

Request for Recommendation

City Council



Type of Decision							
Meeting Date	March 1 st , 2016			Report Date	February 19 th , 2016		
Decision Requested	Yes	<input checked="" type="checkbox"/>	No	Priority	<input checked="" type="checkbox"/>	High	Low
	Direction Only			Type of Meeting	<input checked="" type="checkbox"/>	Open	Closed

Report Title
MALEY DRIVE EXTENSION AND WIDENING PROJECT

Budget Impact/Policy Implication	Recommendation
<p>This report has been reviewed by the Finance Division and the funding source has been identified.</p>	<p>FOR INFORMATION ONLY</p>
<p><input checked="" type="checkbox"/> Background Attached</p>	<p>Recommendation Continued</p>

Recommended by the Department

Tony Cecutti
 Tony Cecutti, P.Eng.
 General Manager of Infrastructure Services

Recommended by the C.A.O.

Kevin Fowke
 Kevin Fowke
 Chief Administrative Officer

Report Prepared By	Division Review
 David Shelsted, P.Eng. Director of Roads and Transportation Services	

Report Attached

Maley Drive Extension - Phase 1 Business Case Report

February 2016

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1. Project Introduction and Background

1.1 Introduction

The Maley Drive Extension is a construction project that will provide short, medium, and long-term benefits to residents, businesses, and industry. The project is eligible for a three-way cost sharing partnership with senior levels of government. The Ministry of Economic Development, Employment, and Infrastructure of Ontario provided Infrastructure Canada with its initial submission for the Provincial-Territorial Infrastructure (PTIC) Component of the Building Canada Fund which included Maley Drive.

The New Building Canada Fund - PTIC provides funding for projects of national and regional significance, with a focus on projects that support economic growth, a clean environment and stronger communities. In addition, only projects identified by a Province or Territory will be assessed under the terms of the TPIC-NRP (National and Regional Projects). All projects under the PTIC-NRP must undergo an initial review, and, if deemed eligible under the PTIC-NRP program Terms and Conditions, must be supported by a project business case demonstrating how the project meets the common project criteria, as well as specific outcomes and project criteria.

Staff is working with Infrastructure Canada as the project business case is being reviewed. This report summarizes the information provided to the senior levels of government as the project business case for their review of the Maley Drive project.

1.2 Description

The Maley Drive Extension is a combination of new road and reconstruction/rehabilitation of existing road to alleviate traffic congestion and promote economic activity while improving safety. Phase 1 of the project will extend for a total distance of 7.5 km from the College Boreal entrance on LaSalle Boulevard to the intersection of Maley Drive and Falconbridge Highway (refer to key plan below). Phase 2 of the project includes the widening of LaSalle Boulevard from College Boreal to MR 35 and the completion of the 4 lane section from Barry Downe Road to Falconbridge Highway. Each section of Phase 1 is briefly described in Table 1.

Table 1: Description of Phase 1

Road Section	Description of Works	Projected AADT
College Boreal entrance to LaSalle Boulevard, Length = 0.6 km	Construction of a new four lane divided roadway including the construction of a grade separated interchange structure at the intersection of LaSalle Boulevard and Maley Drive.	16,000
LaSalle Boulevard to Barry Downe Road, Length = 4.1 km	Construction of a new four lane divided roadway including the construction of a grade separated interchange structure at the intersection of Notre Dame Avenue and Maley Drive, including the relocation and widening of a portion of Notre Dame Avenue.	21,000
Barry Downe Road to Falconbridge Highway, Length = 2.8 km	Reconstruction/rehabilitation of the existing two lane Maley Drive including intersection improvements.	13,000

The projected Annual Average Daily Traffic (AADT) is obtained from the traffic model used in the City's Official Plan.

1.3 Overview Plan

The plan below shows both Phase 1 and Phase 2 of the Maley Drive Extension project.

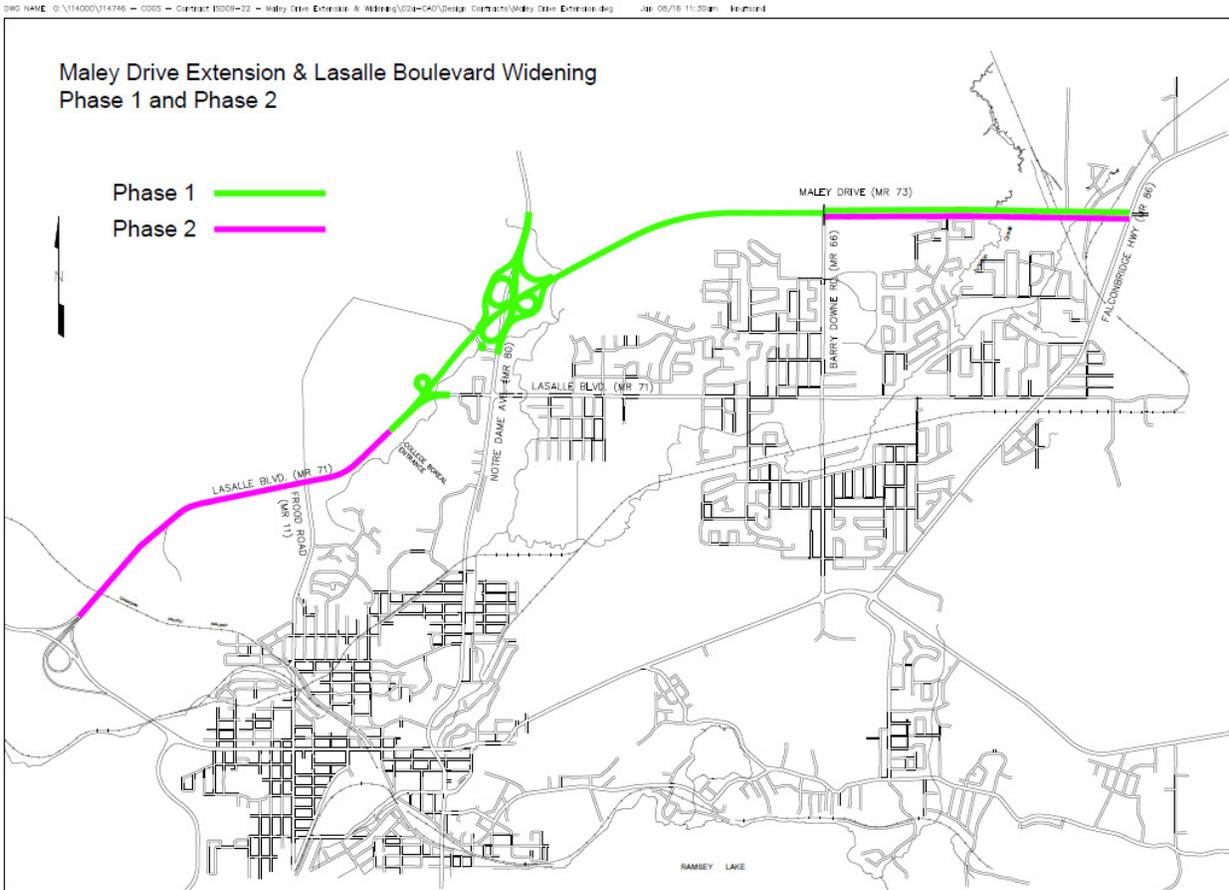


Figure 1: Phase 1 and Phase 2 of Maley Drive Extension Project

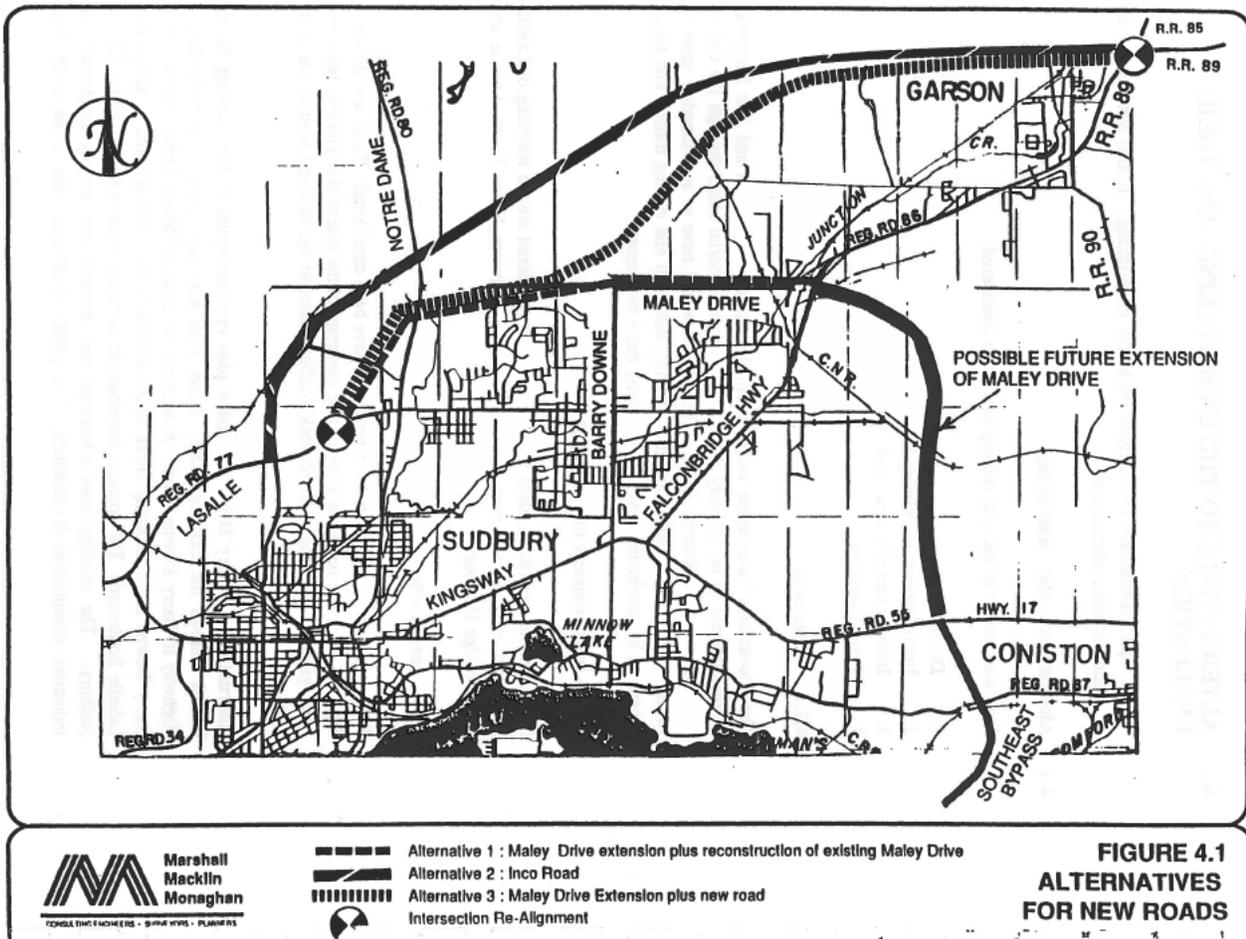
1.4 Background Studies

In 1991, an update of the Regional Transportation Plan was undertaken, with the twin objectives of developing a Trucking Action Plan and updating the Transportation Plan. The Trucking Action Plan recommended the extension of Maley Drive and upgrading of existing Maley Drive as the preferred route for a northern truck by-pass. The Transportation Plan recommended proceeding with the Environmental Assessment of the Maley Drive Extension.

An Environmental Study Report (ESR) was prepared and filed in 1995 as part of the Provincial Class Environmental Assessment (EA) process. Based on an assessment of the various factors associated with the alternatives considered, it was determined that the Maley Drive extension and widening was the preferred alternative. This alternative provides the transportation capacity required in a cost effective and efficient manner, while having the least impact on the natural and social environments. Other alternatives that were considered included expanding existing roads and improvements to Transit.

Figure 4.1 below, Alternatives for New Roads, extracted from the 1995 ESR shows the 3 alternative routes considered in detail as part of the evaluation process. It should be noted that Alternative 2, the INCO Road which traverses undeveloped land well north of Maley Drive, was not recommended due to the following reasons:

- Minor economic benefit
- Negligible reduction in traffic congestion on LaSalle Boulevard and the Kingsway
- High cost (More than double the recommended alternative)



Following amalgamation in 2000, the City conducted a comprehensive review of its existing official plans that were developed for the former municipalities. The intent of this exercise was to produce a new Official Plan for Greater Sudbury under the Planning Act. Key components of the process were Background Studies. The Background Studies set the context for the new Official Plan and identified both the challenges and opportunities that would be translated into the Official Plan Policies and Programs. A key Background Study was the Transportation Study.

To develop a better understanding of travel patterns in Greater Sudbury, a household survey was undertaken. Approximately 5% of the households in Greater Sudbury were contacted and information regarding the travel patterns of all household members over the age of 15 was collected. The information collected from the survey was used to calibrate and validate the travel demand forecasting model that was used during completion of the background study. The travel demand model is a classic four-step network model, where travel demand is forecast for a single year in the future in four sequential steps:

- Trip generation, in which the number of trips to/from each traffic zone are projected based on zonal population and employment
- Trip distribution, in which the origin and destination trip ends are linked together to determine trip flows
- Mode split, in which the origin-destination trips are allocated to feasible travel modes; and
- Trip assignment, in which auto and transit trips are assigned specific paths through the respective road and transit networks

The 2005 Transportation Study identified the Maley Drive extension and widening project as the solution to increase east-west capacity.

Due to recommendations in the 2005 Transportation Study that address long term traffic needs and the more than 10 years since the filing of the 1995 ESR, the City commissioned the preparation of a Municipal Class EA Addendum. An Addendum was prepared and filed in 2008. The addendum addressed 3 components, namely;

The reconstruction and widening of the existing Maley Drive, east of Barry Downe Road to Falconbridge Highway, as a four-lane road.

The extension of Maley Drive westerly from its existing western terminus at Barry Downe Road to the LaSalle Boulevard Extension, west of Notre Dame Avenue. This segment would be constructed as a four-lane road.

The reconstruction and widening of LaSalle Boulevard from just east of the CPR Overhead to 0.3 km west of Notre Dame Avenue, from two-lanes to four-lanes.

In accordance with Class EA guidelines, the Addendum filed in 2008 is valid for a period of 10 years.

2. Project Details

2.1 Construction Schedule

With funding approval, the project is expected to start in the spring of 2016 and be completed by the end of 2019. The completion date is dependent on the start date. The proposed construction schedule which includes costs for each phase of the project is shown in Appendix A.

2.2 Contract Details

A summary of the phases (Contracts) and timelines is presented in Table 2. Detailed design has been completed and the contracts are ready for tendering.

Table 2: Contract Descriptions and Schedule

Contract	Description of Works	Tendering	Construction Starts	Substantial Completion
Contract 1 - Notre Dame Avenue Realignment	This contract involves grading, drainage, granular material, hot mix paving and related work including the construction of the Notre Dame Avenue Interchange Structure. The construction works include the following approximate quantities: <ul style="list-style-type: none"> • 90,000 cu. m. - Rock Excavation • 15,000 cu. m. - Earth Excavation • 37,000 tonnes - Roadway Granulars • 12,000 tonnes - Hot Mix Asphalt • 3,100 lin. m. - Steel Beam Guide Rail • 2,000 cu.m. - Concrete in Structures • 360 lin. m. - Concrete Box Culvert (various sizes) 	May 4, 2016 – June 15, 2016	June 30, 2016	December 8, 2017
Contract 2 - Advanced Clearing LaSalle Boulevard to Barry Downe Road	This contract involves the clearing of trees in preparation for Contract 4 from LaSalle Boulevard to Barry Downe Road. The construction works include the following approximate quantities: <ul style="list-style-type: none"> • 580,000 sq. m. - Close Cut Clearing 	June 27, 2016 - August 5, 2016	September 12, 2016	November 18, 2016
Contract 3 - Existing Maley Drive Reconstruction/ Rehabilitation Barry Downe Road to Falconbridge Highway	This contract involves the reconstruction/rehabilitation of the existing two lane section of Maley Drive. The construction works include the following approximate quantities: <ul style="list-style-type: none"> • 11,000 cu. m. - Earth Excavation • 32,000 tonnes - Roadway Granulars • 4,800 tonnes - Hot Mix Asphalt The schedule for this contract is flexible depending on the main contracts final schedule. The schedule identifies the earliest contemplated dates.	May 18, 2016 - June 22, 2016	July 2, 2016 ±	December 30, 2017±

Contract	Description of Works	Tendering	Construction Starts	Substantial Completion
Contract 4 - Maley Drive Construction - College Boreal Entrance to Barry Downe Road	<p>This contract involves the construction of a new four lane divided roadway including the construction of a grade separated interchange structure at the intersection of LaSalle Boulevard and Maley Drive. Roundabouts will be constructed at the College Boreal entrance and the intersection of Barry Downe Road. The construction works include the following approximate quantities:</p> <ul style="list-style-type: none"> • 390,000 cu. m. - Rock Excavation • 78,000 cu. m. - Earth Excavation • 185,000 tonnes - Roadway Granulars • 34,000 tonnes - Hot Mix Asphalt • 320 lin. m. - Concrete Box Culvert (various sizes) • 4,200 lin. m. - Steel Beam Guide Rail 	January 2, 2017- June 30 2017	July 1, 2017	December 23, 2019

3. Project Outcomes and Benefits

3.1 Reduced Traffic on LaSalle/Kingsway

The Maley Drive Extension Phase 1 project consists of a new four lane divided arterial roadway from College Boreal to Barry Downe Road.

Currently, there are two east-west arterial roadways, namely; LaSalle Boulevard and the Kingsway. Both of these roadways carry in excess of 35,000 vehicles on a daily basis and they are at or near capacity. This project will provide a third east-west arterial road to reduce the traffic volumes on both LaSalle Boulevard and the Kingsway. It is anticipated that traffic along these two corridors will be reduced by approximately 4,000 vehicles per day on the Kingsway and approximately 10,000 vehicles per day on LaSalle Boulevard. In addition, the Maley Drive Extension will attract 1,000 to 1,500 trucks and transports away from the arterial road system on a daily basis, which come from LaSalle Boulevard, the Kingsway, Radar Road and the MR80/15 corridors.

The other alternative for relieving congestion on these corridors considered widening LaSalle Boulevard, the Kingsway, or both. This alternative was not selected due to the high costs, the property acquisition required, disruption to businesses and other social impacts to the road corridors.

3.2 Economic Benefits

More than 50 percent of ore currently mined in Ontario is trucked across Greater Sudbury's road network. The Maley Drive Extension will position the City of Greater Sudbury for growth in the future.

Maley Drive is a foundational piece of infrastructure. It is a key east-west link that will make other infrastructure projects, such as the widening of MR 35 and the Barry Downe extension, more viable.

The project will:

- Support the local mining industry through better connectivity of various key projects, and will prepare the City of Greater Sudbury to meet the needs of future mining development, that will have significant economic benefit for Greater Sudbury and all of Northern Ontario. A plan showing the ore and slurry haul routes in the Sudbury area is attached in Appendix B. This plan shows the overall current mining activity in the Sudbury area and the routes used to move mining products for processing.
- Reduce congestion, allowing businesses to get more done in a day. As noted above, the two existing arterial east-west roadways are operating at or near capacity resulting in delays and aggravation to road users especially in the typical rush hour periods. The Maley Drive Extension is expected to reduce the traffic by 10,000 vehicles per day on LaSalle Boulevard and approximately 4,000 vehicles per day on the Kingsway. The Maley Drive Extension is expected to attract approximately 21,000 vehicles per day. The traffic volumes were modelled as part of the Transportation Study undertaken for the City's Official Plan.

- Save the Greater Sudbury drivers over 500,000 hours annually with reduced traffic congestion and travel times. This translates to an annual savings of \$11.1 million in 2015 dollars.
- Minimize rate of pavement damage and the degradation of the existing road structures, extending life cycles and deferring major road rehabilitation. The impact to the pavement structure of one pass of a large truck is equal to several thousand passes of a passenger car. With a high percentage of heavy truck traffic the result is excessive pavement loading and premature pavement rutting, cracking and ravelling. Pavement longevity is typically based on geotechnical pavement design considerations such as overall depth of pavement structure, traffic volumes, percentage of truck traffic and existing underlying soils conditions. Typical pavement structure service life before rehabilitation is 15-20 years. Excessive loading due to heavy truck traffic results in premature pavement degradation requiring an accelerated rehabilitation. For example it is expected that Maley Drive Extension will add approximately 8 - 10 years to the service life of LaSalle Boulevard.
- Attract 1,000 to 1,500 trucks and transports away from the arterial road system, including LaSalle Boulevard, the Kingsway, MR15, MR 80 and Radar Road on a daily basis .
- Create 780 construction jobs during Phase 1.
- Creates a net economic value of \$135.6 million in present value terms.

3.3 Regional Benefits

The project will:

- Reduce congestion along the Kingsway and LaSalle Boulevard.
- Remove heavy truck traffic, improving the safety of roads through MR15 in Blezard Valley, and MR80 in Val Caron, Val Therese and Hanmer.
- Improve safety along the Kingsway, LaSalle Boulevard and other corridors. Trucks and transports require more room to start, accelerate, maneuver, decelerate and stop. As a result, they contribute to congestion, driver frustration and increased collisions.

3.4 Social Benefits

The project will:

- Improve commercial viability along LaSalle Boulevard, the Kingsway and adjacent areas. Currently these roads are congested with commuter traffic and large vehicles that are not appropriate for commercial areas. Removing these trips and vehicles will make the commercial areas more inviting.
- Provide alternate access to and from the Greater Sudbury Airport by providing an alternate east-west route to the north east section of the City where the airport is located.

- Improve transit as lower congestion will provide more reliable commute times on existing busy routes and provides an opportunity for future commuter hubs to utilize Maley Drive.
- Improve response times for EMS, Fire and Police on existing roads and reduce travel times from Capreol, Nickel Centre, Valley East, and the airport for emergency trips to Health Sciences North.
- Facilitate tourism by reducing road congestion to the shopping areas, and to the Highway 17 and airport as main access points to the City. The Maley Drive extension will result in a more enticing environment for tourists.
- Provide alternative routing for traffic when accidents, emergencies, or construction is occurring on LaSalle Boulevard or the Kingsway. This results in less disruption to businesses, more reliable commutes, more reliable emergency response, and more options for Transit for alternate detour routes.
- Facilitates active transportation by making the LaSalle Boulevard corridor more attractive by removing traffic volume and large vehicles, promoting walking, cycling, and use of public transit. Maley Drive will be constructed with paved shoulders that will provide separation for cyclists. In addition, Maley Drive will have a culvert crossing for snowmobiles and hikers between Barry Downe and Notre Dame. The Maley Drive extension improves safety for all users in all of the areas where traffic is being reduced; namely, the Kingsway, LaSalle Boulevard, MR 80 and MR 15.
- Reduce the frequency of heavy truck traffic on MR 15, MR 80, Radar Road, and LaSalle Boulevard that is causing the adjacent homes to shake and disturb the quality of life for those residents.

4. Cost-Benefit Analysis

A cost-benefit analysis to assess the economic feasibility of the project was undertaken. Using simulation model analysis, estimates of vehicle hours travelled (VHT) and vehicles kilometers travelled (VKT) were developed without and with project for the entire network. A decrease in each of these parameters translates into the following economic benefits: time savings, vehicle operating cost savings and greenhouse gas emissions reduction. These have been quantified and monetized in the analysis. Results indicate that:

- The project will alleviate traffic congestion and generate time savings of about 457 000 vehicles hours per year for auto drivers and 50 778 VHT for truck drivers. In monetary terms, this represents a saving of **\$11.1 million per year**.
- Globally, auto drivers will save **\$1.15 million** annually while truck drivers will save approximately **\$360,000** per year in vehicle operating costs.
- Greenhouse gas emissions will be reduced by 2,459 metric tons of CO₂ eq. which amounts to a monetized saving of about **\$218,000 per year**.
- The projects' costs are twofold: an initial capital cost of **\$80 million** and annual operating costs of **\$170,000**.
- A **2.75 cost/benefit ratio** suggests that costs are largely surpassed by benefits.
- **The project creates a net economic value of \$135.6 million in present value terms and its economic rate of return is 13.6%.**

Results of this analysis are deemed to be conservative as additional potential benefits have been identified but have not been quantified. The cost-benefit analysis is included in Appendix C.

Typically road capacity improvements are identified a Transportation Master Plan to review the entire road network and evaluate many network improvement alternatives. These alternatives are evaluated, and a preferred alternative is selected. For many of these preferred alternatives a more detailed study is completed, typically through a Class Environmental Assessment, to determine the specifics of the project such as the route and alignment. The approach and methodology used in the Maley Drive cost-benefit analysis follows closely that used in the Metrolinx cost-benefit analysis's, including relying on similar types of travel demand models for traffic and ridership estimates and similar key assumptions, such as the real discount rate for translating benefits and cost into a single present value. Metrolinx is the transportation authority for the Greater Toronto and Hamilton area, and it is the only transportation authority that has published a business case analysis or benefits case analysis since the 1990s in Ontario.

5. Sensitivity Analysis

A sensitivity analysis has been completed to show how the project's net present value (NPV) and benefit-cost ratio are affected by variations in the principal assumptions. This analysis was undertaken to illustrate the potential impact of capital expenditure overruns, potential shortfalls in project benefits and alternative assumptions about discount rates. Results of the analysis are presented in a matrix form in order to see the effects of joint variations of costs and benefits on the project's NPV and benefit-cost ratio.

Table 3 to 5 present these results for three different discount rates: 3.5% (used in the main report), 5% and 2.5%. It should be noted that the City of Greater Sudbury's Rate of Return is 2.334%.

Total gross benefits were considered as a whole when applying reductions because all benefits originate from either travel time savings or fewer vehicle kilometers, both of which were based on travel modelling results. Gross benefits could be lower if any of these savings were overestimated.

Operating expenses were omitted from the sensitivity analysis, since these are marginal relative to capital costs and are not a likely source of variation in project outcomes.

As shown in Table 3, sensitivity results remain positive at a discount rate of 3.5%. The only case in which the project costs would outweigh benefits is if capital costs increase by 50% and benefits are 50% lower than expected. When benefits outcomes are at the base case level (0% variation), capital cost overruns reduce the project NPV and benefit-cost ratio, but by a lower proportion than the relative increase in capital costs. Even at a 50% cost overrun, the project has a benefit-cost ratio of 1.85 and creates economic value of \$ 98 million.

The project outcomes are more sensitive to variations in total gross benefits. A 50% reduction of total benefits lowers the project's NPV and benefit-cost ratio significantly, but the results remain positive, even when capital costs increase by 25% at the same time.

Table 3 Sensitivity analysis results at a discount rate of 3.5%

Discount rate : 3.5%		NET PRESENT VALUE			BENEFIT-COST RATIO		
Parameter	Variation	Capital Costs			Capital Costs		
		0%	25%	50%	0%	25%	50%
Total Gross Benefits	0%	135 581 126 \$	116 903 546 \$	98 225 966 \$	2.75	2.21	1.85
	-10%	114 264 659 \$	95 587 079 \$	76 909 499 \$	2.47	1.99	1.67
	-25%	82 289 958 \$	63 612 378 \$	44 934 798 \$	2.06	1.66	1.39
	-50%	28 998 790 \$	10 321 210 \$	-8 356 369 \$	1.37	1.11	0.93

The project NPV and benefit-cost ratio are lower at a 5% discount rate, as presented at Table 4, but remain positive in almost every scenario. The project ceases to create value when total benefits are lower than expected by 50% and capital costs simultaneously overrun by 25% or more.

Table 4 Sensitivity analysis results at a discount rate of 5%

Discount rate : 5.0%		NET PRESENT VALUE			COST-BENEFIT RATIO		
Parameter	Variation	Capital Costs			Capital Costs		
		0%	25%	50%	0%	25%	50%
Total Gross Benefits*	0%	95 716 774 \$	77 561 787 \$	59 406 800 \$	2.28	1.83	1.53
	-10%	78 652 749 \$	60 497 763 \$	42 342 776 \$	2.05	1.65	1.38
	-25%	53 056 713 \$	34 901 726 \$	16 746 739 \$	1.71	1.37	1.15
	-50%	10 396 651 \$	-7 758 336 \$	-25 913 323 \$	1.14	0.92	0.77

Table 5 shows how the results vary if the discount rate is 2.5% instead. As shown in the table, the benefit-cost ratio and the net present value of the project improve considerably with a lower discount rate. The project creates a positive economic value of \$ 170 million at the base case and the benefits are over three times the costs.

Table 5 Sensitivity analysis results at a discount rate of 2.5%

Discount rate : 2.5%		NET PRESENT VALUE			BENEFIT-COST RATIO		
Parameter	Variation	Capital Costs			Capital Costs		
		0%	25%	50%	0%	25%	50%
Total Gross Benefits*	0%	170 229 248 \$	151 189 091 \$	132 148 934 \$	3.14	2.53	2.12
	-10%	145 253 992 \$	126 213 835 \$	107 173 677 \$	2.83	2.28	1.91
	-25%	107 791 107 \$	88 750 950 \$	69 710 793 \$	2.36	1.90	1.59
	-50%	45 352 967 \$	26 312 810 \$	7 272 653 \$	1.57	1.27	1.06

The sensitivity analysis shows that the Maley Drive Extension Phase 1 project would continue to generate net positive economic value for Greater Sudbury under a number of adverse scenarios represented by either higher capital costs and/or lower total benefits.

6. Environmental Benefits

The Maley Drive Extension will reduce travel times and fuel consumption for traffic across the north end of the City saving Greater Sudbury drivers an estimated 1,100,000 litres of fuel.

The project will prevent approximately 2,500 tonnes of emissions per year. This is equivalent to the impact of 65,000 tree seedlings growing for 10 years.

7. Financial Requirements

7.1 Phase 1 Costs

The Table 6 summarizes the total estimated eligible project costs:

Table 6: Total Estimated Eligible Project Costs

Item	Cost
Construction	\$71.5M
Utility Relocations	\$4.1M
Engineering (Contract Administration & Inspection)	\$4.5M
TOTAL	\$80.1M

The City has already undertaken detailed design for this project and understands that these costs are not eligible for funding as the work was completed prior to the date of approval-in-principle.

Currently more than \$10.5 million is in the City of Greater Sudbury account for this extension project.

In addition, approximately \$2.3 million being budgeted each year to cover remainder of City share (identified in the City's Capital Budget for the full five-year projection). The City's portion will be fully funded in seven years, which will be two years after completion of construction.

7.2 Component Expenditures

The Table 7 summarizes the total component expenditures and funding eligibility for Phase 1:

Table 7: Total Component Expenditures and Funding Eligibility for Phase 1

Component	Capital Cost	Contingency Allowance	Total Cost	Eligibility
Engineering – Detailed Design	\$4,000,000	Nil	\$4,000,000	Ineligible
Engineering - Contract Administration	\$4,300,000	5% - \$200,000	\$4,500,000	Eligible
Utility Relocations	\$4,100,000	Nil	\$4,100,000	Eligible
Land Acquisition (Conservation Sudbury, 1 private owner and Vale)	\$200,000	20% - \$40,000	\$240,000	Ineligible
Contract 1 Construction	\$21,400,000	5% - \$1,000,000	\$22,400,000	Eligible
Contract 2 Construction	\$450,000	5% - \$20,000	\$470,000	Eligible
Contract 3 Construction	\$2,600,000	5% - \$130,000	\$2,730,000	Eligible
Contract 4 Construction	\$43,900,000	5% - \$2,000,000	\$45,900,000	Eligible
Total Eligible Expenditure = \$80,100,000				

7.3 Financial Tables

7.3 Financial Tables

As noted above, the City has already undertaken detailed design for this project and understands that these costs are not eligible for funding as the work was completed prior to the date of approval-in-principle.

The Table 8 shows the detailed project costs by component.

Table 8: Detailed Project Cost (in dollars)

Component	Description of Activities	Eligible Costs	Ineligible Costs	Total Project Costs
Component 1	Contract 1 - Notre Dame Avenue	\$21,400,000	Nil	\$21,400,000
	Realignment			
Component 2	Contract 2 - Advanced Clearing - LaSalle Boulevard to Barry Downe Road	\$450,000	Nil	\$450,000
Component 3	Contract 3 - Barry Downe Road	\$2,600,000	Nil	\$2,600,000
	To Falconbridge Highway			
Component 4	Contract 4 - College Boreal to Barry Downe Road	\$43,900,000	Nil	\$43,900,000
Component 5	Utility Relocation	\$4,100,000	Nil	\$4,100,000
Component 6	Engineering - Detailed Design	Nil	\$4,000,000	\$4,000,000
Component 7	Engineering - Contract Administration	\$4,300,000	Nil	\$4,300,000
Component 8	Land Acquisition	Nil	\$200,000	\$200,000
Subtotals		\$76,750,000	\$4,200,000	\$80,950,000
Contingency Amount (5%)		\$3,350,000	\$40,000	\$3,390,000
Total Estimated Costs		\$80,100,000	\$4,240,000	\$84,340,000

8. Project Governance

The City of Greater Sudbury put out a Request for Proposal (RFP) for the Maley Drive Extension project on March 27, 2009. The RFP included both detailed design and contract administration. The City awarded the project to AECOM Canada Ltd. on July 8, 2009.

The project management team for the City is led David Shelsted, MBA, P.Eng. Director of Roads and Transportation. Mr. Shelsted is the Project Manager and is responsible in overseeing AECOM's work.

AECOM's Project Team is led by Chris Redmond, P.Eng.

Mr. Redmond is a civil engineer with extensive project management, planning, design, contract administration, and inspection experience gained through the completion of a wide variety of engineering projects for both the public and private sectors. He has assembled, mobilized, and led large multi-disciplined teams comprised of engineers, planners, surveyors, and scientists that have successfully delivered highly complex projects on-time and within budget. As a Senior Vice-President, he has the ability to draw upon resources available within AECOM to ensure that the project is undertaken to the complete satisfaction of the City of Greater Sudbury.

Mr. Redmond has fulfilled Project Director/Manager responsibilities on 100+ similar and more complex MTO Northeastern Region design assignments completed during the last 20 years.

He has been AECOM's Project Manager during construction of the following:

- Highway 69 Four-Laning from 2.9 km north of Highway 522 to 4.6 km north of Highway 607 for 14.9 km. Work includes grading, drainage, granular base, hot mix paving, illumination, and structures. Construction value: \$175-million.
- Highway 144 rehabilitation / resurfacing from 2.1 km south of the Junction of Highway 144 / Municipal Road 35, northerly for 23.6 km. Work included grading, drainage, granular base and hot mix paving. Construction value: \$9-million.
- Highway 144 rehabilitation / resurfacing from 1.5 km South of Regional Road 8 Northerly for 18.1 km. Work included grading, drainage, granular base, hot mix paving and structural culvert rehabilitation. Construction Value: \$10-million.
- Highway 69 Four-Laning from 3.1 km north of Highway 64 northerly for 11.2 km. Work included grading, drainage, granular base, hot mix paving, illumination, and structures. Construction value: \$55-million.
- Highway 17 Structure Rehabilitations, Vicinity of Highway 17 and Sudbury Municipal Road 55 Interchange. Work included grading, drainage, granular base, hot mix paving, illumination, and structures. Construction value: \$9-million.
- Highway 17 rehabilitation / resurfacing from 1.0 km west of Highway 69 easterly for 13.0 km. Work included grading, drainage, granular base, hot mix paving, structure rehabilitation and electrical. Construction Value: \$9-million.
- Highway 69 Four-Laning from 12.2 km north of Highway 64 northerly to Estaire. The work included grading, drainage, granular base, hot mix paving, illumination, and structures. Construction Value: \$58-million.

- Highway 69 Four-Laning from 12.2 km north of Highway 64 northerly to Highway 637 (Killarney) and remediation of the White Pine Gas Station and Big M Truck Stop. The work included grading, drainage, granular base, hot mix paving, illumination, and four structures. Construction value: \$30-million.
- Highway 69 Four-Laning from 8.3 km north of Highway 637, northerly 6.5 km. The work included grading, drainage, granular base, hot mix paving, four structures, and illumination. Construction Cost: \$41-million.

The detailed design component of the assignment is complete and contract tender packages are ready for tendering once funding is approved. Both detailed design and contract administration was included in the original RFP for the Maley Drive Extension project.

9. Level of Confidence

The cost estimates for the Maley Drive Extension project are based on detailed quantities determined during the detailed design phase of the work and also based on typical construction unit prices in the Sudbury area. The detailed design included, field surveying, establishing a digital terrain model, calculation of earth and rock excavation volumes using engineering design software (In-Roads), calculation of granular and hot mix paving tonnages and all other applicable miscellaneous item calculations. The work was undertaken to a high level of accuracy. To address the possibility of encountering unexpected site conditions, a contingency allowance of 5% has been included in the cost estimates.

All detailed design work was undertaken by AECOM Canada Ltd who was also responsible for preparing the cost estimates. The cost estimates were prepared in November 2014. The construction schedule with costs was updated in December of 2015.

The City of Greater Sudbury tendering procedures ensure that the process is transparent, competitive, fair and is consistent with value for money principles.

10. Legal Requirements

10.1 Land Acquisition

Land acquisition is required for Contract 1, Contract 2 and Contract 4 and negotiations are on-going. A total of 68 ha is required for Phase 1. The City currently owns 20 ha. Of the remaining 48 ha, 80% (38 ha) of the required land for the project is being acquired from Vale. The remaining 20% is being acquired from Conservation Sudbury (1 ha), a public agency, and from 1 private owner (9 ha).

10.2 Environmental Approvals

The Maley Drive Extension project will adhere to all applicable legislation and all necessary permits and authorizations will be obtained.

An Environmental Study Report was prepared and filed in 1995 as part of the Provincial Class Environmental Assessment (EA) process. Since the filing of the Addendum in 2008, provincial legislation with respect to Species at Risk required the City to undertake additional assessments to confirm the presence of Whip-poor-wills and Blanding's turtles. Assessments were done in 2013 and 2014 and it was determined that the section of the Maley Drive Extension from 400 metres east of Notre Dame Avenue to Barry Downe Road is habitat for both Whip-poor-wills and Blanding's turtles. This area is undisturbed and naturally wooded with areas of wetlands. The approval process, which requires an Overall Benefit Permit (OBP), has been on-going and it is expected to acquire the OBP by September 1, 2016. It should be noted that the limits of Contract 1, scheduled for tendering in March 2016, are outside the area requiring the OBP and therefore not impacted by the September 1 date. The proposed construction schedule was based on the requirement and timing to acquire the OBP.

11. Project Risks and Mitigation Measures

Project Risks:

1. Cost overruns due to unanticipated site conditions during construction.
2. Risk associated with contractor's time of completion which ultimately affects the total project cost.

Mitigation Measures

1. Cost overruns are mitigated by accurate quantities; minimizing negotiated costs by ensuring unit prices are included in the contract and carrying a contingency allowance. The Maley Drive Extension project detailed design included, field surveying, establishing a digital terrain model, calculation of earth and rock excavation volumes using engineering design software (In-Roads), calculation of granular and hot mix paving tonnages and all other applicable miscellaneous item calculations. The work was undertaken to a high level of accuracy. In addition, geotechnical investigations were undertaken to ensure a full understanding of the ground conditions. The tendering package is in a "unit price" format that minimizes negotiations. A contingency allowance of 5% has been included in the cost estimates and will also be included in the tender documents.
2. To mitigate the cost associated with not meeting the time of completion, liquidated damages have been included in the tender documents. The liquidated damages cover the cost of contract administration.

Historical Final Construction Costs

Recent experience on large highway construction projects has shown that final construction costs have generally been within 3 - 6% of the engineer's cost estimate at the time of tendering. In addition, it was also shown that the final construction cost has generally been within 3 – 6% of the tendered price. For example, the final construction cost of a recent Highway 69 four-laning project was within 4% of the tendered price.

12. Frequently Asked Questions

Q1: What are the benefits for the northern areas of the City?

A1: *The Maley Drive Extension directly benefits the areas of Capreol, Nickel Centre, Onaping Falls, Rayside-Balfour, New Sudbury and Valley East. The construction of the Maley Drive Extension will provide motorists with an alternate east-west route along the northern limit of the former City of Sudbury. This allows traffic to be dispersed prior to entering the New Sudbury area instead of being funnelled into the existing congested entry points such as Elm Street and MR 80/Notre Dame. Maley Drive then acts as the foundation to facilitate other future road network improvements, such as the Barry Downe extension and the widening of MR 35.*

The Maley Drive Extension provides indirect benefits to the areas of Walden and Sudbury. While there will be a minor change in traffic volumes entering the downtown core, the benefits will be the relief in traffic congestion within the core itself.

Q2: What are the benefits for the existing east-west arterial roads?

A2: *The Maley Drive Extension is expected to reduce the traffic by 10,000 vehicles per day on LaSalle Boulevard and approximately 4,000 vehicles per day on the Kingsway. The Maley Drive Extension is expected to attract approximately 21,000 vehicles per day. In addition, heavy truck traffic will be reduced on the MR 80, MR 15, and Radar Road corridors, benefiting the residents that live on these corridors. The traffic volumes were modelled as part of the Transportation Study undertaken for the City's Official Plan.*

It will also provide alternative routing for traffic when accidents, emergencies, or construction is occurring on Lasalle Boulevard or the Kingsway. This results in less disruption to businesses, more reliable commutes, more reliable emergency response, and more options for Transit for alternate detour routes.

Q3: Will the Maley Drive Extension pavement have good long term performance?

A3: *The roadway has been designed for a 20 year life expectancy before the first rehabilitation is required. This design accounts for the expected traffic volume and the large percentage of heavy truck traffic. The City has undertaken an extensive geotechnical study of the existing soils to complete this pavement design. The first rehabilitation will involve the surface asphalt; all the other components have a much longer life expectancy, upwards of 100 years for the concrete structures.*

Q4: Are there major conflicts with utilities?

A4: *There are no major overhead utility conflicts for Phase 1 of the Maley Drive Extension. The design of the interchange with Notre Dame Avenue incorporated the existing location of the large hydro towers to ensure they are not impacted by the work. There are minor utility conflicts with standard utility poles along Notre Dame Avenue and between Notre Dame and Barry Downe. These can be resolved by relocating the poles.*

There is a conflict with two trunk gas mains between LaSalle and Notre Dame. These gas mains will have to be relocated by Union Gas prior to this section of Maley Drive being constructed. The City has worked with Union Gas on the design and cost sharing agreement for this work. These costs are included in the Phase 1 construction estimate and are eligible for cost sharing.

Q5: Can Maley Drive Extension be designated a toll road?

A5: *There are no provisions in Provincial legislation to allow the City to designate Maley Drive as a toll road.*

Q6: How will Maley Drive Extension benefit emergency services?

A6: *It will improve response times for EMS, Fire and Police on existing roads and reduce travel times from Capreol, Nickel Centre, Valley East, and the airport for emergency trips to Health Sciences North.*

Q7: Can the Maley Drive Extension be constructed as a two lane roadway thereby reducing costs?

A7: *The traffic volumes on the new Maley Drive extension are above the threshold for a two lane roadway. Although the portion of Maley Drive east of Barry Downe will be rehabilitated but remain as two lanes, proposed improvements at the Falconbridge Highway intersection will mitigate congestion at the existing traffic signals. Phase 2 of the Maley Drive Extension proposes to widen the remainder of the corridor to four lanes.*

Q8: Has dynamic loading been considered in the pavement design?

A8: *Dynamic loading has been applied in the pavement design of the Maley Drive Extension. Dynamic loading is represented by Equivalent Single Axle Loading (ESAL). Design ESAL's is a cumulative traffic load summary statistic. It represents a mix of traffic having different axle loads and configurations predicted over the design life of the pavement.*

Q9: Is Maley Drive Extension a "ring" road?

A9: *Phase 1 of the Maley Drive extension is not a "ring" road, but is a section of a northern ring road. In the long-term the Official Plan contemplates an extension of Maley Drive easterly to Highway 17 near the Southeast Bypass. Currently, there are two east-west arterial roadways, namely; LaSalle Boulevard and the Kingsway. Both of these roadways carry in excess of 35,000 vehicles on a daily basis and they are at or near capacity. This project will provide a third east-west arterial road to reduce the traffic volumes on both LaSalle Boulevard and the Kingsway.*

Q10: Is Maley Drive Extension being constructed for the mining truck traffic?

A10: *No, this project is primarily being constructed to reduce congestion on the existing east-west arterial roadways. Approximately 5% of the volume on the Kingsway, LaSalle Boulevard, MR 15, MR 80, and Radar Road is truck traffic. While this volume includes the mining truck traffic, it also includes the business to business truck traffic that supports the commercial and industrial economies in the City. It is forecast that up to 10% of the vehicles on Maley Drive will be trucks, with the remaining being commuter passenger vehicles.*

Q11: Why not fix existing roads instead of investing in Maley Drive?

A11: *Fixing the existing roads does not provide all of the environmental, regional, economic, and social benefits that the Maley Drive Extension provides. Therefore it is difficult to directly compare the investments. The benefits of investing in existing roads are limited to the offset in maintenance costs and the benefit of a smoother travelling surface.*

Investment in new roads and widening roads provide an extended life expectancy to existing roads. The Maley Drive Extension will add 8 to 10 years to the life expectancy of LaSalle Boulevard, and also benefit life expectancy

of the Kingsway, Radar Road, MR 80 and MR 15 among others.

Q12: When was the Maley Drive Extension identified as the top priority for the City?

A12: *The Maley Drive Extension project was identified as the top priority in 1991 through the Trucking Action Plan and the Regional Transportation Plan. Subsequent reports, updates, and traffic models have continued to recommend this project as the number 1 priority.*

Q13: Why not focus on transit improvements instead of Maley Drive?

A13: *All traffic studies, master plans and environmental study reports have concluded that even with a significant increase in transit ridership, the Maley Drive Extension is still warranted. In fact, the Maley Drive Extension will improve transit as lower congestion will provide more reliable service on existing busy routes and provides an opportunity for future commuter hubs to utilize Maley Drive.*

Q14: What are the expected maintenance costs for the new roadway?

A14: *The maintenance costs are expected to be \$170,000 annually and comprised mainly of winter maintenance.*

Q15: Why not extend Hawthorne Drive, upgrade Howey Drive or extend Barry Downe Road?

A15: *The widening of Howey Drive/Bancroft Drive, a Road Network Improvement, was considered during the 1992 Sudbury Transportation Study and during the Kingsway Improvements Class Environmental Assessment completed in 1998. Both these studies concluded that this was not a viable alternative as these improvements did not attract sufficient traffic volumes.*

The Barry Downe Road extension north to Hanmer, also a Road Network Improvement, was assessed as part of the 2005 Transportation Study. This link was considered as an alternative solution to widening MR 80. Based on a number of factors including; transportation benefits, social/cultural environment, natural environment, land use planning and cost, it was concluded that the Barry Downe Road extension was not the preferred solution. The Barry Downe Road extension will also require extensive road improvements to the southerly and northerly road networks prior to its construction. The construction of the Maley Drive Extension on the southerly portion is required to disperse traffic to other entry points, otherwise this traffic is forced to use Barry Downe Road and the Barry Downe/LaSalle Boulevard intersection, which are already congested.

The Hawthorne Drive extension, a Local Road Improvement, was modeled as part of the 2005 Transportation Study. The analysis revealed that the new connection did not attract significant volumes from the Kingsway (only 100 vehicles per hour in the east bound direction) and had other disadvantages such as routing heavier traffic volumes through existing neighbourhoods. The analysis concluded that this link be constructed in conjunction with development in this area.

Q16: Does taking Maley Drive from the mines located near the airport to Levack/Onaping take longer than going through the Valley?

A16: *The route using existing Maley Drive is actually shorter by over a kilometer. Currently, the travel time on this route is longer due to the congestion on LaSalle Boulevard. With the Maley Drive Extension this route will be even shorter, with less congestion, making it even more attractive for mines located near the airport and the smelter in Falconbridge to travel to Levack/Onaping.*

