary benefits to be provided under a flexible pension plan (if applicable)	0
064. Other reserve	33,466,984

065. Reserve type ☐ Expenses ☐ Ad-hoc indexing ☑ Provision for Adverse Deviation ☐ Other (specify) ______

070. Net funded position—surplus/deficit	14,024,800
071. Additional voluntary contributions	0
072. Money purchase assets (if applicable)	0

Solvency valuation

Complete lines **080** to **100** only if the report contains an explicit solvency valuation

Solvency assets	
080. Solvency assets with adjustment for expense provision, if any	426,024,000
081. Amount of wind-up expense provision reflected in line **080**	800,000
082. Optional ancillary contributions account balance included in solvency assets above for a flexible pension plan (if applicable)	
Solvency liabilities	
090. For active members	270,889,389
091. For retired members	230,606,555
092. For other participants	7,355,961
093. For optional ancillary benefits to be provided under a flexible pension plan (if applicable)	0
094. Other reserve	0

095. Reserve type ☐ Expenses ☐ Other (specify) ______

100. Net solvency position—surplus/deficit	(82,827,905)
101. Incremental cost	24,306,310

If the plan provides benefit increases coming into effect during the period covered by the report but after the valuation date, have those increases been reflected in:

102. The going-concern liabilities in lines **060** to **064**? ☐ Yes ☐ No ☑ N/A

103. The solvency liabilities in lines **090** to **094**? ☐ Yes ☐ No ☑ N/A

Discount rate sensitivity

	Change in percentage using discount rate 1% lower	Change in amount using discount rate 1% lower	Change in amount using discount rate 1% higher
104. Going-concern liabilities	13.87	51,501,738	-45,226,799
105. Normal cost	19.99	2,566,574	-2,139,010
106. Solvency liabilities	15.04	76,529,605	-66,524,539

L. Actuarial gains or losses

110. Was a gain/loss analysis done? ☑ Yes ☐ No

111. If line **110** is **yes**, indicate the date of the last filed funding valuation report and the net funded position as of that date: Year 2016 Month 08 Day 01 — (19,383,331)

If line **110** is **yes**, indicate amount of gain or loss due to:

112. interest on surplus (unfunded liability)	(2,451,290)
113. special payments made	15,492,369
114. amount used for contribution holiday	
115. change in actuarial assumptions	27,427,024
116. change in the asset valuation method	
117. change in liability valuation method	
118. plan amendments/changes	
119. investment experience	23,138,040
120. retirement experience	(812,506)
121. mortality experience	741,680
122. withdrawal experience	(3,923,992)
123. salary increase experience	8,488,093
124. optional ancillary contributions forfeited	

Are there major contributing sources other than lines **112** to **124** above (if **yes**, specify)

125. cost of living adjustment	1,957,974
126. Provision for Adverse Deviation	(33,466,984)
127. all other sources (combined)	(3,182,277)

M. Subsequent events

135. Are there any subsequent event(s) that have not been reflected in the valuation? (refer to SOP) ☑ Yes ☐ No

N. Statements of opinion

136. Does the report include the statements of opinion required by the SOP (data, assumptions, methods, accepted actuarial practice)? ☑ Yes ☐ No

136a. Are any of the actuary's statements of opinion qualified? ☐ Yes ☑ No

Financial Services Commission of Ontario — Commission des services financiers de l'Ontario

Part III – Information required by the Financial Services Commission of Ontario

O. Additional valuation information

Going-concern valuation

137. Are benefits under the pension plan provided by an annuity purchase? ☐ Yes ☑ No

138. If line **137** is **yes**,

a) enter the total asset value of the annuities purchased

b) enter the total liability of the annuities purchased

139. Have escalated adjustments been included in going-concern liabilities? ☑ Yes ☐ No ☐ N/A

Solvency valuation

140.1 If line **137** is **yes**,

a) enter the total asset value of the annuities purchased

b) enter the total liability of the annuities purchased

140.2 Enter the value of any solvency deficiency payment that is guaranteed by a letter of credit

140.3 Enter the expiry date of the letter of credit, if any — Year / Month / Day

141. Have any of the excludable benefits been excluded? ☑ Yes ☐ No ☐ N/A

142. If line **141** is **yes**, enter the total amount of liabilities being excluded: 81,043,199

143. With respect to the type of benefits provided under the plan for service after the valuation date, complete the following table:

Provision type	Benefit accruals for service after valuation date (Yes/No)	Closed(Yes/No)
Defined Benefit	Yes	No
Defined Contribution	No	No

144. (i) Has an averaging method been applied to the market value of assets in determining the solvency asset adjustment? ☐ Yes ☑ No

a) If line **(i)** is yes, indicate the positive or negative amount by which the solvency assets are adjusted as a result of applying the averaging method ______

(ii) Has the averaging method used in determining the solvency asset adjustment changed since the last valuation? ☐ Yes ☑ No

If line **(ii)** is **yes**, complete **(ii)a** or **(ii)b**, as appropriate:

a) The change in method increases solvency asset adjustment by the amount of ______

b) The change in method decreases solvency asset adjustment by the amount of ______

P. Miscellaneous

145. Prior year credit balance	0
146. Transfer ratio (express in decimal format)	0.7200

Guarantee fund assessment

147. PBGF liabilities	508,851,905
148. PBGF assessment base	82,027,905
149. Amount of additional liability for plant closure and/or permanent layoff benefits as described in "E" of subsection 37(4) of *Regulation 909, R.R.O. 1990*, as amended	0
149a. Number of Ontario plan beneficiaries	2,963

Part IV – Information required by the Canada Revenue Agency

R. Additional information

173. Surplus/deficit determined at the valuation date as per the instructions:

173a. Going-concern basis	14,024,800
173b. Wind-up basis	-163,871,104
173c. For designated plans, maximum funding valuation basis	

174. Excess surplus determined at the valuation date:

174a. Going-concern basis	0
174b. For designated plans, maximum funding valuation basis	

175. For designated plans, employer normal cost determined under the maximum funding valuation basis:

Period 1	
Period 2	
Period 3	
Period 4	

176. Minimum surplus required under applicable pension benefit legislation before contribution holiday:

176a. Going-concern basis	0
176b. Wind-up basis	0

177. Maximum amount that could be claimed as eligible employer contribution(s) – defined benefit provisions – under subsection 147.2(2) of the *Income Tax Act*:

177a. Unfunded liability	163,871,104
177b. Normal cost:	
Period 1	7,454,354
Period 2	
Period 3	
Period 4	

178. Do you have any employees contributing over the limit stipulated under paragraph 8503(4) of the *Income Tax Regulations?* ☑ Yes ☐ No

Part V – Information required by Retraite Québec

S. Additional Information

185. Date on which the valuation report was prepared .... ____________

186. Value of additional liabilities arising from an improvement on a funding basis .... ____________

187. Value of additional liabilities arising from an improvement on a solvency basis .... ____________

188. Surplus assets that can be allocated to fund contributions .... ____________

189. Special payments............ ____________

190. Total of the letters of credit taken into account in the assets .... ____________

191. Insured annuities from an insurer taken into account in the actuarial valuation on a solvency basis............ ____________

T. Additional information for plans whose employer is a municipality, a municipal housing bureau, or an educational institution at the university level

For service prior to the establishment of the stabilization fund

192. Reserve on a funding basis .... ____________

	Present Value	Amortization payments			
		Period 1	Period 2	Period 3	Period 4
193. Deficiency attributable to the employer					
194. Funding deficiency **194a.** Payable by the members					
194b. Payable by the employer					

For service following the establishment of the stabilization fund

195. Stabilization fund value .... ____________

	Stabilization contributions			
	Period 1	Period 2	Period 3	Period 4
196. Members				
197. Employer				

	Present Value	Amortization payments			
		Period 1	Period 2	Period 3	Period 4
198. Technical funding deficiency **198a.** Payable by the members					
198b. Payable by the employer					

U. Additional information for pension plans other than those mentioned in Section T, and for which solvency funding does not apply.

199. Target level (as a percentage) of the required stabilization provision .... ____________

	Stabilization contributions			
	Period 1	Period 2	Period 3	Period 4
200. Members				
201. Employer				

	Present Value	Amortization payments			
		Period 1	Period 2	Period 3	Period 4
202. Technical funding deficiency **202a.** Payable by the members					
202b. Payable by the employer					
203. Stabilization funding deficiency **203a.** Payable by the members					
203b. Payable by the employer					
204. Improvement funding deficiency **204a.** Payable by the members					
204b. Payable by the employer					

Part VI – Certification by Actuary

As the actuary who signed the funding valuation report (the report), I certify that this completed form accurately reflects the information provided in the report.

Dated this 31 (day) day of May (month), 2019 (year)

Signature of actuary

Geoffrey Melbourne
Print or type name of actuary

Towers Watson Canada Inc.
Name of firm

(416)960-2780
Telephone number

geoffrey.melbourne@willistowerswatson.com
Email Address*

*** Optional information. The Canada Revenue Agency will not communicate on plan specific matters with clients by email, since we cannot guarantee the confidentiality of emailed information.**

Personal information is collected under the authority of section 147.2 of the *Income Tax Act* and is used for the administration of a registered pension plan. It may also be used for any purpose related to the administration or enforcement of the Act such as audit and compliance. Information may also be shared or verified under information-sharing agreements to the extent authorized by law. Under the *Privacy Act*, individuals have the right to access their personal information and request correction if there are errors or omissions. Refer to Info Source **cra.gc.ca/gncy/tp/nfsrc/nfsrc-eng.html**, Personal Information Bank CRA PPU 226.