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UNIVERSITY OF WINDSOR EMPLOYEES' RETIREMENT PLAN

Report on the Actuarial Valuation for Funding Purposes as at January 1, 2020

December 2020

Financial Services Regulatory Authority of Ontario Registration Number: 0310573

Canada Revenue Agency Registration Number: 0310573

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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, and the sensitivity to three adverse scenarios. 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 Benefits 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.

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Summary of Results

	1.1.2020	1.1.2018
Going Concern Financial Status		
Smoothed value of assets	$257,586,100	$235,707,400
Going concern funding liabilities	$217,319,700	$198,083,500
Provision for adverse deviations in respect of the going concern liabilities	$18,427,300	$15,740,900
Funding excess (shortfall)	$21,839,100	$21,883,000
Hypothetical Wind-up Financial Position		
Wind-up assets	$267,609,000	$245,312,000
Wind-up liability	$290,073,400	$255,178,600
Wind-up excess (shortfall)	($22,464,400)	($9,866,600)
Solvency Financial Position		
Solvency assets	$267,609,000	$245,312,000
Solvency liability	$289,165,100	$254,059,900
Solvency excess (deficiency)	($21,556,100)	($8,747,900)
Transfer ratio	0.92	0.96
Solvency ratio	0.93	0.97

	1.1.2020	1.1.2018
Funding Requirements in the Year Following the Valuation [1]		
Total current service cost	$7,046,400	$6,559,000
Provision for adverse deviations in respect of current service cost	$598,900	$524,600
Total	$7,645,300	$7,083,600
Estimated members' required contributions	$3,822,650	$3,541,800
Estimated University's required contributions	$3,822,650	$3,541,800
Total	$7,645,300	$7,083,600
Minimum special payments	$0	$0
Estimated minimum contribution	$7,645,300	$7,083,600
Estimated maximum eligible contribution	$30,109,700	$16,950,200
Next required valuation date	January 1, 2023	January 1, 2021

[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.

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Introduction

To the University of Windsor

At the request of the University of Windsor (the "University"), we have conducted an actuarial valuation of the University of Windsor Employees' Retirement Plan (the "Plan"), sponsored by the University of Windsor (the "University"), as at the valuation date, January 1, 2020. 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 January 1, 2020 on going concern, hypothetical wind-up, and solvency bases;
- The minimum required funding contributions from 2020, in accordance with the *Pension Benefits Act (Ontario)* (the "Act");
- The minimum required funding contributions from 2020, in accordance with the cost sharing provisions of the Plan; and
- The maximum permissible funding contributions from 2020, in accordance with the *Income Tax Act*.

The information contained in this report was prepared for the internal use of the University, and for filing with the Financial Services Regulatory Authority 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 Regulatory Authority 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 January 1, 2023, or as at the date of an earlier amendment to the Plan depending on any funding implications.

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 the going concern valuation beyond the provision for adverse deviations that are prescribed under the Act.
- 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.
  - Certain excludable benefits were excluded from the solvency liabilities.
  - The solvency financial position was determined on a market value basis.

See the Valuation Results – Solvency section of the report for more information.

Events since the Last Valuation at January 1, 2018

Pension Plan

This valuation reflects the provisions of the Plan as at January 1, 2020. Since the previous valuation, the Plan has been amended to reflect:

- new employee contribution rates based on the Plan's cost sharing provisions and the results of the July 1, 2017 and January 1, 2018 valuations; and
- new minimum going concern and solvency funding requirements based on new Ontario funding rules that became effective May 1, 2018

The Plan will be further amended effective February 8, 2021 to reflect the new employee contribution rates based on the Plan's cost sharing provisions and the results of the January 1, 2020 valuation.

The University amended its Statement of Investment Policies and Procedures document effective October 22, 2019.

There have been no other notable events since the last valuation date.

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 summarized 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
Assumptions		
• Discount rate:	5.30%	5.60%
• Pensionable earnings increases:	1.20% in 2020; 1.75% in 2021 & 2022; and 3.00% thereafter	3.00%
• Post retirement pension increases:	0.59% at July 1, 2020; and 0.00% per year thereafter	0.79% at July 1, 2018, 0.95% at July 1, 2019, 0.67% at July 1, 2020; and 0.00% per year thereafter
• Discount rate for calculation of commuted value assumed to be settled	3.25%	4.00%
Methods		
• Disabled member funding method	Aggregate	Projected unit credit

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 no changes to the Act or the relevant regulations that impact the funding of the Plan.

On May 21, 2019, amendments to the Regulations to the Ontario Pension Benefits Act were released. These amendments were intended to provide additional clarity to the operation of the new funding rules. On May 29, 2019, Bill 100 received Royal Assent. Bill 100 included several amendments to the Pension Benefits Act, including adjustments to permit the use of the Prior Year Credit Balances to pay for employer's current service cost.

These changes have been reflected in this actuarial valuation. However, they do not impact the financial position of the Plan.

Subsequent Events

On July 23, 2020, the Canadian Institute of Actuaries released the final standards for pension commuted values ("CIA CV Standard") which will be effective December 1, 2020.

From the effective date, they will affect the assumptions used to value the solvency and wind-up liabilities for benefits assumed to be settled through a lump sum transfer. They will also affect the assumptions used to determine the commuted values payable upon termination for members assumed to elect a lump sum transfer under the going concern basis. The financial impact of those changes has not been reflected in this actuarial valuation and will be considered in a future actuarial valuation, once they are effective.

After checking with representatives of the University, to the best of our knowledge there have been no other events subsequent to the valuation date that, in our opinion, would have a material impact on the results of the valuation as at January 1, 2020. However, since the valuation date, there have been significant fluctuations in the financial markets, which may have led to a deterioration of the funded position of the Plan after the valuation date. 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.

Impact of Case Law

This report has been prepared on the assumption that all claims on the Plan after the valuation date will be in respect of benefits payable to members of the Plan determined in accordance with the Plan terms and that all Plan assets are available to provide for these benefits. It is possible that court and regulatory decisions and changes in legislation could give rise to additional entitlements to benefits under the Plan and cause the results in this report to change. By way of example, we bring your attention to the following decisions:

- The Ontario Court of Appeal's 2003 decision in *Aegon Canada Inc. and Transamerica Life Canada versus ING Canada Inc.* restricted the use of original plan surplus where two or more pension plans were merged.

- The Supreme Court of Canada's 2004 decision in *Monsanto Canada Inc. versus Superintendent of Financial Services* upheld the requirement, with retroactive effect, to distribute surplus on partial plan wind-up under the *Pension Benefits Act (Ontario).*

We are not in a position to assess the impact that such decisions or changes could have on the assumption that all plan assets on the valuation date are available to provide for benefits determined in accordance with the Plan terms. If such a claim arises subsequent to the date of this report, the consequences will be dealt with in a subsequent report. We are making no representation as to likelihood of such a claim.

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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:

	1.1.2020	1.1.2018
Assets		
Market value of assets	$267,934,000	$245,637,000
Asset smoothing adjustment	($10,347,900)	($9,929,600)
Smoothed value of assets	$257,586,100	$235,707,400
Going concern funding target		
Going concern liabilities:		
• Active members	$108,202,000	$100,516,500
• Disabled members	$10,288,300	$5,946,900
• Suspended members	$4,991,600	$3,795,600
• Pensioners and survivors	$89,977,300	$82,394,400
• Deferred pensioners	$3,860,500	$5,430,100
Subtotal	$217,319,700	$198,083,500
Provision for adverse deviations in respect of going concern liabilities as prescribed by the Act[2]	$18,427,300	$15,740,900
Total	$235,747,000	$213,824,400
Funding excess (shortfall)[3]	$21,839,100	$21,883,000

[2] 8.50%/8.00% PfAD is applied to total 2020/2018 liabilities excluding liabilities of $527,700/$1,321,900 in respect of post-retirement indexing.

[3] Funding excess (shortfall) may or may not be equal to the going concern excess (unfunded liability) as described in the Act. Details of the going concern excess (unfunded liability) are provided in Appendix A.

The going concern liabilities at January 1, 2020 do not include an additional margin for adverse deviations beyond the provision for adverse deviations prescribed by the Act.

Reconciliation of Financial Status

Funding excess (shortfall) as at previous valuation		$21,883,000
Provision for Adverse Deviations (PfAD) at previous valuation		$15,740,900
Funding excess (shortfall) as at previous valuation before PfAD		$37,623,900
Interest on funding excess (shortfall) before PfAD at 5.60% per year		$4,331,900
University's PfAD funding contributions, with interest		$1,071,100
Net experience gains (losses)		
• Investment return	$4,607,800	
• Increases in pensionable earnings	$2,171,900	
• Increase in YMPE and maximum pension limits	($167,900)	
• Indexation	$233,000	
• Mortality	$423,600	
• Retirement	($1,069,500)	
• Termination	($1,370,700)	
Total experience gains (losses)		$4,828,200
Impact of changes in assumptions		
• Discount rate	($8,058,300)	
• Pensionable earnings increase	$3,926,200	
• Indexation	$157,500	
• Discount rate for calculation of commuted value assumed to be settled	($1,773,700)	
Total assumption changes impact		($5,748,300)
Impact of change in going concern valuation method (disabled members)		($1,927,900)
Net impact of other elements of gains and losses		$87,500
Funding excess (shortfall) before PfAD at current		$40,266,400
Provision for Adverse Deviations at current valuation		($18,427,300)
Funding excess (shortfall) as at current valuation		$21,839,100

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. A provision for adverse deviations in respect of the current service cost is determined in accordance with the Act.

The current service cost and the provision for adverse deviations in respect of the current service cost, during the year following the valuation date, compared with the corresponding values determined in the previous valuation, is as follows:

	2020	2018
Total current service cost		
• As a dollar amount per year	$7,046,400	$6,559,000
• As a percentage of members' pensionable earnings	13.3%	13.1%
Provision for adverse deviations in respect of the current service cost (based on the percentage defined in Appendix A)		
• As a dollar amount per year	$598,900	$524,600
• As a percentage of members' pensionable earnings	1.1%	1.1%
Total current service cost and provision for adverse deviations in respect of the current service cost		
• As a dollar amount per year	$7,645,300	$7,083,600
• As a percentage of members' pensionable earnings	14.4%	14.2%
Estimated Members' required contributions for current service cost	$3,822,650	$3,541,800
Estimated University's matching contributions for current service cost	$3,822,650	$3,541,800

The key factors that have caused a change in the current service cost, excluding the provision for adverse deviations, since the previous valuation are summarized in the following table:

Current service cost as at previous valuation	13.1%
Demographic changes	0.1%
Changes in assumptions	0.6%
Changes in funding method (disabled members)	(0.5%)
Current service cost as at current valuation	13.3%

Discount Rate Sensitivity

The following table summarizes the effect on the going concern liabilities and current service cost shown in this report of using a discount rate that 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. The effect of a change in the discount rate on the provision for adverse deviations is not reflected.

Scenario	Valuation Basis	Reduce Discount Rate by 1%
Going concern funding liabilities	$217,319,700	$248,142,100
Current service cost	$7,046,400	$8,577,400

Plausible Adverse Scenarios

The financial impact on the going concern results of plausible adverse scenarios that would pose threats to the Plan's future financial condition is presented in Appendix G.

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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 consistent with the hypothesized scenario 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:

	1.1.2020	1.1.2018
Assets		
Market value of assets	$267,934,000	$245,637,000
Termination expense provision	($325,000)	($325,000)
Wind-up assets	$267,609,000	$245,312,000
Present value of accrued benefits for:		
• Active members	$152,419,200	$130,642,700
• Disabled Members	$11,836,800	$8,048,100
• Suspended Members	$6,852,200	$4,750,100
• Pensioners and survivors	$112,905,600	$103,836,100
• Deferred pensioners	$6,059,600	$7,901,600
Total wind-up liability	$290,073,400	$255,178,600
Wind-up excess (shortfall)	($22,464,400)	($9,866,600)

Wind-up Incremental Cost

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:

	1.1.2020	1.1.2018
Number of years covered by report	3 years	3 years
Total hypothetical wind-up liabilities at the valuation date (A)	$290,073,400	$255,178,600
Present value at the valuation date of projected hypothetical wind-up liability at the next required valuation (including expected new entrants) plus expected benefit payments until the next required valuation (B)	$327,194,400	$292,368,500
Hypothetical wind-up incremental cost (B – A)	$37,121,000	$37,189,900

The incremental cost is not an appropriate measure of the contributions that would be required to maintain the windup position of the Plan even if actual experience is exactly in accordance with the going concern valuation assumptions. For example, 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 summarizes the effect on the hypothetical wind-up liabilities shown in this report of using a discount rate that is 1% lower than that used in the valuation:

Scenario	Valuation Basis	Reduce Discount Rate by 1%
Total hypothetical wind-up liability	$290,073,400	$339,855,200

Plausible Adverse Scenarios

The financial impact on the hypothetical wind-up financial position of plausible adverse scenarios that would pose threats to the Plan's future financial condition is presented in Appendix G.

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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.	The following benefits were excluded from the solvency liabilities shown in this valuation: • Post-retirement pension increases
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:

	1.1.2020	1.1.2018
Assets		
Market value of assets	$267,934,000	$245,637,000
Termination expense provision	($325,000)	($325,000)
Net assets	$267,609,000	$245,312,000
Liabilities		
Total hypothetical wind-up liabilities	$290,073,400	$255,178,600
Difference in circumstances of assumed wind-up	$0	$0
Value of excluded benefits	($908,300)	($1,118,700)
Liabilities on a solvency basis	$289,165,100	$254,059,900
Surplus (shortfall) on a market value basis	($21,556,100)	($8,747,900)
Transfer Ratio	0.92	0.96
Solvency Ratio	0.93	0.97

Plausible Adverse Scenarios

The financial impact on the solvency financial position of plausible adverse scenarios that would pose threats to the Plan's future financial condition is presented in Appendix G.

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Minimum Funding Requirements

The Act prescribes the minimum contributions that 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, the provision for adverse deviations in respect of the current service cost, and special payments to fund any funding shortfall or solvency shortfall that exceeds the level as set out under the Act. In accordance with the cost sharing provisions of the Plan, the University and the members contribute equally to fund the minimum amounts required to fund the Plan.

On the basis of the assumptions and methods described in this report, no special payments are required. However, since the available actuarial surplus is zero, the Act requires the contribution of the current service cost including the provision for adverse deviations. The determination of the provision for adverse deviations is shown in Appendix A. On the basis of the assumptions and methods described in this report, the rule for determining the minimum required monthly contributions to be shared equally between the University and members, as well as an estimate of the contributions, from the valuation date until the next required valuation are as follows:

	Contribution Rule [A + B]		Estimated Contributions		
Period beginning	Monthly current service cost[4] [A]	Provision for adverse deviations[4] [B]	Monthly current service cost[5]	Provision for adverse deviations	Total Minimum monthly contributions
January 1, 2020	13.3%	1.1%	$587,200	$49,908	$637,108
January 1, 2021	13.3%	1.1%	$597,476	$50,782	$648,258
January 1, 2022	13.3%	1.1%	$607,932	$51,670	$659,602

The estimated contribution amounts above are based on projected members' pensionable earnings. Therefore, the University's and members' actual current service cost and provision for adverse deviations in respect of the current service cost may be different from the above estimates and, as such, the contribution requirements should be monitored closely to ensure contributions resume in accordance with the Act. That said, under the

[4] Expressed as a percentage of members' estimated pensionable earnings.

[5] Excluding the provision for adverse deviation.

cost sharing provisions of the Plan, and subject to any limits under the *Income Tax Act*, the University's contributions may not be less than the aggregate regular employee contributions for the year as specified by the Plan.

Appendix A includes details on the determination of the provision for adverse deviations.

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 reduced solvency shortfalls, if any.

In addition, although minimum funding requirements do include a requirement to fund the going concern current service cost and a provision for adverse deviations in respect of the 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.

Timing of Contributions

Funding contributions are due on a monthly basis. Contributions for current service cost and the provision for adverse deviations 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 and members 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. If 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.

Letters of Credit

Minimum funding requirements in respect of required solvency special payments that otherwise require monthly contributions to the pension fund may be met, in the alternative, by establishing an irrevocable letter of credit subject to the conditions established by the Act. Required solvency special payments in excess of those met by a letter of credit must be met by monthly contributions to the pension fund.

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Maximum Eligible Contributions

The *Income Tax Act* (the "ITA") limits the amount of University contributions that can be remitted to the defined benefit component of a registered pension plan. For purposes of this section on maximum eligible contributions only, any reference to the current service cost includes the provision for adverse deviations in respect of the current service cost.

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

For a plan that is fully funded on both going concern and hypothetical wind-up bases, the University can remit a contribution equal to the University's current service cost, including the explicit expense allowance if applicable, 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 that is fully funded on both going concern and hypothetical wind-up bases, the plan may not retain its registered status if the University 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 benefits legislation are eligible contributions in accordance with Section 147.2 of the ITA and can be remitted.

Schedule of Maximum Contributions

In aggregate, the University and the members are permitted to is permitted to fully fund the greater of the going concern and hypothetical wind-up shortfalls ($22,464,400), as well as make current service cost contributions including the provision for adverse deviations in respect of the current service cost. The portion of this contribution representing the payment of the hypothetical wind-up shortfall can be increased with interest at 2.79% 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 and the members contribute the greater of the going concern and the hypothetical wind-up shortfall of $22,464,400 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:

	Contribution Rule			Estimated contributions
Year beginning	Monthly current service cost[6]	Provision for adverse deviations[5]	Deficit Funding	Monthly current service cost
January 1, 2020	13.3%	1.1%	n/a	$637,108
January 1, 2021	13.3%	1.1%	n/a	$648,258
January 1, 2022	13.3%	1.1%	n/a	$659,602

The current service cost and provision for adverse deviations in respect of the current service cost shown in the above table was estimated based on projected members' pensionable earnings. The University's and members' actual current service cost and provision for adverse deviations will be different from these estimates and, as such, the contribution requirements should be monitored closely to ensure compliance with the ITA. That said, under the cost sharing provisions of the Plan, and subject to any limits under the *Income Tax Act*, the University's contributions may not be less than the aggregate regular employee contributions for the year as specified by the Plan.

[6] Expressed as a percentage of members' estimated pensionable earnings.

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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).

Bill Watson
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

December 21, 2020
Date

Lise Houle
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

December 21, 2020
Date

Appendix A
Prescribed Disclosure

Definitions

The Act defines a number of terms as follows:

Defined Term	Description		Result
Going concern assets	Total value of assets plus the sum of the following:		$257,586,100
	(a) the present value of special payments in respect of any past service unfunded liability identified in a previously filed report	$0	
	(b) the present value of special payments in respect of any plan amendment that increases going concern liabilities	$0	
	(c) present value of special payments in respect of going concern unfunded liabilities identified in a previously filed report that are scheduled for payment within one year of the date of this report	$0	
Going concern excess / (unfunded liability)	The Going Concern Assets minus the sum of the following:		$21,839,100
	a. the going concern liabilities		
	(i) liabilities excluding the value of escalated adjustments	$216,792,000	
	(ii) liabilities in respect of escalated adjustments	$527,700	
	b. the provision for adverse deviations in respect of the going concern liabilities excluding the value of escalated adjustments	$18,427,300	
	c. Prior Year Credit Balance	$0	

Defined Term	Description	Result
Going concern funded ratio	The ratio of: (a) Total value of assets (excluding letters of credit) less the Prior Year Credit Balance; to (b) going concern liabilities	1.19
Transfer Ratio	The ratio of: (a) Solvency Assets minus the lesser of the Prior Year Credit Balance and the minimum required University contributions including the provision for adverse deviations 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.	0.92
Solvency Ratio	The ratio of: (a) Solvency Assets related to defined benefits and ancillary benefits plus the total amount of any letters of credit minus the Prior Year Credit Balance (b) the sum of the Solvency Liabilities related to defined benefits and ancillary benefits	0.93
Prior Year Credit Balance	Accumulated sum of contributions made to the pension plan in excess of the minimum required contributions (note: only applies if the University chooses to treat the excess contributions as a Prior Year Credit Balance).	$0
Solvency Assets	Market value of assets including accrued or receivable income and excluding the value of any qualifying annuity contracts.	$267,934,000

Defined Term	Description	Result
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 required to liquidate any past service unfunded liability	$0
	(c) the present value of going concern special payments identified in January 1, 2018, valuation and scheduled for 5 years	$0
	(d) the present value of going concern special payments (identified in this report) that are scheduled for payment within 6 years following the valuation date	$0
	(e) the present value of any previously scheduled solvency special payments (excluding those identified in this report)	$0
	(f) the total value of all letters of credit in respect of the special payments due before the valuation date, subject to the limit of 15% of solvency liabilities	$0
		$0
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 University's business were discontinued on the valuation date of the report, but, if elected by the plan sponsor, excluding liabilities for,	$289,165,100
	(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.	

Defined Term	Description	Result
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	$289,165,100
	(b) the Solvency Liability Adjustment	$0
	(c) the Prior Year Credit Balance	$0
		$289,165,100
	Exceeds the sum of	
	(d) the Solvency Assets net of estimated termination expenses[7]	$267,609,000
	(e) the Solvency Asset Adjustment	$0
		$267,609,000
		$21,556,100
Reduced Solvency Deficiency / (Solvency Excess)	The sum of:	
	(a) 85% of the Solvency Liabilities	$245,790,300
	(b) 85% of the Solvency Liability Adjustment	$0
	(c) the Prior Year Credit Balance	$0
		$245,790,300
	minus the sum of:	
	(d) the Solvency Assets net of estimated termination expenses[8]	$267,609,000
	(e) the Solvency Asset Adjustment	$0
		$267,609,000
		($21,818,700)

[7] 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.

Provision for Adverse Deviations

The provision for adverse deviations has been established in accordance with regulations taking into account the following parameters:

Defined Amount		Results
Fixed Income Component (L)	The sum of the Plan's target allocation of assets (excluding those allocated to annuity contracts and meeting the minimum rating requirement) as described in the regulations according to the investment policy applicable at the valuation date: **Investment** — **Target** Canadian Bonds and debentures — 35%	35%
Alternative Investment Component (M)	The sum of the Plan's target allocation of assets (excluding those allocated to annuity contracts) meeting requirements as described in the regulations according to the investment policy applicable at the valuation date. **Investment** — **Target** Infrastructure — 5.0%	5.0%
Investment Component (N)	Plan's target asset allocation for mutual, pooled or segregated funds	0.0%
Investment Component Fixed Income % (P)	Portion of Investment Component (N) that is allocated to investment categories accounted for in Fixed Income Component (L)	0.0%
Investment Component Alternative Investment % (Q)	Portion of Investment Component (N) that is allocated to investment categories accounted for in Alternative Income Component (M)	0.0%
Annuity Contract Allocation (R)	Annuity contracts that have been purchased from an insurance company and excluded from the Fixed Income Component (L) and Alternative Investment Component (M)	0.0%

Combined Target Asset Allocation for Fixed Income Assets (J)			
Sum of			
• Fixed Income Component (L)	35.50%		
• 0.5 × Alternative Investment Component (0.5 × M)	2.50%		
• Investment Component × Investment Component Fixed Income % (N × P)	0.00%		
• 0.5 × Investment Component × Investment Component Alternative Investment % (0.5 x N × Q)	0.00%		
		37.50%	
Divided by			
• 100% - Annuity Contract Allocation (100% - R)		100.0%	
Combined Target Asset Allocation for Fixed Income Assets			**37.50%**

Combined Target Asset Allocation for Non-Fixed Income Assets (K)	
100% – Combined **Target** Asset Allocation for Fixed Income Assets (100% - J)	**62.50%**

Duration of going concern liabilities at valuation date	
= (F - G) / (G × 0.01)	**14.18**
where,	
G = going concern liabilities excluding liabilities in respect of escalated adjustments and liabilities in respect of benefits for which an annuity contract has been purchased at valuation date established using the discount rate determined for this valuation	$217,319,700
F = going concern liabilities excluding liabilities in respect of escalated adjustments and liabilities in respect of benefits for which an annuity contract has been purchased established using the discount rate minus 1%	$248,142,100

Benchmark Discount Rate (E)	
Base rate	0.50%
Effective yield from CANSIM Series V39056 (H)	2.18%
1.5% x Combined **Target** Asset Allocation for Fixed Income Assets (1.5% × J)	0.56%
5.0% x Combined **Target** Asset Allocation for Non-Fixed Income Assets (5.0% × K)	3.13%
Benchmark Discount Rate	**6.37%**

Provision for Adverse Deviations			
i.	5.0% for a closed plan and 4.0% for a Plan that is not a closed plan		4.00%
ii.	Provision based on Combined Target Asset Allocation for Non-Fixed Income Assets		4.50%
iii.	Greater of zero and the		
	• Duration of going concern liabilities at valuation date	14.18	
	Multiplied by:		
	– Going concern valuation gross discount rate net of active investment management fees (D), less	5.54%	
	– Benchmark Discount Rate (E)	6.37%	0.00%
Provision for Adverse Deviations (A + B + C)			**8.50%**

The available actuarial surplus that may be used according to the Act is established as follows:

Available actuarial surplus			
Excess of			
• Assets determined on basis of going concern valuation including accrued and receivable income but excluding the value of any letters of credit		$257,586,100	
Over			
• Going concern liabilities	$217,319,700		
• Provision for adverse deviations in respect of the going concern liabilities	$18,427,300		
• Prior Year Credit Balance	$0		
		$235,747,000	
		$21,839,100	(a)
Excess of			
• Solvency assets excluding the value of any letters of credits and lesser of Prior Year Credit Balance and minimum required University contributions, including the provision for adverse deviations until the next required valuation		$267,934,000	
Over			
• Wind-up liabilities × 105%		$304,577,100	
		$0	(b)
The available actuarial surplus = the lesser of a) and b) above		**$0**	

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 University 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.

Accordingly, the next valuation of the Plan will be required as of January 1, 2023.

Special Payments

As the Plan does not have a funding shortall and there is no reduced solvency deficiency, no special payments are required.

Pension Benefits Guarantee Fund (PBGF) Assessment

A PBGF assessment is required to be paid under Section 37 of the Act. The PBGF assessment base is derived as follows:

Solvency assets	$267,934,000	(a)
PBGF liabilities	$289,165,100	(b)
Solvency liabilities	$289,165,100	(c)
Ontario asset ratio	100.00%	(d) = (b) ÷ (c)
Ontario portion of the fund	$267,934,000	(e) = (a) × (d)
PBGF assessment base	$21,231,100	(f) = max(0, (b) – (e))
Amount of additional liability for plant closure and/or permanent layoff benefits which is not funded and subject to the 2% (3% for years after 2018) assessment pursuant to s.37(4)	$0	(g)

Appendix B
Plan Assets

The pension fund is held by Northern Trust Company. In preparing this report, we have relied upon fund statements prepared by Northern Trust Company 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:

	2018	2019
January 1	$245,636,988	$233,879,985
PLUS		
University's contributions	$4,066,671	$3,995,038
Members' contributions	$4,066,489	$3,997,607
Investment earnings and gains	($5,837,990)	$40,190,377
	$2,295,170	$48,183,022
LESS		
Pensions paid	$7,573,198	$8,044,359
Lump-sums paid	$5,076,024	$3,671,823
Administration and investment fees	$1,402,951	$1,272,413
	$14,052,173	$12,988,595
December 31	$233,879,985	$269,074,412
Gross rate of return[8]	(2.41%)	17.37%
Rate of return net of expenses[9]	(2.98%)	16.77%

[8] Assuming mid-period cash flows.

[9] Assuming mid-period cash flows.

The market value of assets shown in the above table is adjusted to reflect in-transit amounts as follows:

	Current Valuation	Previous Valuation
Market value of invested assets	$269,074,412	$245,636,988
In-transit amounts		
• Benefit payments	($1,140,375)	($0)
Market value of assets adjusted for in-transit amounts	$267,934,037	$245,636,988

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.

Investment Policy

The plan administrator has adopted a statement of investment policy and procedures. This policy is intended to provide guidelines for the manager(s) as to the level of risk that is consistent with the Plan's investment objectives. A significant component of this investment policy is the asset mix.

The University amended its Statement of Investment Policies and Procedures document effective October 22, 2019.

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			Actual asset Mix as at January 1, 2020
	Minimum	Target	Maximum	
Canadian Equities	15%	30%	40%	30.5%
Global Equities	15%	30%	40%	36.6%
Canadian Long Bonds	17%	27%	37%	21.1%
Canadian Universe Bonds	3%	8%	18%	7.8%
Infrastructure	0%	5%	10%	3.2%
Cash and cash equivalents	0%	0%	20%	0.8%
		100%		100%

Because the Plan's assets (which are invested in accordance with the above investment policy) are not matched to 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 University contributes to the Plan based on the funding requirements presented in this report.

Appendix C
Methods and Assumptions – Going Concern

Valuation of Assets

For this valuation, we have continued to use a moving three-year average method to determine the smoothed value of assets. Under this method, fund investment return (net of expenses) above or below the expected return during a given year are spread on a straight-line basis over three years. As a result, the asset value produced at January 1, 2020 recognizes the following percentages of the fund investment return different from the expected return that arose during the past three years:

Year	Percentage of Gains (Losses) Recognized
2019	33.33%
2018	66.67%
Before 2018	100.0%

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. To the extent that more capital gains than losses will arise over the long term, the smoothed value will tend to be lower than the market value.

The smoothed value of the assets at January 1, 2020 was derived as follows:

Market value of assets		$269,074,400
LESS		
Pending in-transits		($1,140,400)
		$267,934,000
LESS		
Unrecognized capital gains	2018: ($20,870,200) × 1/3 =	($6,956,700)
(losses) realized or unrealized	2019: $25,956,900 × 2/3 =	$17,304,600
		$10,347,900
Smoothed value of assets		$257,586,100

Going Concern Funding Target

Over time, the real cost to the employer 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, with the exception of the liability in respect of disabled members. Under this method, we determine the present value of benefit cash flows expected to be paid in respect of service accrued prior to the valuation date, including ancillary benefits, based on projected final earnings. For disabled members, for the current valuation we have changed from the projected unit credit actuarial cost method used for the prior valuation to the aggregate actuarial cost method. Under this method, we determine the present value of benefit cash flows expected to be paid in respect of service accrued prior to the valuation date as well as projected future service, including ancillary benefits, based on projected final earnings. This, inclusive of the PfAD, is referred to as the funding target.

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, (inclusive of the PfAD), absent additional contributions.

As required under the Act, a funding shortfall (including the prior year credit balance) and the provision for adverse deviations must be amortized over no more than 10 years through special payments beginning one year after the valuation date. A funding excess may, from an actuarial standpoint, be applied immediately to reduce required employer 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 current service cost is the present value of projected benefits to be paid under the plan with respect to service expected to accrue during the period until the next valuation.

Under the projected unit credit actuarial cost method, the current service cost for an individual member will increase each year as the member approaches retirement. However, the 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 distribution of the group remains constant. There is no current service for disabled members, under the aggregate actuarial cost method.

Under the cost sharing provisions of the plan, subject to any limits under the Income Tax Act, the University and the members contribute equally to fund the minimum amounts required to fund the Plan.

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:	5.30%	5.60%
Inflation:	2.00%	2.00%
ITA limit / YMPE increases:	3.00%	3.00%
Pensionable earnings increases:	1.20% in 2020; 1.75% in 2021 & 2022; and 3.00% thereafter	3.00%
Post retirement pension increases:	0.59% at July 1, 2020; and 0.00% per year thereafter	0.79% at July 1, 2018, 0.95% at July 1, 2019, 0.67% at July 1, 2020; and 0.00% per year thereafter
Interest on employee contributions	2.50%	2.50%
Retirement rates:	• Active – Same age related table • Deferred - 100% at age 60	• Active - Age related table • Deferred - 100% at age 60
Termination rates:	Same age related table	Age related table
Mortality rates:	100% of the rates of the 2014 Private Sector Canadian Pensioners Mortality Table (CPM2014Priv)	100% of the rates of the 2014 Private Sector Canadian Pensioners Mortality Table (CPM2014Priv)
Mortality improvements:	Fully generational using CPM Improvement Scale B (CPM-B)	Fully generational using CPM Improvement Scale B (CPM-B)
Disability rates:	None	None
Commuted value election on pre-retirement termination:		
• Percentage of members electing commuted value on termination	• 40% of non-retirement eligible members; and • 10% of retirement eligible members	• 40% of non-retirement eligible members; and • 10% of retirement eligible members
• Discount rate for calculation of commuted value assumed to be settled	3.25%	4.00%
• Mortality rates and improvements for calculation of commuted value assumed to be settled	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational mortality improvements using Scale B (CPM-B)	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational mortality improvements using Scale B (CPM-B)

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:

Age	Termination	Retirement
20	4.0%	0.0%
25	6.0%	0.0%
30	4.0%	0.0%
35	4.0%	0.0%
40	1.0%	0.0%
45	1.0%	0.0%
50	1.0%	0.0%
55	0.0%	0.0%
56	0.0%	0.0%
57	0.0%	0.0%
58	0.0%	0.0%
59	0.0%	5.0%
60	0.0%	5.0%
61	0.0%	5.0%
62	0.0%	5.0%
63	0.0%	5.0%
64	0.0%	50.0%
65	0.0%	50.0%
66	0.0%	15.0%
67	0.0%	100.0%

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 rate of pay on January 1, 2020 and assumed that such pensionable earnings will increase at the assumed rate.

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 market value of the fund net of fees. 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:

- An **assumed investment return** based on estimated return for each major asset class that are consistent with market conditions on the valuation date modified to include a provision for increases in market interest rates to a level higher than current historically low levels, on the expected time horizon over which benefits are expected to be paid, and on the target asset mix specified in the Plan's investment policy.
- An **active investment management expense provision**. We have assumed that these fees would be offset by an equivalent additional return resulting from active management.
- An **assumed passive investment management expense provision** which represents the hypothetical fees for passive investment management of assets based on estimated fees charged by index managers for balanced mandates.
- An **implicit non-investment management expense provision** determined as the average rate of non-investment expenses paid from the fund over the last 3 years. These would include all fees payable from the fund (administration, custodial, audit, consulting, etc.) except those payable to investment managers, to the extent that these fees are not covered in an explicit provision for expenses added to the current service cost

The discount rate was developed as follows:

Assumed investment return	5.54%
Additional returns for active investment management offset by related investment management fees	0.00%
Assumed passive investment management expense provision	(0.05%)
Implicit non-investment management expense provision	(0.17%)
Rounding	(0.02%)
Net discount rate	5.30%

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 historical real economic growth and the underlying inflation assumption.

Pensionable Earnings

The assumption is based on general wage growth assumptions increased by our best estimate of future merit and promotional increases over general wage growth considering current economic and financial market conditions, applicable collective agreement provisions, and University expectations.

Post-Retirement Pension Increases

The assumption is based on the Plan formula and inflation assumption above.

Retirement Rates

The assumption is based on experience over the years 2006/2007 to 2010-2011 and expectations of future experience based on Plan terms and employment standards law. Subsequent experience has been consistent with these rates.

Termination Rates

The assumption is based on experience from 2006/2007 to 2010/2011. Subsequent experience has been consistent with these rates.

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.

Due to the size of the Plan, specific data on plan mortality experience is insufficient to determine the mortality rates. It was determined to use the CPM mortality rates from the private sector without adjustment after considering plan-specific characteristics, such as the type of employment, the industry experience, pension and employment income for the plan members, and data in the CPM study.

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).
- 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, 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 21.8 years for males and 24.2 years for females.

Interest on Employee Contributions

The assumption is based on Plan terms and the underlying investment return assumption on government mid-term bonds.

Disability Rates

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

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.

To determine the actuarial liability 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.

The circumstances in which the plan wind-up is assumed to have taken place are as follows:

- The University is discontinued on the valuation date

No benefits payable on plan wind-up under the above postulated scenario were excluded from our calculations.

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 January 1, 2020.

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

However, there is limited data available to provide credible guidance on the cost of a purchase of indexed annuities in Canada. In accordance with the *Canadian Institute of Actuaries Educational Note: Assumptions for Hypothetical Wind-up and Solvency Valuations with Effective Dates Between December 31, 2019 and*

December 30, 2020 (the "Educational Note"), we have used an annuity proxy to estimate the cost of purchasing annuities.

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 no adjustment to the mortality rates used in the regular annuity purchase assumptions is required.

We have not included a margin for adverse deviations 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 and deferred pensioners under age 55, and 50% of active members and deferred pensioners 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:	2.50% per year for 10 years, 2.60% per year thereafter

Maximum Pension limit:	$3,092.22 increasing at 2.31% per year for 10 years, 2.36% per year thereafter
Post retirement pension increases:	0.54% at July 1, 2020 and 0.00% per year thereafter
Basis for Benefits Assumed to be Settled through the Purchase of an Annuity	
Mortality rates:	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational improvements using CPM Scale B
Interest rate:	2.96% per year based on a duration of 12.30 years determined for the liabilities assumed to be settled through the purchase of an annuity.
Maximum pension limit:	$3,092.22 increasing at 2.34% per year
Post retirement pension increases:	0.54% at July 1, 2020 and 0.00% per year thereafter
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 2.79% per year
Final average earnings:	Based on actual pensionable earnings over the averaging period
Family composition:	Same as for going concern valuation
Termination expenses:	$325,000

For solvency and wind-up valuation purposes, we have assumed that, for active members, the annuity conversion basis used at the time of their ultimate pension commencement will be the conversion basis used to value the supplementary benefits for funding purposes.

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.

In addition, termination expenses also include a provision for transaction fees related to the liquidation of the Plan's assets and for expenses that may reasonably be expected to be paid by the pension fund under the postulated scenario between the wind-up date and the settlement date. It was assumed for this purpose that the termination process would extend over a two-year period. 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.

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.

- Pensionable earnings, money purchase accounts, 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.
- Cost of living adjustments are consistent with the inflation assumption used for the going concern valuation.
- To accommodate for new entrants to the Plan, we have added to the projected liability an amount equal to the liability of new entrants that have joined the Plan since the previous valuation.

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 with the exception that we have excluded post retirement indexing.

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 January 1, 2020, provided by 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, contributions accumulated with interest, 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.

	1.1.2020	1.1.2018
Active Members		
Number	749	716
Total pensionable earnings for the following year	$53,246,527	$50,002,388
Average annualized pensionable earnings for the following year	$71,090	$69,836
Average years of pensionable service	13.0 years	13.8 years
Average age	48.3 years	49.2 years
Accumulated contributions with interest	$42,866,659	$40,098,146
Suspended Members		
Number	29	25
Total pensionable earnings for the following year	$3,892,592	$3,308,649
Average pensionable earnings for following year	$134,227	$132,346
Average years of pensionable service	8.1 years	7.5 years
Average age	50.5 years	52.3 years
Accumulated contributions with interest	$1,312,131	$927,549
Disabled Members		
Number	31	25
Total pensionable earnings for the following year	$2,064,492	$1,560,963
Average pensionable earnings for following year	$66,597	$62,439
Average years of pensionable service	24.8 years	24.2 years
Average age	57.2 years	58.5 years
Accumulated contributions with interest	$2,883,024	$2,048,741
Deferred Pensioners		
Number	70	79
Total annual pension	$453,744	$589,980
Average annual pension	$6,482	$7,468
Average age	50.4 years	50.1 years
Accumulated additional contributions with interest	$128,402	$148,782
Pensioners and Survivors		
Number receiving lifetime pension	450	428
Total annual lifetime pension	$8,180,238	$7,392,769
Average annual lifetime pension	$18,178	$17,273
Average age	75.0 years	74.5 years

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

	Actives	Suspended Members	Disabled Members	Deferred Pensioners	Pensioners and Survivors	Total
Total at 1.1.2018	716	25	25	79	428	1,273
New entrants	124					124
Suspended	(7)	7				-
Disabled	(11)		11			-
Terminations:						
• Transfers/lump sums	(32)	(1)	(1)	(9)		(43)
• Deferred pensions	(5)		(1)	6		-
Deaths	(3)		(1)	(1)	(29)	(34)
Retirements	(33)	(2)	(2)	(5)	42	-
Beneficiaries					9	9
Total at 1.1.2020	749	29	31	70	450	1,329

The distribution of the active members by age and pensionable service as at the valuation date 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	5 $55,211								5 $55,211
25 to 29	39 $64,048								39 $64,048
30 to 34	53 $67,389	4 $84,890	2 *						59 $69,474
35 to 39	40 $69,514	8 $76,911	23 $69,766	3 $72,111					74 $70,497
40 to 44	29 $68,428	11 $81,308	43 $73,746	20 $73,629	1 *				104 $73,225
45 to 49	31 $69,026	13 $69,552	24 $68,614	34 $77,899	5 $73,767	5 $68,251			112 $71,870
50 to 54	19 $69,305	11 $66,349	23 $70,257	20 $71,732	15 $75,330	14 $72,234	4 $67,835		106 $70,847
55 to 59	13 $70,226	13 $64,705	28 $72,020	24 $79,943	16 $74,173	13 $68,686	34 $73,805		141 $72,896
60 to 64	6 $86,038	4 $83,195	17 $60,508	13 $69,549	11 $73,619	15 $69,3619	12 $72,499	13 $77,838	91 $71,574
65 +		3 $54,666	2 *	5 $65,102	2 *	3 $75,745	1 *	2 *	18 $66,152
Total	235 $68,069	67 $71,958	162 $70,286	119 $74,962	50 $74,161	50 $70,250	51 $73,772	15 $75,958	749 $71,090

*For individual cells with information on two members or less, the average earnings are not disclosed for confidentiality reasons.

The distribution of the inactive members by age as at the valuation date is summarized as follows:

	Deferred Pensioners			Pensioners and Survivors	
Age	Number	Average Pension		Number	Average Pension
< 25					
25 - 29	1	*			
30 - 34	2	*			
35 - 39	4	$5,744			
40 - 44	13	$3,920			
45 – 49	13	$5,209			
50 – 54	13	$7,849			
55 – 59	14	$6,098		3	$15,816
60 – 64	8	$14,734		29	$19,232
65 – 69	1	*		114	$25,077
70 – 74	1	*		113	$20,562
75 – 79				68	$15,039
80 – 84				54	$12,383
85 – 89				46	$11,496
90 – 94				14	$7,009
95 +				9	$8,279
Total	70	$6,482		450	$18,178

*For individual cells with information on two members or less, the average earnings are not disclosed for confidentiality reasons.

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 January 1, 2020. Since the previous valuation, the Plan has been amended to reflect:

- new employee contribution rates based on the Plan's cost sharing provisions and the results of the July 1, 2017 and January 1, 2018 valuations; and
- new minimum going concern and solvency funding requirements based on new Ontario funding rules that became effective May 1, 2018

The following is a summary of the main provisions of the Plan in effect on January 1, 2020. This summary is not intended as a complete description of the Plan.

Background	The Plan became effective September 1, 1955. Benefits are based on a set formula and are paid for by the University and Member contributions.
Eligibility for Membership	Any Non-Teaching Employee must become a Member upon completion of 30 days of employment. However, each Union member must become a Member on his/her seniority date. An Employee who is employed on a less than full-time basis is eligible to become a Member on the first day of the month coincident with or following the completion of 24 months of Continuous Service, provided that, in each of the two immediately preceding consecutive calendar years, the employee has: • earned at least 35% of the YMPE; or • worked at least 700 hours for the Employer.

Contributions	Subject to contribution limits under the *Income Tax Act*, Members contribute an amount equal to: i) 9.2% of earnings up to the Year's Basic Exemption; plus ii) 6.4% of earnings in excess of the Year's Basic Exemption, up to the Year's Maximum Pensionable Earnings; plus iii) 9.2% of earnings in excess of the Year's Maximum Pensionable Earnings Effective June 4, 2018, the Plan will be amended to change the Member contribution rates as follows: iv) 11.0% of earnings up to the Year's Basic Exemption; plus v) 7.7% of earnings in excess of the Year's Basic Exemption, up to the Year's Maximum Pensionable Earnings; plus vi) 11.0% of earnings in excess of the Year's Maximum Pensionable Earnings Effective September 10, 2018, Member contribution rates will be as follows: vii) 9.3% of earnings up to the Year's Basic Exemption; plus viii) 6.5% of earnings in excess of the Year's Basic Exemption, up to the Year's Maximum Pensionable Earnings; plus ix) 9.3% of earnings in excess of the Year's Maximum Pensionable Earnings Effective February 8, 2021, Member contribution rates will be as follows: i) 10.0% of earnings up to the Year's Basic Exemption; plus ii) 7.0% of earnings in excess of the Year's Basic Exemption, up to the Year's Maximum Pensionable Earnings; plus iii) 10.0% of earnings in excess of the Year's Maximum Pensionable Earnings Effective May 3, 2021, Member contribution rates will be as follows: i) 9.4% of earnings up to the Year's Basic Exemption; plus ii) 6.6% of earnings in excess of the Year's Basic Exemption, up to the Year's Maximum Pensionable Earnings; plus iii) 9.4% of earnings in excess of the Year's Maximum Pensionable Earnings

	These contributions will continue to the date of the next actuarial valuation, at which time the contribution rates will be assessed. Subject to contribution limits under the *Income Tax Act*, the University shall contribute a minimum amount equal to the employee contributions in aggregate. A provision is also made for the Members to contribute additional voluntary contributions up to the limits allowed for deductibility under the appropriate sections of the *Income Tax Act*.
Cost Sharing Provisions	If at any time, the Actuary certifies that the assets of the Pension fund exceed its liabilities (such excess referred to as "funding excess"), such funding excess shall be applied in the following order: a) first, the funding excess shall be applied to reduce or eliminate any unfunded liabilities or experience deficiencies b) second, the funding excess shall be applied to reduce the University's contributions in respect of the normal cost benefits, provided that, where permitted under the *Income Tax Act*, the amount contributed by the University each Plan Year shall not be less than the aggregate regular employee contributions for the years If, after the application of funding excess, the University's contributions exceed the aggregate regular contributions, the employee contributions shall be increased such that the members and the University each contribution 50% of the total amount required to fund the Plan provided that the aggregate contributions made by a Member for any calendar year shall not exceed the maximum amount permitted under the *Income Tax Act* for that calendar year.

Retirement Dates	Normal Retirement Date • The normal retirement date is the first day of the month coincident with or next following the member's 65th birthday. Early Retirement Date • Early retirement is permitted during the 10-year period prior to the Normal Retirement Date. Disability Retirement Date • Retirement on total and permanent disability is allowed after age 50 and completion of 15 years of Continuous Service. Postponed Retirement Date • A Member may elect to postpone retirement beyond Normal Retirement Date.
Normal Retirement Pension	1.5% of the Member's Best Average Earnings not in excess of the Average Canada Pension Plan Base PLUS 2.0% of the Member's Best Average Earnings in excess of the Average Canada Pension Plan Base MULTIPLIED BY The Member's pensionable service.
Pensionable Earnings	Gross salary or wage, as determined by the University.
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 basic pension payable, however, will be reduced by a given percentage for each month before the normal retirement date, as follows: • For the first 60 months: 0.33% per month • For the next 60 months: 0.50% per month
Postponed Retirement Pension	If a member elects to postpone retirement, the member will be entitled to a pension that is calculated the same way as for a normal retirement.
Disability 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 pension payable will not be reduced to reflect the early payment in the event of total and permanent disability retirement.

Post-Retirement Indexing	Each June 30, pensions are adjusted by one-half of the excess of the Average Fund Rate of Return over the valuation interest rate, capped at 50% of the CPI for the year. The adjustment is not allowed to reduce pensions. Members retiring in the year the adjustment is made will receive a pro-rated portion of the adjustment.
Maximum Pension	The total annual pension payable from the Plan upon retirement, death or termination of employment cannot exceed the lesser of: • 2% of the average of the best three consecutive years of total compensation paid to the member by the University, multiplied by total credited service; and • $3,092.22 indexed from 2020 or such other maximum permitted under the *Income Tax Act*, multiplied by the member's total credited service. The maximum pension is determined at the date of pension commencement. For service prior to January 1, 1992, service is capped at 35 years when determining the maximum pension. Also, for service prior to January 1, 1992, the value of the pension benefit provided upon early retirement cannot exceed the above maximum pension payable at age 60 in the form of a single life annuity guaranteed for 10 years. For service on and after January 1, 1992, the above maximum must be reduced by ¼ of 1% for each month by which pension commencement preceded the earliest day on which: • The Member attains age 60; • The Member completes 30 years of Continuous Service; • The Members' age plus Continuous Service are equal to 80; • The Member suffers a total and permanent disability.

Death Benefits	Pre-retirement: • If a member dies before the normal retirement date and before any pension payments have begun, the member's spouse, or beneficiary if there is no spouse, will receive a lump sum settlement equal to the sum of the following: — 100% of the Member's required contributions made prior to January 1, 1987, with Credited Interest, increasing by 10% for each complete year of Continuous Service in excess of 10 years, reaching 200% after 20 or more years of Continuous Service; — The greater of: – 100% of the Member's required contributions made on or after January 1, 1987 and prior to January 1, 1992, with Credited Interest, increasing by 10% for each complete year of Continuous Service in excess of 10 years, reaching 200% after 20 or more years of Continuous Service; and – The Commuted Value of the pension accrued on and after January 1, 1987 and prior to January 1, 1992; — The Commuted Value of the pension accrued on and after January 1, 1992; — The Member's additional voluntary contributions with Credited Interest. Post retirement: • The normal form of payment is a lifetime pension guaranteed for five years. However, the member may elect to receive an optional form of pension on an actuarial equivalent basis provided such election is made at least 3 months prior to retirement. • If the member has a spouse on the date pension payments commence, the automatic form of payment is a 60% joint and survivor pension. The amount of this pension will be the actuarial equivalent of the normal form pension.

Termination Benefits	***Pension Benefit*** • A deferred lifetime pension based on the member's earnings, contributions and credited service accrued up to the date of termination. ***Additional Voluntary Contributions*** A Member who terminates employment is entitled to either: • Leave the balance of any additional voluntary contributions, under the Plan to provide an additional pension; or • Receive a lump sum refund of any additional voluntary contributions with Credited Interest. ***Payment of Benefits*** Deferred pensions are payable commencing at age 65. However, a member may elect to receive a reduced early retirement pension as early as age 55. A terminating Member may elect to transfer the Commuted Value of the deferred pension to another registered pension plan or registered retirement savings plan.
50% Cost Rule	If a member dies, retires or terminates employment and his/her own contributions made after January 1, 1987, with Credited Interest thereon, exceeds 50% of the value of the benefit earned in respect of that service, then the excess shall be paid to the Member, or his/her Spouse or Beneficiary in the case of a deceased Member, in a single lump sum payment.
Disability Accrual	During any period of Total Disability, the Member shall continue to accrue benefits under the Plan as though he/she were still actively employed, but the Member shall be deemed to have received Earnings and to have made contributions during the disability period based on his/her level of Earnings prior to disability including improvements in earnings as provided in subsequent contracts or University policies. The Member is not required to make Employee Contributions during any period of Total Disability.

Appendix G
Plausible Adverse Scenarios

In this Appendix, the financial impact on the Plan's going concern results (i.e., going concern financial position at the valuation date and current service cost from the valuation date to the next valuation date), on the Plan's hypothetical wind-up and solvency financial positions at the valuation date and on the special payments of plausible adverse scenarios that would pose threats to the Plan's future financial condition is illustrated for the following risks:

- Interest rate risk, the potential that interest rates will be lower than expected;
- Deterioration of asset values; and
- Longevity risk, the potential that pension plan members will live longer than expected.

The following tables summarize the results, where we assumed for:

- Interest rate risk, an immediate parallel decrease in market interest rates of 100 basis points
- Deterioration of asset values, an immediate decrease of 15% in the market value of non-fixed income assets; and
- Longevity risk, that life expectancy from the valuation date at age 65 for a male and a female would increase by 1.4 years and 1.3 years, respectively.

(All figures in $000's)	GOING CONCERN VALUATION RESULTS AS AT 1.1.2020	PLAUSIBLE ADVERSE SCENARIO RESULTS AS AT 1.1.2020		
		INTEREST RATE RISK	DETERIORATION OF ASSET VALUES	LONGEVITY RISK
Market value of assets	$267,934	$281,331	$241,810	$267,934
Going Concern Financial Status				
Smoothed value of assets	$257,586	$262,031	$248,910	$257,586
Going concern funding target	$217,320	$227,219	$217,320	$223,932
Provision for Adverse Deviation	$18,427	$19,267	$18,427	$18,988
Funding excess (shortfall)	$21,839	$15,545	$13,163	$14,666
Estimated Current Service Cost including Provision for Adverse Deviation				
January 1, 2020	$7,645	$8,177	$7,645	$7,937
January 1, 2021	$7,779	$8,320	$7,779	$8,076
January 1, 2022	$7,915	$8,466	$7,915	$8,217

(All figures in $000's)	HYPOTHETICAL WIND-UP AND SOLVENCY POSITION AS AT 1.1.2020	PLAUSIBLE ADVERSE SCENARIO RESULTS AS AT 1.1.2020		
		INTEREST RATE RISK	DETERIORATION OF ASSET VALUES	LONGEVITY RISK
Hypothetical Wind-up Financial Position				
Market value of assets	$267,934	$281,331	$241,810	$267,934
Termination expense provision	($325)	($325)	($325)	($325)
Wind-up assets	$267,609	$281,006	$241,485	$267,609
Wind-up liabilities	$290,073	$339,727	$290,073	$297,134
Wind-up excess (shortfall)	($22,464)	($58,721)	($48,588)	($29,525)
Solvency Financial Position				
Value of excluded benefits	($908)	($905)	($908)	($927)
Surplus excess (shortfall)	($21,556)	($57,816)	($47,680)	($28,598)
Solvency ratio	93%	83%	84%	90%
Transfer ratio	92%	83%	83%	90%

(All figures in $000's)	MINIMUM ANNUAL SPECIAL PAYMENTS AS AT 1.1.2020[10]	PLAUSIBLE ADVERSE SCENARIO RESULTS AS AT 1.1.2020		
		INTEREST RATE RISK	DETERIORATION OF ASSET VALUES	LONGEVITY RISK
January 1, 2020	$0	$0	$0	$0
January 1, 2021	$0	$1,489	$948	$0
January 1, 2022	$0	$1,489	$948	$0

[10] A new special payment is assumed to start 1 year have the valuation date.

If the University sponsoring the Plan became insolvent and unable to continue making contributions to meet the minimum funding requirements described in the report, the Plan would likely be wound up. The impact of this adverse scenario, as measured at 1.1.2020, would be a shortfall in the Plan of $22,464,400.

The balance of this Appendix provides details of the plausible adverse scenarios selected and the determination of their impact on valuation results.

Interest Rate Risk

The purpose of this scenario is to illustrate the sensitivity of the Plan's valuation results to the potential that interest rates will be lower than expected. For this purpose, we have assumed an immediate parallel decrease in market interest rates underlying fixed income investments, where fixed income investments are as shown in the investment policy summarized in Appendix B.

Using a methodology consistent with the one used to determine the going concern discount rate, we have determined that a parallel decrease in market interest rates of 100 basis points would have a non-trivial probability (between 1 in 10 and 1 in 20) of occurring within the year following the valuation date. For purpose of this scenario, we have assumed that such a decrease in market interest rates would occur immediately on the valuation date and would have the following impact on the value of assets and going concern assumptions:

Defined Term	Description
Market value of assets	The decrease in market interest rates has been assumed to affect only the market value of the fixed income investments. The decrease is assumed to have occurred immediately on the valuation date.
Smoothed value of assets	**Going concern**: For purposes of determining the smoothed value of assets, 33.33% of the change in the market value of asset has been recognized in the smoothed value of assets. **Hypothetical wind-up and solvency** : n/a
Discount rate assumption	**Going concern**: It was assumed that the decrease in market interest rates affects only the expected return on assets for the fixed income portion of assets. The discount rate assumption was therefore decreased from 5.30% to 4.95%. **Hypothetical wind-up and solvency**: The interest rates used in the valuation were reduced by 100 basis points.

Defined Term	Description
Other assumptions	Except as mentioned above, all assumptions used were the same as those used for this valuation. In particular, the discount rate used to value benefits assumed to be settled through a lump sum was not changed.
Provision for Adverse Deviations	The above changes would not affect the calculation of the Provision for Adverse Deviations.

Deterioration of Asset Values

The purpose of this scenario is to illustrate the sensitivity of the Plan's valuation results to a deterioration of asset values. For this purpose, we assumed an immediate reduction in the market value of the Plan's non-fixed income assets, where non-fixed income investments are as shown in the investment policy summarized in Appendix B.

Using a methodology consistent with the one used to determine the going concern discount rate, we have determined that a decrease of 15% in the market value of value of non-fixed income assets would have a non-trivial probability (between 1 in 10 and 1 in 20) of occurring within the year following the valuation date. For purpose of this scenario, we have assumed that such a decrease would occur immediately on the valuation date and would have the following impact on the value of assets and valuation assumptions:

Defined Term	Description
Market value of assets	The decrease in the market value of the non-fixed income portion of assets is assumed to have occurred immediately on the valuation date.
Smoothed value of assets	**Going concern**: For purposes of determining the smoothed value of assets, 33.33% of the change in the market value of assets has been recognized in the smoothed value of assets. **Hypothetical wind-up and solvency** : n/a
Going concern assumptions	This scenario is assumed to have no impact on the assumptions used for this valuation.
Wind-up & solvency assumptions	This scenario is assumed to have no impact on the assumptions used for this valuation.

Longevity Risk

The purpose of this scenario is to illustrate the sensitivity of the Plan's valuation results to the potential that pension plan members will live longer than expected. For this purpose, we have determined that a plausible adverse scenario would be to assume that future mortality improvements[11] will be in line with the average improvements experienced by the Canadian population over the most recent 15-year period available, with uniform improvement rates for all future years but varying by age[12] and gender.

The table below summarizes the improvement rates under the plausible adverse scenario compared to those currently assumed under the CPM-B scale and is based on Canadian population experience from the Human Mortality Database (HMD) from 2002 to 2016.

	Males				Females			
	CPM-B			Adverse	CPM-B			Adverse
Age	2020	2025	2030+	Scenario	2020	2025	2030+	Scenario
20	1.59%	1.20%	0.80%	1.68%	0.98%	0.89%	0.80%	1.47%
30	1.88%	1.34%	0.80%	1.68%	0.98%	0.89%	0.80%	1.47%
40	1.80%	1.30%	0.80%	1.68%	1.17%	0.98%	0.80%	1.47%
50	1.17%	0.98%	0.80%	1.76%	0.98%	0.89%	0.80%	1.34%
55	1.47%	1.13%	0.80%	1.67%	1.11%	0.96%	0.80%	1.14%
60	1.77%	1.28%	0.80%	1.75%	1.24%	1.02%	0.80%	1.34%
65	2.06%	1.43%	0.80%	2.11%	1.36%	1.08%	0.80%	1.65%
70	2.06%	1.43%	0.80%	2.48%	1.36%	1.08%	0.80%	1.77%
75	2.01%	1.41%	0.80%	2.66%	1.36%	1.08%	0.80%	1.93%
80	1.96%	1.38%	0.80%	2.63%	1.36%	1.08%	0.80%	2.03%
85	1.38%	1.03%	0.68%	2.32%	1.31%	0.99%	0.68%	1.98%
90	0.75%	0.62%	0.48%	1.68%	0.75%	0.62%	0.48%	1.60%
95	0.16%	0.25%	0.34%	1.04%	0.16%	0.25%	0.34%	1.12%
100	0.14%	0.22%	0.30%	0.64%	0.14%	0.22%	0.30%	0.80%
105	0.14%	0.22%	0.30%	0.38%	0.14%	0.22%	0.30%	0.55%

[11] i.e. starting one year after the valuation in this context

[12] improvement rates below age 45 are set to those at age 45

Appendix H
University Certification

With respect to the Report on the Actuarial Valuation for Funding Purposes as at January 1, 2020 of the University of Windsor Employees' Retirement Plan, 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 beyond the provisions for adverse deviations prescribed under the Act.
- A copy of the official plan documents and of all amendments made up to January 1, 2020 was provided to the actuary and is reflected appropriately in the summary of plan provisions contained herein.
- The asset information summarized 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 January 1, 2020.
- All events subsequent to January 1, 2020 that may have an impact on the Plan have been communicated to the actuary.

December 21, 2020

Date

Signed

Sandra Aversa

Name

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