

Nova Scotia Public Service Long Term Disability Plan

Actuarial Valuation as at December 31, 2018

Prepared April 2019

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Executive Summary

This report has been prepared at the request of the Board of Trustees (the “Board”) of the Nova Scotia Public Service Long-term Disability Plan Trust Fund (the “Plan”). The Board has retained Morneau Shepell to perform an actuarial valuation of the Plan as at December 31, 2018. The main purposes of the valuation are to assess the current funded position of the Plan and its funding requirements moving forward.

The results of the valuation are summarized below.

Funding Position as at Dec. 31, 2018

Item	Amount
Net Assets Available for Benefits (market value)	\$157,141,000
Total Liabilities	\$95,175,000
Funding Margin	\$61,966,000

The Plan’s total liabilities have been calculated using a discount rate of 3.25%. The liabilities include both active in-force claims as of the valuation date and allowance for claims incurred before the valuation date but not yet reported or adjudicated. It also includes a provision for future administrative expenses on claims incurred as of the valuation date equal to 10.0% of expected benefit payments.

The Plan’s funding margin of \$61,966,000 represents a \$9.0 million decrease from the funding margin that existed at the time of the last valuation (December 31, 2016). The main items contributing to this change in funded position are:

- * Experience gains on claims incurred as at the last valuation;
- * Revenue losses in 2017 and 2018 (i.e. Cost of new claims incurred in 2017 and 2018 including administrative expenses greater than premiums and EI rebates received by Plan); and
- * Increased liabilities resulting from assumption changes made based on a study of the Plan’s historical experience completed in 2018.

We have estimated the cost of providing ad hoc indexing at December 31, 2019 and December 31, 2020 to be \$2,347,000. If adopted, such indexing would provide inflation protection to qualifying claimants (i.e. those who have been on claim for at least 24 months by the indexation date) for CPI increases to December 31, 2020. It would lower the Plan’s funding margin to \$59,619,000.

We have also estimated a range for the expected cost of new claims for the 2019 disability year. Based on the Plan’s cost experience in the 2014 to 2018 disability years, we estimate new claims costs in 2019 to be between \$18.7 million and \$20.7 million. Please note that this is a best-estimate range and does not include any margin for adverse deviation.

There is a discount inherent in the Plan’s current premium rates. That is, the Plan’s estimated 2019 premiums (\$14.9 million) and EI rebates (\$0.3 million) are expected to be less than the best-estimate cost of new claims.

At its current funded level (165%), the Plan's funding policy specifies that the Board should implement premium discounts and/or benefit improvements in order to return the Plan to its target funded ratio (125%) within 10 years. Benefit indexing should also be recommended until the next actuarial valuation. After accounting for ad hoc indexing for 2019 and 2020, the funding policy implies there is excess funding margin of \$35.2 million to be used for premium discounts and/or benefit improvements. The Plan's current funding trajectory is impacted by the recent pilot program that allows employers to retain EI rebates that have historically been submitted to the Plan. Whether the Plan's current premium and benefit structure is expected to return the Plan to its 125% funding target within 10 years depends on the future treatment of these EI rebates. Regardless of this, there are multiple combinations of premium discounts and/or benefit improvements that the Board may wish to consider that are in agreement with its funding policy. For further details, please refer to Section 4 of this report.

Introduction

This report has been prepared at the request of the Board of Trustees (the “Board”) of the Nova Scotia Public Service Long-term Disability Plan Trust Fund (the “Plan”). The Board has retained Morneau Shepell to perform an actuarial valuation of the Plan as at December 31, 2018 (the “valuation date”). The previous valuation of the Plan was performed as at December 31, 2016.

The purpose of this actuarial valuation is:

- * To determine the going-concern funded position of the Plan as at December 31, 2018; and
- * To estimate the cost of new long-term disability claims incurred after December 31, 2018 until the date of the next actuarial valuation (scheduled for December 31, 2020).

Certain results from the actuarial valuation will also be used for financial reporting purposes by the Plan in accordance with its accounting standards.

The valuation was performed in accordance with Terms of Engagement signed by management of the Plan and Morneau Shepell. The Terms of Engagement define the scope and purpose of the valuation, and describe the methodology and assumptions to be used. The significant terms of the engagement include:

- * The valuation is to be conducted on a best-estimate basis and does not include any specific provisions for adverse deviation.
- * The discount rate for the valuation considers the expected rate of return on the Plan’s total net assets (i.e. both the liability-hedging and return-generating portfolios).
- * The valuation does not include any calculation of taxes that the Plan may owe under Health and Welfare Trust rules as a result of operations up to the valuation date. It also does not include any projection of taxes that may become payable in the future as result of the Plan’s operations.

For full details on the terms for the December 31, 2018 valuation, please reference the actual signed Terms of Engagement document.

This report is organized as follows:

- * Section 1 contains our Actuarial Statement of Opinion;
- * Section 2 outlines the Plan’s financial position as at the valuation date along with the major items contributing to its change since the last valuation;
- * Section 3 contains our estimate of the cost of new claims for the Plan;
- * Section 4 reviews the operation of the Plan’s funding policy and assesses its current revenue balance; and
- * Our concluding comments are given in Section 5.

Various appendices are attached to this report that present more detail on the methodology, data and results of the calculations.

Section 1 – Statement of Actuarial Opinion

We have completed a going-concern funding valuation of the benefit liabilities of the Nova Scotia Public Service Long-term Disability Plan Trust Fund (the “Plan”) as at December 31, 2018 (the “valuation date”). Details of the data, actuarial assumptions, valuation methods, and results are included in the actuarial valuation report as at the valuation date, of which this statement forms part. The valuation reflects our understanding of the provisions of the Plan, and its associated policies and procedures as of the date of this report. To the best of our knowledge, there have been no subsequent events as of the date of this report that would have a material impact on this valuation.

Our estimate of the liabilities for the Plan is \$95,175,000. This figure includes both active in-force claims as of the valuation date and allowance for claims incurred before the valuation date but not yet reported or adjudicated. It also includes a provision for future expenses on claims incurred as of the valuation date. It does not include any provision for future indexing of benefit amounts. The estimated additional cost to provide indexing to qualifying claimants for the next two calendar years is \$2,347,000. If approved, such indexing would increase the estimated liabilities to \$97,522,000.

Finally, our estimated range for the annual cost of new disabilities is \$18.7 million to \$20.7 million (2019 dollars).

In our opinion:

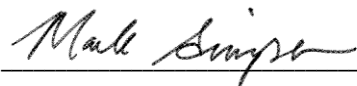
- * the data on which the valuation is based are sufficient and reliable for the purpose of the valuation;
- * the assumptions are appropriate for the purpose of this valuation; and
- * the methods employed in the valuation are appropriate for the purpose of the valuation.

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice.

Emerging experience, differing from the assumptions used in this valuation, will give rise to gains or losses which will be revealed in future actuarial valuations of the Plan. The next full actuarial valuation of the Plan is scheduled for December 31, 2020.

We are available to respond to any comments or questions regarding this report.

Respectfully submitted,



Mark Simpson, F.S.A., F.C.I.A.
Principal

This report has been peer reviewed by Allen Furlong, FCIA.

April 2019

Section 2 – Financial Position

Balance Sheet as at December 31, 2018

The financial position of the Plan as at December 31, 2018 is presented in the table below. Results are shown with the potential ad hoc indexing separately identified. The net market value of assets figures were obtained from the Plan's financial statements. For reference, the results from the last valuation as at December 31, 2016 (the "previous valuation") are also shown.

	December 31, 2016	December 31, 2018
Market Value of Net Assets Available for Benefits	\$153,988,000	\$157,141,000
Actuarial Liabilities		
• Claims currently in payment	\$66,884,000	\$76,123,000
• Claims incurred but not reported or approved (IBNR)	\$9,600,000	\$10,400,000
• Future admin expenses on claims currently in payment	<u>\$6,501,000</u>	<u>\$8,652,000</u>
Total Liabilities	\$82,985,000	\$95,175,000
Funding Margin / (Deficiency)	\$71,003,000	\$61,966,000
Funded Percentage	185.6%	165.1%
Cost of ad hoc indexing for 2 years	\$1,928,000	\$2,347,000
Total Liabilities Including ad hoc Indexing	\$84,913,000	\$97,522,000
Funding Margin / (Deficiency) Including ad hoc Indexing	\$69,075,000	\$59,619,000
Funded Percentage Including ad hoc Indexing	181.3%	161.1%

The assumptions and methods used to calculate the liability figures for the current valuation are outlined in Appendix A – Actuarial Basis. As well, the data on which the calculations are based is described in more detail in Appendix B. Finally, Appendix C shows a reconciliation of the Plan's market value of net assets figure from the previous valuation to the current valuation.

Reconciliation of Financial Position

The following table shows a reconciliation of the change in the financial position of the Plan from December 31, 2016 to December 31, 2018:

	Adjustments	Funding Margin
Funding Margin as at December 31, 2016 (before ad hoc indexing)		\$71,003,000
Cost of ad hoc indexing (2017 and 2018)	(1,928,000)	
Funding Margin as at December 31, 2016 (after ad hoc indexing)		\$69,075,000
Interest on funding margin at 3.00% for two years	4,207,000	
Loss due to investment returns lower than assumed	(1,285,000)	
Revenue loss due to new claim costs in excess of premiums/EI rebates	(6,995,000)	
Experience gain on claims incurred as at December 31, 2016	4,647,000	
Liability change due to assumption revisions from experience study	(7,637,000)	
Other sources of gain (loss)	(46,000)	
Funding Margin as at December 31, 2018, prior to ad hoc indexing		\$61,966,000
Cost of ad hoc indexing for 2019 and 2020	(2,347,000)	
Funding Margin as at December 31, 2018, after ad hoc indexing		\$59,619,000

Overall, the Plan's funding position decreased by \$9,037,000 since the previous valuation (from \$71,003,000 to \$61,966,000). This net deterioration results from a combination of items.

- * Shortly following the December 31, 2016 valuation, the Plan Sponsors pre-approved indexing for 2017 and 2018. As part of the prior valuation, we estimated a cost of \$1.9 million for this indexing based on an assumed indexation rate of 2.0% per annum.
- * Taking into account the pre-approved indexing, the Plan had a funding margin of \$69.1 million as at December 31, 2016. Even if the assumptions used in the previous valuation had been exactly realized, the Plan's funding margin would have grown due to investment income earned by the existing margin amount. A 3.0% rate of return earned for two years would have increased funding margin by \$4.2 million.
- * The previous valuation assumed that the Plan assets would earn 3.0% per annum, net of investment-related expenses. Actual investment returns (net of investment expenses) over the past two years have averaged 2.57% per annum. The Plan's lower than expected investment returns has resulted in a loss of \$1.3 million over the two-year period.
- * The calculated cost of new long-term disability claims incurred since the previous valuation (including associated expenses) has exceeded the premiums and EI rebates collected over this period. This shortfall in revenue has reduced the Plan's funding position by \$7.0 million.

- * There has been an experience gain on claims incurred as at the previous valuation (i.e. claims from disability years 2016 and prior). Overall, the net experience gain on claims incurred as at December 31, 2016 is \$4.6 million and is composed of several items:
 - \$0.4 million gain due to claims terminating earlier than expected.
 - \$1.4 million gain due to net benefit amounts being lower than anticipated. This gain results from a number of items including CPPD and other offset experience different from expected, and benefit indexing different from assumed. For reference, the actual indexing granted was 1.5% for 2017 and 2.3% for 2018.
 - \$2.2 million gain for less claims emerging than provided for in last valuation's Incurred But Not Reported liability.
 - \$0.6 million gain due to actual payments made during 2017 and 2018 being less than expected.
- * As discussed in Appendix A, the assumption basis used for the current valuation has been updated based on a study of the Plan's historical experience completed in 2018. The updated assumption basis increases Plan liabilities by \$7.6 million, as follows:
 - Updated claim termination rates increased liabilities by \$3.9 million
 - Updated CPPD offset assumption increased liabilities by \$1.3 million
 - Increase in discount rate from 3.0% to 3.25% reduced liabilities by \$1.0 million
 - Updated method for estimating IBNR liability increased liabilities by \$1.6 million
 - Increase in loading for future administrative expenses from 8.5% to 10.0% of benefit payments increased liabilities by \$1.8 million

Ad Hoc Indexing

When granted, ad hoc indexing for the Plan is calculated based on the change in Consumer Price Index (CPI) for Canada. Specifically, the calculation is based on the year-over-year change in the average monthly CPI, using the 12 months from November to October to calculate the year's average CPI.

We have estimated the cost of providing ad hoc indexing for calendar years 2019 and 2020 to be \$2,347,000. This estimate is based on an assumed inflation rate of 2.0% per annum for 2019 and 2020. Please note that this ad hoc indexing is available only to claimants who have reached their "change of disability definition date" (24 months after the end of the elimination period) by the indexation date. There is currently no guarantee of benefit increases in recognition of future inflation beyond January 1, 2019.

Sensitivity Analysis

A sensitivity analysis was completed on the Plan's liability (not including ad-hoc indexing). Specifically, the liabilities were calculated using a discount rate that is 1.0% below the valuation discount rate (i.e. using a discount rate of 2.25%). The results are shown in the table below.

Discount Rate	Liability	Percent Change
2.25%	\$100,201,000	+5.3%

A discount rate of 2.25% increases liabilities by \$5,026,000 to \$100,201,000. Consequently, the Plan's funding margin would be reduced to \$56,940,000 if this rate were used for the valuation.

Section 3 – Cost of New Claims

Aside from measuring the funded position of the Plan, the other primary purpose of the actuarial valuation is to estimate the cost of new long-term disability claims incurred after the valuation date until the date of the next actuarial valuation (scheduled for December 31, 2020). The cost of new claims is used to assess the adequacy of current premium levels and to evaluate the Plan's financial position moving forward.

The assumptions and methods used to estimate the cost of new claims are described in Appendix A. The results of our analysis are summarized below. The figures presented do not consider potential ad hoc indexing for 2019 and 2020 since new claims incurred in 2019 and 2020 will not be eligible for those indexing adjustments even if they are approved.

Estimated Cost of New Claims Including Admin Expenses (in 2019 \$)

Disability Year	Total Costs
2014	16,131,000
2015	20,305,000
2016	20,271,000
2017	20,031,000
2018	21,612,000
Average	19,670,000

The figures in the above table have all been adjusted to make them consistent with 2019 coverage volumes and benefit levels. Please note that a relatively large group of employees joined the Plan in July of 2018, so the 2018 premium amounts are not indicative of full-year coverage levels going forward. When we adjust the 2018 premium levels to account for this new group on a full-year basis, it suggests an increase in total premiums of 3.75%. Combining this adjustment with a regular 2.5% adjustment for expected wage growth yields a total adjustment of 6.25% to bring costs from 2018 to expected 2019 levels.

Inspection of the results in the above table show that the cost of new claims varies from year to year. We have used an average of the results for the previous five disability years as a best-estimate of the expected cost of new claims going forward. We believe that this is a reasonable approach for estimating the expected cost of new claims. However, the volatility of the results in above table show that the actual cost of new claims for a future disability year could be higher or lower than our best-estimate.

Based on the above results, the best-estimate cost of new claims for 2019, including administrative expenses, is \$19.7 million.

This is a single point estimate. Allowing for a 5% variance around this estimate gives a best-estimate range for 2019 new claim costs of \$18.7 to \$20.7 million. Use of a range takes account of the inherent volatility in new disability costs, along with the various uncertainties involved in their estimation.

Section 4 – Funding Analysis

Funding Policy

The Board has adopted a funding policy to help guide its recommendations on Plan premium and benefit levels. The objective of the Plan’s funding policy is to maintain a funded position that provides for the security of benefits promised to claimants while maintaining stable and affordable premium rates.

In particular, the Board aims to maintain a funded ratio of 125% for the Plan. Plan premiums should be set at a level that, when combined with other revenue sources or previously approved commitments/adjustments, is expected to achieve the Plan’s target funding level within a ten-year period.

At the time of each full actuarial valuation, the Board assesses the updated estimates for the cost of new claims and funded ratio, and consider adjustments to Plan premiums to achieve its funding goals as laid out in its policy. The Board will take the following actions depending on the Plan’s funded ratio and in accordance with the terms of the Trust Deed:

Funded Ratio	Actions
Above 145%	Board shall recommend implementing a premium discount and/or benefit improvements to reduce the funded ratio to 125% over a period of up to 10 years. Benefit indexing shall be recommended until the next actuarial valuation.
Above 135% but at or below 145%	Board may recommend implementing a premium discount (or modifying an existing discount) to reduce the funded ratio to 125% over a period of up to 10 years. Benefit indexing may be recommended until the next actuarial valuation, subject to Board discretion.
Above 115% but at or below 135%	No premium discount/surcharge required. Benefit indexing may be recommended until the next actuarial valuation, subject to Board discretion.
Above 105% but at or below 115%	Board may recommend implementing a premium surcharge (or modifying an existing surcharge) to increase the funded ratio to 125% over a period of up to 10 years. Benefit indexing may be recommended until the next actuarial valuation, subject to Board discretion, so long as it is not expected to reduce the funding level below 105%.
At or below 105%	Board shall recommend implementing a premium surcharge and/or benefit reductions to increase the funded ratio to 125% over a period of up to 10 years. Benefit indexing shall not be recommended.

The information presented above is a summary of the Plan’s funding policy. For an authoritative statement, please refer to the actual policy statement maintained by the Plan office.

Based on this valuation, the Plan is 165% funded as at December 31, 2018. This puts the Plan in the “Above 145%” band in the preceding table. Based on its funding policy, the Board should recommend premium discounts and/or benefit improvements with the aim of returning the Plan to its target funded ratio of 125% in 10 years or less. Benefit indexing should also be recommended until the next actuarial valuation.

We have calculated the Plan’s funding policy target in the table below. Please note that these calculations assume that the ad hoc indexing for 2019 and 2020 will be granted.

Funding Policy Parameters

Item	\$ millions
(a) Net assets available for benefits	157.1
(b) Actuarial liabilities (including ad hoc indexing)	97.5
(c) Funding target (125% x b)	121.9
(d) Excess funding margin (a minus c)	35.2
(e) Annual shortfall to amortize d. over 10 years	3.7

The Plan’s 125% funding target corresponds to a target asset level of \$121.9 million. Given the Plan’s current net assets of \$157.1 million, this implies an excess funding margin of \$35.2 million. Further, an annual revenue shortfall of \$3.7 million (or about 19% of the cost of new claims) is required to amortize this excess funding margin over a period of 10 years.

Current Revenue Balance and Implications

As noted in Section 3, the best-estimate cost of new claims for 2019 is \$19.7 million. The cost of new claims constitutes the Plan’s annual revenue requirement. In the absence of a significant funding margin or deficiency, this is the amount that the Plan needs to collect through its revenue sources in order to maintain its funded position.

The Plan has two major sources of revenue: premiums and EI rebates. The Plan collected premiums of \$14.1 million in 2018. Applying the same 6.25% inflation assumption to the 2018 premiums as was used to project the cost of new claims for 2019 gives an estimate for the Plan’s 2019 premiums of \$14.9 million.

Projecting future EI rebates is slightly more complicated because of a pilot program recently financed by the Plan that allows employers to retain the EI rebates that have historically been submitted to the Plan for a period of three years. Based on elections received from participating employers, it is expected that the majority of EI rebates historically received by the Plan will be deferred for the period of the pilot. However, the start dates vary for employers (and hence their end dates vary as well). Further, it is not clear at this time whether the pilot program will be made permanent at the end of the three-year period or whether the Plan will return to receiving EI rebates from all participating employers. For reference, the Plan collected \$1.8 million in EI rebates in 2017 (the last year in which full EI rebates were received).

For the purpose of this analysis, we have examined two scenarios: one in which the pilot EI program ends after 3 years and another in which the program continues indefinitely. For the first scenario (pilot program ends after 3 years) we have assumed EI rebates of \$300,000 will be received in 2019 and this will eventually return to the estimated full rebate level of \$1.8 million (2019 dollars) in 2023 when all participating employers are assumed to have completed their 3-year deferral period. For the second scenario, we have assumed EI rebates of \$300,000 will be received in 2019, reducing thereafter to \$100,000 per annum (2019 dollars) indefinitely. The assumed EI rebates of \$300,000 for 2019 is based on figures provided by Plan staff.

We have projected the Plan’s funding position under both of these scenarios. In particular, we projected the Plan’s assets and liabilities using our valuation assumptions, projected benefit cash flows, and results for new claims costs, expected premiums and EI rebates. The main results are shown in the following table.

Projected Funding Results – Current Premium Rates

Item	Scenario 1 (EI pilot program ends after 3 years)	Scenario 2 (EI pilot program continues indefinitely)
Estimated cost of new claims - 2019 dollars	\$19.7 million	\$19.7 million
Estimated premiums - 2019 dollars	\$14.9 million	\$14.9 million
Estimated EI rebates - 2019 dollars	\$0.3 million in 2019 increasing to \$1.8 million in 2023+	\$0.3 million in 2019 \$0.1 million in 2020+
Estimated revenue excess (shortfall) - 2019 dollars	(\$4.5 million) in 2019 reducing to (\$3.0 million) in 2023+	(\$4.5 million) in 2019 (\$4.7 million) in 2020+
Estimated funded ratio at the end of 10 years	128%	115%
Estimated time to reach 125% funded target	11 years	8 years
Estimated premium adjustment needed to reach 125% within 10 years	\$0.3 million (~2%) reduction	n/a

The results in the above table should be interpreted with care as they are projections based on numerous assumptions. However, the following general observations should be noted:

- * There is a discount (~23% of the estimate cost of new claims) inherent in the Plan’s current premium rates (i.e. Plan premiums plus EI rebates are less than expected cost of new claims).
- * Under scenario 1, the current premium structure is not expected to return the Plan to its target funded position within 10 years as specified in the funding policy. The projections indicate a premium reduction of \$300,000 (or about 2%) would be needed to reach the 125% target in 10 years.
- * Under scenario 2, the current premium structure is expected to return the Plan to its target funded position within 10 years as specified in the funding policy.
- * Under either scenario, the projected outcomes at December 31, 2020 (the date of the next actuarial valuation) are the same. The Plan will receive updated estimates of its funded position and cost of new claims before the current EI pilot program is scheduled to end.
- * Neither scenario contemplates benefit improvements that may be considered in light of the Plan’s strong funding position (aside from benefit indexing in 2019 and 2020 that is included in the projections).

Whether the Plan’s current premium and benefit structure is expected to return the Plan to its 125% funding target within 10 years depends on the ultimate decision regarding the EI pilot program. However, in the case where the Plan is not expected to reach 125% funded within 10 years (i.e. Scenario 1 - EI pilot program ends after 3 years), the projections indicate that only a minor premium adjustment (~2% reduction) would be needed to attain the target.

Regardless of the above scenarios, there are multiple combinations of premium discounts and/or benefit improvements that the Board may wish to consider that are in agreement with its funding policy.

Section 5 – Conclusions

The primary purpose of this valuation is to assist the Board of Directors in assessing the financial condition of the Plan. The results of the valuation show that:

- The Plan is currently in a strong funded position;
- There is a discount inherent in the Plan's current premium rates. That is, premiums plus EI rebates are expected to be less than the best-estimate range for expected cost of new claims including administrative expenses; and
- At its current funded level, the Plan's funding policy specifies that the Board should implement premium discounts and/or benefit improvements in order to return the Plan to its target funded ratio within 10 years. Whether the Plan's current premium and benefit structure is expected to return the Plan to its 125% funding target within 10 years depends on the ultimate outcome for the current EI rebate pilot program.

Appendix A – Actuarial Basis

In estimating the present value of the Plan's obligations, it is necessary to make certain assumptions with respect to the factors that will affect benefit payments in the future. These assumptions, along with the methodologies used to calculate liabilities, form the actuarial basis and are described below.

Assumptions

The main assumptions used for the valuation are listed in the table below. The assumptions for the current valuation, with the exception of the discount rate, are based on a study of the Plan's historical experience completed in 2018. For reference, the assumptions used in the previous valuation have also been included. More details on the valuation assumptions and their rationale are given following the table. For further information, please refer to the actual experience study report.

Item	Dec. 31, 2016 Valuation		Dec. 31, 2018 Valuation	
Inflation	2.00%		2.00%	
Discount Rate	3.00%		3.25%	
Rates of Termination	1987 GLTD Basic Tables modified for Plan historical experience		2004-2008 CIA Termination Study rates adjusted for 2008-2017 Plan experience	
	Year on Claim	Scaling Factor	Year on Claim	Scaling Factor
	1	50%	1	75%
	2	150%	2	105%
	3	325%	3	105%
	4	200%	4+	75%
	5	150%		
	6	125%		
	7+	125%		
Retirement Age	Pre May 2002: Age 63 May 2002 to Dec. 2008: Age 60 Post Dec. 2008: Age 63 (those over 63 at time of disability get 2 years of benefits)		Pre May 2002: Age 63 May 2002 to Dec. 2008: Age 60 Post Dec. 2008: Age 63 (those over 63 at time of disability get 2 years of benefits)	
Future Admin Expense Liability	8.5% of expected benefit payments		10.0% of expected benefit payments	

Item	Dec. 31, 2016 Valuation	Dec. 31, 2018 Valuation
CPPD Offsets:	Pending Applications: 90% successful at 6 months following the valuation date Not Applied Yet: 90% will apply and be successful at 12 months following valuation date	Pending Applications & Not Applied Yet: Proportion assumed to be successful varies by duration of disability. Year 1: 0% Year 2: 20% Year 3: 50% Year 4: 75% Year 5 and onwards: 90%
Incurred But Not Reported (IBNR) Claims	Loadings applied to cost of claims to date Most recent disability year (2016): 85% Prior disability year (2015): 5%	Loadings applied to cost of claims to date Most recent disability year (2018): 110% Prior disability year (2017): 5%

Inflation

The Bank of Canada has a target range for inflation of 1% to 3%. Actual inflation experience over the last 10 to 20 years suggests a rate in the 1.5% to 2.5% per annum range. Given the expected duration of benefits, we have used a 2.0% inflation assumption consistent with recent actual experience.

Discount Rate

The Plan’s assets are partitioned into two accounts: a liability-hedging portfolio that is invested 100% in fixed income assets providing a reasonable match to the duration and cash flow profile of the Plan’s liability, and a return-generating portfolio that is invested in a balanced fund. The target for the liability-hedging portfolio is to hold assets between 100% and 110% of the Plan’s liabilities. Given the Plan’s current liabilities of \$95.2 million, this implies a target for the liability-hedging portfolio of \$99.9 million (assuming target of 105% of liabilities), or 64% of Plan assets.

Per the Board’s funding approach, the present value of expected future benefits is calculated using the expected rate of return on the Plan’s total assets (liability-hedging and return-generating portfolios combined) as the discount rate. Based on the expected split of Plan assets between the two portfolios, their individual strategic asset allocations, and expected future returns, we have selected a discount rate of 3.25% per annum for the current valuation. This rate is net of expected investment-related expenses for the Plan.

In order to estimate an expected return for the Plan’s total assets, we first determined the target allocation for the combined portfolio. This was determined by combining the strategic asset allocation for each of the sub-portfolios with its expected proportion of total Plan investments (using an implied target for liability-hedging portfolio of 64% of total assets, as noted above). The results of this calculation are shown below.

Strategic Allocation for Total Investment Assets

	Liability Hedging Portfolio	Return Generating Portfolio	Combined Portfolio
Expected Proportion of Total Assets	64%	36%	100%
Strategic Allocations:			
• T-Bills	10.0%	5.0%	8.2%
• Bonds (Universe)	90.0%	40.0%	72.1%
• Canadian Equity	0%	30.0%	10.7%
• US Equity	0%	12.5%	4.5%
• International Equity	0%	12.5%	4.5%

Next we combined the target allocation for the Plan's total investment assets with expected returns for each of the underlying asset classes. In our analysis of the combined portfolio, we have examined both a low and a high scenario. These scenarios represent a best-estimate of future returns developed by Morneau Shepell's Asset and Risk Management practice. The expected real returns were established by reviewing historical returns for various periods, current market conditions, and fund manager's long-term expectations. We have used a medium-term (10 year) horizon for the expected real returns given the relatively short duration for the expected benefit payments and the timeframe contemplated in the Board's funding policy. These calculations are shown in the following table.

Calculation of Expected Return – Plan Assets

Asset Classes	Target Allocation	Expected Real Return (Low)	Expected Real Return (High)
T-Bills	8.2%	-0.20%	-0.10%
Bonds (Universe)	72.1%	0.20%	0.70%
Canadian Equity	10.7%	4.55%	5.85%
US Equity	4.5%	3.15%	4.45%
International Equity	<u>4.5%</u>	<u>5.00%</u>	<u>6.20%</u>
Total Real Return	100.0%	0.98%	1.60%
Expected Inflation		2.00%	2.00%
Value Added for Rebalancing & Diversification		0.25%	0.25%
Offset for investment-related expenses		<u>-0.30%</u>	<u>-0.30%</u>
Total Expected Return		2.93%	3.55%

The range presented above suggests that a valuation discount rate of 3.25% is reasonable.

Please note that as the Plan transitions towards its target funded ratio of 125%, an increasing percentage of its assets will be allocated to the liability-hedging portfolio versus the return-generating portfolio (ultimate target of 80% of assets in liability-hedging portfolio and 20% in return-generating portfolio). All else equal, this will tend to reduce the expected return in the future. Given the numerous uncertainties impacting expected returns and funding levels in the future, we have chosen not to explicitly incorporate this trend in our discount rate assumption. However, we have considered this eventuality when choosing the valuation discount rate from the range of potential values.

Claims Termination

It has been assumed that disabled members would terminate from claim based on a modification of the tables from the Canadian Institute of Actuaries Long-term Disability Termination Study 2004-2008 (the CIA 2004-2008 tables). The CIA 2004-2008 tables provide termination rates based on sex, age at disability, and time on claim. The tables include monthly termination rates for the first 5 years and annual rates thereafter. The rates are given for 9 central ages at disability (i.e. under 25, 27, 32, 37, 42, 47, 52, 57 and 62).

The modification applied for purposes of this valuation involves multiplying a factor by the base termination rates in the CIA 2004-2008 tables. The chosen factors are based on a detailed analysis of the Plan's actual termination experience completed during 2018.

Retirement Age

For disabilities occurring before May 1, 2002:

- * We have assumed that all members would retire at age 63. The selection of age 63 is meant to represent the aggregate expected experience of the Plan. Individual claimants will retire prior to or after age 63 depending on their own length of service under the Public Service Superannuation Plan (PSSP), or other pension plan as applicable. For any claimants over age 63 at the valuation date, we have assumed a retirement age of 65.

For disabilities occurring on or after May 1, 2002 but before January 1, 2009:

- * Benefits end at the earlier of age 60 or attainment of 35 years of pensionable service. As a result, we have assumed that all such members will retire at age 60. If there are claimants who reach 35 years of service before age 60, then the Plan will realize a modest gain relative to the retirement assumption used.

For disabilities occurring on or after January 1, 2009:

- * We have assumed that all members would retire at age 63. The selection of age 63 is meant to represent the aggregate expected experience of the Plan. Individual claimants will retire prior to or after age 63 depending on their own length of service under the Public Service Superannuation Plan (PSSP), or other pension plan as applicable. For any claimants over age 63 at the valuation date, we have assumed a retirement age of 65. Finally, the valuation incorporates a 2-year benefit term for any claimant who begins receiving disability benefits after the age of 63, in accordance with Plan provisions.

Expenses

An implicit allowance has been made for investment-related expenses as the discount rate of 3.25% is the expected rate of return on the Plan's assets net of investment-related expenses.

A liability equal to 10.0% of expected benefit payments is included for future administrative expenses on claims incurred as of the valuation date. The purpose of this provision is to provide for all future administrative expenses on claims incurred as of the valuation date, independent of the on-going operation of the Plan. The 10.0% provision is meant cover expenses related to ongoing claims management, rehabilitation expenses, and a portion of the Plan’s overhead costs.

Benefit Amount

The projected future benefits for current LTD claimants are based on each member's net benefit as at the date of our data file (December 31, 2018), i.e. including all offsets in effect at that time, with the exception of any rehab offsets that are considered to likely be non-permanent.

Additionally, we have assumed that claimants with pending CPP disability pension (“CPPD”) applications and those who have not yet applied for CPPD as of the valuation date may ultimately received a CPPD pension. Specifically, the probability of such claims having a CPPD offset is projected according to the following rates for a new claim:

Disability Duration	Proportion Qualifying
0-12 months	0%
12-24 months	20%
24-36 months	50%
36-48 months	75%
48 months and onwards	90%

For both groups of claimants, the LTD benefit amount is adjusted going forward to take account of projected CPPD offsets, and an allowance is also included for retroactive CPPD recoveries from the date of disability to projected date of approval (limited to 12 months). A CPPD award of \$1,067 per month was assumed for projected offsets based on the average CPPD offset in recent disability years.

For disabilities occurring after January 1, 2009, we have assumed that, after three years on claim, the gross disability benefit payable increases from 65% to 70% of pre-disability income, in accordance with the terms of the Plan.

External Sources of Funding

While the majority of funding for the Plan is shared between the covered members and the employers, the Plan also receives rebates from Employment Insurance (EI) on a regular basis. As well, the Plan realizes third party recoveries from time to time. As discussed in Section 4 of this report, we have considered EI rebates that the Plan is expected to receive in the future in our funding projections. We have not made any assumption regarding third party recoveries in the future and to the extent that they occur there would be a gain to the Plan.

Methodology

The methodologies used to calculate the liabilities are the same as those used for the previous valuation.

In-Force Claims

A liability was established for each disabled member in receipt of benefits as at the valuation date as the present value of expected future benefits taking into account probability of receiving each benefit payment based on the assumptions described above. As noted above, we have adjusted active claims liabilities for projected CPPD recoveries.

The structure of the CIA 2004-2008 tables required that we rounded each claimant's duration at the valuation date to the nearest month. Finally, the rates for central age 62 were used for all claimants over age 60 at the time of their disability.

Incurred But Not Reported Claims

The liability for active claimants includes only those members in receipt of benefits as at the valuation date. We have therefore established a liability for Incurred But Not Reported claims (IBNR) for those claimants who were disabled as at the valuation date but either have not yet reported a claim or have reported a claim but have not yet been approved for benefits (i.e. are pending).

For the current valuation, we have updated the IBNR liability estimate based on the experience study recently completed for the Plan. Specifically, we have included an IBNR loading of 110% for the 2018 disability year and 5% for the 2017 disability year in the current valuation. These loadings are based on the Plan's historical IBNR claim experience. For further details on the methodology used to determine these loadings, please refer to the 2018 experience study for the Plan.

Cost of New Claims

To determine an updated estimate of the cost of new claims, we proceeded as follows. For each calendar year beginning January 1, 2014 and ending December 31, 2018 (i.e. the most recent 5 calendar years), we determined the amount of funds that would have been sufficient to cover the costs (past and future) related to claims initiated in that particular year. Specifically, for claims that began in a particular calendar year, we discounted their corresponding benefit payments to the mid-point of the calendar in which the claims were made. We also discounted the applicable liability that was determined as at December 31, 2018 to the mid-point of the appropriate year. These calculations included the liability for incurred but not reported claims. The results for each disability year were then adjusted to make them consistent with expected 2019 coverage volumes and benefit levels. The assumptions and methods used to calculate liabilities are the same as those described in this Appendix for the 2018 valuation.

In order to incorporate administrative expenses into the required premium calculation, the following adjustments were made:

- * A 10.0% loading was applied to the estimated cost of new claims to allow for future administrative expenses on those claims; and
- * \$0.6 million was added in order to provide for estimated current year administrative costs not covered by the future expense liability

The assumed current year administrative costs are based on the Plan's recent financial history. In particular, the \$0.6 million provision for current year administrative costs is based on total expected administrative costs for the Plan less those expenses covered by the Plan's future expense liability.

Appendix B – Membership Data

The valuation data was obtained from the Plan’s Disability Claims Manager (Manulife Financial) and was provided to us by Plan staff. There are two main data files required for the valuation. The first is a database of in-force claims which includes both benefit and offset amounts along with claimant demographic information (gender, date of birth, date of disability, etc.). The second file contains details on benefit payments by claim over the period from January 1, 2017 to December 31, 2018. This second file is used in our cost of new disability claims and IBNR liability calculations.

We are not in a position to confirm that the data supplied is complete and accurate because we do not have access to independent records that would allow such verification. We do, however, apply checks of reasonableness, and have concluded that the data are sufficient and reliable for the purposes of the valuation.

The checks we applied were of three principal types, namely:

- * To check the internal consistency of various data elements within each data set;
- * To check the consistency of common or related data elements in different sets (including data supplied for the previous valuation); and
- * To check the consistency of various data elements with other separate information sources (e.g. data contained in the Plan’s financial statements).

A few minor inconsistencies were identified and were resolved satisfactorily through provision of additional explanation or data by Manulife and Plan staff, as necessary.

Claims data at the current and previous valuation dates are summarized in the table below:

	December 31, 2016	December 31, 2018
Number of Active LTD Claims	568	577
Average Age of Claimant	54.6	54.5
Average Bi-weekly Gross Benefit	\$1,390	\$1,457
Average Bi-weekly Net Benefit	\$1,079	\$1,120
Average Duration (months since disability)	94.3	89.7
Average Months Paid	88.9	84.4

A breakdown of the current active claimant population by benefit category is given below. Significant changes were made to the benefit provisions of the Plan on May 1, 2002 and again on January 1, 2009, resulting in three different sets of benefit provisions depending on a claimant’s date of disability: Pre May 2002, May 2002 to December 2008, or Post December 2008. The information in the following table is broken down according to the benefit provisions applied to the current in-force claimant population. More information on the benefit provisions can be found in Appendix D or by referring to the official Plan document.

	Pre May 2002 Disabilities	May 2002 to Dec 2008 Disabilities	Post Dec 2008 Disabilities	Total
Number of Active LTD Claims	89	56	432	577
Average Age of Claimant	59.6	53.4	53.6	54.5
Average Bi-weekly Gross Benefit	\$1,266	\$1,318	\$1,514	\$1,457
Average Bi-weekly Net Benefit	\$798	\$848	\$1,222	\$1,120
Average Duration (months)	271.3	159.4	43.3	89.7
Average Months Paid	265.3	153.7	38.1	84.4

Appendix C – Plan Assets

The custodian of the Plan's assets is CIBC Mellon. The assets are managed by Beutel Goodman.

The following shows the progress of the fund over the previous two calendar years, from January 1, 2017 to December 31, 2018, with investments shown at market value. This information was obtained from the Plan's financial statements.

Calendar Year	2017	2018
Opening Value as at Jan. 1st	153,988,000	159,977,000
Plus		
• Premiums	13,156,000	14,059,000
• Investment Income	8,384,000	481,000
• EI Rebates	1,792,000	901,000
Less		
• Benefits paid (net of recoveries)	(14,917,000)	(15,704,000)
• Non-investment fees and expenses	(1,970,000)	(2,127,000)
• Investment management & custodian fees	(457,000)	(446,000)
Closing Value as at Dec. 31st	159,977,000	157,141,000

The breakdown of the net assets is as follows:

	December 31, 2016	December 31, 2018
Assets		
• Investments, Market Value	154,534,000	155,710,000
• Cash	3,673,000	3,499,000
• Accounts Receivable	689,000	742,000
• Fixed Assets	13,000	7,000
Total Assets	158,908,000	159,958,000
Liabilities		
• Accounts Payable	(4,920,000)	(2,818,000)
• Other Current Liabilities	-	-
Total Liabilities	(4,920,000)	(2,818,000)
Net Assets Available for Benefits	153,988,000	157,141,000

Appendix D – Summary of Plan Provisions

The following is a summary of the main provisions of the Plan. For an authoritative statement please review the official Plan document.

Eligibility and Level of Benefit

In order to qualify for LTD benefits, an employee must first be disabled to the extent of being unable to perform the regular duties of his occupation for 100 consecutive work days. Following completion of this elimination period an employee will be eligible to receive LTD benefits in accordance with the applicable Plan terms.

If the disability occurred before May 1, 2002:

- An employee will be eligible to receive LTD benefits for up to 30 months as long as he continues to be unable to perform his own occupation. Thereafter, an employee continues to be eligible for LTD benefits, but not beyond age 65, provided he is unable to perform the duties of any occupation for which the employee is or may become suited through education, training, experience or rehabilitation, which occupation pays not less than 80% of the current rate of the position, class and step he held immediately prior to disability.
- The bi-weekly LTD benefit is 70% of the employee's salary at time of disability, to a maximum of \$2,000.

If the disability occurred on or after May 1, 2002 and prior to January 1, 2009:

- An employee will be eligible to receive LTD benefits for up to 24 months as long as he continues to be unable to perform his own occupation. Thereafter, an employee continues to be eligible for LTD benefits until age 60, or until they attain 35 years of pensionable service, whichever is earlier, provided he is unable to perform the duties of any occupation for which the employee is or may become suited through education, training, experience or rehabilitation, which occupation pays not less than 75% of the current rate of the position, class and step he held immediately prior to disability.
- The bi-weekly LTD benefit is 65% of the employee's salary at time of disability, to a maximum of \$3,000.

If the disability occurred on or after January 1, 2009:

- And the claimant's elimination period ends before or on the day they turn 63 years, the benefit will cease at age 65 or the attainment of 35 years of service, whichever is earlier.
- And the claimant's elimination period ends after they turn 63 years, the benefit will cease 2 years after the end of the elimination period or the attainment of 35 years of service, whichever is earlier.
- An employee will be eligible to receive LTD benefits for up to 24 months as long as he continues to be unable to perform his own occupation. Thereafter, an employee continues to be eligible for LTD benefits provided he is unable to perform the duties of any occupation for which the employee is or may become suited through education, training, experience or rehabilitation, which occupation pays not less than 75% of the current rate of the position, class and step he held immediately prior to disability.
- The bi-weekly LTD benefit is 65% of the employee's salary at time of disability, to a maximum of \$4,375, for the first three years of benefits, and thereafter 70% of the employee's salary at the time of disability, to a maximum of \$4,711.54

Benefit Offsets

The benefits are reduced by:

- (1) the amount of disability benefit entitlement, excluding children's benefits, under the Canada Pension Plan at the date of disability;
- (2) the amount of benefits payable from any other group disability plan or pension plan, sponsored by the Employer;
- (3) 50% of the amount of income received from rehabilitative employment;
- (4) the amount of Workers' Compensation payments, except permanent partial disability awards;
- (5) the amount of benefits payable from any disability plan sponsored by any employer, since inception of this Plan;
- (6) the amount of benefits payable as a result of a disability which occurred at work and is deemed to be less than 70 percent compensable by the Workers' Compensation Board;
- (7) the amount of income received by an employee from self-employment as set out in guidelines made pursuant to this Plan;
- (8) the amount of earnings recovered through a legally enforceable cause of action against some other person or corporation.

Termination of Benefits

Benefits terminate on the earliest of:

- (1) the date the employee returns to work;
- (2) the date the employee ceases to qualify for LTD benefits, as defined under the Plan;
- (3) death;
- (4) attainment of:
 - (a) age 65 for claims incurred before May 1, 2002,
 - (b) the earlier of attaining age 60 or 35 years of service for claims incurred after April 30, 2002 but before January 1, 2009, and
 - (c) the earlier of attaining age 65 and 35 years of service for claims incurred after December 31, 2008 and whose elimination period ends before or on the day the employee turns 63
 - (d) the earlier of 2 years of payment and attaining 35 years of service for claims incurred after December 31, 2008 and whose elimination period ends after the employee turns 63
- (5) upon the effective date of the employee's early retirement under the PSSP.

Termination of Employee's Coverage

Termination of coverage for employees at work takes effect on the earliest of:

- (1) 100 working days prior to the end of the month in which the employee attains 35 years of service;
- (2) The date the employee occupies a position that is not eligible for coverage in accordance with the terms of the Plan;
- (3) The date of the employee's termination or retirement from service.

Rehabilitation

The Plan makes provision for rehabilitation employment opportunities where deemed appropriate. For employees who qualify for rehabilitation employment, their LTD benefit will be reduced by 50% of their rehabilitation income for employees disabled prior to January 1, 2009 or disabled after December 31, 2008 and have been in receipt of benefit payments for less than 5 years, or reduced by 35% for employees disabled after December 31, 2008 who have been in receipt of benefit payments for more than 5 years. There is a further stipulation that where the total of LTD and any rehabilitation income exceeds the current rate of pay for the position and class held by the employee immediately prior to his date of disability, the LTD benefit shall be reduced in order that such total not exceed 100% of such rate of pay.

Appendix E – Employer Certification

With respect to the actuarial valuation report of the Nova Scotia Public Service Long Term Disability Plan as at December 31, 2018, we hereby confirm that to the best of our knowledge:

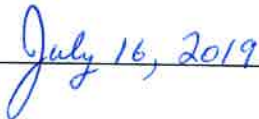
- the data regarding Plan members provided to Morneau Shepell constitutes a complete and accurate description of the information contained in our files;
- the summary of Plan assets contained in this report is accurate;
- copies of the official text of the Plan and all amendments to date were provided to Morneau Shepell and the summary of Plan provisions contained in this report is accurate;
- there are no subsequent events nor any extraordinary changes to the membership other than those listed in the December 31, 2018 actuarial report on the Plan, which would materially affect the results.



Chief Executive Officer

Title

Date



About Morneau Shepell Inc.

Morneau Shepell is the only human resources consulting and technology company that takes an integrated approach to employee well-being to meet health, benefits and retirement needs. The Company is the largest administrator of retirement and benefits plans and the largest provider of integrated absence management solutions in Canada. LifeWorks by Morneau Shepell is the leading total well-being solution that combines employee assistance, wellness, recognition and incentive programs. As a leader in strategic HR consulting and innovative pension design, the Company also helps clients solve complex workforce problems and provides integrated productivity, health and retirement solutions.

Established in 1966, Morneau Shepell serves approximately 24,000 clients, ranging from small businesses to some of the largest corporations and associations. With more than 4,500 employees in offices across North America, the United Kingdom and Australia, Morneau Shepell provides services to organizations around the globe. Morneau Shepell is a publicly-traded company on the Toronto Stock Exchange (TSX:MSI). For more information, visit morneaushepell.com.

