MERCER
MAKE TOMORROW, TODAY

REVISED PENSION PLAN OF QUEEN'S UNIVERSITY

REPORT ON THE ACTUARIAL VALUATION FOR FUNDING PURPOSES AS AT AUGUST 31, 2017

FEBRUARY 2018

Financial Services Commission of Ontario and
Canada Revenue Agency Registration Number: 0344929

MARSH & McLENNAN COMPANIES

Note to reader regarding actuarial valuations:

This valuation report may not be relied upon for any purpose other than those explicitly noted in the Introduction, nor may it be relied upon by any party other than the parties noted in the Introduction. Mercer is not responsible for the consequences of any other use. A valuation report is a snapshot of a plan's estimated financial condition at a particular point in time; it does not predict a pension plan's future financial condition or its ability to pay benefits in the future. If maintained indefinitely, a plan's total cost will depend on a number of factors, including the amount of benefits the plan pays, the number of people paid benefits, the amount of plan expenses, and the amount earned on any assets invested to pay the benefits. These amounts and other variables are uncertain and unknowable at the valuation date. The content of the report may not be modified, incorporated into or used in other material, sold or otherwise provided, in whole or in part, to any other person or entity, without Mercer's permission. All parts of this report, including any documents incorporated by reference, are integral to understanding and explaining its contents; no part may be taken out of context, used, or relied upon without reference to the report as a whole.

To prepare the results in this report, actuarial assumptions are used to model a single scenario from a range of possibilities for each valuation basis. The results based on that single scenario are included in this report. However, the future is uncertain and the plan's actual experience will differ from those assumptions; these differences may be significant or material. Different assumptions or scenarios within the range of possibilities may also be reasonable, and results based on those assumptions would be different. Furthermore, actuarial assumptions may be changed from one valuation to the next because of changes in regulatory and professional requirements, developments in case law, plan experience, changes in expectations about the future, and other factors.

The valuation results shown in this report also illustrate the sensitivity to one of the key actuarial assumptions, the discount rate. We note that the results presented herein rely on many assumptions, all of which are subject to uncertainty, with a broad range of possible outcomes, and the results are sensitive to all the assumptions used in the valuation.

Should the plan be wound up, the going concern funded status and solvency financial position, if different from the wind-up financial position, become irrelevant. The hypothetical wind-up financial position estimates the financial position of the plan assuming it is wound up on the valuation date. Emerging experience will affect the wind-up financial position of the plan assuming it is wound up in the future. In fact, even if the plan were wound up on the valuation date, the financial position would continue to fluctuate until the benefits are fully settled.

Decisions about benefit changes, granting new benefits, investment policy, funding policy, benefit security, and/or benefit-related issues should not be made solely on the basis of this valuation, but only after careful consideration of alternative economic, financial, demographic, and societal factors, including financial scenarios that assume future sustained investment losses.

Funding calculations reflect our understanding of the requirements of the *Pension Benefit Act (Ontario)*, the Income Tax Act, and related regulations that are effective as of the valuation date. Mercer is not a law firm, and the analysis presented in this report is not intended to be a legal opinion. You should consider securing the advice of legal counsel with respect to any legal matters related to this report.

CONTENTS

1

Summary of Results ($000's)

	31.08.2017	31.08.2014
Going Concern Financial Status		
Smoothed value of assets	$1,992,415	$1,666,764
Going concern funding target	$2,023,998	$1,842,369
Funding excess (shortfall)	($31,583)	($175,605)
Hypothetical Wind-up Financial Position		
Wind-up assets	$2,005,893	$1,763,373
Wind-up liability	$2,322,992	$2,069,184
Wind-up excess (shortfall)	($317,099)	($305,811)
Funding Requirements in the Year Following the Valuation [1]		
Estimated member's required contributions	$24,858	$22,597
Estimated University's money purchase contributions	$21,050	$19,135
Estimated University's minimum guarantee current service cost	$5,325	$5,345
Estimated University's total current service cost	$26,375	$24,480
University's minimum guarantee current service cost as a percentage of members' pensionable earnings	1.62%	1.78%
Minimum special payments	$8,761[2]	$14,412[3]
Estimated minimum University contribution	$35,136	$38,892
Estimated maximum eligible University contribution	$343,474	$330,291
Next required valuation date	August 31, 2020	August 31, 2017

[1] Provided for reference purposes only. Contributions must be remitted to the Plan in accordance with the Minimum Funding Requirements and Maximum Eligible Contributions sections of this report.

[2] Special payments with respect to September 1, 2017 to August 31, 2018. Full special payment schedules are outlined in Section 6 – Minimum Funding Requirements and Appendix A.

[3] Special payments with respect to September 1, 2014 to August 31, 2015.

2

Introduction

To Queen's University

At the request of Queen's University (the "University"), we have conducted an actuarial valuation of the Revised Pension Plan of Queen's University (the "Plan"), sponsored by the University, as at the valuation date, August 31, 2017. We are pleased to present the results of the valuation.

Purpose

The purpose of this valuation is to determine:

- The funded status of the Plan as at August 31, 2017 on going concern, hypothetical wind-up and solvency bases;
- The minimum required funding contributions from September 1, 2017, in accordance with the *Pension Benefits Act of Ontario;* and
- The maximum permissible funding contributions from September 1, 2017, in accordance with the *Income Tax Act*

The Regulations to the *Pension Benefits Act (Ontario)* were amended in May 2011 to provide temporary solvency funding relief measures for certain pension plans in the broader public sector.

The University applied and qualified for Stage 1 relief, as described in the regulations and the August 31, 2011 actuarial valuation report reflected the minimum monthly contribution requirements in accordance with the temporary solvency funding relief regulations for certain pension plans in the broader public sector.

The University applied and qualified for Stage 2 relief, as described in the regulations and the August 31, 2014 actuarial valuation report ("Stage 2 Report") reflected the minimum monthly contribution requirements in accordance with the temporary solvency funding relief regulations for certain pension plans in the broader public sector. More specifically, the University elected to follow the modified version of the funding rules contained in Regulation 307/13.

This is the first report subsequent to qualifying for Stage 2 relief, as described in the regulations. This report constitutes the "First Subsequent Report following Stage 2" required by the regulations. Accordingly, the minimum monthly contribution requirements determined herein reflect the temporary solvency funding relief regulations for certain pension plans in the broader public sector according to Regulation 178/11 Section 12.

The information contained in this report was prepared for the internal use of the University and the Queen's University Pension Committee, and for filing with the Financial Services Commission of Ontario and with the Canada Revenue Agency, in connection with our actuarial valuation of the Plan. This report will be filed with the Financial Services Commission of Ontario and with the Canada Revenue Agency. This report is not intended or suitable for any other purpose.

In accordance with pension benefits legislation, the next actuarial valuation of the Plan will be required as at a date not later than August 31, 2020, or as at the date of an earlier amendment to the Plan.

Terms of Engagement

In accordance with our terms of engagement with the University, our actuarial valuation of the Plan is based on the following material terms:

- It has been prepared in accordance with applicable pension legislation and actuarial standards of practice in Canada;
- As instructed by the University, we have not reflected a margin for adverse deviations in our going concern valuation;
- We have reflected the University's decisions for determining the solvency funding requirements, summarized as follows:
  - The same Plan wind-up scenario was hypothesized for both hypothetical wind-up and solvency valuations;
  - The solvency financial position was determined on a market value basis without smoothing of asset values or discount rates;
  - Solvency relief measures have been applied. They are described in the Regulatory Environment and Actuarial Standards section; and
  - Future post-retirement indexation based on favourable past fund returns has been excluded from the solvency liabilities.
  - First Subsequent Report following Stage 2 solvency funding relief was applied to determine minimum special payments.

See the Valuation Results – Hypothetical Wind-up and the Valuation Results - Solvency sections of the report for more information.

Events since the Last Valuation at August 31, 2014

The Queen's University Pension Committee decided in March 2015 to change the mortality table used for converting money purchase balances to pensions effective September 1, 2015. The new mortality table is based on 95% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table with the CPM-B mortality improvement scale (the same table used for the August 31, 2014 and August 31, 2017 going-concern valuations). This change has been reflected in the current valuation.

This valuation reflects the provisions of the Plan as at August 31, 2017. There have been no amendments to the Plan since the date of the previous valuation which would have an impact on this valuation. The Plan has been amended to exclude interns employed under the Queen's Undergraduate Internship Program from eligibility to participate in the Plan.

We are not aware of any other pending definitive or virtually definitive amendments coming into effect during the period covered by this report. The Plan provisions are summarised in Appendix F.

Assumptions

We have used the same going concern valuation assumptions and methods as were used for the previous valuation, except for the following:

	Current valuation	**Previous valuation**
Discount rate	5.60%	5.80%
Pensionable earnings increases:	3.00% in year 1 and 4.50% per year thereafter	3.25% in year 1, 3.75% in year 2, 4.00% in year 3, 4.50% per year thereafter
Non-reduction cost		
- Non-retired member liabilities	7.50%	6.50%
- Actives current service cost	7.50%	6.50%
- Retirees	7.50% ("true" pension valued)	6.50% ("true" pension valued)
Form of benefit elected:	Under age 55: 70% of eligible members receive a pension from the plan and 30% elect a lump sum transfer Over age 55: 90% of eligible members receive a pension from the plan and 10% elect a lump sum transfer	N/A
Actuarial basis for benefits assumed to be settled through a lump sum:	Discount rate: 2.70% per year for 10 years, 3.60% per year thereafter Mortality rates: CPM2014 with fully generational improvements using CPM-B	N/A
Retirement rates	Revised age related table	Age related table
Withdrawal rates	Revised age related table	Age related table

A summary of the going concern methods and assumptions is provided in Appendix C.

The hypothetical wind-up and solvency assumptions have been updated to reflect market conditions at the valuation date. A summary of the hypothetical wind-up and solvency methods and assumptions is provided in Appendix D.

Regulatory Environment and Actuarial Standards

There have been a number of changes to the Act and regulations which impact the funding of the Plan.

The Regulations to the *Pension Benefits Act* were amended in May 2011, November 2013, May 2014, and October 2016 to include the temporary solvency funding relief measures for certain pension plans in the broader public sector. The University applied and qualified for Stage 1 and Stage 2 relief. The last actuarial valuation of the Plan as at August 31, 2014 was the Stage 2 valuation report and this actuarial valuation of the Plan as at August 31, 2017 is the first subsequent report following Stage 2. Accordingly, the minimum monthly contribution requirements determined herein reflect the subsequent solvency funding relief regulations for broader public sector pension plans effective October 31, 2016.

CIA Transfer Value

The Actuarial Standards Board (ASB) decided to promulgate the use of the following mortality table with respect of the computation of pension commuted values ("CIA CV Standard"), effective October 1, 2015: *Mortality rates equal to the 2014 Canadian Pensioners Mortality Table (CPM2014) combined with mortality improvement scale CPM Improvement Scale B (CPM-B)*. The change affects the mortality assumption used to value the solvency and wind-up liabilities for benefits assumed to be settled through a lump sum transfer. The financial impact of the change in the CIA CV Standard has been reflected in this actuarial valuation on a solvency and hypothetical wind-up basis.

Subsequent Events

On July 20, 2017, the Canadian Institute of Actuaries released an Exposure Draft with proposed changes to the standards for pension commuted values ("Section 3500"). The impact of any changes to Section 3500 will be considered in a future actuarial valuation, once the amendments are finalized.

The Canadian Institute of Actuaries (CIA) Task Force on Mortality Improvement released a report on September 20, 2017 which recommends that Canadian actuaries consider the selection of mortality improvement scale MI-2017 for the purpose of reflecting future mortality improvement in Canadian actuarial work, while acknowledging that it might be appropriate to use alternative mortality improvement assumptions to reflect the nature of the work. The CIA Committee on Pension Plan Financial Reporting published a revised version of the Educational Note on the Selection of Mortality Assumptions for Pension Plan Valuations on December 21, 2017. The Educational Note indicates that given the recent publication of the CPM-B (published in February 2014 as part of the Canadian Pensioners Mortality study) and MI-2017 improvement scales and the similar data sets used in their development, it may be appropriate to use either scale in the absence of credible information to the contrary, such as the publication of a successor scale by the CIA. For the current valuation, we have continued to use the CPM-B scale without adjustment, which is a reasonable outlook for future mortality improvement.

In December 2017, the Ontario Government tabled Bill 177 which contains amendments to the Pension Benefits Act (PBA). These amendments and the enabling regulations (which have not yet been proclaimed) include significant changes to the funding regulations for single employer pension plans. Once proclaimed, the new funding regulations will apply to valuations of single employer pension plans with effective dates on or after December 31, 2017. Consequently, we expect that the new regulations will apply to the next valuation of the Plan.

After checking with representatives of the University, to the best of our knowledge there have been no events subsequent to the valuation date which, in our opinion, would have a material impact on the results of the valuation. Our valuation reflects the financial position of the Plan as of the valuation date and does not take into account any experience after the valuation date.

3

Valuation Results – Going Concern

Financial Status

A going concern valuation compares the relationship between the value of Plan assets and the present value of expected future benefit cash flows in respect of accrued service, assuming the Plan will be maintained indefinitely.

The results of the current valuation, compared with those from the previous valuation, are summarized as follows:

(all figures in $000's)	31.08.2017	31.08.2014
Assets		
Market value of assets	$2,007,893	$1,765,373
Less:		
Market value of:		
• Money purchase accounts	$865,473	$778,794
• Past service accounts	$24,538	$25,874
• Additional and special voluntary accounts	$42,302	$41,532
Total defined contribution accounts	$932,313	$846,200
Market value of assets related to defined benefit liabilities	$1,075,580	$919,173
Actuarial value adjustment to assets (see Appendix C)	($15,478)	($98,609)
Actuarial value of assets related to defined benefit liabilities	$1,060,102	$820,564
Defined benefit liabilities:		
• Pensioner liability	$959,454	$873,151
• Non-reduction reserve	$71,959	$56,755
• Actuarial liability for projected minimum guarantee benefits	$60,272	$66,263
Total defined benefit liabilities	$1,091,685	$996,169
Funding excess (shortfall)	**($31,583)**	**($175,605)**

The going concern funding target is based on best-estimate assumptions and does not include a provision for adverse deviations.

Reconciliation of Financial Status ($ Millions)

Funding excess (funding shortfall) as at August 31, 2014 - Smoothed Basis	**($175.6)**
Removal of smoothing adjustment	122.1
Funding excess (funding shortfall) as at August 31, 2014 - Market Value	**(53.5)**
Interest on funding excess (funding shortfall) at 5.80% per year to August 31, 2017	(9.9)
University special payments to fund deficiency	62.3
Investment gains/(losses) [4]	16.0
Indexation experience [5]	22.4
Pensioner mortality gains/(losses)	(5.7)
Retirement experience gains/(losses)	(16.3)
Salary experience gains/(losses)	7.0
Impact of assumption changes [6]	(38.3)
Data corrections and other demographic experience	3.4
Funding excess (funding shortfall) as at August 31, 2017 - Market Value	**(12.6)**
Impact of smoothing adjustment	(19.0)
Funding excess (funding shortfall) as at August 31, 2017 - Smoothed Basis	**($31.6)**

Current Service Cost

The current service cost is an estimate of the present value of the additional expected future benefit cash flows in respect of pensionable service that will accrue after the valuation date, assuming the Plan will be maintained indefinitely.

The University current service cost is made up of the following:

For Money Purchase Benefits

- 6% of regular earnings up to the Year's Maximum Pensionable Earnings ("YMPE") and 7.50% of regular earnings in excess of the YMPE subject to the Income Tax Act maximum.

For Minimum Guarantee Benefits

- an amount equal to 1.62% of members' regular earnings

[4] Investment return on defined benefit assets ($12 million gain) plus change in minimum guarantee liabilities ($4 million gain)

[5] Changes to deferred indexing reserve net of actual indexation for 2015-2017

[6] Consists of discount rate change ($21 million loss), change to MPC conversion mortality ($2 million loss), change to salary scale assumption ($4 million gain), change to non-reduction reserve ($13 million loss) and change in termination & retirement rates and % electing lump sum payment option ($6 million loss)

Details of the actuarial cost for future benefits are summarised as follows:

Actuarial Cost of Future Benefits (all figures in $000's)

	Estimated cost based on August 31, 2017 valuation			**Estimated cost based on August 31, 2014 valuation**
Actuarial Cost In Respect of	**2017/2018**	**2018/2019**	**2019/2020**	**2014/2015**
Employee contributions	$24,858	$25,551	$26,575	$22,597
- % of regular earnings	*7.57%*	*7.45%*	*7.41%*	*7.59%*
University cost				
§ Money purchase	$21,050	$21,632	$22,495	$19,135
- % of regular earnings	*6.41%*	*6.31%*	*6.28%*	*6.41%*
§ Minimum guarantee	$5,325	$5,565	$5,815	$5,345
- % of regular earnings	*1.62%*	*1.62%*	*1.62%*	*1.78%*
Total University Actuarial Cost	$26,375	$27,197	$28,310	$24,480
- % of regular earnings	*8.03%*	*7.93%*	*7.90%*	*8.19%*

Total Regular Earnings for the period September 1, 2017 to August 31, 2018 is projected to be $328,264,000.

Discount Rate Sensitivity

The following table summarises the effect on the going concern funding target and the University actuarial cost shown in this report of using a discount rate which is 1% lower than that used in the valuation. For the purposes of the illustration, we have not changed the interest rate used to determine commuted values upon termination of employment.

Scenario ($000's)	**Valuation Basis**	**Reduce Discount Rate by 1%**
Going concern funding target	$2,023,998	$2,151,960
Current service cost		
• Money purchase	$21,050	$21,050
• Minimum guarantee	$5,325	$9,397
Total University Actuarial Cost	$26,375	$30,447
- % of regular earnings	*8.03%*	*9.28%*

4

Valuation Results – Hypothetical Wind-up

Financial Position

When conducting a hypothetical wind-up valuation, we determine the relationship between the respective values of the Plan's assets and its liabilities assuming the Plan is wound up and settled on the valuation date, assuming benefits are settled in accordance with the Act and under circumstances producing the maximum wind-up liabilities on the valuation date. More details on such scenario are provided in Appendix D.

The hypothetical wind-up financial position as of the valuation date, compared with that at the previous valuation, is as follows:

(all figures in $000's)	31.08.2017	31.08.2014
Assets		
Market value of assets	$2,007,893	$1,765,373
Termination expense provision	($2,000)	($2,000)
Wind-up assets	$2,005,893	$1,763,373
Wind-up Liabilities		
Market value of:		
• Money purchase accounts	$865,473	$778,794
• Past service accounts	$24,538	$25,874
• Additional and special voluntary accounts	$42,302	$41,532
Present value of accrued benefits for:		
• Active members	$163,072	$129,182
• Pensioners and survivors	$1,223,899	$1,073,366
• Deferred indexing reserve	$3,708	$20,436
Total wind-up liabilities	$2,322,992	$2,069,184
Wind-up excess (shortfall)	($317,099)	($305,811)
Transfer ratio	86%	85%

Wind-up Incremental Cost to August 31, 2020

The wind-up incremental cost is an estimate of the present value of the projected change in the hypothetical wind-up liabilities from the valuation date until the next scheduled valuation date, adjusted for the benefit payments expected to be made in that period.

The hypothetical wind-up incremental cost determined in this valuation, compared with the corresponding value determined in the previous valuation, is as follows:

(all figures in $000's)	31.08.2017	31.08.2014
Number of years covered by report	3 years	3 years
Total hypothetical wind-up liabilities at the valuation date (A)	$2,322,992	$2,069,184
Present value of projected hypothetical wind-up liability at the next required valuation (including expected new entrants) plus benefit payments until the next required valuation (B)	$2,548,203	$2,222,744
Hypothetical wind-up incremental cost (B – A)	$225,211	$153,560[7]

The incremental cost is not an appropriate measure of the contributions that would be required to maintain the financial position of the Plan on a hypothetical wind-up basis unchanged from the valuation date to the next required valuation date, if actual experience is exactly in accordance with the going concern valuation assumptions. This is because it does not reflect the fact that the expected return on Plan assets (based on the going concern assumptions) is greater than the discount rate used to determine the hypothetical wind-up liabilities.

Discount Rate Sensitivity

The following table summarises the effect on the hypothetical wind-up liabilities shown in this report of using a discount rate which is 1% lower than that used in the valuation:

Scenario ($000's)	Valuation Basis	Reduce Discount Rate by 1%
Total hypothetical wind-up liability	$2,322,992	$2,588,045

[7] Hypothetical wind-up incremental cost as at August 31, 2014 excluded members' required contributions

5

Valuation Results – Solvency

Overview

The Act also requires the financial position of the Plan to be determined on a solvency basis. The financial position on a solvency basis is determined in a similar manner to the Hypothetical Wind-up Basis, except for the following:

Exceptions	Reflected in valuation based on the terms of engagement
The circumstance under which the Plan is assumed to be wound up could differ for the solvency and hypothetical wind-up valuations.	The same circumstances were assumed for the solvency valuation as were assumed for the hypothetical wind-up valuation.
Certain benefits can be excluded from the solvency financial position. These include: (a) any escalated adjustment (e.g. indexing), (b) certain plant closure benefits, (c) certain permanent layoff benefits, (d) special allowances other than funded special allowances, (e) consent benefits other than funded consent benefits, (f) prospective benefit increases, (g) potential early retirement window benefit values, and (h) pension benefits and ancillary benefits payable under a qualifying annuity contract.	Post-retirement indexation resulting from favourable prior fund returns has been excluded from the solvency liabilities.
The financial position on the solvency basis needs to be adjusted for any Prior Year Credit Balance.	Not applicable.
The solvency financial position can be determined by smoothing assets and the solvency discount rate over a period of up to 5 years.	Smoothing was not used.
The benefit rate increases coming into effect after the valuation date can be reflected in the solvency valuation.	Not applicable.

Financial Position

The financial position on a solvency basis, compared with the corresponding figures from the previous valuation, is as follows:

(all figures in $000's)	31.08.2017	31.08.2014
Assets		
Market value of assets	$2,007,893	$1,765,373
Termination expense provision	($2,000)	($2,000)
Net assets	$2,005,893	$1,763,373
Liabilities		
Total hypothetical wind-up liabilities	$2,322,992	$2,069,184
Difference in circumstances of assumed wind-up	$0	$0
Value of excluded benefits[8]	($3,708)	($20,436)
Liabilities on a solvency basis	$2,319,284	$2,048,748
Surplus (shortfall) on a solvency basis	($313,391)	($285,375)

[8] Deferred Indexing Reserve excluded from solvency liabilities

6

Minimum Funding Requirements

The Act prescribes the minimum contributions that Queen's University must make to the Plan. The minimum contributions in respect of a defined benefit component of a pension plan are comprised of going concern current service cost and special payments to fund any going concern or solvency shortfalls.

The University has qualified for the subsequent solvency funding relief measures for certain pension plans in the broader public sector as at October 31, 2016. These relief measures are applicable for the First Subsequent Report following Stage 2. Accordingly, the minimum monthly contribution requirements determined herein reflect the provisions under the temporary solvency funding relief regulations for certain pension plans in the broader public sector according to Regulation 178/11 Section 12.

On the basis of the assumptions and methods described in this report, the rule for determining the minimum required University monthly contributions, as well as an estimate of the University's contributions, from the valuation date until the next required valuation are as follows:

	Estimated University annual contribution ($000's)		
Period beginning	**September 1, 2017**	**September 1, 2018**	**September 1, 2019**
Current Service Cost			
Money purchase[9]	$21,050	$21,632	$22,495
Minimum guarantee	$5,325	$5,565	$5,815
Total Current Service Cost	$26,375	$27,197	$28,310
Going concern special payments	$8,761	$3,398	$3,398
Solvency special payments	$0	$15,569	$15,569
Total Special Payments	$8,761[10]	$18,967[11]	$18,967
Total University Contribution	$35,136	$46,164	$47,277

The estimated contribution amounts above are based on projected members' pensionable earnings. Therefore, actual University current service cost will be different from the above estimates and, as such, the contribution requirements should be monitored closely to ensure contributions are made in accordance with the Act.

The development of the minimum special payments is summarized in Appendix A.

[9] Money purchase contributions should be made based on Plan terms. The amounts shown are estimates only.

[10] $730,066 per month

[11] $1,580,582 per month

Other Considerations

Differences between Valuation Bases

There is no provision in the minimum funding requirements to fund the difference between the hypothetical wind-up and solvency shortfalls, if any.

In addition, although minimum funding requirements do include a requirement to fund the going concern current service cost, there is no requirement to fund the expected growth in the hypothetical wind-up or solvency liability after the valuation date, which could be greater than the going concern current service cost.

Timing of Contributions

Funding contributions are due on a monthly basis. Contributions for current service cost must be made within 30 days following the month to which they apply. Special payment contributions must be made in the month to which they apply.

Retroactive Contributions

The University must contribute the excess, if any, of the minimum contribution recommended in this report over contributions actually made in respect of the period following the valuation date. This contribution, along with an allowance for interest, is due no later than 60 days following the date this report is filed.

Payment of Benefits

The Act imposes certain restrictions on the payment of lump sums from the Plan when the transfer ratio revealed in an actuarial valuation is less than one. Since the transfer ratio shown in this report is less than one, the Plan administrator should ensure that the monthly special payments are sufficient to meet the requirements of the Act to allow for the full payment of benefits, and otherwise should take the prescribed actions.

Additional restrictions are imposed when:

- The transfer ratio revealed in the most recently filed actuarial valuation is less than one and the administrator knows or 'ought to know' that the transfer ratio of the Plan has declined by 10% or more since the date the last valuation was filed.

- The transfer ratio revealed in the most recently filed actuarial valuation is greater than or equal to one and the administrator knows or 'ought to know' that the transfer ratio of the Plan has declined to less than 0.9 since the date the last valuation was filed.

As such, the administrator should monitor the transfer ratio of the Plan and, if necessary, take the prescribed actions.

7

Maximum Eligible Contributions

The *Income Tax Act* (the "ITA") limits the amount of employer contributions that can be remitted to the defined benefit component of a registered pension plan.

In accordance with Section 147.2 of the ITA and *Income Tax Regulation* 8516, for a plan which is underfunded on either a going concern or on a hypothetical wind-up basis, the maximum permitted contributions are equal to the employer's current service cost plus the greater of the going concern funding shortfall and hypothetical wind-up shortfall.

For a plan which is fully funded on both going concern and hypothetical wind-up bases, the employer can remit a contribution equal to the employer's current service cost as long as the surplus in the Plan does not exceed a prescribed threshold. Specifically, in accordance with Section 147.2 of the ITA, for a plan which is fully funded on both going concern and hypothetical wind-up bases, the Plan may not retain its registered status if the employer makes a contribution while the going concern funding excess exceeds 25% of the going concern funding target.

Notwithstanding the above, any contributions that are required to be made in accordance with pension benefit legislation are eligible contributions in accordance with Section 147.2 of the ITA and can be remitted.

Schedule of Maximum Contributions

The University is permitted to fully fund the greater of the going concern and hypothetical wind-up shortfalls; $317,099,000, as well as make current service cost contributions. The portion of this contribution representing the payment of the hypothetical wind-up shortfall can be increased with interest at 2.85% per year from the valuation date to the date the payment is made, and must be reduced by the amount of any deficit funding made from the valuation date to the date the payment is made.

Assuming the University contributes the greater of the going concern and hypothetical wind-up shortfall of $317,099,000 as of the valuation date, the rule for determining the estimated maximum eligible annual contributions, as well as an estimate of the maximum eligible contributions until the next valuation are as follows:

	University contribution rule (% of pensionable earnings)		
Year beginning	**Money Purchase Contributions[12]**	**Minimum Guarantee Current Service Cost**	**Estimated University monthly contributions**
September 1, 2017	6.41%	1.62%	$2,197,900
September 1, 2018	6.31%	1.62%	$2,266,400
September 1, 2019	6.28%	1.62%	$2,359,200

The University's current service cost in the above table was estimated based on projected members' pensionable earnings. The actual University's current service cost will be different from these estimates and, as such, the contribution requirements should be monitored closely to ensure compliance with the ITA.

[12] Money purchase contributions should be made based on Plan terms. The amounts shown are estimates only.

8

Actuarial Opinion

In our opinion, for the purposes of the valuations,

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

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada. It has also been prepared in accordance with the funding and solvency standards set by the *Pension Benefits Act (Ontario).*

Manuel Monteiro
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

7 March 2018

Date

Armand Abehsera
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

7 March 2018

Date

APPENDIX A

Prescribed Disclosure

Definitions

The Act defines a number of terms as follows:

Defined Term	Description	Result ($000's)
Transfer Ratio	The ratio of: (a) solvency assets minus the lesser of the Prior Year Credit Balance and the minimum required employer contributions until the next required valuation; to (b) the sum of the solvency liabilities and liabilities for benefits, other than benefits payable under qualifying annuity contracts that were excluded in calculating the solvency liabilities.	86%
Prior Year Credit Balance	Accumulated excess of contributions made to the pension plan in excess of the minimum required contributions	$0
Solvency Assets	Market value of assets including accrued or receivable income and excluding the value of any qualifying annuity contracts	$2,007,893
Solvency Asset Adjustment	The sum of:	
	(a) the difference between smoothed value of assets and the market value of assets	$0
	(b) the present value of going concern special payments (including those identified in this report) within 8 years[13] following the valuation date	$24,319
	(c) the present value of any previously scheduled solvency special payments (excluding those identified in this report)	$0
		$24,319

[13] In accordance with Regulation 178/11 Section 12 applicable for First Subsequent Report following Stage 2 for certain pension plans in the broader public sector.

Defined Term	Description	Result ($000's)
Solvency Liabilities	Liabilities determined as if the plan had been wound up on the valuation date, including liabilities for plant closure benefits or permanent layoff benefits that would be immediately payable if the employer's business were discontinued on the valuation date of the report, but, if elected by the plan sponsor, excluding liabilities for, (a) any escalated adjustment, (b) excluded plant closure benefits, (c) excluded permanent layoff benefits, (d) special allowances other than funded special allowances, (e) consent benefits other than funded consent benefits, (f) prospective benefit increases, (g) potential early retirement window benefit values, and (h) pension benefits and ancillary benefits payable under a qualifying annuity contract.	$2,319,284
Solvency Liability Adjustment	The amount by which solvency liabilities are adjusted as a result of using a solvency valuation interest rate that is the average of market interest rates calculated over the period of time used in the determination of the smoothed value of assets.	$0
Solvency Deficiency	The amount, if any, by which the sum of:	
	(a) the solvency liabilities	$2,319,284
	(b) the solvency liability adjustment	$0
	(c) the prior year credit balance	$0
		$2,319,284
	Exceeds the sum of	
	(d) the solvency assets net of estimated termination expenses[14]	$2,005,893
	(e) the solvency asset adjustment	$24,319
		$2,030,212
		$289,072

[14] In accordance with accepted actuarial practice, for purposes of determining the financial position, the market value of plan assets was reduced by a provision for estimated termination expenses payable from the Plan's assets that may reasonably be expected to be incurred in terminating the Plan and to be charged to the Plan.

Special Payments Prior to Reflecting October 31, 2016 Relief Measures

Based on the results of this valuation, the Plan is not fully funded. In accordance with the Act, any going concern deficits must be amortized over a period not exceeding 15 years, beginning on a date no later than 12 months after August 31, 2017.

In accordance with the Stage 2 solvency funding relief prior to reflecting the temporary relief measures effective October 31, 2016, special payments to liquidate the solvency deficiency would have had to be made over a period that is the longer of 5 years or the remaining period to the end of the 10 year period beginning on a day that is no later than 12 months after the Stage 2 valuation date of August 31, 2014 (i.e. August 31, 2025) commencing not later than 12 months after the valuation date of August 31, 2017.

As such, the minimum special payments that would have been required prior to reflecting the temporary relief measures effective October 31, 2016 would have been as follows:

				Present Value ($000's)	
Type of payment	**Start date**	**End date**	**Monthly Special Payment**	**Going Concern Basis[15]**	**Solvency Basis[16]**
Revised going concern	September 1, 2015	August 31, 2030	$283,196	$31,583	$24,319
New solvency	September 1, 2018	August 31, 2025	$3,903,505	N/A	$289,072
				$31,583	**$313,391**

The present value of going concern special payments scheduled in the previous valuation exceeded the going concern shortfall. In accordance with the Act, the excess can be used to reduce the amount or the period of any going concern special payment schedule. Therefore, we have eliminated the previously scheduled payments with payment start date prior to or on September 1, 2012. We have also reduced the monthly payment beginning September 1, 2015 from $525,334 to $283,196.

The present value of the revised going concern special payments up to August 31, 2025 is lower than the solvency shortfall resulting in a solvency deficiency of $289,072,000. In accordance with the Stage 2 temporary funding relief measures prior to the subsequent solvency funding relief measure effective October 31, 2016, the solvency deficiency would have had to be amortized over a period not exceeding 5 years commencing not later than twelve months after the valuation date of August 31, 2017 or to August 31, 2025. As such, a new solvency special payment schedule would have had to be established in the amount of $3,903,505 per month from September 1, 2018 to August 31, 2025.

[15] Calculation only considers going concern special payments and is based on the current going concern discount rate of 5.60%.

[16] Calculation considers going concern special payments (eight years only) and solvency special payments and is based on the current average solvency discount rate of 2.85%.

Temporary subsequent solvency funding relief

The University applied and qualified for Stage 2 relief. Accordingly, the minimum monthly special payment requirements determined herein reflect the temporary solvency funding relief regulations for broader public sector pension plans effective October 31, 2016.

In accordance with the solvency funding relief measures applicable for the First Subsequent Report following Stage 2, special payments to liquidate the solvency deficiency commencing 12 months after the valuation date of August 31, 2017 is determined as follows:

Solvency assets	$2,007,893,000	***(a)***
Solvency liabilities	$2,319,284,000	***(b)***
Solvency asset adjustment (present value of going-concern special payments)	$24,319,000	***(c)***
solvency ratio	0.8657	***(d) = (a) ÷ (b)***
1 – solvency ratio	0.1343	***(e) = 1 – (d)***
solvency ratio + 25% * (1 – solvency ratio)	0.8993	***(f) = (d) + 0.25** x **(e)***
modified solvency liabilities	$2,085,740,750	***(g) = (b)** x **(f)***
modified solvency deficit	$55,528,750	***(h) = max((g) – (a) – (c), 0)***
modified solvency special payments	$749,836	***(i)***
solvency liabilities less modified solvency liabilities	$233,543,250	***(j) = (b) – (g)***
interest on solvency liabilities in excess of modified solvency liabilities	$547,549	***(k)*** [17]
solvency assets + solvency asset adjustment less modified solvency liabilities	$0	***(l) = (a) + (c) – (g)***
interest on solvency assets + solvency asset adjustment in excess of modified solvency liabilities	$0	***(m)*** [18]
excess interest	$547,549	***(n) = (k) – (m)***
solvency special payments	$1,297,386	***(o) = (n) + (i)***
(monthly starting September 1, 2018)		

Minimum Total Special Payments for September 1, 2017 to August 31, 2018

	August 31, 2017
Solvency liabilities less solvency assets	$311,391,000
Monthly interest on solvency deficit at 2.85%	$730,066

[17] Effective monthly liability weighted average solvency interest rate.

[18] Effective monthly liability weighted average solvency interest rate.

Monthly Solvency Special Payments

	Sep 1, 2017 to Aug 31, 2018	Sep 1, 2018 to Aug 31, 2019	Sep 1, 2019 to Aug 31, 2020	Sep 1 , 2020 to Aug 31, 2021
Solvency special payments	$446,870	$1,297,386	$1,297,386	$1,297,386
Going concern special payments	$283,196	$283,196	$283,196	$283,196
Total special payments	$730,066	$1,580,582	$1,580,582	$1,580,582

Timing of Next Required Valuation

In accordance with the Act, the next valuation of the Plan would be required at an effective date within one year of the current valuation date if:

- The ratio of solvency assets to solvency liabilities is less than 85%.
- The employer elected to exclude plant closure or permanent lay-off benefits under Section 5(18) of the regulations, and has not rescinded that election.

Otherwise, the next valuation of the Plan would be required at an effective date no later than three years after the current valuation date.

However, according to the regulations applicable for the First Subsequent Report following Stage 2 for certain broader public sector pension plans effective October 31, 2016, the next valuation of the Plan will be required as of August 31, 2020.

Pension Benefit Guarantee Fund (PBGF) Assessment

The PBGF assessment base and liabilities are derived as follows:

Solvency assets	$2,007,893,000	(a)
PBGF liabilities	$2,319,284,000	(b)
Solvency liabilities	$2,319,284,000	(c)
Ontario asset ratio	100%	(d) = (b) ÷ (c)
Ontario portion of the fund	$2,007,893,000	(e) = (a) x (d)
PBGF assessment base	$311,391,000	(f) = (b) – (e)
Amount of additional liability for plant closure and/or permanent layoff benefits which is not funded and subject to the 2% assessment pursuant to s.37(4)	$0	(g)

APPENDIX B

Plan Assets

The pension fund is held by CIBC Mellon. In preparing this report, we have relied upon the auditors' report prepared by KPMG without further audit. Customarily, this information would not be verified by a plan's actuary. We have reviewed the information for internal consistency and we have no reason to doubt its substantial accuracy.

Reconciliation of Market Value of Plan Assets

The pension fund transactions since the last valuation are summarized in the following table:

(all figures in $000's)	September 1, 2014 to August 31, 2015	September 1, 2015 to August 31, 2016	September 1, 2016 to August 31, 2017
September 1 value	$1,765,373	$1,783,084	$1,891,747
PLUS			
Members' contributions	22,373	23,155	23,868
University's contributions	38,978	46,347	47,960
Voluntary contributions	1,126	1,223	1,263
Past service contributions	7	42	4
Transfers from other plans	1,764	1,493	2461
Investment return	53,883	154,153	154,326
	$118,131	$226,413	$229,882
LESS			
Pensions paid	83,406	86,444	89,076
Lump-sums paid	11,576	16,928	10,726
Administration fees	5,438	14,378	13,934
	$100,420	$117,750	$113,736
August 31 value	$1,783,084	$1,891,747	$2,007,893
Gross rate of return[19]	3.06%	8.77%	8.24%
Rate of return net of expenses[19]	2.77%	7.91%	7.47%

We have tested the pensions paid, the lump-sums paid and the contributions for consistency with the membership data for the Plan members who have received benefits or made contributions. The results of these tests were satisfactory.

We verified the growth of account balances for common members at successive valuation dates. Moreover, we tracked the inflow and outflow of monies on a global basis to confirm the reasonableness of the overall size of account balances. The results of these checks were also satisfactory.

[19] Calculated based on audited financial statements. Returns may be different from those used to determine pensioner indexation (based on trust financial statements).

Investment Policy

The Plan administrator has adopted a statement of investment policy and procedures. This policy is intended to provide guidelines for the managers as to the level of risk which is commensurate with the Plan's investment objectives. A significant component of this investment policy is the asset mix.

The plan administrator is solely responsible for selecting the plan's investment policies, asset allocations, and individual investments.

The constraints on the asset mix and the actual asset mix at the valuation date are provided for information purposes:

	Investment Policy[20]			Actual Asset Mix as at August 31, 2017
	Minimum	**Target**	**Maximum**	
Canadian Equities	15%	20%	25%	21%
Global Equities	28%	33%	38%	34%
Real Estate	0%	5%	10%	5%
Infrastructure	0%	5%	10%	5%
Fixed Income and Cash	32%	37%	42%	35%
		100.0%		100.0%

Because of the mismatch between the Plan's assets (which are invested in accordance with the above investment policy) and the Plan's liabilities (which tend to behave like long bonds) the Plan's financial position will fluctuate over time. These fluctuations could be significant and could cause the Plan to become underfunded or overfunded even if the Company contributes to the Plan based on the funding requirements presented in this report.

[20] Source: Statement of Investment Policies and procedures dated October 16th, 2017

APPENDIX C

Methods and Assumptions – Going Concern

Valuation of Assets

For this valuation, we have continued to use an adjusted market value method to determine the actuarial value of Plan assets. Under this method, the difference between actual and expected investment income in a given year is spread on a straight-line basis over 4 years. Expected investment income is determined using 5.80% per year, the gong-concern the discount rate as at August 31, 2014. The asset values produced by this method are related to the market value of the assets, with the advantage that, over time, the market-related asset values will tend to be more stable than market values. The adjustment to the asset value is only applied to the portion of Plan assets which relates to defined benefit liabilities. The actuarial value of assets as at August 31, 2017 is determined as follows:

($000s)	**September 1, 2014 to August 31, 2015**	**September 1, 2015 to August 31, 2016**	**September 1, 2016 to August 31, 2017**
Expected Investment Return	5.80%	5.80%	5.80%
Beginning market value	$1,765,373	$1,783,084	$1,891,747
Payments into the Plan	$64,247	$72,260	$75,556
Payments out of the Plan	($94,982)	($103,373)	($99,802)
Expected investment income	$101,501	$102,516	$109,019
Investment gains/(losses)	($53,055)	$37,260	$31,373
Ending market value	$1,783,084	$1,891,747	$2,007,893

Actuarial Value of Assets as at August 31, 2017

1. Market value of assets		$2,007,893,000
LESS		
Investment experience gains / (losses)	2017: $31,373,000 x 75% =	$23,530,000
Vis-à-vis the expected return	2016: $37,260,000 x 50% =	$18,630,000
	2015: ($53,055,000) x 25% =	($13,264,000)
2. Total adjustment		$28,896,000
3. Actuarial value of total assets (1.– 2.)		$1,978,997,000
4. Market value of assets related to defined benefit liabilities		$1,075,580,000
5. Adjustment (3. / 1.)		0.98561
6. Actuarial value of assets related to defined benefit liabilities (4. x 5.)		$1,060,102,000

Going Concern Funding Target

Over time, the real cost to the University of a pension plan is the excess of benefits and expenses over member contributions and investment earnings. The actuarial cost method allocates this cost to annual time periods.

For purposes of the going concern valuation, we have continued to use the projected unit credit actuarial cost method to value liabilities for active members of the Plan. In determining the liability arising due to the final average earnings-related minimum guarantee provision, a projected accrued benefit funding method has been used. Under this method, we first project the minimum guarantee pension and the money purchase account balance (after application of the actuarial value adjustment ratio described above) to each future decrement age. We then derive the projected money purchase pension by charging the non-reduction cost to the account balance and then dividing it by the money purchase conversion factors used by the Plan for administration purposes. The excess, if any, of the minimum guarantee pension over the money purchase pension is calculated. The actuarial liability for minimum guarantee benefits is the actuarial present value of this excess multiplied by the ratio of a member's credited service to the valuation date to the member's total projected credited service at the decrement age multiplied by the probability of termination, death or retirement at that decrement age, summed over all decrement ages and over all of the membership. This is referred to as the funding target.

Since the actuarial liability for minimum guarantee benefits depends upon projected money purchase pensions, this liability is significantly impacted by the rate of return credited to money purchase account balances from valuation to valuation.

The funding excess or funding shortfall, as the case may be, is the difference between the market or smoothed value of assets and the funding target. A funding excess on a market value basis indicates that the current market value of assets and expected investment earnings are expected to be sufficient to meet the cash flows in respect of benefits accrued to the valuation date as well as expected expenses – assuming the Plan is maintained indefinitely. A funding shortfall on a market value basis indicates the opposite – that the current market value of the assets is not expected to be sufficient to meet the Plan's cash flow requirements in respect of accrued benefits and absent additional contributions.

As required under the Act, a funding shortfall must be amortized over no more than 15 years through special payments. A funding excess may, from an actuarial standpoint, be applied immediately to reduce required University current service contributions unless precluded by the terms of the Plan or by legislation.

The actuarial cost method used for the purposes of this valuation produces a reasonable matching of contributions with accruing benefits. Because benefits are recognized as they accrue, the actuarial cost method provides an effective funding target for a plan that is maintained indefinitely.

Current Service Cost

The employer current service cost for the minimum guarantee benefits is equal to the actuarial present value of projected minimum guarantee pensions in excess of projected money purchase pensions relating to one year of service. The employer's current service cost for the minimum guarantee benefits has been expressed as a percentage of the member's pensionable earnings to provide an automatic adjustment in the event of fluctuations in membership and/or covered earnings.

Under the projected accrued benefit funding method, the current service cost for an individual member will increase each year as the member approaches retirement. However, the minimum guarantee current service cost of the entire group, expressed as a percentage of the members' pensionable earnings, can be expected to remain stable as long as the average age of the group remains constant.

It is important to understand that the rate of return credited to money purchase account balances has a significant impact on the level of current service cost from valuation to valuation since the projected minimum guarantee pension, and its corresponding liability and current service cost, are significantly dependent upon the projected money purchase account balances. These balances are, in turn, directly affected by the actual rate of return credited in a particular year.

The current service cost for minimum guarantee benefits is dependent on the return credited to member money purchase accounts from valuation to valuation since the current service costs reflect the difference between projected minimum guarantee and money purchase pensions.

Actuarial Assumptions – Going Concern Basis

The present value of future benefit payment cash flows is based on economic and demographic assumptions. At each valuation we determine whether, in our opinion, the actuarial assumptions are still appropriate for the purposes of the valuation, and we revise them, if necessary. Emerging experience will result in gains or losses that will be revealed and considered in future actuarial valuations.

The table below shows the various assumptions used in the current valuation in comparison with those used in the previous valuation.

Assumption	Current valuation	Previous valuation
Discount rate:	5.60%	5.80%
Inflation:	2.00%	2.00%
ITA limit / YMPE increases:	2.50%	2.50%
Regular earnings increases:	3.00% in year 1, 4.50% per year thereafter	3.25% in year 1, 3.75% in year 2, 4.00% in year 3, 4.50% per year thereafter
Interest on employee contributions:	5.60%	5.80%
Non-reduction cost:		
- Non-retired member liabilities	7.50%	6.50%
- Actives current service cost	7.50%	6.50%
- Retirees	7.50% ("true" pension valued)	6.50% ("true" pension valued)
Deferred indexing reserve:	Reflects projected future change in "true" pensions related to past fund returns (applies to all pensioners)	Reflects projected future change in "true" pensions related to past fund returns (applies to all pensioners)
Retirement rates:	Revised age related table	Age related table
Termination rates:	Revised age related table	Age related table
Mortality rates:	95% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)	95% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)
Mortality improvements:	Fully generational using CPM Improvement Scale B (CPM-B)	Fully generational using CPM Improvement Scale B (CPM-B)
Form of benefit elected:	Under age 55: 70% of eligible members receive a pension from the plan and 30% elect a lump sum transfer Over age 55: 90% of eligible members receive a pension from the plan and 10% elect a lump sum transfer	N/A

Assumption	Current valuation	Previous valuation
Actuarial basis for benefits assumed to be settled through a lump sum:	Discount rate: 2.70% per year for 10 years, 3.60% per year thereafter Mortality rates: CPM2014 with fully generational improvements using CPM-B	N/A
Disability rates:	None	None
Eligible spouse at retirement:	80%	80%
Spousal age difference:	Male 3 years older	Male 3 years older

The assumptions are best-estimates and do not include a margin for adverse deviations.

Age Related Tables

Sample rates from the age related tables are summarized in the following table:

	Termination		Retirement	
Age	**Current valuation**	**Previous valuation**	**Current valuation**	**Previous valuation**
20	20.00%	6.88%	0.00%	0.00%
25	12.50%	5.98%	0.00%	0.00%
30	8.10%	5.09%	0.00%	0.00%
35	4.80%	4.19%	0.00%	0.00%
40	2.90%	3.29%	0.00%	0.00%
45	2.20%	2.39%	0.00%	0.00%
50	2.00%	1.50%	0.00%	0.00%
55 – 59	0.00%	0.00%	3.00%	1.00%
60 – 64	0.00%	0.00%	10.00%	6.00%
65	0.00%	0.00%	50.00%	75.00%
66 – 69	0.00%	0.00%	25.00%	10.00%
70	0.00%	0.00%	25.00%	100.00%
71	0.00%	0.00%	100.00%	100.00%

Pensionable Earnings

The benefits ultimately paid will depend on each member's final average earnings. To calculate the pension benefits payable upon retirement, death or termination of employment, we have taken the rate of pay at August 31, 2017 and assumed that such pensionable earnings will increase at the assumed rates.

Rationale for Assumptions

A rationale for each of the assumptions used in the current valuation is provided below.

Discount Rate

We have discounted the expected benefit payment cash flows using the expected investment return on the smoothed value of the fund. Other bases for discounting the expected benefit payment cash flows may be appropriate, particularly for purposes other than those specifically identified in this valuation report.

The discount rate is comprised of the following:

- Estimated returns for each major asset class consistent with market conditions on the valuation date, the expected time horizon over which benefits are expected to be paid, and the target asset mix specified in the Plan's investment policy.
- Additional returns assumed to be achievable due to active equity management equal to the fees related to active equity management. Such fees were determined by the difference between the provision for total investment expenses and the hypothetical fees that would be incurred for passive management of all assets.
- Implicit provision for expenses determined based on the Pension Committee's expectation regarding future expenses to be paid from the fund

The discount rate was developed as follows:

Assumed investment return	5.74%
Additional returns for active management	0.29%
Implicit expense provision	(0.43%)
Margin for adverse deviation	(0.00%)
Net discount rate	5.60%

Expenses

The assumption is based on the Pension Committee's expectation regarding future investment and administrative expenses to be paid from the pension fund.

Inflation

The inflation assumption is based on the mid-point of the Bank of Canada's inflation target range of between 1% and 3%.

Income Tax Act Pension Limit and Year's Maximum Pensionable Earnings

The assumption is based on the underlying inflation assumption and expectations for future general real wage growth of 0.5% per year.

Regular Earnings Increases

The ultimate assumption of 4.5% per year is based on general wage growth assumptions combined with expectations that the long-term level of regular earnings increases resulting from progression through the ranks (PTR increases). The assumptions used in the first year following the valuation date reflects an adjustment for the across-the-board (ATB) increases that the University expects will be reflected in the various collective agreements that will be in effect over this period, compared to the expected long-term level of ATB increases.

Non-Reduction Reserve

A charge of 7.5% has been applied to money purchase accounts to account for the future cost of non-reduction for active employees. This charge reflects the estimated true cost of non-reduction based on a stochastic analysis. Since the actual non-reduction charge currently applied is 4.5%, a further provision of 3% has been applied to provide for the cost of non-reduction for active employees.

The pensioner liabilities have been valued based on true pensions rather than actual pensions payable and a 7.5% non-reduction reserve has been held for such members.

Deferred Indexing Reserve

As a result of favourable fund returns in the past few years, it is anticipated that pensioners will receive an increase in their true pensions. A reserve has been established to provide for the cost of these indexation adjustments.

Retirement Rates

The assumption is based on an analysis of Queen's experience and future expectations.

Termination Rates

The assumption is based on experience from 2015 to 2017.

Mortality Rates

The assumption for the mortality rates is based on the Canadian Pensioners' Mortality (CPM) study published by the Canadian Institute of Actuaries in February 2014. The mortality rates selected reflect plan-specific experience over the last 10 years ending August 31, 2017.

There is broad consensus among actuaries and other longevity experts that mortality improvement will continue in the future, but the degree of future mortality improvement is uncertain. Two mortality improvement scales were recently published by the Canadian Institute of Actuaries (CIA) and may apply to Canadian pension valuations:

- The Canadian Pensioners Mortality (CPM) study published in February 2014 included CPM Improvement Scale B (CPM-B) which is also used for commuted value calculations.
- A report released by the Task Force on Mortality Improvement on September 20, 2017 includes an analysis of the rate of mortality improvement for the Canadian population and provides for mortality improvement scale MI-2017 to be considered for the purpose of reflecting future mortality improvement in Canadian actuarial work, while acknowledging that it might be appropriate to use alternative mortality improvement assumptions to reflect the nature of the work.

The CIA Committee on Pension Plan Financial Reporting published a revised version of the Educational Note on the Selection of Mortality Assumptions for Pension Plan Valuations on December 21, 2017. The Educational Note indicates that given the recent publication of the CPM-B and MI-2017 improvement scales and the similar data sets used in their development, it may be appropriate to use either scale in the absence of credible information to the contrary, such as the publication of a successor scale by the CIA.

For the present valuation, we have continued to use the CPM-B scale without adjustment, which is a reasonable outlook for future mortality improvement.

Based on the assumption used, the life expectancy of a member age 65 at the valuation date is 23.2 years for males and 25.1 years for females.

Interest on Employee Contributions

The assumption is based on Plan terms and the underlying investment return assumption.

Disability Rates

Use of a different assumption would not have a material impact on the valuation.

Eligible Spouse

The assumption is based on an industry standard for non-retired members (actual status used for retirees).

Spousal Age Difference

The assumption is based on an industry standard showing males are typically 3 years older than their spouse.

APPENDIX D

Methods and Assumptions – Hypothetical Wind-up and Solvency

Hypothetical Wind-up Basis

The Canadian Institute of Actuaries requires actuaries to report the financial position of a pension plan on the assumption that the plan is wound up on the effective date of the valuation, with benefits determined on the assumption that the pension plan has neither a surplus nor a deficit.

In determining the liability related to the minimum guarantee provision, we have considered that all active members as at August 31, 2017, would be entitled to a deferred pension payable from the commencement age that would produce the greatest value if employment were to have continued for the purpose of determining eligibility for early retirement benefits.

The Standards of Practice of the Canadian Institute of Actuaries require that the scenario upon which the hypothetical wind-up valuation is based be postulated. However, there are no benefits under the plan contingent upon the circumstances of the plan wind-up or contingent upon other factors. Therefore, it was not necessary to postulate a scenario upon which the hypothetical wind-up valuation is made. No benefits payable on plan wind-up were excluded from our calculations. The plan wind-up is assumed to occur in circumstances that maximize the actuarial liability.

To determine the actuarial liability related to the minimum guarantee provision on the hypothetical wind-up basis, we have valued those benefits that would have been paid had the Plan been wound up on the valuation date, with all members fully vested in their accrued benefits.

Upon Plan wind-up members are given options for the method of settling their benefit entitlements. The options vary by eligibility and by province of employment, but in general, involve either a lump sum transfer or an immediate or deferred pension.

The value of benefits assumed to be settled through a lump sum transfer is based on the assumptions described in Section 3500 – *Pension Commuted Values* of the Canadian Institute of Actuaries' Standards of Practice applicable for August 31, 2017.

For deferred members, we have held their money purchase account balances for solvency liability purposes.

Benefits provided as an immediate pension are assumed to be settled through the purchase of annuities based on an estimate of the cost of purchasing annuities.

Effective September 1, 2013, the Plan provides for indexation based on the difference between the 6-year average of pension fund returns and 6%, with a guarantee that pensions will not reduce. If the Plan continues on a going concern basis, based on the history of returns up to August 31, 2017, increases are expected to be granted in the next few years to pensioners who retired after September 1, 2012, unless future returns are well below 6% per year. Consequently, based on the history of past returns, a deferred indexing reserve has been established to provide for future pension adjustments for these pensions.

We have estimated the cost of settlement through purchase of annuities in accordance with the CIA Educational Note: *Assumptions for Hypothetical Wind-up and Solvency Valuations with Effective Dates Between December 31, 2016 and December 30, 2017*.

The Educational Note provides guidance on estimating the cost of annuity purchases assuming a typical group of annuitants. That is, no adjustments for sub- or super-standard mortality are considered. However, it is expected that insurers will consider plan experience and certain plan-specific characteristics when determining the mortality basis for a particular group. The Educational Note states that the actuary would be expected to make an adjustment to the regular annuity purchase assumptions where there is demonstrated substandard or super-standard mortality or where an insurer might be expected to assume so. In such cases, the actuary would be expected to make an adjustment to the mortality assumption in a manner consistent with the underlying annuity purchase basis. Given the uncertainty surrounding the actual mortality basis that would be typical of a group annuity purchase, it is reasonable to assume that there is a range of bases that can be expected not to be materially different from the actual mortality basis. Therefore, an adjustment to the regular annuity purchase assumptions would be warranted when the plan's assumed basis falls outside that range.

In this context, we have determined that an adjustment to the mortality rates used in the regular annuity purchase assumptions is required. The actual mortality experience of the Plan members has been significantly lower than standard mortality rates. As such, we have used 90% rather than 100% of the rates from the CPM table to reflect the expectation on that annuity pricing for a University pension plan will reflect higher longevity than the typical Canadian pension plan.

We have not included a margin for adverse deviation in the solvency and hypothetical wind-up valuations.

The assumptions are as follows:

Form of Benefit Settlement Elected by Member	
Lump sum	70% of active members under age 55, and 50% of active members over age 55, elect to receive their benefit entitlement in a lump sum
Annuity purchase	All remaining members are assumed to elect to receive their benefit entitlement in the form of a deferred or immediate pension. These benefits are assumed to be settled through the purchase of deferred or immediate annuities from a life insurance company.
Basis for Benefits Assumed to be Settled through a Lump Sum	
Mortality rates:	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational improvements using CPM Scale B

Interest rate:	2.70% per year for 10 years, 3.60% per year thereafter
Basis for Benefits Assumed to be Settled through the Purchase of an Annuity	
Mortality rates:	90% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational improvements using CPM Scale B
Interest rate:	2.86% per year reflecting the duration of Plan liabilities expected to be settled through an annuity purchase of 9.54
Retirement Age	
Maximum value:	Members are assumed to retire at the age which maximizes the value of their entitlement from the Plan based on the eligibility requirements which have been met at the valuation date
Grow-in:	The benefit entitlement and assumed retirement age of Ontario members whose age plus service equals at least 55 at the valuation date, reflect their entitlement to grow into early retirement subsidies
Other Assumptions	
Special payments	Discounted at the average interest rate of 2.85% per year
Investment indexing reserve[21]	Reflects projected future change in pensions related to past fund returns
Final average earnings:	Based on actual pensionable earnings over the averaging period
Family composition:	Same as for going concern valuation
Maximum pension limit:	$2,914.44 increasing at 2.20% per year for 10 years, 2.80% per year thereafter
Termination expenses:	$2,000,000

To determine the hypothetical wind-up position of the Plan, a provision has been made for estimated termination expenses payable from the Plan's assets in respect of actuarial and administration expenses that may reasonably be expected to be incurred in terminating the Plan and to be charged to the Plan.

Because the settlement of all benefits on wind-up is assumed to occur on the valuation date and is assumed to be uncontested, the provision for termination expenses does not include custodial, investment management, auditing, consulting and legal expenses that would be incurred between the wind-up date and the settlement date or due to the terms of a wind-up being contested.

Expenses associated with the distribution of any surplus assets that might arise on an actual wind-up are also not included in the estimated termination expense provisions.

In determining the provision for termination expenses payable from the Plan's assets we have assumed that the plan sponsor would be solvent on the wind-up date. We have also assumed, without analysis, that the Plan's terms as well as applicable legislation and court decisions would permit the relevant expenses to be paid from the Plan.

Although the termination expense assumption is a best estimate, actual fees incurred on an actual Plan wind-up may differ materially from the estimates disclosed in this report.

[21] Excluded for purposes of valuing solvency liabilities

Incremental Cost

In order to determine the incremental cost, we estimate the hypothetical wind-up liabilities at the next valuation date. We have assumed that the cost of settling benefits by way of a lump sum or purchasing annuities remains consistent with the assumptions described above. Since the projected hypothetical wind-up liabilities will depend on the membership in the Plan at the next valuation date, we must make assumptions about how the Plan membership will evolve over the period until the next valuation.

We have assumed that the Plan membership will evolve in a manner consistent with the going concern assumptions as follows:

- Members terminate, retire and die consistent with the termination, retirement and mortality rates used for the going concern valuation.

- Regular earnings, the Income Tax Act pension limit and the Year's Maximum Pensionable Earnings increase in accordance with the related going concern assumptions.

- Active members accrue pensionable service in accordance with the terms of the Plan.

- We have made an allowance for new entrants in determining the amount of money purchase contributions expected to be made over the 3 years following the valuation date (by assuming that the total regular earnings for Plan members increases in line with our valuation assumption). No provision is included for the incremental minimum guarantee cost for new entrants to the Plan up to the next valuation date on the basis that such inclusion would not have a material effect on the incremental cost.

Solvency Basis

In determining the financial position of the Plan on the solvency basis, we have used the same assumptions and methodology as were used for determining the financial position of the Plan on the hypothetical wind-up basis.

The solvency position is determined in accordance with the requirements of the Act.

APPENDIX E

Membership Data

Analysis of Membership Data

The actuarial valuation is based on membership data as at August 31, 2017, provided by Queen's University.

We have applied tests for internal consistency, as well as for consistency with the data used for the previous valuation. These tests were applied to membership reconciliation, basic information (date of birth, date of hire, date of membership, gender, etc.), pensionable earnings, credited service, money purchase account balances and pensions to retirees and other members entitled to a deferred pension. Contributions, lump sum payments and pensions to retirees were compared with corresponding amounts reported in financial statements. The results of these tests were satisfactory.

If the data supplied are not sufficient and reliable for its intended purpose, the results of our calculation may differ significantly from the results that would be obtained with such data. Although Mercer has reviewed the suitability of the data for its intended use in accordance with accepted actuarial practice in Canada, Mercer has not verified or audited any of the data or information provided.

Plan membership data are summarized below. For comparison, we have also summarized corresponding data from the previous valuation.

	August 31, 2017	**August 31, 2014**
Active Members		
Number	3,955	3,715
Total salary[22]	$320,829,000	$291,236,000
Average salary	$81,120	$78,395
Average years of pensionable service	10.9	11.4
Average age	47.4	47.8
Average MPC Balance	$177,810	$170,462
Deferred Pensioners		
Number	1,582	1,675
Average MPC Balance	$102,550	$86,882
Average age	51.4	49.9
Pensioners and Survivors		
Number	2,401	2,128
Total annual "True" pension[23]	$91,355,234	$75,089,900
Average annual "True" pension	$38,049	$35,287
Average annual pension currently paid	$38,329	$38,850
Average age	73.8	73.6

[22] Salary for each member limited to the level at which benefit accruals would be capped by the ITA limit.

[23] "True pension" is the pension that would be payable in the absence of the non-reduction provisions of the Plan.

The membership movement for all categories of membership since the previous actuarial valuation is as follows:

	Active Members	Deferred Pensioners	Pensioners and Survivors	Total
Total at August 31, 2014	3,715	1,675	2,128	7,518
New entrants	1,096			1,096
Terminations:				
• Deferred pension	(277)	277		
• Lump sum payout	(270)	(250)		(520)
Deaths	(21)	(2)	(195)	(218)
Term Expired			(1)	(1)
Retirements	(287)	(105)	392	
New beneficiaries		8	76	84
Data adjustments[24]	(1)	(21)	1	(21)
Total at August 31, 2017	3,955	1,582	2,401	7,938

[24] Includes rehires, merged records, marriage breakdowns and data adjustments.

The distribution of the active members by age and pensionable service as at August 31, 2017 is summarized as follows:

	Years of Pensionable Service								
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35+**	**Total**
Under 25	29								29
	$47,091								$47,091
25-29	204	17							221
	$53,026	$51,901							$52,939
30-34	294	99	6						399
	$61,673	$59,229	$63,912						$61,100
35-39	263	126	82	5					476
	$64,970	$76,806	$75,522	$71,879					$69,993
40-44	197	125	142	44					508
	$69,723	$75,656	$93,927	$78,449					$78,704
45-49	143	113	149	113	18	2			538
	$77,590	$81,206	$92,242	$98,990	$84,652	**			$87,058
50-54	130	94	125	130	113	41	10		643
	$68,376	$79,059	$91,697	$104,202	$91,689	$74,815	$65,847		$86,183
55-59	86	71	91	99	85	134	21	5	592
	$74,274	$79,911	$89,751	$102,725	$108,529	$87,305	$81,463	$71,558	$90,187
60-64	47	52	62	57	47	79	97	5	446
	$83,947	$78,919	$101,503	$87,286	$108,624	$98,572	$102,726	$79,516	$95,453
65+	15	18	12	15	9	12	14	8	103
	$71,661	$107,053	$117,459	$88,735	$126,557	$144,248	$154,478	$136,850	$115,242
Total	1,408	715	669	463	272	268	142	18	3,955
	$65,717	$75,794	$91,166	$97,234	$100,566	$91,031	$102,087	$102,787	$81,120

For each age/service cell, the second row indicates the average limited annual earnings
** The salary information in cells with two members or less is not disclosed for reasons of confidentiality.

The distribution of pensioners and survivors by age as at the valuation date is summarized as follows:

		Pensioners and Survivors	
		Average Annual Pension	
Age	**Number**	**"True"**	**"Currently Paid"**
Under 45	4	$5,038	$5,043
45 – 49	9	$6,838	$6,867
50 – 54	16	$8,004	$8,078
55 – 59	64	$18,200	$18,317
60 – 64	242	$25,025	$25,069
65 – 69	533	$30,074	$30,211
70 – 74	540	$40,854	$41,206
75 – 79	408	$49,769	$50,264
80 – 84	292	$45,241	$45,569
85 – 89	183	$47,698	$48,060
90 – 94	88	$34,550	$34,803
95 +	22	$24,956	$25,136
Total	2,401	$38,049	$38,329

APPENDIX F

Summary of Plan Provisions

Mercer has used and relied on the plan documents, including amendments and interpretations of plan provisions, supplied by the University. If any plan provisions supplied are not accurate and complete, the results of any calculation may differ significantly from the results that would be obtained with accurate and complete information. Moreover, plan documents may be susceptible to different interpretations, each of which could be reasonable, and the results of estimates under each of the different interpretations could vary.

This valuation is based on the Plan provisions in effect on August 31, 2017. Since the previous valuation, the Plan has been amended to exclude interns employed under the Queen's Undergraduate Internship Program from eligibility to participate in the Plan.

The following is a summary of the main provisions of the Plan in effect on August 31, 2017. This summary is not intended as a complete description of the Plan.

Background	The Plan became effective September 1, 1969 Benefits are based on a hybrid approach of a minimum guaranteed defined benefit and a money purchase account. The benefit is funded by a combination of Employee and University contributions.
Eligibility for membership	Each full-time employee appointed to a continuing position on or after January 1, 1995 in academic, administrative, library, technical, secretarial, clerical or maintenance work is required to join the Plan not later than the date coincident with their appointment to a continuing position. A part-time employee of the University who works at least 700 hours each year and who has a continuing appointment will be eligible to join the Plan one year after the original appointment. A part-time employee who works less than 700 hours per year but who earns more than 35% of the Canada Pension Plan's Maximum Pensionable Earnings per year will be eligible to join the Plan two years after the original appointment.
Regular earnings	Base pay
Employee Money Purchase Contributions	Each member is required to contribute a percentage of their regular earnings up to the Canada Pension Plan's Year's Maximum Pension Earnings (YMPE) and a different percentage of regular earnings above this threshold. The contribution rates depend on the contribution period and are as follows: - Prior to January 1, 2012: 4.50% up to YMPE and 6.00% thereafter - January 1, 2012 to June 30, 2012: 5.00% up to YMPE and 6.60% thereafter - July 1, 2012 to December 31, 2012: 5.50% up to YMPE and 7.20% thereafter - January 1, 2013 to June 30, 2013: 6.00% up to YMPE and 7.80% thereafter - July 1, 2013 to December 31, 2013: 6.50% up to YMPE and 8.40% thereafter - January 1, 2014 and onward: 7.00% up to YMPE and 9.00% thereafter

University Money Purchase Contributions	The University is required to contribute a percent of each member's regular earnings up to the YMPE and a different percentage of regular earnings above this threshold. The contribution rates depend on the contribution period and are as follows: - After September 1, 1997 and prior to January 1, 2012: 6.00% up to YMPE and 7.00% thereafter, plus 1.5% of the sum of University and employee money purchase contributions - January 1, 2012 and onward: 6.00% up to YMPE and 7.50% thereafter
Money Purchase Contributions – application of tax limits	Both Employee and University money purchase contributions are limited to the maximum amounts permitted under the Income Tax Act. Members whose earnings are such that total money purchase contributions would exceed the money purchase limit prescribed by the Income Tax Act, may at each member's election, remit the maximum employee contributions to the plan with a corresponding reduction in contributions by the University.
Defined Benefit Contributions	The University will make contributions as are required on the basis of actuarial valuations to provide the defined benefits provided by the plan.
Retirement Dates	Normal Retirement Date • The normal retirement date for a member of the academic staff is the last day of the employment year after reaching age 65. • The normal retirement date for support staff is the last day of the month in which the employee attains age 65. Early Retirement Date • Early retirement is permitted at any time prior to the employee's normal retirement date.

Normal Retirement Pension

A member's pension at retirement is equal to the money purchase pension plus the minimum guarantee pension (as described below). In addition, each member who has made additional voluntary or special voluntary contributions may elect to receive such additional pension as can be provided on a money purchase basis.

- **Money Purchase Pension:** The money purchase pension is the amount that can be provided, based on actuarial tables in force at the retirement date, by the member's money purchase account balance which consists of the member and University money purchase contributions credited with fund earnings (net of administration expenses). The account balance at retirement is further reduced by a charge to account for cost of the non-reduction provision. The charge is phased in as follows:

  - Prior to September 1, 2012: 1.50% of post-1992 account balances
  - September 1, 2012 to August 31, 2013: 1.50% of total account balance
  - September 1, 2013 to August 31, 2014: 3.00% of total account balance
  - September 1, 2014 onward: 4.50% of total account balance

- **Minimum Guarantee Pension:** The member's minimum guarantee pension is the excess, if any, of (a) plus (b) over (c) below:

  (a) 1.35% of Final Average Earnings up to the Average YMPE plus 1.8% of Final Average Earnings over the Average YMPE, multiplied by the number of years of credited service from September 1, 1962 to August 31, 1997;
  (b) 1.4% of Final Average Earnings up to the Average YMPE plus 1.8% of Final Average Earnings over the Average YMPE, multiplied by the number of years of credited service from September 1, 1997;
  (c) the member's money purchase pension.

  "Final Average Earnings" is the average of the highest 48 consecutive months of earnings and "Average YMPE" is the average of the YMPE for the same 48 months as used for the Final Average Earnings.

Early Retirement Pension	If a member retires early, the member will be entitled to a pension that is calculated the same way as for a normal retirement. The minimum guarantee pension payable, however, will be reduced by a given percentage for each month before the normal retirement date. The early retirement reductions are as follows: - Minimum Guarantee Benefits accrued as of September 1, 2012: reduction is 2% per year for the first five years prior to normal retirement and 6% per year for each additional year prior to normal retirement. - Minimum Guarantee Benefits accrued on or after January 1, 2012 and future increases to Minimum Guarantee Benefit accrued prior to September 1, 2012 resulting from earnings increases: reduction is 3% per year for the first five years prior to normal retirement and 6% per year for each additional year prior to normal retirement.
Postponed Retirement Pension	A member may postpone retirement and commencement of pension, but in any event the pension shall commence no later than the end of the year of attainment of age 71. Such member must make an election at age 65 to: - continue contributing and accruing pension benefits during the postponed retirement period; - cease contributing and commence a pension at age 65; or - cease contributing and receive a pension at their postponed retirement age. Under this option, the minimum guarantee pension is calculated at age 65 (reflecting only earnings and service to that point), but actuarially adjusted upward to account for deferred commencement of the pension. A member who elected at age 65 to continue contributing beyond age 65 and subsequently begins to work on a less than full time basis has the option to cease contributing to the Plan upon the change to less than full time employment. If such option is elected, the member will have the choice of commencing a pension at the date of the change in status or receiving an actuarially increased pension at their subsequent postponed retirement date.
Income Tax Act maximum pension limit	The annual lifetime minimum guaranteed pension payable to a member upon normal retirement, prior to reduction by the money purchase pension shall not exceed the years of the member's credited service multiplied by the lesser of: (a) the defined benefit limit for the year; and (b) 2% of the Member's highest average indexed compensation in any 3 non over-lapping periods of 12 consecutive months. The amount shall be increased on an actuarial equivalent basis in the manner permitted by the Canada Revenue Agency if the pension commences after normal retirement. The amount shall be reduced if the pension commences before normal retirement. The reduction in respect of service prior to September 1, 2012 is 3% per year that retirement precedes the earliest of age 60, 30 years of service or 80 points (age plus service). The reduction in respect of service on and after September 1, 2012 shall be determined based on the Plan early retirement reductions (3% per year for the first five years prior to normal retirement and 6% per year for each additional year prior to normal retirement).

Death Benefits	**Pre-Retirement** - *Death Before 24 Months of Membership:* A death benefit will be payable equal to the full amount of the member's money purchase account. Also, any additional voluntary contributions with interest are payable. - *Death After 24 Months of Membership:* A death benefit will be payable equal to the full amount of the member's money purchase account plus any additional value of minimum guarantee pension for service after January 1, 1987 over the money purchase account balance with respect to service after January 1, 1987. Also, any additional voluntary contributions with interest are payable. **Post-Retirement** • The normal form of pension is payable for life with the guarantee that, should a member die before the member has received 120 monthly payments, his/her estate or beneficiary will receive the balance of such payments. • Optional forms of payments are made available at retirement. In accordance with the Ontario Pension Benefits Act, a married member must elect a form that provides for at least 60% contribution to the spouse upon his/her death, unless both spouses sign a waiver.
Termination Benefits	A member who terminates employment with the University may elect to have the money purchase account plus the excess, if any, of the value of the minimum guarantee pension over the money purchase account: - transferred to another pension plan, if the administrator of that plan agrees; - transferred to a prescribed retirement savings arrangement; or - applied to purchase an annuity from an insurer. A member may elect to receive the following lump sum payments in lieu of all or part of the amount described above. - *Prior to completing 24 month of membership:* The lump sum payment is the money purchase account attributable to contributions on and after January 1, 1987, plus the amount by which the value of the minimum guarantee pension attributable to service on and after January 1, 1987 exceeds the corresponding money purchase account. - *Prior to Age 45 With 10 Years of Service:* The lump sum payment is the money purchase account attributable to contributions prior to January 1, 1987, plus the amount by which the value of the minimum guarantee pension attributable to service prior to January 1, 1987 exceeds the corresponding money purchase account. - *Age 45 With 10 Years of Service:* The lump sum payment is 25% of the money purchase account attributable to contributions prior to January 1, 1987, plus the amount by which the value of the remaining 75% minimum guarantee pension attributable to service prior to January 1, 1987 exceeds the corresponding money purchase account. A terminating member is also entitled to a lump sum refund of any voluntary or special lump sum contributions. Any lump sum payment may also be transferred to a retirement savings arrangement, but such a transfer is on a "non-locked-in basis".

Post Retirement Indexing	**Pensioners retiring prior to or on September 1, 2012** Pensions in payment will be adjusted each year to reflect the 4-year average fund earnings rate in excess of 6%. No reduction in pensions will be made even if the 4-year average earnings rate is less than 6% for any year. **Pensioners retiring after September 1, 2012** Pensions in payment will be adjusted each year to reflect the 6-year average fund earnings rate in excess of 6%. However, this adjustment will only apply to the money purchase pension, and a pro-rated portion of the excess, if any, of the minimum guarantee pension over the money purchase pension[25]. For this purpose, the fund earnings rate for periods prior to the retirement date will be set at 6%. The pension indexation will be adjusted either positively or negatively to reflect actual mortality gains or losses as determined by the plan actuary. No reduction in pensions will be made even if the 6-year average earnings rate combined with the mortality experience adjustment is less than 6% for any year.

[25] Based on the ratio of the minimum guarantee pension accrued to September 1, 2012 over the minimum guarantee pension accrued to the retirement date, both determined prior to any offset for the money purchase pension.

APPENDIX G

University Certification

With respect to the Report on the Actuarial Valuation for Funding Purposes as at August 31, 2017 of the Revised Pension Plan of Queen's University I hereby certify that, to the best of my knowledge and belief:

- The valuation reflects the terms of the University's engagement with the actuary described in section 2 of this report, particularly the requirement to not reflect a margin for adverse deviations in the going concern valuation and the University's decisions in regards to determining the going concern and solvency funding requirements.
- A copy of the official plan documents and of all amendments made up to August 31, 2017 was provided to the actuary and is reflected appropriately in the summary of plan provisions contained herein.
- The asset information summarised in Appendix B is reflective of the Plan's assets.
- The membership data provided to the actuary included a complete and accurate description of every person who is entitled to benefits under the terms of the Plan for service up to August 31, 2017.
- All events subsequent to August 31, 2017 that may have an impact on the Plan have been communicated to the actuary.

March 7, 2018
Date

Signed

ROBERT J. WEISNAGEL
Name

MERCER
MAKE TOMORROW, TODAY

Mercer (Canada) Limited
120 Bremner Boulevard, Suite 800
Toronto, Ontario M5J 0A8
+1 416 868 2000