

To: ONE Joint Investment Board  
From: Keith Taylor, Chief Investment Officer  
Date: June 23, 2020  
Re: Sensitivity Analysis of Investment Allocations  
Report: 20-014

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## 1. Recommendations

It is recommended that:

The report be received for information

## 2. Key Points

- Expected annual returns and standard deviation are presented for three scenarios: (1) using the current allocations as decided in the May 22, 2020 ONE JIB meeting, (2) reducing the equity allocation by 5%, and (3) reducing the equity allocation by 10%.
- Risk tolerances of the Founding Municipalities have been presented to gauge if the changing equity weights are more suitable considering each municipality's risk tolerance.
- The efficient frontiers are concave; the slope diminishes as more risk is assumed. The tradeoff between risk and return is not constant – at higher return levels more risk needs to be assumed to increase return. That is, the Sharpe ratio diminishes as more risk assumed.
- Lowering equity weights by 10% has a modest impact on risk levels which is mitigated by a longer investment time horizon
- Conditional Tail Expectation (CTE) analysis has also been provided as standard deviation as a measure of risk does not adequately account for the long-term investment horizons of the municipalities. The risk associated with investment allocation diminishes as the investment horizon changes.
- This additional context demonstrates that the risk return profiles are appropriate for municipalities considering their risk tolerances and investment time horizons as disclosed in their Investment Policy Statement (IPS) and Municipal Client Questionnaire (MCQ).

### 3. Background

Staff were requested to present additional sensitivity analysis to better understand how changing investment allocations affected the expected risk and return attributes – specifically to analyze the impact of reducing the equity allocations by 5% and 10%.

The risk tolerance of the participating municipalities is relevant to any decisions related to this sensitivity analysis. The key consideration is to validate that the risk profile of investments matches the preferences, goals, and risk tolerance of the investors.

The municipal IPS defines risk tolerance and this information on risk tolerances is elaborated in the MCQ.

Each Founding Municipality disclosed details of their risk tolerance when answering the following three questions in the MCQ:

3.1 Which of the following best reflects the Municipality’s investment objectives for its MNRI?

- Capital preservation is the main objective. Willingness to accept low returns in order to avoid any years with losses.
- Achieve moderate growth without excessive risk to capital.
- Willingness to accept higher risk, including risk of loss of capital, for potentially higher returns over the longer term

3.2 What is the Municipality’s risk tolerance for its MNRI?

- Low (Conservative Approach: A very small chance of loss of capital over a 5-year period)
- Moderate (Moderate chance of loss of capital over a 5-year period)
- High (Greater uncertainty with potential of higher returns over a 5-year period)

3.3 Annual Return Expectations: Which range best reflects the Municipality’s expected annual return for its MNRI?

- 0% to 2% gain
- 5% loss to 5% gain
- 10% loss to 10% gain

The answers to these questions in the MCQ from each of the Founding Municipalities capture how they evaluate risk. Table 1 provides a summary of the Founding Municipalities responses.

Table 1 - Founding Municipalities MCQ Risk Responses

	Main Objective	Risk Tolerance	Annual Return Expectations
<b>Bracebridge</b>	Moderate Growth	Moderate Risk	-5% to +5%
<b>Huntsville</b>	Moderate Growth	Moderate Risk	-5% to +5%
<b>Innisfil</b>	Moderate Growth	Moderate Risk	-5% to +5%
<b>Kenora</b>	Capital Preservation	Low Risk	0% to +2.5%
<b>Muskoka</b>	Higher Returns	Moderate Risk	-5% to +5%
<b>Whitby</b>	Higher Returns	Moderate Risk	-5% to +5%

#### 4. Analysis

The sensitivity analysis is presented in Tables 2, 3 and 4, which respectively represent the proposed allocations, the allocations with 5% less equity, and the allocations with 10% less equity. As can be seen in these tables, the yellow cells have been adjusted to reflect the different assumptions that affect the return and standard deviation for each outcome. The grey cells show the corresponding allocations for each municipality.

Table 2 - Proposed Allocations with Risk and Return Detail

Outcome Category	Outcome Strategy	Allocation			Outcomes	
		Equity	Fixed Income	Cash	Strategy Return	Strategy Std Dev
Cash Plus	Cash			100%	0.9%	1.3%
	Cash Plus	10%	70%	20%	3.0%	2.8%
Stable Return	Stable Return	30%	60%	10%	3.8%	4.2%
Contingency	Contingency	60%	40%		4.9%	6.6%
	Asset mgt reserves	90%	10%		5.8%	9.1%
Target Date	Target Date 5-10 yrs	50%	50%		4.6%	5.8%
	Target Date 10+ yrs	75%	25%		5.3%	7.9%

	New Allocations		
	Return	Std Dev	Equity
Bracebridge	5.1%	7.2%	67.6%
Huntsville	3.5%	4.1%	34.4%
Innisfil	4.9%	6.6%	60.0%
Kenora	4.0%	4.5%	34.7%
Muskoka	4.0%	4.5%	34.9%
Whitby	4.0%	4.5%	35.3%

Table 3 - Proposed Allocations (with 5% less equity) with Risk and Return Details

Outcome Category	Outcome Strategy	Allocation			Outcomes	
		Equity	Fixed Income	Cash	Strategy Return	Strategy Std Dev
Cash Plus	Cash			100%	0.9%	1.3%
	Cash Plus	5%	75%	20%	2.9%	2.7%
Stable Return	Stable Return	25%	65%	10%	3.7%	3.8%
Contingency	Contingency	55%	45%		4.8%	6.2%
	Asset mgt reserves	85%	15%		5.6%	8.7%
Target Date	Target Date 5-10 yrs	45%	55%		4.5%	5.4%
	Target Date 10+ yrs	70%	30%		5.2%	7.4%

	New Allocations		
	Return	Std Dev	Equity
Bracebridge	5.0%	6.8%	62.6%
Huntsville	3.4%	3.8%	30.6%
Innisfil	4.8%	6.2%	55.0%
Kenora	3.8%	4.2%	29.7%
Muskoka	3.8%	4.2%	30.0%
Whitby	3.8%	4.2%	30.4%

**Table 4 - Proposed Allocations (with 10% less equity) with Risk and Return Details**

Outcome Category	Outcome Strategy	Allocation			Outcomes	
		Equity	Fixed Income	Cash	Strategy Return	Strategy Std Dev
Cash Plus	Cash			100%	0.9%	1.3%
	Cash Plus	0%	80%	20%	2.7%	2.6%
Stable Return	Stable Return	20%	70%	10%	3.5%	3.6%
Contingency	Contingency	50%	50%		4.6%	5.8%
	Asset mgt reserves	80%	20%		5.5%	8.3%
Target Date	Target Date 5-10 yrs	40%	60%		4.3%	5.1%
	Target Date 10+ yrs	65%	35%		5.1%	7.0%

	New Allocations		
	Return	Std Dev	Equity
Bracebridge	4.8%	6.4%	57.6%
Huntsville	3.3%	3.5%	26.9%
Innisfil	4.6%	5.8%	50.0%
Kenora	3.7%	3.9%	24.7%
Muskoka	3.7%	3.9%	25.1%
Whitby	3.7%	3.9%	25.4%

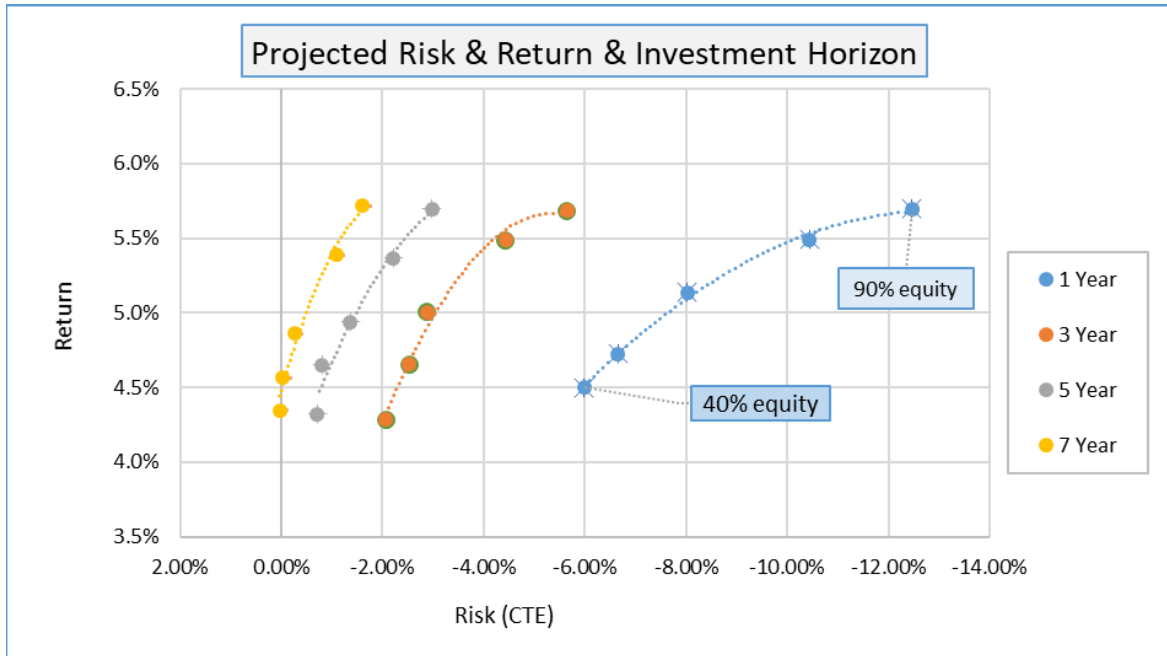
The efficient frontiers are concave; the slope diminishes as more risk is assumed. The tradeoff between risk and return is not constant – at higher return levels more risk needs to be assumed to increase return. That is, the Sharpe ratio diminishes as more risk assumed, so lowering the equity allocations will reduce risk more than it reduces return. Lowering equity weights by 10% will reduce standard deviations, but the impact is modest.

However, the standard deviation modelling above does not adequately account for the investment time horizons of each municipality. When examining risk, the holding period of investments is also highly relevant. This is not always immediately apparent when evaluating standard deviations. Evaluating risk based on holding period returns rather than one-year standard deviations provides context that allows the reader to more readily confirm that the risks associated with each allocation are appropriate and reflective of each municipality’s risk tolerances.

Chart 1 shows the efficient frontiers generated under different risk, return, and holding period scenarios using a risk measure called Conditional Tail Expectation (CTE). In this graph, a better outcome either is upwards or to the left (i.e., more return for each level of risk, or less risk for any given level of return).

For example, if the holding period is three years, rather than being evaluated based on a one-year basis, the returns are nearly identical, but the holding period risk, as measured by CTE is dramatically lower; the MNRI controlled and managed by the ONE JIB typically have long investment time horizons, therefore the risks assumed should, arguably, be evaluated based on a longer holding period return. As a result, the risks associated with the various outcomes, even with relatively heavy equity allocations, are appropriate considering the stated risk tolerances of the Founding Municipalities.

Chart 1 - Impact of Investment Horizon on Holding Period Risk and Return



## 5. Conclusion

Given the long-term nature of the funds being managed by ONE JIB, this detailed sensitivity analysis supports the allocations for investment outcomes found in the May 20, 2020 - ONE JIB Report #20-O11 - Investment Outcomes and approved by ONE JIB.

Drafted by: Keith Taylor, Chief Investment Officer

Approved for submission by: Judy Dezell and Donna Herridge, Co-President/CEO